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# **PSY1102**

## **Introduction to Applied Psychology**

### **Class 11**

### **Stress and health**

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# Agenda for today

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1. Stress and health
  - a. Stress and illness
  - b. Stress and the heart
  - c. Stress and susceptibility to disease
2. Promoting health
  - a. Coping with stress
  - b. Pets are friends, too
  - c. Managing stress

# 1. Stress and health

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- Stress and health
  - Stress and illness
  - Stress and the heart
  - Stress and susceptibility to disease
- Promoting health

## 1a. Stress and illness: what is stress?

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- Stress is “the process by which we appraise and cope with environmental threats and challenges” (p. 528).
- The same stimulus can be stressful for one person and innocuous to another.
- Short-lived stressors can have positive effects, such as energising the “fight-or-flight” response.
- However, long-lived, chronic stressors can damage us, whether the stressor be abuse experienced by a child, the stress of battle, an oppressive work environment, or some other condition.

## 1a. Stress and illness: the stress response system

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- In 1929 Walter Cannon demonstrated that “the stress response is part of a unified mind-body system” (p. 528).
- Physical stressors such as cold, lack of oxygen, and others cause stress hormones epinephrine (adrenaline) and norepinephrine to be released from the core of the adrenal glands through the action of the sympathetic nervous system, part of the autonomic nervous system.
- A sharp event will cause, via epinephrine, increased heart rate and respiration, increased blood flow to the muscles, dulled pain, and the release of sugar and fat from our “stores”, all of which are consistent with the “fight or flight” response.

## 1a. Stress and illness: stress response system (cont'd.)

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- Another stress response system has been identified.
- This system causes glucocorticoids to be released from the outer part (cortex) of the adrenal glands. Cortisol is one such stress hormone.
- “In a fight-or-flight scenario, epinephrine is the one handing out guns; glucocorticoids are the ones drawing up blueprints for new aircraft carriers needed for the war effort.”
- However, the response does not have to be either fight or flight. One can choose to withdraw and conserve energy.
- Social withdrawal is more common among men than among women, perhaps because women secrete oxytocin, which is a stress-moderating hormone linked to breastfeeding, among other social behaviours.

## 1a. Stress and illness: stress response system (cont'd.)

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- Hans Selye proposed the general adaptation syndrome (GAS), the body's response that is a general, undifferentiated alerting system.
- Selye proposed three phases to a severe emotional or physical trauma:
  - Phase 1: Alarm reaction, where blood pressure, heart rate, and respiration spike because of the sympathetic nervous system.
  - Phase 2: Resistance, where temperature, blood pressure, and respiration remain high, with an outpouring of hormones.
  - Phase 3: Exhaustion, which occurs in the post-stress period, where you are more vulnerable to illnesses or, in extreme cases, death.

## 1a. Stress and illness: stressful life events

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- Things that provoke stress responses include:
  - Catastrophes, such as 9/11, the assassination of JFK (or others), or some natural catastrophes such as earthquakes or tsunamis.
  - Significant life changes, including death of a loved one, job loss, marriage, divorce, or leaving home.
  - Daily hassles, such as traffic, being over-committed and always late, etc.



## 1b. Stress and the heart

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- Increased blood pressure increases the risk of coronary heart disease.
- Two types of people have been proposed:
  - Type A, who are competitive, hard-driving, impatient, verbally aggressive, and easily angered; and
  - Type B, who are more laid-back and laissez-faire.
- Type A people were reported as being more prone to heart attacks. However, another way of looking at Type A behaviour is that it indicates “combat-readiness”, with the autonomic activation this implies.

## 1c. Stress and susceptibility to disease

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- In the “old days”, people used to speak of psychosomatic illnesses.
- Some people interpreted “psychosomatic” as a synonym for “imaginary”, but in fact it means that the patient was exhibiting physical symptoms that had one or more psychological causes.
- Today, we refer to psychophysiological illnesses, such as high blood pressure (hypertension) and some other ailments.
- Stress can also affect our resistance to disease, which leads to the field of psychoneuroimmunology – the interaction of psychological, neural, and endocrine systems interact.

## 1c. Psychoneuroimmunology

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- Our immune system can be thought of as a sort of police force that detects threats to the body and responds to the threat quickly and (usually) effectively.
- The immune system attacks bacteria, viruses, and other substances that are foreign to the body.
- The activity of the immune system is affected by several factors, including:
  - Age
  - Stress
  - Nutrition
  - Genetics
  - Body temperature

## 1c. Psychoneuroimmunology: immune tools

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- The immune system uses two types of white blood cells (lymphocytes) as tools:
  - B lymphocytes form in the bone marrow and release antibodies that fight bacteria; and
  - T lymphocytes form in the thymus gland and other lymphatic tissue and attack cancer cells, viruses, and other “foreign” objects, including transplanted tissues.
- As well, the immune system uses macrophages which, as the name suggests, eats invaders and worn-out cells.
- Finally, the immune system uses natural killer cells (NK cells), which interact with diseased cells.

