Stress and Health

Behavioral medicine – an interdisciplinary field that integrates behavioral and medical knowledge and applies that knowledge to health and disease
- Changes unhealthy behaviors (cigarette smoking, alcohol abuse, unprotected sex, illicit drug use, poor nutrition, etc) that can contribute to death to enhance the quality of life

Health psychology – a subfield of psychology that provides psychology’s contribution to behavioral medicine
- How do our emotions and personality influence our risk of disease?
- What attitudes and behaviors help prevent illness and promote health and well-being?
- How do our perceptions of a situation determine the stress we feel?
- How can we reduce or control stress?

Stress and Illness

Stress and Stressors
- Stress – the process by which we perceive and respond to certain events, called stressors that we appraise as threatening or challenging.
  - Not a stimulus OR a response but a process
  - Arises less from events themselves, and more by how we appraise (judge/label) the events (something that is stressful for one person, may not be for another)
Stressors can elicit positive or negative responses
- Stressors that are short-lived and are presented as challenges can influence positive, aroused, and focused responses → increased self-esteem, new outlooks on life, sense of purpose
- Stressors that are severe and prolonged may elicit negative responses → ex: post-traumatic stress disorder, chronic illnesses

The Stress Response System
- Dual-track response system – triggers flight/fight
  - FAST TRACK
    - Sympathetic nervous system arouses body → increases heart rate and respiration, inhibits digestion, releases energy, and the adrenal glands secrete epinephrine and norepinephrine
  - SLOW TRACK
    - The cerebral cortex (via the hypothalamus and pituitary gland) tell the adrenal glands to release glucocorticoids (ex: cortisol)
- Hans Selye’s discovered that organisms react in generally the same way to a stressor
  - general adaption syndrome – Selye’s concept of the body’s adaptive response to stress in three stages – alarm, resistance, exhaustion.
  - Psychologists agree – prolonged stress can lead to physiological deterioration

<table>
<thead>
<tr>
<th>ALARM</th>
<th>RESISTANCE</th>
<th>EXHAUSTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobilization of resources</td>
<td>Coping with stress</td>
<td>Reserves depleted</td>
</tr>
<tr>
<td>- reaction to sudden activation of sympathetic nervous system</td>
<td>- Temperature, blood pressure and respiration remain high</td>
<td>- Immunity to illness decreases</td>
</tr>
<tr>
<td>- heart rate zooms</td>
<td>- Sudden outpouring of hormones</td>
<td>- Collapse → death</td>
</tr>
<tr>
<td>- blood directed toward skeletal muscles</td>
<td>- If stress is persistent, this phase can deplete the body’s reserves</td>
<td></td>
</tr>
<tr>
<td>- faintness of shock</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Stressful Life Events
- Three major types of stressors – catastrophes, significant life changes, and daily hassles

Catastrophes
- Unpredictable, large scale events (wars, natural disasters, etc) that nearly everyone appraises as threatening.
- Can lead to significant health consequences (increase heart attack rates, sleeping problems, depression, anxiety)
- Psychological disorders can stem from sudden changes like uprooting, family separation, adjusting to a foreign country’s language, culture, societal norms, etc.

Significant Life Changes
- Ex: leaving home, death of a loved one, loss of a job, a marriage, a divorce, birth, etc.
- Young people respond more intensely to significant life changes
- People experiencing a major life change are susceptible to diseases
- Experiencing a cluster of events increases vulnerability
- Ex: people experiencing the loss of a spouse had a doubled risk of death in the following the loss.

Daily Hassles
- Everyday annoyances can be a significant source of stress
  - Traffic, annoying roommates, long lines at the store, many things to do, etc
  - Racism and prejudice
- Some stressors can be shaken off by some people, while others can be “driven up a wall” by the same stressors
- Everyday stressors can add up and take a toll ➔ hypertension (high blood pressure)

Stress and the Heart
- Coronavirus heart disease – the clogging of the vessels that nourish the heart muscle; the leading cause of death in many developed countries
  - Can be caused by a mix of all of the following…
    - Hypertension
    - Family history
    - Smoking
    - Obesity
    - High fat diet
    - Inactivity
    - Personality
- Type A personality – competitive, hard-driving, impatient, verbally aggressive, and anger-prone people
  - More physiologically aroused by challenges – more hormones are secreted, increased heart rate and blood pressure ➔ plaque buildup in arteries which can lead to increased likelihood of heart attack
- Type B personality – easygoing, relaxed people
  - Calmer when presented with challenges
- Pessimism, depression, and anger can also lead to higher risks of heart attacks.
Stress and Susceptibility to Disease

- **Psychophysiological illness** – literally, “mind-body” illness; any stress-related physical illness, such as hypertension and some headaches.

