AN INTEGRATIVE APPROACH TO PSYCHOPATHOLOGY

I. One-Dimensional versus Multidimensional Models

A. One-dimensional models posit single causes of psychopathology (e.g., its all conditioning, its all biology, its all social or psychological).

B. Multi-dimensional models hold that a system of different reciprocal influences (i.e., biological, cognitive, learning, emotional, social, cultural) interact in complex ways to yield the major etiological and maintaining processes responsible for abnormal behavior. As such, any biological or environmental influence can become part of this system and cannot be considered in an isolated context.

II. Genetic Contributions to Psychopathology

A. The nature of genes

1. Genes are segments of deoxyribonucleic acid (DNA) that contain information about specific characteristics.

2. Each human cell contains 46 chromosomes (arranged in 23 pairs – half from each parent).

3. The first 22 pairs of chromosomes program development of body (including the brain) and the last pair, called the sex chromosomes, determines sex phenotype.

4. Dominant gene is one of the pair of genes that determine a particular trait and the effect can be quite noticeable.

5. Recessive gene must be paired with another recessive gene to determine a trait.

6. Defective gene results if something is wrong with respect to the ordering of DNA molecules on the double helix.

7. Genes seldom determine our physical development in any absolute way and the same is true for psychopathology. Much of human development and behavior is polygenic (i.e., influences by many genes that individually exert a tiny effect). Because of this, scientists look for patterns of influence across genes using a procedure called quantitative genetics.

B. New developments in the study of genes and behavior

1. The best estimate for genetic contribution to enduring personality traits and cognitive abilities in humans is about 50%.

2. With respect to psychological disorders, genetic influences seem to account for less than half the etiological explanation; however, no individual genes have been identified relating to any major psychological disorders.

3. More important questions now are how genetic and environmental factors interact to influence psychological disorders.
C. The interaction of genetic and environmental effects

1. An example of gene-environment interaction was proposed by Eric Kandel, who stated that the process of learning may change the genetic structure of cells. This may occur when environmental processes turn on dormant genes and changes in the brain's biochemical functioning. This view lends support to the notion that we are less hardwired than previously thought.

2. The diathesis-stress model
   a. According to this model of gene-environment interaction, persons inherit from multiple genes tendencies to express certain traits or behaviors (diathesis), which may then be activated under certain environmental events such as stress. Examples include blood-injury-injection phobia and alcoholism. The diathesis or vulnerability does not necessarily lead to a disorder unless some specific life event occurs.
   b. A person with a large diathesis would, according to this model, require a smaller amount of stress for a disorder to develop compared to someone with a relatively smaller diathesis to begin with.

3. The Reciprocal gene-environment model
   a. This model states that persons are believed to have a genetically determined tendency to create the very environmental risk factors that trigger genetic vulnerabilities.
   b. Such a model may be used to explain depression, divorce, and personality characteristics such as impulsivity.

4. Nongenomic "inheritance" of behavior
   a. Related to research suggesting that there has been an overemphasis on the role of genetic influence on personality, temperament, and their contribution to the development of psychological disorders. Examples include research on genetically identical mice (including rats and rhesus monkeys using cross-fostering strategies) reared in identical environments, but perform and behave quite differently on several experimental tasks above what genes would suggest.
   b. The moral is that it is even too simplistic to say that the genetic contributions to personality traits or psychopathology is 50%; one must consider the heritable contribution in the context of an individual’s past and present environment.
III. Neuroscience and its Contributions to Psychopathology

A. The field of neuroscience focuses on understanding the role of the nervous system in disease and behavior. Knowing how the nervous system and particularly the brain works is central to understanding behavior, emotion, and cognitive processes.

B. The central nervous system (CNS)

1. Consists of the brain and spinal cord and processes all information received from our sense organs and reacts as necessary.

2. Neurons control every thought and action, the brain contains an average of 140 billion neurons. (Worksheet)

   a. The typical neuron contains a central cell body with two different kinds of branches. One set of branches, dendrites, extend from the cell body to receive chemical messages from other nerve cells which are converted into electrical impulses. The other branch, the axon, transmits these impulses to other neurons. Any one nerve cell is linked with multiple others.

   b. Neurons themselves operate electrically, but communicate with other neurons chemically. The synaptic cleft (or gap) is a small space that exists between the axon of one neuron and the dendrites of another. It is here where neurons communicate with one another via release of neurotransmitters.

   c. Neurotransmitters (page 42) are the chemicals released from one nerve cell to another across the synaptic cleft. After a neurotransmitter is released it is quickly drawn back from the synaptic cleft into the same neuron via a process known as reuptake. Major neurotransmitters implicated in psychopathology include norepinephrine (or noradrenaline), serotonin, dopamine, and gamma aminobutyric acid (GABA).