## 1c. Psychoneuroimmunology: immune response

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- The immune system can make two types of errors:
  - It can attack the body's own tissues, causing diseases such as arthritis or an allergic reaction; and
  - It can under-react, which can enable cancer cells to multiply or viruses to erupt. One example of a virus is “cold sores”, caused by Herpes simplex virus 1, or HSV 1. Another is genital herpes, typically (but not always) HSV 2.
- Women typically have stronger immune systems than do men, which means that they typically have fewer infections. Unfortunately, the flip side is that women are more prone to get self-attacking diseases such as lupus or multiple sclerosis.

## **1c. Psychoneuroimmunology: immune response**

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- The immune system can become less active in the face of external stressors, such as restraint, shocks, various devices used in torture (noise, cold water), and other factors.
- The textbook (page 535) lists some examples of reduced immune response that occur consistently with stress:
  - Slow healing of surgical wounds
  - Susceptibility to intra-nasal virus

## 1c. Stress and AIDS

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- AIDS (acquired immune deficiency syndrome) is the disease that results from being infected with the human immunodeficiency virus (HIV).
- HIV is typically spread through sharing body fluids, typically semen and blood. This usually happens during unprotected sex and when sharing needles for intravenous drug use.
- AIDS was first diagnosed in the early 1980s. In the early days, the cause wasn't clear, but the outcome was: death.
- As more and more cases appeared, it became clear that a group at risk was males who engaged in male-on-male sex.
- Because of this, some conservative Christians labelled AIDS “the gay disease” and argued that it was “God’s retribution” for their sinful lifestyle.

## 1c. Stress and AIDS (continued)

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- AIDS used to be a death sentence, because the fatality rate was nearly 100%. More recently, the development and increased availability of drugs (such as anti-retroviral agents) have helped make AIDS a disease that people live with.
- However, given its name you will appreciate that a primary symptom of AIDS is a weakened immune system. This weakening makes the patient more susceptible to pneumonia and certain types of cancer (e.g., Kaposi's sarcoma).
- Typically, before recent treatment AIDS patients would die from one of these diseases.



## 1c. Stress and AIDS (concluded)

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- As it turns out, stress and negative emotions do seem to play a role in two aspects of the progress of the disease:
  - Faster progression from HIV infection to full-blown AIDS; and
  - The rate of decline of the patient.
- As AIDS has become better understood and de-stigmatised, the focus has been on prevention and treatment rather than blame.
- As a result, various techniques designed to help de-stress the lives of HIV-infected people seem to slow the progress of the disease; these techniques include:
  - Exercise
  - Bereavement support
  - Relaxation training, and others.

## 1c. Stress and cancer

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- Likewise, stress and negative emotions have been tied to the progression of cancer in other species.
- Using rodents, researchers at Carleton University implanted tumour cells or exposed them to carcinogens. Next, some of these rodents were exposed to inescapable shocks to induce shocks.
- The rodents experiencing this stressful situation developed cancer, their tumours developing sooner and growing larger.

## 1c. Stress and cancer (continued)

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- Some studies – but not all – have found a link between certain types of cancer and life stress, such as depression or job stress.
  - One Swedish study found a colon cancer rate 5.5 times higher among people with workplace stress than people without this type of stress.
  - However, other studies have not replicated this result.
- People who have experienced enormous stress (e.g., prisoners of war or inmates of concentration camps) have not shown increased cancer rates.
- Thus, the evidence concerning the relationship between cancer and stress in humans is mixed.

