HEALTH AND STRESS

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The American Institute of Stress

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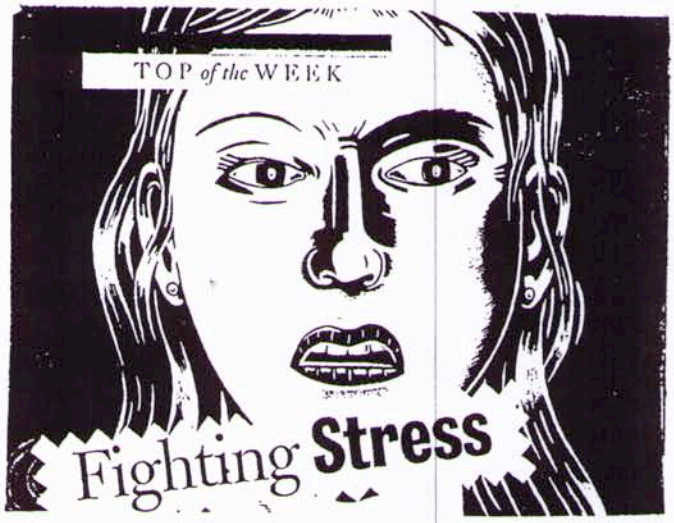
MORE HEADLINES ABOUT JOBS, STRESS, AND HEALTH

Key Words: "Fight or flight" responses, job stress, immune and cardiovascular system responses to stress, anger, depression, anxiety, aging, memory loss, carpal tunnel syndrome, workplace violence

Stress is making headline news again, both in professional journals and the popular press. Earlier this year, *The New England Journal of Medicine's* lead article reviewed over 100 research reports published over the past decade dealing with the role of stress in disease. The March/April issue of *Psychosomatic Medicine* provided a few additional reports, also confirming the damaging effects of stress on the cardiovascular and immune systems.

Job stress is the major source of stress for American adults and has steadily increased over the past two decades both here and abroad. Strategies to solve this problem were discussed at "Work, Stress, & Health: Organization of Work in a Global Economy", a conference co-sponsored by the National Institute of Occupational Safety and Health and The American Psychological Association in March.

ALSO INCLUDED IN THIS ISSUE



Newsweek's June 14th cover story was devoted to explaining how stress attacks your body, the various disorders that can result, and offered suggestions on what can be done to fight back. Some people seem to be more resistant to stress than others, and possible explanations for this were suggested. Studies were cited showing that stress can cause everything from memory loss to changes in body shape, and that our responses to stress are influenced by numerous factors, including gender, as well as early childhood experiences. This Newsletter will review some of the highlights from the Newsweek story and other recent reports on stress that have made the headlines.

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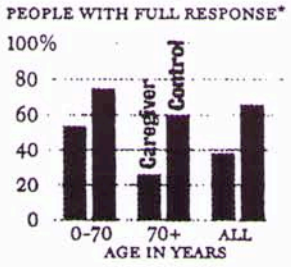
Newsweek's Cover Story On Stress

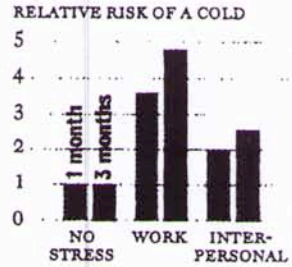
Our "fight or flight " reactions to severely stressful situations have been exquisitely honed over the lengthy course of human evolution. Their purpose was to preserve life by providing keener perception of potential dangers, more strength in combat or other physical challenges, and greater speed of locomotion to enable escaping from a perilous situation. While quite appropriate for an encounter with a saber-toothed tiger or warring tribe once or twice a year, these reactions are of little value in dealing with the emotional stress faced by modern man. Repeatedly invoked, it is not hard to see how such responses (which include surges in blood pressure, a rise in blood sugar, and increased muscle tension), could contribute to cardiovascular disease, diabetes, low back and neck pain, headache, and other conditions resulting from protracted muscle spasm.

