

STRESS-RELATED ILLNESS AND THE IMMUNE SYSTEM

Introduction

The immune system is our main defence against infection by foreign agents. Essentially, the immune system is made up of **white blood cells** whose job it is to fight **antigens** such as bacteria, viruses, fungi and protozoa. Sometimes, normally harmless particles, such as dust and pollen, cause an over-reaction of the immune system, and this is the basis of allergies.

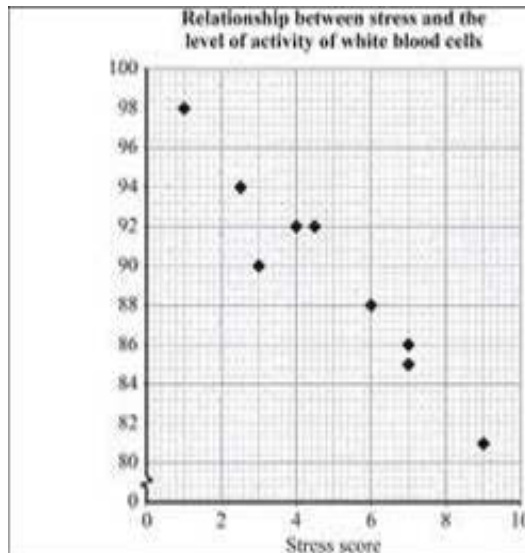


There are many different types of white blood cell, including **T-cells**, **B-cells**, and **natural killer cells**. Fortunately, we do not need to have a detailed knowledge of exactly what these different types of cell do!

Psychological research into the relationship between stress and illness

Research has investigated the effects of different chronic stressors on the immune system. The most studied chronic stressors are **death of a spouse, preparing for examinations, caring for a spouse or relative, and divorce/separation**.

Kiecolt-Glaser et al (1984) investigated the correlation between perceived stress and immune system functioning in 75 first year medical students preparing for important *examinations*. Natural killer cell activity was measured one month before and one month after the examinations, and the students were also given questionnaires assessing mental disorder and stressful life changes they had experienced in the previous year.



A typically observed negative correlation between stress and immune system functioning

The researchers found that natural killer cell activity declined as the examinations got nearer, and that there was a strong correlation between how much stress a person reported and how much their natural killer cell activity declined. The researchers concluded that stressful life changes and examinations *cause* impairment of the immune system.

Evaluation of Kiecolt-Glaser et al's study

- Just because there is a significant correlation does not mean that stress *caused* a decline in the immune system. Other things occurring between the 'before' and 'after' measures may have affected the immune system. Researchers cannot control for these factors.
- We have to *assume* that participants told the truth on the questionnaires. They may not have wanted to divulge some information about themselves.
- The sample studied was *students*. The results from this population may not be representative of other populations.

Gerra et al (2003) studied people who had recently experienced an unexpected *bereavement*. The researchers found lower natural killer cell activity in these people as compared with a control group of matched people who had not experienced bereavement. The difference was still

evident 40 days after the bereavement, and in some people it persisted after six months. The risk of death following bereavement was greater for men than for women.

Evaluation of Gerra et al's study

- We do not know to what extent other things associated with bereavement (such as sleep disturbances) affect the immune system's functioning.
- It is not clear why men and women should be at different degrees of risk.
- This study used a non-student sample, so issues about representativeness are less relevant.

Sweeney (1995) studied two groups of participants. The first were people *caring for a relative with dementia*, whilst the second were a matched control group who were not caring for a relative. When we cut ourselves, a protein called **interleukin-b** is produced by the immune system. This regulates the production of **collagen**, the tough fibrous tissue in scars, which enables the wound to heal. The participants were given a small skin biopsy on their arms, and the time taken for scar tissue to be produced was measured. Sweeney found that it took significantly longer for the wound to heal in the people caring for a relative with dementia.

Evaluation of Sweeney's study

- We do not know to what extent other consequences of caring for a relative with dementia (such as sleep disturbances) affect the immune system's functioning.
- This study also used a non-student sample, so issues about representativeness are less relevant.

A classic laboratory experiment into the relationship between stress and the immune system was conducted by **Cohen et al (1993)**. 394 participants completed questionnaires, which were combined to produce

an overall 'stress index'. Participants were then exposed to one of five common cold viruses, and monitored in special housing for a few days before and after exposure to the virus.

The researchers found significant differences between those who were classified as 'high stress' and those classified as 'low stress' in terms of the likelihood of catching a cold, irrespective of the type of virus. This result remained even when other variables linked to the onset of a cold (e.g. smoking) were taken into account. Because of all the checks and controls, it is very likely that catching a cold was *caused* by how stressed the participants were.

Evaluation of Cohen et al's study

- This is a laboratory study which is very highly controlled. However, because it was conducted under laboratory conditions, the study lacks ecological validity.
- This study also used a non-student sample, so issues about representativeness are less relevant.

General evaluation of studies of stress-related illnesses and the immune system

The negative effects of stress on the functioning of the immune system have been found in hundreds of research studies. Therefore, the results in this area of research are extremely **reliable**.

Even though a lot of research in this area is correlational, it *probably* is the case that there is a **causal relationship** between stress and the functioning of the immune system.

However, studies typically talk about 'group' differences or correlations (e.g. medical students, people who have been bereaved, etc.). Within those groups, there are large **individual differences**, and some people experiencing bereavement (for example) don't show impaired immune system function. We know that there are important individual differences (gender would appear to be one), but we don't know *why* these occur.