

Compulsory Coursework Essay Title

Biological Psychology PS1060B

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“What is known of the biological factors that underly the relationship
between psychological stress and disease?”

It is ambiguous, and a matter open for much debate, as to whether disease is caused by stress or stress is an effect of disease. However it is clear from various research that there is a substantial link between the two and as our knowledge and understanding of the brain and it's various functions increases the answers about the causes and possible cures for stress may become more apparent still. Stress is a state of psychological tension caused by certain pressures or forces that are either physical or psychological in nature. For example prolonged exposure to the cold would cause physical stress to the body. Disease occurs when the body's immune system cannot produce enough antibodies to sufficiently combat an infection. The immune system is a collection of billions of cells, which travel through the bloodstream moving in and out of tissues and organs. They defend the body against foreign agents such as viruses, bacteria and cancerous cells. The stress response is the body's way of dealing with any form of stress by suppressing certain metabolic functions thus enabling other functions that deal better with stress to take over. A good example of this type of response from the body would be when a person is running and the body concentrates on the air intake of the individual while other unnecessary functions are shut down. During the stress response certain proteins are suppressed including antibodies, which means the body is unable to effectively fight off disease. In the short term this process is perfectly normal and healthy but if the stress continues for a long period of time the body will simply succumb to any infection and become progressively more vulnerable. This is where the link between stress and disease is formed.

Stress can come from a variety of sources. Environmental stresses such as noise, temperature, pollution and the general urban environment are part of everyday stress for most people. Occupational stress caused by job demands and a feeling of controllability over one's own career is another highly stressful and important part of a person's life that can put huge strain on the individual. It is life events however such as marriage, divorce and bereavement that can have a profound impact on an individual and their ability to cope with stress. Although these major life events happen infrequently research has shown that it is at these times when people are most likely to succumb to stress and eventually fall ill from disease. This evidence supports the link between stress and disease. High emotion levels such as anxiety, fear, aggression or frustration can also increase stress levels and are normal if kept at a reasonable level for a short period of time. Finally, disruption of circadian rhythms or sleep cycles can also subject an individual to increased stress levels. Cox (1975) simplified these sources of stress into three models. In the engineering model stress represents the effects of environmental events or stimuli, known as 'stressors', to the body. The model is based on the Law of Elasticity in that you can expose the body to a certain amount of stress but if it is pushed beyond a certain point negative effects begin to become apparent. The physiological model sees the effects of stress as a pattern of physiological changes within the body caused by external stressors. The transactional model combines the two; it states that stress occurs when there is disparity between how a person perceives demands made upon them and how they perceive their ability to cope with these demands. These feelings of stress will lead to a physiological response.

Most of the physiological changes result from the activation of two neuro-endocrine systems controlled by the hypothalamus: the sympathetic system and the adrenal-cortical system. The hypothalamus is regarded as the stress centre because of its dual

functions in emergencies. The first function is to activate the sympathetic division of the autonomic nervous system. Nerve impulses from the hypothalamus are transmitted to nuclei in the brain stem that control the functioning of the autonomic nervous system. The sympathetic division of the autonomic system acts directly on the smooth muscles and internal organs to produce bodily changes such as increased heart rate, elevated blood pressure and dilated pupils. The sympathetic system also stimulates the inner core of the adrenal glands to release the hormones epinephrine and norepinephrine into the blood stream. Epinephrine has the same effect on the muscles and organs as the sympathetic system does and therefore brings about a state of arousal. Norepinephrine, through its action on the pituitary gland is indirectly responsible for the release of extra sugar on the liver. The second function is the activation of the adrenal cortical system by arousing the pituitary, which secretes adrenocorticotrophic hormone (ACTH). This stimulates growth of the adrenal gland and adrenal hormones. The adrenal gland secretes adrenaline (epinephrine), which stimulates the sympathetic ANS and releases sugar. ACTH may also act as a neuromodulator to reduce anxiety by blocking GABA receptors in the same way that enkephalins block pain. Observing and testing various parts of the body can measure stress levels. Prolonged stress enlarges the adrenal gland and increases the amount of cortisol in the urine. Selye (1956) said that stress produces a distinct physiological reaction and stress from any source will trigger off a sequence of events. 'The alarm reaction' is caused by the release of ACTH and epinephrine, which makes a person ready for 'fight'. The 'resistance' stage is where the hormone production is maintained at low levels as the body adjusts to the stressor. The final stage 'collapse' is the eventual exhaustion of the body's resources where the adrenal cortex does not function properly leaving the individual unable to fight off infections.

The effects of stress in relation to disease have been highly researched. Cohen (1980) infected university students with a cold virus and gave them questionnaires relating to the amount of stress in their lives. He discovered that those with a great deal of stress at that time were more likely to suffer the ill effects of the virus. Jemmott et al. (1985) also found that during examination period's students had lower levels of certain antibodies. Cancer is not contagious; it is the growth of the body's tissue in an abnormal way. Research has shown that chronic stress makes you not only susceptible to viruses but also to cancer. Cancer often strikes after a life crisis such as bereavement or retirement and this implies that psychological stress has an effect on a person's susceptibility to cancer not just viruses. Riley (1981) implanted malignant tissue into rats and exposed some of them to stress. The rats exposed to stress were less able to fight off the cancer. Greer et al. (1979) examined the effects of cancer on humans. He studied women who had been diagnosed as having breast cancer and had had a mastectomy. The women who simply denied they were ill and those who had a 'fighting spirit' were more likely to be free of the cancer five years later than the ones who had simply accepted the illness or felt helpless because of it. The implication behind this study and others like it is that the first two reactions shown by the women help in the immune systems fight against the spread of cancer. Therefore it can be said that a positive and stress free mind can actually stop disease before it occurs.

In response to the question of whether stress causes disease or disease causes stress, Sussman (1960, 62) argued with psychiatry's notion that all mental illnesses have an underlying physical cause in the nervous system or the brain and claimed that environment and 'problems in living' play a major part in disease. This again reinforces the link between stress related diseases. Sussman claimed that it is the exception rather than the rule to come across an individual with an organic brain disorder who is

mentally ill. It is far more likely that their mental illness is caused by the 'stress of life'. Some psychiatrists distinguish between organic psychoses, which have an underlying physical cause and functional psychoses, whose cause is either unknown or simply not there. This argument suggests that stress causes disease but it is obviously not responsible for every ailment.

Research linking stress and disease appears to be highly valuable in our understanding of how a 'healthy mind equals a healthy body'. The research suggests that there is a tenuous link between disease and stress and the biological information we know today puts scientific knowledge to the theories. It is undisputed now that stress plays a huge part in disease but it is almost impossible to know exactly how big a part this is or test it in any way. The fact remains that some of the causes of diseases are unknown and stress cannot be associated with all of them. It may be more accurate to say that stress does not cause disease but it contributes towards it and prolongs its effects.

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