Contemporary stress is more apt to stem from chronic mental, rather than acute physical threats; it tends to be insidious and emotionally challenging. Potential stressors such as loneliness, frustration, and poverty, have been shown to impair immune system defenses, making us more susceptible to infections ranging from common colds to AIDS, and possibly cancer.

Immune response
People who care for spouses with dementia didn't respond to a flu vaccine as well as a control group.



Viral infection
The chances of catching a cold increase the longer people experience work or interpersonal stress.



Two examples of the effects of stress on immune system function were graphically illustrated, as depicted above. In the first, immune system responses to a standard injection of influenza vaccine were compared in people caring for a spouse suffering from Alzheimer's disease with age and sex matched controls. The caregivers, who are under chronic stress, didn't develop as much resistance to the virus. The second study followed up on a previous report demonstrating that people who ranked high on perceived stress rating scales were much more likely to develop colds when infected with a respiratory virus under experimental conditions. This new study showed that although a single, severe stress in the preceding year did not increase susceptibility to colds, chronic stress at work or home increased the likelihood of upper respiratory infections three to five times.

More evidence is also accumulating about the role of various types of stress in coronary heart disease. "Fight or flight" responses increase blood levels of fats and glucose that are not metabolized, because, unlike primitive man, there is usually no resultant increase in physical activities like fighting or fleeing. As a result, they remain in the blood stream and tend to be deposited in the form of atherosclerotic lesions. Depressed individuals are more likely to suffer a coronary event, and heart attack victims who develop depression have higher rates of complications, repeat infarctions, and death over the next 12-18 months. Increased levels of anxiety also increase the risk of a future coronary.

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Anger is another stressful emotion that has been linked to cardiovascular complications, particularly sudden death due to ventricular fibrillation and cerebrovascular accidents. Anger is much more apt to be lethal when it is suppressed, so that you can't get things off your chest literally as well as figuratively. Stress is difficult to define, since it is a subjective state that differs for each of us. It is often difficult to tell what is going on from external appearances. Some people are "hot reactors" or "wear their heart on their sleeve". Others may look cool on the outside, with no apparent evidence of the strong anger, resentment, sadness, frustration, or other feelings they are experiencing.

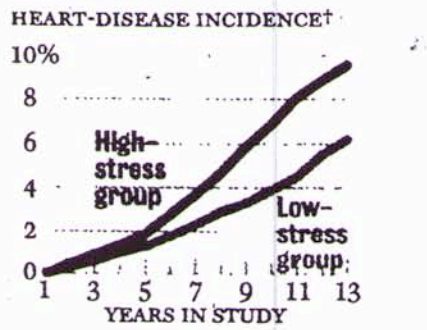
Things that are distressful for certain individuals may be pleasurable for others, or seemingly have little impact either way. This is readily illustrated by observing passengers on the same steep roller coaster ride. Some are terrified, and can't wait for imprisonment in the torture chamber to end so they can get away. At the same time, exhilarated and gleeful thrill seekers race to get on the very next ride. Others seem to have an air of nonchalance that almost borders on boredom. It may be difficult to determine what is really going on inside. These very varied responses to the identical experience are useful in understanding what stress is all about. Clearly, it is not roller coaster rides or situations that are inherently stressful, but rather how we perceive them that is crucial. The difference between those who were terrified and those who were not, was the sense of control they perceived over the event. While none of the passengers had any more or less control, their perceptions and expectations were quite different. Thus, we often create our own stress by faulty perceptions, catastrophizing, and constantly worrying about "What if?" As John Milton noted in *Paradise Lost:*

> The mind is its own place,
> And in itself,
> Can make a heaven of hell,
> A hell of heaven.

Cardiovascular disease provides another example of the power of perception. As noted below, middle aged men who perceived they were under significant stress, were much more likely to have both heart attacks and strokes.

Coronary disease

Men who said they were highly stressed were more likely to have heart attacks and strokes.