Stress and the Immune System

- The immune system defends the body against illnesses using 2 different types of white blood cells, called **lymphocytes**
  - **B lymphocytes** – white blood cells that form in the bone marrow that release antibodies that fight bacterial infections
  - **T lymphocytes** – white blood cells that form in the thymus and other lymphatic tissue that attack cancer cells, viruses, and foreign substances (including transplanted organs)
  - **Macrophages** – “big eater,” identifies, pursues, and ingests harmful invaders

- The immune system’s effectiveness is influenced by age, nutrition, genetics, body temperature, and stress.
- If the immune system responds too strongly, it can attack the body’s own tissues (arthritis, allergies, etc)
- If the immune system fails to respond, it may allow dormant herpes virus to erupt or cancer cells to multiply.
- Women are immunologically stronger than men, therefore less susceptible to infections; however, this strength can also make women more susceptible to self-attacking diseases, such as lupus and multiple sclerosis.
- The secretion of stress hormones suppresses the creation and effectiveness of disease-fighting lymphocytes.
  - The immune system and responding to stress both require energy, and stress wins. Therefore, in times of stress, we are more likely to be susceptible to illness.

Stress and AIDS

- AIDS (acquired immune deficiency syndrome) is caused by HIV (human immunodeficiency virus), which is spread by the exchange of bodily fluids, primarily semen and blood.
- We know stress lowers the effectiveness of immune system → increased stress levels and negative emotions correlate with progression from HIV infection to AIDS and a speedier decline in health of those infected.

Stress and Cancer

- Stress and negative emotions have been linked to cancer’s rate of progression.
- Studies of rats have shown…
  - That when the immune system is suppressed by stress, tumors developed sooner and grew larger.
  - That when exposed to uncontrollable stress, rats were more prone to cancer.
- Stress does not create cancer cells, but it may affect their growth by weakening the body’s natural defenses.

Conditioning and the Immune System

- Study by Robert Ader and immunologist Nicholas Cohen studied taste aversion in rats by pairing saccharin-sweetened water with injections of a drug that suppresses the immune system. After repeated pairings, the sweetened water alone triggered immune suppression (without the drug injection).
- Using this information, researchers are hoping to enhance the immune system by conditioning.
  - The placebo effect could work like this.
Promoting Health
  • Implating strategies that prevent illness and enhance wellness.

Coping With Stress
  • Stressors are unavoidable, thus we need to learn how to cope with stress.
    o **Coping** – alleviating stress using emotional, cognitive, or behavioral methods.
    o **Problem-focused coping** – attempting to alleviate stress directly – by changing the stressor or the way we interact with that stressor.
      • Ex: directly confronting a family member that is causing you stress
      • Used when you feel in control of the stressor or the situation
    o **Emotion-focused coping** – attempting to alleviate stress by avoiding or ignoring a stressor and attending to emotional needs related to one’s stress reaction.
      • Ex: reaching out to friends to help address our own emotional needs
      • Used when you do not feel in control of the stressor or the situation

Perceived Control
  • A real or perceived loss of control over a situation triggers an outpouring of stress hormones \( \rightarrow \) decreased immune system \( \rightarrow \) increased susceptibility to disease and illness

Explanatory Style
  • More optimistic people tend to secrete less stress hormones and are less susceptible to illness.

Social Support
  • People with supportive friends, family, and spouses tend to eat better, exercise more, sleep better, and smoke less and therefore cope with stress better.
Managing Stress

Aerobic Exercise
- **Aerobic exercise** – sustained exercise that increases heart and lung fitness; may also alleviate depression and anxiety
- Why does aerobic exercise alleviate depression and anxiety?
  - Increases levels of mood-boosting chemicals such as norepinephrine, serotonin, and endorphins
  - Could enhance memory
  - Promotes growth of new brain cells
- Exercise also promotes health by strengthening the heart, increasing blood flow, reducing plaque in arteries, and lowering blood pressure.