   (Brain worksheet)
3. The brain is divided into two parts. The lower brain stem is the most primitive part and is responsible for most of the automatic functions necessary for survival (e.g., breathing, sleeping, moving). The more advanced brain systems are located in the forebrain.

a. The hindbrain is the lowest part of the brainstem, and contains the medulla, pons, and cerebellum (motor coordination). These structures control activities such as breathing, heartbeat, and digestion.

b. The midbrain coordinates movement with sensory input and contains parts of the reticular activating system (RAS). The RAS contributes to arousal, tension, and waking and sleeping.

c. At the very top of the brain stem (i.e., above the hindbrain) lies the diencephalon, which contains the thalamus and hypothalamus; these structures help transmit information to the forebrain and are integral to behavior and emotion.

d. At the very base of the forebrain (just above the thalamus and hypothalamus) is the telencephalon, containing the limbic system. Limbic means "border," and this system figures prominently in much of psychopathology. It includes the following structures: hippocampus (sea horse), cingulate gyrus (girdle), septum (partition), and amygdala (almond). Emotional expression, impulse control, sex, aggression, hunger, and thirst are controlled by this part of the brain. Another area at the base of the forebrain is the basal ganglia, including the caudate (tailed) nucleus. Motor behavior is controlled by this area, and damage can cause twitching or shaking.

e. The largest part of the forebrain is the cerebral cortex which contains over 80% of the neurons in the CNS. Reasoning and creative skills are derived from this brain area. The cerebral cortex is divided into two near-symmetrical hemispheres: the left hemisphere appears to be responsible for verbal and cognitive processes, whereas the right hemisphere appears more responsible for spatial abilities.

f. Each hemisphere of the cerebral cortex consists of four separate areas of lobes. The temporal lobe is associated with the recognition of sights and sounds and long-term memory storage. The parietal lobe is associated with touch recognition. The occipital lobe integrates visual input. The frontal lobe is most interesting from the standpoint of psychopathology and is largely responsible for thinking and reasoning abilities, memory; it enables one to relate to people and events in the world and to behave as social animals.
C. The **peripheral nervous system** works in coordination with the brain stem to ensure proper bodily functioning and consists of the (1) **somatic nervous system**, which controls muscles and movement, and (2) **autonomic nervous system (ANS)**, which is divided into the **sympathetic** and **parasympathetic nervous systems**. The ANS regulates the cardiovascular system, endocrine system (e.g., pituitary, adrenal, thyroid, gonadal glands) and aids in digestion and regulation of body temperature.

1. The sympathetic and parasympathetic branches of the ANS operate in a complementary fashion. The **sympathetic** nervous system mobilizes the body (e.g., increases heart rate) during periods of stress or danger and is part of the emergency or alarm response; the **parasympathetic** nervous system renormalizes arousal and facilitates digestion.

2. The **endocrine system** produces its own chemical messengers (i.e., **hormones**) and releases them directly into the bloodstream. **Adrenal glands** produce epinephrine (also called adrenaline) in response to stress, including salt-regulating hormones; the **thyroid** produces thyroxine, which facilitates energy metabolism and growth; the **pituitary** is the master gland that produces several regulatory hormones; and the gonads produce sex hormones (e.g., testosterone and estrogen). The endocrine system is closely related to the immune system and is implicated in anxiety, stress-related, and sexual disorders.

3. The **hypothalamic-pituitary-adrenalcortical axis** (HYPAC axis) illustrates the connection between the nervous and endocrine systems and is implicated in several forms of psychopathology.

D. **Neurotransmitters**

1. Drug therapies function by either increasing or decreasing the flow of specific neurotransmitters. **Agonists** increase the activity of a neurotransmitter by mimicking its effects. Some drugs, known as **antagonists**, function to inhibit or block the production of neurotransmitter or function indirectly to prevent the chemical from reaching the next neuron by closing or occupying the receptors; other drugs increase production of competing biochemicals that deactivate the neurotransmitter or produce effects opposite those produced by the neurotransmitter (inverse agonists). Most drugs are either agnostic or antagonistic.