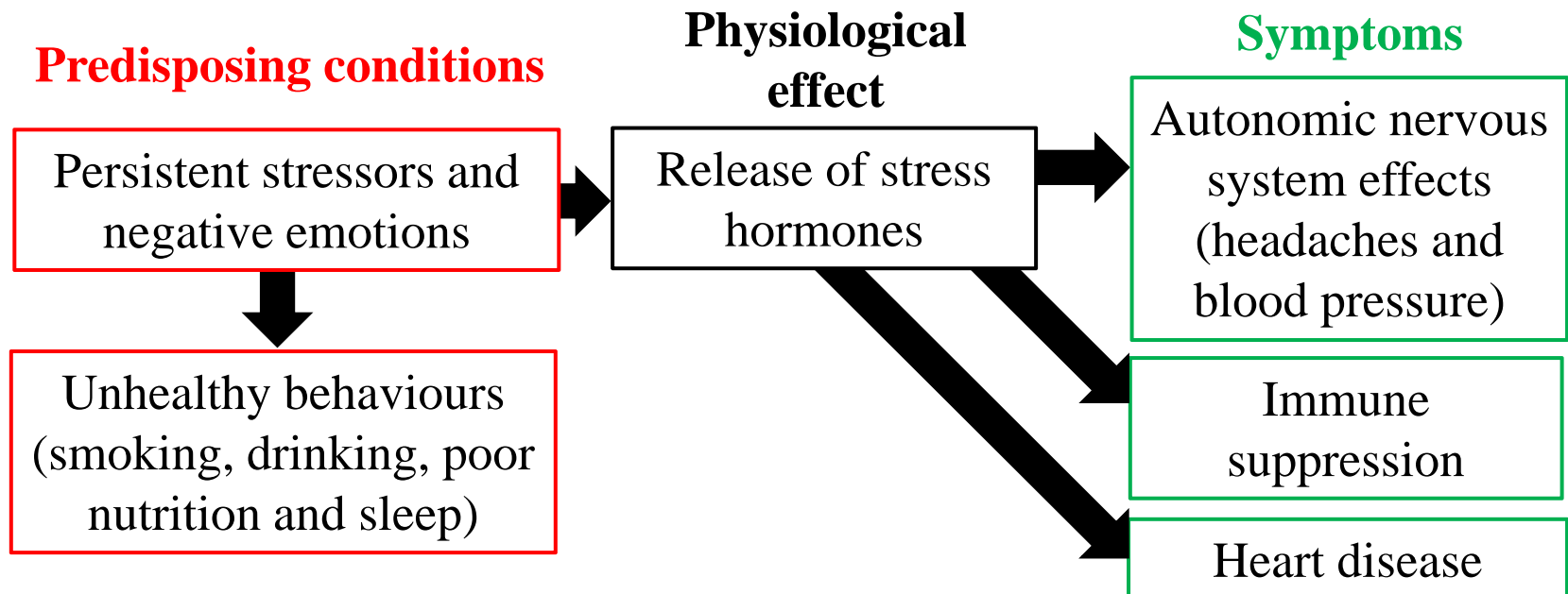
## 1c. Stress and cancer (concluded)

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- Currently, we believe that stress does not create cancer cells but may create the conditions that foster their growth by reducing the strength of the immune system.
- Given that this is a Psychology course (and not Medicine), what can we say about the effect of attitudes and behaviour on cancer?
  - A “positive attitude” is unlikely to offer significant protection to someone exposed to carcinogens.
  - There is no benefit to blaming someone for “negative attitude” if they develop cancer.

## 1d. Stress and behavioural medicine

- As shown in Figure 12.29 (page 537) in the textbook, stress activates us in our daily lives. A certain amount of stress is not only necessary but is stimulating.
- However, persistent, unavoidable stress – that is, stress over which we have no control – can be damaging.



## 1d. Stress and behavioural medicine

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- The textbook makes the point that mind and body interact, that “everything psychological is simultaneously physiological.”
- Strictly speaking, this is a materialistic interpretation of Psychology, where it is assumed that each thought and feeling has a physical basis. Although this may be true, the evidence is not yet complete!

## 2. Promoting health

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- a. Coping with stress
  - Perceived control
  - Optimism and health
  - Social support
- b. Managing stress
  - Aerobic exercise
  - Biofeedback, relaxation, and meditation
  - Spirituality and faith communities

## 2a. Coping with stress

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- We cannot avoid all stress in life. Given this, we should ensure that we develop skills for coping with stress.
- One strategy is problem-focused coping, in which we deal with the source of stress (e.g., another person) directly.
  - This can be useful when we feel a sense of control.
- If that solution doesn't work, we can try emotion-focused coping, using tactics such as seeking support from friends.
  - This approach may be more useful when we do not have a sense of control.



## 2a. Coping with stress: perceived control

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- Rats subjected to shocks over which they have no control develop ulcers and other signs of stress.
- By contrast, rats which have some control over the shocks remain healthy. In other words, the shocks themselves – although painful – do not affect the health of the rats; rather, the sense of loss of control affects their health.
- Similar situations can be observed in humans (e.g., ulcers precipitated by a bacterial infection and stress).