Biofeedback, Relaxation, and Meditation
- Can we consciously control the physiological effects of stress?
- **Biofeedback** – a system for electronically recording, amplifying, and feeding back information regarding a subtle physiological state, such as blood pressure or muscle tension.
  - Biofeedback methods seem to work best with tension headaches, but simple relaxation can offer the same effects as complicated and complex biofeedback methods for issues such as headaches, hypertension, anxiety, and insomnia.
- Meditation allows the subject to feel the same effects as biofeedback, such as decreased blood pressure, heart rate, and oxygen consumption.

Complementary and alternative medicine – unproven healthcare treatments not taught widely in medical schools, not used in hospitals, and not usually reimbursed by insurance companies.
- encompasses methods such as acupuncture, massage therapy, homeotherapy, spiritual healing, herbal remedies, chiropractic, and aromatherapy.
- These types of alternative medicines may be beneficial to some people, therefore, it does not matter if it is considered alternative or not, as long as it is helpful.

Spirituality and Faith Communities
- Religious affiliation and religiosity have correlated with a longer life span.
  - Religiously active people lead healthier lifestyles (less smoking, drinking, etc)
  - Faith communities can act as social support networks.
  - Religious communities encourage marriage → longer life span
  - Religious activity can help people think about the future optimistically and lead to less anxiety and depression.

*** Sustained emotional reactions to stressful events can be debilitating. However, we can cope with stressors by problem-solving or emotional coping, and we can manage stress by making ourselves emotionally and physically stronger.***
Modifying Illness-Related Behaviors

- Many patients seeing health care professionals complain of common symptoms such as fatigue, headaches, chest or abdominal pains, dizziness, constipation, and insomnia; however, fewer than 20% of these patients have a clear source of the complaint. Researchers presume many of the rest involve psychosocial factors that could be modified by health-promoting programs. These programs could help people who struggle with issues concerning smoking, nutrition, and weight control.

The Risks of Smoking

- 250 million packs a day consumed worldwide
- Almost 5 million tobacco related deaths a year
- 1.3 billion consumers worldwide
- “Teen to the grave” smoker has a 50% chance of dying from smoking
- 1 cigarette = 12 minutes of life
- 97% of Americans believe smoking is harmful to health
- Smoking correlates with higher rates of depression, chronic disabilities, and divorce.

When and Why Do People Start Smoking?

- Smoking is considered a pediatric disease – people usually begin to smoke in adolescence.
  - Especially common among those who get low grades, who drop out of school, who feel less competent and in control of their future, and whose friends, parents, and siblings smoke.
  - Those who have not started smoking by the time they are in college/university, will probably not start.
- Adolescents mimic those around them and those that they admire
  - Family (parents, siblings, etc)
  - Peers (“cool kids,” peer pressure, etc)
- Cigarette companies market cigarettes with themes that appeal to teens: independence, adventure-seeking, social approval, sophistication.
- Smoking in films and TV became more prominent in the 1990s, especially in movies marketed to teens.

Why Do People Not Stop Smoking?

- Studies have shown that tobacco products are as addictive as heroin and cocaine. However, at least 1 in 3 people who try smoking becomes hooked – a higher addiction rate that of heroin or cocaine.
- Smokers become dependent on the tobacco, as well as develop a tolerance to tobacco levels. Quitting smoking results in a nicotine withdrawal during which the individual can experience cravings, insomnia, anxiety, and irritability.
- Nicotine…
  - Triggers the release of epinephrine and norepinephrine which diminish appetite and boost alertness.
  - Stimulates the release of dopamine which activates the reward/pleasure system in the brain.
- Genes can influence one’s propensity to tobacco addiction.
  - Studies have shown that smokers and nonsmokers differ in a gene that influences responses to dopamine.

Helping Smokers Quit

- Some efforts to helping smokers quit include…
  - Public health warnings
  - Counseling
  - Drug treatments
  - Hypnosis
  - Aversive conditioning (ex: have people sicken themselves by rapidly smoking cigarette after cigarette)
  - Operant conditioning
  - Cognitive therapy
  - Support groups
- These treatments are often effective in the short run, but 1/5 of participants eventually start smoking again.
- CDC reports that 50% of American smokers have quit at some point, with more than 90% of those doing so on their own, often after repeated attempts.
- More restaurants and workplaces are placing bans on smoking.
- Among highly educated people or those in the upper socioeconomic level, smoking rates have decreased.
The death rate due to coronary heart disease has declined by 30% since the mid 1960s.

- Global perspectives on smoking:
  - Smoking has become increasingly popular in Asia (35% of Japanese smoke)
  - African countries such as Kenya and Zimbabwe are prime targets for British and US tobacco companies, as there are relatively low per-person consumption rates.
  - The World Health Organization predicts that in the next 30 years, 70% of tobacco-related will occur in developing countries where many are unaware of the dangers that accompany smoking.

How Can We Prevent Smoking?
- Key aspects to smoking prevention programs:
  - Information about the effects of smoking
  - Information about peer, parent, and media influences
  - Training in refusal skills, through modeling and role-playing
- Tobacco sales could decrease if prices increase → tobacco tax

For Those Who Want to Stop Smoking…
- Set a quit date.
- Inform family and friends (accountability).
- Remove all cigarettes.
- Review things you learned from previous attempts to quit and anticipate challenges.
- Use a nicotine patch or gum.
- Be totally abstinent – not even a single puff.
- Abstain from or greatly limit alcohol (which facilitates relapse).
- If other smokers live or work with you, quit together.
- Avoid places where others are likely to smoke.
- Exercise (studies have shown that quitters who exercise have higher success rates).

Obesity and Weight Control
- CDC reports that 65% of Americans are overweight.
- Fat = stored energy
  - Product of evolution – energy for when our ancestors faced times of famine
- Where food is scarce, obesity is ideal
  - Centuries ago in Western cultures, obesity signaled affluence and wealth (had enough money to eat excessively and was wealthy enough to escape manual labor)
- Where food is plentiful, thin is ideal
  - Current western societies that praise thinness
- Being slightly overweight proposes small health risks, that can be minimized by regular exercise and fitness.
- Severe obesity, especially among children, poses risks such as diabetes, high blood pressure, heart disease, gallstones, arthritis, and some types of cancer → shorter life expectancy
  - Risks are greater for those who tend to carry excess fat in their mid-section, rather than their hips or thighs.
  - Some studies link obesity in women to higher rates of Alzheimer’s disease later in life.
- In 2004, the US Medicare system began recognizing obesity as an illness.
- The US government guidelines encourage a body mass index (BMI) under 25. The World Health Organization and many other countries define obesity as a BMI of 30 or more. BMI is calculated using the following formula: (weight in kg/squared height in meters). To find weight in kg, multiply weight in pounds by 0.45. To find squared height in meters, divide height in inches by 39.4 and then square the result.

The Social Effects of Obesity
- Obesity is stigmatized in the US.
  - Affects the way obese people are treated and how they view themselves.
  - Negative stereotype: slow, lazy, and sloppy.
Viewed as a choice by some people, evidence of a lack of self-discipline, or a personality problem (a maladjusted way of reducing anxiety, dealing with guilt, or gratifying an “oral fixation.”

Studies have shown that when images of people are adjusted to appear heavier, others rate these images as less sincere, less friendly, meaner, and more obnoxious.

Obese women followed in a study for 7 years found that those who remained obese made less money and were more likely to be unmarried.

Studies reveal a “weight bias” in job interviews, especially towards women, that could be more significant that gender or race bias.

- So why don’t obese people just lose weight? Answer lies in the physiology of weight…

The Physiology of Weight
- Research disagrees with the conclusion that obese people are weak, undisciplined people.
- Common sense tells us that if a pound is 3500 calories, then a pound will be lost for every 3500 calorie deficit in a diet. Research disagrees.

Fat Cells
- The number and size of fat cells are the immediate determinants of body fat.
- Typical adults have 30-40 billion fat cells, half of which lie near the skin’s surface.
- In an obese person, fat cells can swell to 2-3 times their normal size, and then divide, resulting in up to 75 billion fat cells.
- Once fat cells develop, they may shrink, but never disappear.

Set Points and Metabolism
- Fat tissue has a lower metabolic rate, which means it takes less food energy to maintain.
- An obese person has a higher set-point (“weight thermostat”), and when weight drops below the set-point, hunger increases and metabolism decreases → body adapts to less food by burning less calories.
  - A study in which obese patients were given a 450 calorie a day diet lost only 6% of their body weight because their metabolism dropped about 15%. → evidence for why simply reducing your caloric intake by 3500 calories will not result in a 1 pound loss.
- Lean people are more likely to fidget and move about more than energy-conserving obese people who tend to sit still longer.