2. Types of neurotransmitters include:
   a. **Serotonin** (5HT) is concentrated in the midbrain and connected to the cortex, thus producing widespread effects on behavior, mood, and thought processes. Extremely low levels of serotonin are associated with less inhibition, instability, impulsivity, and tendencies to overreact to situations (e.g., aggression, suicide, impulsive overeating, excessive sexual behavior. Tricyclic antidepressants (e.g., imipramine), and new classes of serotonin specific reuptake inhibitors (SSRIs; e.g., Prozac) affect the serotonergic system (see also St. John’s-wort).
b. **Gamma aminobutyric acid (GABA)** reduces postsynaptic activity which, in turn, inhibits several behaviors and emotions, particularly anxiety. **Benzodiazepines**, or mild tranquilizers, make it easier for GABA to attach to specialized receptors. Effect is not specific to anxiety. The benzodiazepine-GABA system reduces overall arousal and tempers anger, hostility, aggression, and possibly excessive anticipation and even positive emotional states.

c. **Norepinephrine** (also known as noradrenaline) is also part of the endocrine system and important in psychopathology. **Catecholamines** are secreted by the adrenal glands and norepinephrine stimulates at least alpha-adrenergic and beta-adrenergic receptors. **Beta-blockers** for hypertension reduce the surge in norepinephrine and keep heart rate and blood pressure down. You may ask students to think about what might happen to someone who over does it when they are taking beta-blockers.

d. **Dopamine** (also classified as a catecholamine) has been implicated in schizophrenia and may act by "switching on" various brain circuits that inhibit or facilitate emotions or behavior. Reserpine (from Chapter 1) blocks specific dopamine receptors, thus lowering dopamine activity. Dopamine and serotonin circuits cross at many points and seem to balance one another. An agonist for dopamine is L-DOPA, which has been shown to be effective for treating Parkinson's disease by increasing levels of dopamine. Illustrate to students what happens when Parkinson’s patients are given too much dopamine — they begin to show signs and symptoms of schizophrenia, whereas when the levels of dopamine are lower to the extreme schizophrenic patients show behaviors associated with Parkinson's disease.

**E. Implications for psychopathology**

1. Methods for studying brain images have been applied to psychopathology. For example, persons with obsessive-compulsive disorder show increased activity in the orbital surface of the cerebral cortex, the cingulate gyrus, and to a lesser extent the caudate nucleus. One of the strongest concentrations of neurotransmitters in these areas is serotonin, which is related to over reactive or compulsive behavior. Damage to this brain circuit is related to an inability to ignore irrelevant cues, making the organism over reactive.

**F. Psychosocial influences on brain structure and function**

1. In addition to potential biological interventions, psychological treatments may be powerful enough to modify brain circuits; for example, the treatment of OCD via exposure and response prevention can result in the normalization of brain function. Also, psychosocial factors may directly affect levels of neurotransmitters (animal studies indicate that certain neurochemical substances have very different effects depending on the psychological histories of the animals). An example of psychosocial influences on brain structure and function include **psychosocial dwarfism**.
2. Several recent experiments illustrate the interaction of psychosocial factors and brain function at the level of neurotransmitter activity. Experiments on early effects of controllability over life events in Rhesus monkeys have shown psychosocial factors can exert powerful effects on the action of neurotransmitters over subsequent behavior. Learning and experience can also affect the structure of neurons, including the number of receptors on a cell and how they respond to subsequent experience. One explanation is that learning and experience produces more plastic and rich neural connections in the brain, and that such experience can determine vulnerability to psychological disorders later in life.

IV. Psychological Contributions to Psychopathology

A. Conditioning and cognitive processes

1. Robert Rescorla and others’ experiments indicate that basic classical and operant conditioning paradigms facilitate the learning of the relations among events in the environment. This learning involves complex cognitive and emotional processing in humans and lower animals.

2. Martin Seligman described the concept of learned helplessness, or the lack of behavior shown by an organism when it encounters conditions over which no control is possible. People may make certain attributions about their environment when they believe they have little control over stress in their lives. People may become depressed if they decide or think they can do little about the stress in their lives (i.e., attribution of no control), even if others think there is something that could be done.

3. Albert Bandura observed that organisms can learn simply by watching others in their environment (modeling or observational learning). This type of learning requires a symbolic integration of the experiences of others with judgments of what might happen to the observer. