

Outline and evaluate
research into the
relationship between
the immune system
and...



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The main function of the immune system is to protect the body from infectious agents such as viruses and other toxins. The immune system can fail us in two ways-either by becoming under-vigilant, letting infections enter the body, or over-vigilant, so that it is the immune system itself, rather than an infectious agent that causes illness. Most studies of the relationship between stress and the immune system have focussed on acute(i. e. short lived) stressors and have found a decrease in immune cell function.

Selye (1956) developed a model called the General Adaptation Syndrome (GAS) which explained the short-term effects of exposure to stressors. He proposed that all stressors cause the same biological response in all animals and humans. The GAS has 3 stages. In the first Alarm stage, the presence of a stressful event is registered. This can be a threat from outside or a physical stressor, such as injury or illness affecting the body. Adrenaline is released and the heart rate goes up. Muscle tension, blood sugar and the pain threshold increases.

In the second stage of Resistance, the body's stress response is fully activated and is apparently coping with the stressor. However, resources are still being used up faster than they are being restored and so a person may remain irritable and " on edge". However, if the stressor is long lasting, the body enters the third stage of Exhaustion. Selye felt that hormone reserves were depleted and it is at this point that stress-related conditions such as ulcers, depression and anxiety may develop as stress systems become exhausted.

Another research study into the relationship between stress related illness and the immune system was carried out by Kielcot-Glaser et al (1984). They performed a natural experiment to investigate whether the stress of short term stressors, such as important exams, had an effect on the immune system of medical students. Blood samples were taken before and during their exams and their NK (Natural Killer) cell activity was measured as indication of immune function. The students were also given questionnaires to assess psychological variables such as life events and loneliness.

They found that the students had a significantly lower white cell count during exams and this was most reduced in students who had reported high levels of life events and loneliness. They concluded that exam stress reduces immune function, potentially leaving the individual vulnerable to illness and infections. Immune function is also affected by psychological variables such as the stress of life events and feelings of loneliness. These long term stressors may make individuals more vulnerable to the added effect of short term stressors such as exams.

In evaluating the GAS Theory, it is helpful to note that it was the first systematic attempt to describe the body's response to stress. However, all Selye's early work was carried out on rats, using physical stressors. There are physiological differences between rats and humans making it difficult to generalise his research findings to people. Another criticism of the GAS theory is that it ignores individual differences. It assumes we all respond in the same way to stressors, but we now know that personality and gender can significantly affect reactions to stress.

There are people who may have Type A behaviour which is characterised by intense competitiveness and impatience and which is believed to increase the risk of coronary heart disease (CHD). Type B personalities are less competitive, more easygoing and tolerant and are less likely to suffer from CHD. Those people with a Hardy personality, as described by Kobasa, are more resistant to the harmful effects of stress because they see themselves as being in control of their lives rather than being controlled by external factors.

They also see life challenges as problems to be overcome rather than as stressors. Selye also believed that “ exhaustion” occurred when a constant outpouring of stress hormones eventually depleted our stores. It was this that led to stress-related illness. However, it is now believed that hormone supplies are rarely exhausted-even under the most severe pressure. The study carried out by Kielcot-Glaser was a natural experiment using a natural source of stress i. e. exams and therefore had reasonable ecological validity.

However, students may not constitute a representative group and generalisations should be made with caution. It was essentially a correlational study, so a strong conclusion about a cause-and-effect relationship cannot be drawn. There are various reasons why it is difficult to establish a causal relationship between stress related illnesses and the immune system. Health is affected by many different factors (genetics/lifestyle etc.). It also tends to be fairly stable and slow to change and therefore it is difficult to demonstrate that exposure to particular stressors have caused a change in health.