Assessing the Economic Impact of Stress—The Modern Day Hidden Epidemic

Madhu Kalia

This article examines the economic effects of all forms of stress—work-related stress, home stress, and post-traumatic stress disorder (PTSD)—as health hazards. Such an approach inherently broadens the analysis from a few well-defined, quantitative variables, such as those most commonly studied by economists who traditionally examine job stress alone. It also enables us to draw conclusions regarding the socioeconomic factors and the psychology of stress and helps in understanding the larger question of the economic cost of stress in today's global environment. Stress and its related comorbid diseases are responsible for a large proportion of disability worldwide. The World Health Organization (WHO) Global Burden of Disease Survey estimates that mental disease, including stress-related disorders, will be the second leading cause of disabilities by the year 2020. Although the term "stress" is used in a wide variety of contexts, it has consistently been demonstrated that individuals with stress and related disorders experience impaired physical and mental functioning, more work days lost, increased impairment at work, and a high use of health care services. The disability caused by stress is just as great as the disability caused by workplace accidents or other common medical conditions such as hypertension, diabetes, and arthritis. We present evidence that calls for early recognition of workplace stress and for businesses to allocate more resources to stress management in the workplace.

THE GLOBAL ECONOMIC burden of stress-related mental illness is expected to rise in the coming decade.[1] The World Health Organization (WHO) Global Burden of Disease Survey[2] estimates that by the year 2020, depression and anxiety disorders, including stress-related mental health conditions, will be highly prevalent and will be second only to ischemic heart disease in the scope of disabilities experienced by sufferers. The WHO Collaborative Study of Psychological Problems in General Health Care screened nearly 26,000 individuals attending primary care facilities in 14 countries and found that 10.4% of patients had current depression or stress-related anxiety.[1,3] The Depression Research in European Society (DEPRES) survey,[1,4] involving 78,463 adults, found a 6-month prevalence rate of 17% for depressive disorders. Similarly, the US National Co-morbidity Survey (NCS) found that 17.3% of the general population had experienced an episode of major depression and 24.5% had suffered from an anxiety disorder at some time during their lives.[1,5] A higher mortality rate is observed in myocardial infarction patients who are depressed than in myocardial infarction patients without depression.[6] Stress, social isolation, lower income, and lower educational levels are all related to a poor cardiac outcome.[7]

In order to analyze the price or the cost of stress, it has been thought reasonable to use work-related stress alone to arrive at conclusions related to the monetary equivalent of stress. Groot and Maassen van den Brink[8] have used this economic approach to make monetary inferences and also to test some of the psychological theories of stress such as the demand/control theory. In doing so, these authors assume that the "good stress" or "arousal stress" of Selye's general adaptation syndrome theory[9] has little economic value and that all work-related stress is an undesirable characteristic of the job and, therefore, the worker needs to receive extra monetary compensation for doing a job involving stress. Is work stress the only form of stress that has an impact on the economy? Does home stress impact job performance and therefore productivity in economic terms? Does post-traumatic stress disorder (PTSD) impact employee productivity, for example, after the September 11 World Trade Center terrorist attack? Should stress be treated just as another job hazard? Are there any beneficial effects of stress? Do these stresses impact the cost of health care? These are some the questions this review will attempt to address.

In the context of work and home stress, stress has been defined as an emotional experience associated with nervousness, tension, and strain.[10,11] This definition is consistent with earlier definitions of psychological stress.[12,13] Stress can be based on a number of factors affecting various domains, including pressures at work and at home.[14] Work stress is stress that occurs in the workplace. For example, it could be based on tension with coworkers and supervisors and can involve arguments, strain, and anxiety. Home stress is similar in many respects (conflict, tension, arguments, strain, etc), but includes additional factors—relationships, responsibilities, finances, and events that only occur at home.

A variation of the Yerkes-Dodson Law (1908)[15] is the oldest model of stress and performance, and it suggests an inverted U-shaped relationship. Accordingly, for low to moderate levels of stress, the relationship with performance is positive, but for moderate to high levels of stress, the relation between stress and performance is negative.[16-18] The explanation usually given for this U-shaped relationship is the "activation theory," Thus, as the stress level increases so does the degree of physiological arousal and this leads to the narrowing of attention that causes employees to neglect relevant as well as irrelevant tasks and thereby reduce routine work performance levels.

There has been little research that directly examines home/work "cross-over," where home variables affect work outcomes.[18,19] However, recent theory suggests that an individual's situation at home can influence performance at work.[19,20] Van Dyne et al[10] examined the relationship between employ-

From the Departments of Biochemistry, Molecular Pharmacology, Neurosurgery, and Anesthesiology, Jefferson Medical College, Thomas Jefferson University, Philadelphia, PA.

Address reprint requests to Madhu Kalia, MD, PhD, MBA, Professor of Biochemistry, Molecular Pharmacology, Anesthesiology and Neurosurgery, 233 S 10th St, Suite 238, Philadelphia, PA 19107.

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ees' home stress and their behavior at work and found that home stress is negatively related to routine performance at work.