Stress seems to be greater in those with lower social status, and animal studies support this viewpoint. Like humans, male macaque monkeys have a hierarchical social structure and susceptibility to coronary artery disease. Low-status monkeys in captivity showed more coronary atherosclerosis than those at the high end of the scale. However, when new animals were introduced into the group, the high ranking monkeys were now under greater stress because of a possible challenge to their status. Those males who were forced to repeatedly fight each new rival to reestablish their dominance, subsequently developed the most extensive coronary artery disease.

Early childhood experiences and gender also influence responses to stress. Children raised in orphanages or neglectful homes have higher levels of stress hormones and greater reactivity to stress as adults. Stress-related blood pressure elevations are less in women compared to men; this is probably due to estrogen, since the difference diminishes or disappears after menopause or a hysterectomy. Women react to a wider range of stressors; as was noted, "A man may worry if someone in his immediate family is sick: his wife takes on the burdens of the whole neighborhood".

Work, Stress, & Health Conference

Everyone experiences hassles at work from time to time. A Northwestern National Life Insurance study on employee burnout, revealed that at least one out of four employees viewed their job as the greatest stressor in their life. Job stress is clearly the leading source of stress for the U.S. adult population, and the problem has steadily escalated here and all over the world in recent years. Various sources and solutions were suggested and discussed at the March 15th conference co-sponsored by The National Institute of Occupational Safety and Health and The American Psychological Association.

Some of the factors contributing to occupational stress are: longer working hours; heavier work loads; poor environmental conditions; conflicting or uncertain job expectations; lack of growth opportunities; little decision making power; and job insecurity. A Lou Harris Poll found that the workweek has increased by 15 percent in the last 25 years, while leisure time decreased by more than 67 percent. Workers seem to feel that the decrease in leisure time is the most disturbing problem.

Statistics from the Family and Work Institute indicate that a whopping 13 percent of Americans are presently holding second jobs to support their families. Almost three out of four parents complain that they do not have enough time to spend with their children. Personal time has almost become extinct for some, since evenings and weekends are spent attending to various chores that have accumulated. Another major and growing problem that affects employees at every level is lack of job security. Hardly a day goes by without news of some mega merger, hostile acquisition, or downsizing that mandates layoffs or transfer to a new geographical location. Relocation may affect a spouse's job and severely disrupts the family's social relationships. According to the Director of NIOSH, "There is no question that more American workers, now about half, are really worried that they may face a layoff sometime in the future. "

The Health Effects Of Job Stress

A St. Paul Fire and Marine Insurance Company study reported that "Problems at work are more strongly associated with health complaints than are any other life stressor - more so than financial problems or family problems." (It should be noted that these also often stem from job stress.) Some of the most frequent symptoms of job stress are headaches, sleep disturbances, difficulty in concentrating, and being short-tempered and irritable when dealing with co-workers and customers. Conference participants learned that there could be serious long term consequences, such as hypertension, heart disease, musculoskeletal disorders, gastritis and other gastrointestinal conditions, impaired immune system function, and persistent psychological disturbances.

Cardiovascular Disease

Job stress, as defined by the high demand-little control model of Karasek and Theorell, has been shown to result in increased rates of hypertension and heart attacks in numerous reports. This was further supported by ambulatory blood pressure monitoring studies showing that surges in blood pressure were clearly correlated with work-related activities. Men who were older (51 to 60), or had preexisting hypertension, had the highest elevations. This was particularly true for those in the lower economic brackets, or who lacked the stress buffering effects of strong social support.

One study found that social support from women was more effective in dampening blood pressure responses to stress than social support from men. When 109 men and women were asked to give a speech before a predefined audience, blood pressure elevations were much less marked when females were in the audience as opposed to an all male audience. According to the authors, this may partially explain why married men are healthier and have less hypertensive disease than single or divorced controls. Women were at increased risk if they had a combination of significant family responsibilities as well as high job strain.