## 2a. Coping with stress: perceived control (cont'd.)

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- Humans who have control over their circumstances:
  - Stay healthier and live longer (nursing home residents)
  - Experience less stress (workers arranging office decor)
  - Etc.
- In general, people who perceive that they have control over their circumstances live longer than people who feel they have no control.
- These results may help explain why wealthier people tend to live longer.
- The mechanism seems to be that stress hormones exist in higher concentrations when control is lost; this happens in both humans and other mammals.

## 2a. Coping with stress: optimism and health

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- Is your outlook on life optimistic or pessimistic, or somewhere in between?
- Some evidence suggests that optimists perceive that they have control, they handle stress better, and they are healthier.
  - This also applies to optimistic students in the month before exams.
- The textbook cites (p. 540) several studies across several countries and lifestyles showing that optimists live longer.
- Similarly, those who see humour in life seem to handle stress better; the mechanism may be laughter strengthening the immune response.

## 2a. Coping with stress: social support

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- Close relationships predict health. For example (p. 541):
  - People with rich social ties live longer, whether their ties are with family, friends, workers, co-religionists, or others.
  - Married people live longer than others; a good marriage at age 50 was a better predictor of healthy aging than a low cholesterol level at age 50.
- In general, people with better social relationships (friends, marriage, etc.) eat better, exercise more, sleep better, smoke less, and cope with stress better.
- People with better social ties are less likely to catch a virus to which they were exposed.
- Also, there is some evidence that sharing confidences about past experiences is good for one's health.

## 2b. Pets are friends, too

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- “Seeing eye dogs” are service animals for people who are blind.
- There is some evidence that pets – not (yet) service animals – can help contain blood pressure among people in stressful jobs or promote healing in people recovering from heart attack, for example.

## 2c. Managing stress

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- Given that we will certainly be exposed to stress, what can we do to manage it?
- We'll briefly consider several actions:
  - Aerobic exercise
  - Biofeedback, relaxation, and meditation
  - Interaction with spirituality and faith communities

## 2c. Managing stress: aerobic exercise

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- Aerobic exercise (jogging, biking, swimming) increases heart and lung fitness and is good for body health.
- The textbook says (p. 543) that aerobic exercise can reduce stress. People doing aerobic exercise:
  - Manage stress better
  - Exhibit more self-confidence
  - Feel more vigour
  - Feel depressed and fatigued less than others
- However, it could simply be that stressed people exercise less. In the absence of a critical experiment, this argument proposes an entirely different relationship.

## 2c. Managing stress: aerobic exercise (continued)

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- The textbook describes (p. 543, and chart at the bottom of the page) a study in which stressed, depressed, or anxious people were randomly assigned to aerobic exercise, relaxation, or no treatment. Pre- and post-study evaluations of depression were made.
- The results were clear:
  - Depression scores in the no-treatment group did not change;
  - Scores for the relaxation treatment decreased;
  - Scores for the aerobic exercise group decreased sharply.
- Thus, it appears that aerobic exercise reduces depression scores. The mechanism for this is not yet clear, but may involve endorphins, serotonin, or norepinephrine.
- In addition, of course, exercise helps the body!



## 2c. Managing stress: biofeedback, relaxation, etc.

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- Biofeedback first became popular in Western society in the late 1960s, but relaxation and meditation have been part of Eastern cultures for centuries.
- Biofeedback trains people to control their brain waves or other “unconscious” behaviours, feeding the signals to an analyser that then triggers feedback to the person.
- Biofeedback has become a therapeutic tool for a variety of conditions, but seems to be most effective for headaches.
- By contrast, relaxation techniques involve no expensive equipment, yet can produce many of the same results that were promised for biofeedback.

## 2c. Managing stress: biofeedback, relaxation, etc.

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- Meditation has been in use in Eastern cultures for centuries. The goal is to empty the mind.
- People experienced in meditation can control autonomic functions such as heart rate, blood pressure, and oxygen consumption.
- In controlled studies in North America, patients randomly assigned to meditation had better survival rates than those assigned to other treatments.

## 2c. Managing stress: spirituality and faith

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- Through history, religion has been a source of comfort for many people. Is religion effective in handling stress?
- Many of the studies that purport to show positive effects of religion contain confounds.
  - For example, they may contain more women than men, and women live longer than men anyway.
  - Also, the Abrahamic religions (Judaism, Christianity, Islam) typically use communal worship, which involves social ties.
  - Some religions prohibit smoking or alcohol consumption.
  - Stress and susceptibility to disease
- However, overall there seems to be an effect of faith on well-being, but more work needs to be done in this area.

# Summary: Class 11

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