The definition of stressors should include careful, behaviorally anchored terminology, and use of imprecise jargon should be avoided. In addition, when measuring the stressor, the exposure should be measured independently of the symptoms exhibited in reaction to the exposure. The timing and intensity of the exposure should be determined since the reaction could occur long after the initial exposure.

Organizational scholars and economists have long been interested in stress[12,17,21] and have focused on examining task, job, and work stress in particular. More recently, research in the context of work and family issues has examined the relationship between home-related stress and several other outcomes such as home-life satisfaction and workplace satisfaction.[11,19,20] Although work stress is the most commonly studied form of stress, other types of stress such as home stress, trauma leading to post-traumatic stress syndrome, and anxiety need to be included in any comprehensive analysis of stress-related outcomes.

THE HIGH COST OF STRESS

The misdiagnosis of stress-related disorders, including anxiety, costs the United States billions of dollars each year (Table 1). With more than 19 million Americans inflicted each year, anxiety disorders are the most common form of mental illnesses, yet less than one third of affected people receive appropriate treatment. Stress-related disorders cost the nation more than $42 billion per year. More than half of that is due to the repeated use of health care services. In fact, studies have shown that people suffering from stress-related illnesses are 3 to 5 times more likely to visit the doctor and 6 times more likely to be hospitalized than nonsufferers. In addition, approximately 43% of these people are also depressed or have alcohol or substance abuse problems.

JOB STRESS

Although the relationship between stress and health care costs is receiving considerable attention, the true price tag is far greater than that of health care alone. Most organizations do not have an accurate assessment of how much employee stress costs them each year. Stress has been shown to add to the cost of doing business in a number of ways. Some of the serious consequences of employee stress are absenteeism, Worker's Compensation claims, litigation, grievances, accidents, errors of judgment and action, conflict and interpersonal problems, violence, customer service problems, resistance to change, no time to do it right, and loss of intellectual capital.

The American Institute of Stress has determined that 75% to 90% of all doctor visits are now stress-related. The Property and Casualty Insurance Edition of Best's Review estimates that $150 billion of revenue is lost to stress annually in lost productivity, absenteeism, poor decision-making, stress-related mental illness, and substance abuse. In addition, the same edition of Best's Review reports that 1 of 4 American workers suffer a mental health problem rooted in stress. The Washington Business Group on Health has found that 46% of all employees are severely stressed to the point of burnout. Stress leads to anxiety, which leads to 15% of doctors' patients and 33% of Americans suffering from insomnia.[22] With regard to heart disease, it has been estimated that the yearly costs of treatment and lost productivity are $117 billion and that 13.5 million people are affected.[23]

Several studies funded by the National Institute of Occupational Safety Health (NIOSH) have examined the effect of job stress on health.[22] A few suggest that psychologically demanding jobs that allow employees little control over the work process increase the risk of cardiovascular disease. On the basis of research by NIOSH and many other organizations, it is widely believed that job stress increases the risk for development of back and upper-extremity musculoskeletal disorders. Several studies suggest that differences in the rates of mental

Table 1. Statistics

Source	Heath Benefits (% of after-tax profit)	Stress (% of all health care problems)	Workman's Comp Stress Claims	Absenteeism	Consequences of Absenteeism	Accidents
Foster Higgins, Co	45%	60%-90%				
The California Workers Compensation Institute			700% increase between 1979-1988			
Maine Bureau of Labor Statistics			1,000% increase since 1985			
American Journal of Health Promotion				2 times more likely to be absent more than 5 times a year	Lost productivity and replacement costs	
Harvard Business Review						Highly stressed workers are 3% more likely to have accidents

NOTE. Data represent the effect of stress on healthcare and economics for the most recent published studies indicated.

health problems (such as depression and burnout) for various occupations are due partly to differences in job stress levels. Economic and lifestyle differences between occupations may also contribute to some of these problems. NIOSH suggests that there is growing concern that stressful working conditions interfere with safe work practices and set the stage for injuries at work. Some studies indicate a possible relationship between stressful working conditions and these health problems. However, more research is needed before firm conclusions can be drawn. Some of the early warning signs of job stress are headache, sleep disturbances, difficulty in concentrating, short temper, upset stomach, job dissatisfaction, and low morale.

Psychosocial Factors in Job-Related Stress

NIOSH has been concerned with these issues since 1986.[23] At that time, NIOSH stated that more information was needed on the association between work-related psychosocial factors and the development of cardiovascular disease. This research could focus on several factors, such as machine pacing of work, work overload (eg, holding 2 jobs), work organization, job-decision latitude, and various aspects of stress at work. The potential for new technologies such as computer-mediated work were expected to increase job-related stress on workers.

NIOSH has redefined Hans Selye's extreme response of the general adaptation syndrome as stress.[24] The moderate response, described by Selye as "arousal," is described by NIOSH as "challenge." NIOSH defines stress as the harmful physical and emotional responses that occur when the requirements of the job do not match the capabilities, resources, or the needs of the worker. Job stress can lead to poor health and even injury. The concept of job stress, according to NIOSH is often confused with challenge, but these concepts are not the same. Challenge energizes us psychologically and physically, and it motivates us to learn new skills and master our jobs. When a challenge is met we feel relaxed and satisfied. Thus, challenge is an important ingredient for health and productive work. The importance of challenge in our work lives is what NIOSH believes is the same as "a little bit of stress is good for you."