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Immune & Gastrointestinal System Effects

Advances in psychoneuroimmunology have confirmed the significant and varied effects stress can exert on the immune system. Chronic stress appears to inflict the worst damage, as indicated in a report on Alzheimer's caregivers. This study dealt with elderly individuals who had the job of attending to the needs of relatives suffering from Alzheimer's disease. Those who were responsible for providing continuous care were particularly vulnerable. This group had about half the level of different circulating CD lymphocytes that protect against infections, compared to controls having some respite from these duties. Previous studies have found that caregivers subjected to this type of chronic stress were also much more likely to develop hypertension, and to require hospitalization for other conditions.

In another presentation, Japanese investigators demonstrated how psychological strain due to job stress could cause gastritis and other gastrointestinal complaints. In the past, this has been attributed to increased secretion of acid and enzymes in stomach, which cause ulcerations in its inner lining. More recently, it has been proposed that peptic ulcers, gastritis, esophagitis and other gastrointestinal lesions are due to infection with *Helicobacter pylori.* Support for this comes from the observation that a course of treatment with appropriate antibiotics results in relief of symptoms, and unlike the experience with antacids and popular acid antagonist pharmaceuticals, recurrences are rare. As a consequence, there has been a growing tendency to reject the stress-ulcer hypothesis. On the other hand, it has also been well established that perhaps over ninety percent of individuals who harbor this organism have no symptoms of ulcer or other digestive disturbances. These researchers believe that this may be due to the fact that the gastrointestinal mucosa is normally resistant to Helicobacter infection. However, stress causes a depression of immune system defenses that increases susceptibility to this as well as other microorganisms.

Musculoskeletal Disorders

Job stress was also associated with an increase in complaints of low back, neck and shoulder pain. This was particularly true in those whose duties involved repetitive and demanding physical labor. According to Swedish researchers, one of the markers for job stress may prove to be interleukin 6 (IL-6), a specific component of the immune system. Interleukin 6 is involved in the transmission of hypothalamic-pituitary stress signals from the brain to the immune system. Blood concentrations were found to be increased in female workers complaining of low back pain. In addition, these individuals also had an absence of the normal variation of cortisol levels, confirming a disruption of normal pituitary adrenal relationships.

Another report demonstrated that mental workload time pressures and frustrations related to poor job control can cause chronic low level muscle tension that may have sinister consequences. Such workers were shown to have evidence of increased electromyographic activity in their back musculature even though they had few symptoms to suggest this. The distress associated with increased muscle spasm that causes low back pain and sciatica can be quite severe. However, the persistent low grade "lack of relaxation" state seen in these patients can be even more disabling because it leads to chronic hyperventilation. This results in an overall disturbance in homeostatic mechanisms, and prevents the body from returning to its normal resting state.

In addition to its adverse effects on workers' health, job stress is also costly for U.S. businesses because of increased absenteeism, accidents, employee turnover, and direct medical and legal expenses. A recent study of some 46,000 workers at several major companies, confirmed that those who reported being under stress had 46 percent higher health-care costs than others. For workers who scored high on depression rating scales, the bills were 70 percent greater. Costs were 2.5 times higher when stress and depression co-existed, compared to others without these complaints.

The NEJM Review & Other Findings

The January 15 *New England Journal of Medicine* review of over 100 recent stress related publications, concluded that there were eight objective criteria that could be utilized to evaluate stress levels and their effect on the body. These ranged from blood pressure and cortisol measurements to the amount of abdominal fat and its relationship to body shape. It also confirmed that all stressful challenges, regardless of their perceived severity, stimulated the release of stress hormones. Major life changes like losing a loved one, traffic jams and other daily hassles, the pressures of being an executive, frustration over a low-level position, and even social upheaval in an unstable country, could all cause a chronic increase in stress hormone levels.

With respect to health effects, the manner in which our bodies react to these hormones is much more important than how we feel about stressful events. During acute challenges, stress hormones stimulate body defense mechanisms to provide short term protection. However, when produced in excess or repeatedly invoked, the resultant physiologic responses prove harmful. The most detailed studies have centered about the cardiovascular system, showing that stress due to lack of control on the job results in hypertension and coronary heart disease. Other types of stress, including social instability can also cause changes in clotting factors that contribute to heart attacks and strokes. One study revealed that cardiovascular disease was largely responsible for the 40 percent jump in the death rate in Russian men following the fall of communism.

The price the body has to pay for the ability to adapt to stress is referred to as "allostatic load". High allostatic load can lead to immune system suppression and susceptibility to infections, weakened bones and muscles, a rise in insulin levels that contributes to atherosclerosis and higher levels of fat deposition in the body, especially around the abdomen. Studies have shown that people with an "apple" body shape are at much greater risk for coronary heart disease.

Stress can also affect how we age, especially when it comes to the brain. Memory loss, especially for recent events, is one of the hallmarks of aging. This is due to progressive atrophy of the hippocampus, which is responsible for memory retrieval and learning. Stress hormones like cortisol also cause the same type of hippocampal shrinkage. Studies show that patients suffering from depression or post traumatic stress disorder often complain of memory loss, and that this can be correlated with increased cortisol levels.

However, such stress effects may be much more subtle and widespread than previously suspected. The authors state that "results from studies on aging animals and humans suggest that a lifelong allostatic load may accelerate changes in the brain that can lead to memory loss." The chronic frustration of persistent poverty, having a low-level job that lacks autonomy, living in an unhealthy, polluted environment, or long standing loneliness has an enormous impact on health status that researchers are only just beginning to appreciate.

To test the allostatic load hypothesis, a group of successfully aging elderly people were followed for three years. Common tests such as blood pressure, blood glucose, cortisol and cholesterol levels were used to determine how allostatic load levels affected health. Researchers found that those with the highest allostatic loads were the ones most apt to develop newly diagnosed cardiovascular disease, and were significantly more likely to show declines in mental and physical functioning. It also appeared that the best way to reduce stress levels and allostatic load is to exercise. Regular aerobic activity reduces insulin resistance, which is known to accelerate atherosclerosis. "Exercise also often helps to end the vicious cycles of stress-eating, over-indulging in alcohol, cigarette smoking and other unhealthy habits."

More recent reports on stress suggest that it is responsible for most "Gulf War Syndrome" symptoms, acceleration of clinical signs of AIDS in asymptomatic HIV infection, as well as its downhill course, and aggravation of diabetes. Repetitive stress disorders have also hit the headlines, and with good reason.

Repetitive Stress Injury

Repetitive stress injury (RSI), previously called "cumulative trauma injury" or "repetitive motion disorder", now accounts for two-thirds of all work-related disabilities. These problems are manifested by chronic musculoskeletal and nerve complaints in the hands, arms, shoulders and neck, and are usually due to various degrees of carpal tunnel syndrome. All types of employees can be affected, from grocery clerks, computer programmers, and data entry personnel, to journalists and assembly-line workers. Persistent and prolonged typing is the major cause, and the change in nomenclature to "stress injury" may be particularly appropriate. One three year study designed to evaluate the incidence of RSI in video display terminal operators found that almost one in four had symptoms that fell under this classification. However, reported job stress levels were significantly higher in this group compared to controls, suggesting that occupational pressures may make workers more susceptible.

Repetitive stress injury is hardly new. In his *Treatise on Diseases of Workers* published in 1700, Ramazzini, an Italian physician, referred to the "harvest of diseases" that affect workers because of "certain violent and irregular motions and unnatural postures of the body." A deformity of the hand known as "washerwoman's sprain" was described more than a century ago. Today, we also have "pricers palsy" in sore clerks, "Nintendonitis" in video game addicts, and "pickle pusher's thumb" in workers at food processing plants where the last pickle must be pushed into place in the jar manually. Frequent use of jack hammers, pneumatic drills, and other equipment that causes repetitive trauma to the upper extremities, can cause other problems. The incidence of RSI is also high in employees involved in automobile manufacturing, shipbuilding, frozen bakery products, pen and pencil repairs, and metal furniture assembly.