The Genetic Factor
- Studies have revealed genetic factors concerning weight…
  - Adoptive children’s weight resembles that of their biological parents than adoptive parents.
  - Identical twins have closely similar weights, compared to fraternal twins or siblings.
  - Given an obese parent, a boy is 3 times and a girl is 6 times more likely to become overweight than children without an obese parent.
- Genetic factor is still unclear… some people might have genes that signal a fullness feeling sooner, or genes that dictate how many calories are burned and how many are turned to fat, or genes that cause some people to fidget more.
- It is scientifically known that the brain monitors the genes that produce the protein leptin, which decreases appetite and increases activity when injected into rats. Some diet pills are testing leptin in humans (2004).

The Food and Activity Factors
- There are environmental factors that influence obesity…
  - Americans are more obese than Europeans
  - Women in lower socioeconomic classes are 6 times more likely to be obese.
  - TV watching, in increments of 2 hours, has been correlated with obesity and higher risk of diabetes.
  - People living in walking-dependent communities tend to weigh less than those living in car-dependent suburbs.
  - Visits to fast-food institutions have tripled since 1997 while the serving sizes have also increased.
  - Average calorie intake has risen since 1971, men by 200 and women by 300.
  - College and university campuses have instituted all-you-can-eat food buffets, including soft drinks and sweets… some explanation for the “Freshman 15.”
  - Obese smokers die on average 13.5 years sooner than their nonsmoking obese counterparts.
  - Since 1960, the average American has gown one inch and gained 23 pounds.
o Worldwide, 60% of people are overweight (according to the World Health Organization).
 o New stadiums, subway cars, and theaters are offering wider seats to accommodate a “growing” population.

*** Genes can account for why one person may be obese or thin compared to their current peers. Environmental factors can account for why the current population is more apt to obesity than the population of 50 years ago.***

Losing Weight
• Most people who lose weight, eventually regain the weight → formerly obese people have the same number of fat cells, just shrunken.
• Some people manage to keep the weight off, by modifying their lifestyle and eating behaviors.
• Americans spend $40 billion a year on diet foods and drinks.
• Some suggestions for losing weight that alter the environment include:
  o Instituting an extra tax on high-fat or high calorie foods.
  o Using the revenue to support healthy food programs and health-supportive nutritional advertising.
  o Establish a fast-food free zone around schools.
  o Ban the advertising of junk foods to kids.
  o Encourage activity by designing communities with walks, bike paths, and residences near workplaces.

For Those Who Want to Lose Weight…
• Severely overweight people are advised to seek medical evaluations and guidance, however for those who want to lose a few pounds…
  o Begin when you are motivated and feel self-disciplined. → permanent weight loss includes lifestyle changes.
  o Minimize exposure to tempting food → keep tempting foods out of sight and out of the house.
  o Take steps to boost metabolism → begin exercising such as walking, running, or swimming
  o Be realistic and moderate → set realistic goals and realize that permanent weight loss happens gradually.
  o Eat healthy foods → whole grains, fruits, vegetables, healthy fats like olive oil and fish can regulate appetite.
  o Don’t starve all day and eat one big meal at night. → this slows metabolism, it is best to eat a more balanced, bigger breakfast.
  o Beware of the binge. → drinking alcohol or feeling anxious or depressed can cause the urge to eat… lapsing is common but permanent weight loss requires life-long self-control.

*** We all tend to deny health risks (ex: smokers may discount the effects due to rigorous exercise habits), thus the first goal of health-promotion programs must make us all realize our vulnerability to stress and behavior-related health problems.***

<table>
<thead>
<tr>
<th>Health</th>
<th>Biological</th>
<th>Psychological</th>
<th>Sociocultural</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Genetic predispositions towards physiological reactivity, disease, addiction, depression, and other health problems</td>
<td>Appraising stressors as challenges or threats</td>
<td>Environmental stressors</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Coping ability</td>
<td>Cultural influences on eating, smoking, and other behaviors</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Personality</td>
<td>Social support</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Optimistic or pessimistic explanatory style</td>
<td>Available medical support</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Healthful or harmful behaviors</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Personal control and other previous experiences</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Spirituality</td>
<td></td>
</tr>
</tbody>
</table>