There is general agreement on the fact that job stress results from the interaction of the worker and the conditions at work. There are differing views about the relative importance of worker characteristics versus working conditions as the primary cause of job stress. NIOSH and the National Occupational Research Agenda (NORA) have recognized that the US workplace is changing and the workforce is becoming increasingly diverse. The distribution of jobs in the US economy continues to shift from manufacturing to services. Longer hours, compressed work weeks, shift work, reduced job security, and part-time and temporary work are realities of the modern workplace. By the year 2005, the US workforce will grow to an estimated 147 million, with minorities representing 28% of the workforce and women representing approximately 48%.[25]

STRESS FOLLOWING TRAUMA

In the past, stress following trauma was associated mainly with combat-related events and was called: "shell shock," "combat neurosis," "soldier's heart," or "operational fatigue."[26] When it became evident that even noncombative traumatic events can cause similar neuroses, the terms "traumatic neurosis" and later "post-traumatic stress disorder" (PTSD) were coined.[27,28] These new terms are meant to encompass the broader view of traumatic stress, which includes conditions such as a severe automobile accident, violent personal assault (eg, rape, physical attack, robbery, mugging), terrorist attack, natural or man-made disaster (such as a fire), witnessing serious injury or death due to any of the above, as well as other situations, such as being kidnapped or being held hostage.

PTSD is not a normal response to these traumatic events but is considered to be a pathological response since the individual is unable to adapt and go on with a normal life after an initial period (no longer than 1 month). It has been estimated that approximately one third of the population will be exposed to a severe trauma during their lifetime.[29,30] Of these individuals, 10% to 20% will develop PTSD,[31] which makes the prevalence of PTSD in the general population to be in the range of 3% to 6%. This has been confirmed by a recent study in the United States.[32] Yet, most patients are not being diagnosed and are consequently not being treated. There are 4 characteristics of PTSD: exposure to a traumatic event, re-experiencing the traumatic event, avoidance including emotional anesthesia, and increased arousal.[28,33]

Table 2. Differences Between HPA Axis Alterations in PTSD and Chronic Stress/Depression

PTSD	Chronic Stress/Depression
Increased CRF release	Increased CRF release
Decreased levels of cortisol	Increased levels of cortisol
Increased glucocorticoid receptor responsiveness	Decreased glucocorticoid receptor responsiveness
Stronger negative feedback inhibition	Weaker negative feedback inhibition

Abbreviation: CRF, corticotropin-releasing factor.
Reprinted with permission.[34]

Table 2 compares the hypothalamic-pituitary-adrenal (HPA) axis alterations in PTSD with chronic stress/depression (see VanItallie in this supplement).

Epidemiologic studies show that prevalence of trauma and PTSD is substantial in modern society. Most people will experience a traumatic event at some point in their life and up to 25% of them will develop the disorder. Traumatic exposure and PTSD have an impact on the individual's health, health care service utilization, and general functioning. Such effects result in a considerable economic burden for the individual and for the health care system and society as a whole.[35]

A recent study by Deykin et al[36] has shown that PTSD alone or in combination with depression has a direct negative relationship with physical health that, in turn, is associated with more frequent use of primary health care services. This study did not show that PTSD leads to inappropriate (eg, distress-motivated) use of services.

HOME STRESS

Van Dyne et al[10] have developed a model for work stress and home stress and found a strong relationship between home stress and creativity and employee satisfaction at work. Their

results provide the scientific rationale for the argument that supportive supervision for the stress and positive moderating influence of intrinsic motivation for the stress will result in positive work outcomes. This study is one of the few to examine the spillover from work to nonwork and the relationship between stress and employee creativity at work.

Home stress is an expanding, yet under-researched area in which most of the work has addressed stress and well-being, stress in the home/family domain, and stress from work to nonwork. There has been relatively little research done on examining the relation between stress and employee work performance.[13,18,19]

MANAGING STRESS AND CONCLUSIONS

In the United Kingdom, the Mental Health Foundation reports that stress costs British industry 3 billion British pounds per year.[37] Most companies did not view stress as a mental health problem. Macho environments in large corporations and financial institutions are often hot-beds of stress and the high-profile nature of the job often means that mistakes can cost large amounts of cash. The report found that new companies were more often aware of the problems of stress and had set up external counseling, shiatsu massage, discount sports facilities, and a quiet room to relieve staff of stress. The businesses involved in the study have called for a national campaign to tackle stress and for an independent employee counseling service for firms employing more than 100 people. This British study indicates that raising awareness through publications is important in tackling this workplace challenge and that sharing "good practice guidelines" within the business community is an important step forward.

"Depression and anxiety disorders impose considerable burdens on the individual; and on society in terms of impairment of daily activities and work productivity and cost to health care providers."[1] Since stress is the most common underlying condition leading to depression and anxiety, there is an urgent need for prevention, early intervention, increased recognition, and treatment of stress and the related comorbid psychiatric and medical conditions.[38]

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