Meat packing industry workers have about 12 times more RSI complaints than any other occupational group. Several years ago, an Occupational Safety and Health Administration study found that almost 80 percent were affected.

The most common diseases resulting from RSI are carpal tunnel syndrome, upper extremity tendinitis, tennis elbow, rotator-cuff disturbances, and fibromyalgia. Initial symptoms can vary from slight numbness and tingling in the fingertips to a dull aching in the forearms, or a burning sensation in the shoulders. But because these injuries cause connective tissue damage the pain can travel, and what started as a hand or neck injury, can spread to the shoulder or scalp. Since symptoms of RSI can mimic other disorders like Lyme disease, misdiagnosis is common. Conditions such as diabetes and arthritis may also cause confusion, and in addition, may intensify RSI complaints. Two thirds of RSI occurs in women, possibly because they have smaller bones that are also less dense due to osteoporosis, and therefore more susceptible to trauma.

It is often not appreciated that because of chronic and sometimes unexplained physical pain, many RSI victims develop severe emotional disturbances. This usually begins with an attitude of denial that is subsequently replaced by anger, fear, panic, guilt, shame, or grief, and eventually depression. These types of emotional distress can cause greater muscle tension that increases their physical pain, leading to a vicious cycle. Emotional distress also stems from outside pressures such as employers or co-workers, who view RSI victims as malingerers. According to one California forensic psychiatrist who has treated thousands of RSI patients for anxiety and depression "They just think the person doesn't want to work or is just looking for compensation."

RSI accounts for two-thirds of all work-related injuries and costs U.S. businesses about $20 billion a year, according to the Labor Department. RSI victims can recover medical costs and lost wages, but workers' compensation does not require employers to provide ergonomic equipment. Contrary to popular belief, the Americans with Disabilities Act does not necessarily allow workers to keep their jobs if they become injured.

Book Review:

Violence At Work, Chappell and Di Martino, V. International Labour Office Publications, Geneva, 1998, 165 pgs. $35.00

Although not dealt with in any of the reports reviewed in this Newsletter, violence in the workplace is a rapidly increasing problem. This has been highlighted recently by the Columbine and other school shooting tragedies. Outbreaks of murder and other violent acts in Post Offices by disturbed and disgruntled employees have become so common, that the term "Postal Rage" has crept into our vocabulary. While we tend to view workplace violence in terms of isolated episodes of homicide, rape or physical attacks, other threats that are more chronic also are classified as violent behaviors, and can be a major source of job stress. Some examples that are cited in this book are: harassment, including sexual and racial abuse; bullying; leaving offensive messages; aggressive posturing and rude gestures; interfering with work tools and equipment; threats; intimidation; and ostracism.

As indicated in this meaty volume, which provides numerous statistics on all aspects of the subject, violence has increased not only in the U.S., but all over the world. In the U.S., "homicide has become the second leading cause of occupational death overall, and the first cause in relation to women". Each week, an average of 20 workers are murdered, and 18,000 are physically assaulted. The numbers may be higher, since many such crimes are not reported. Violence tends to be higher in certain occupational settings; retail trade and service industries account for more than half of workplace homicides and 85 percent of non-fatal workplace assaults. Taxicab drivers have the highest risk of any occupation, (more than forty were murdered in New York City last year), and health care and community service workers are also at increased risk. In the United Kingdom, workplace murders are much less common, and the majority of physical attacks occur to workers trying to prevent theft and robberies. In Japan, violence at work is most apt to take the form of bullying or sexual harassment; in the Philippines, the problem is seen primarily in women who are hired for domestic service and entertainment. In Germany, a survey revealed that 93 percent of women had been sexually harassed at work during the course of their employment.

This book, which was produced under the auspices of the International Labour Organization, emphasizes that violence in the workplace is a labor issue, a health and safety issue, as well as a criminal justice issue. A multipronged approach by trade unions, employers, legislators, and other public bodies is therefore required. In this book the authors review the sources of workplace violence, strategies that are effective in preventing different types of aggressive and harmful behaviors, and legislation that will be required to provide more protection for workers.

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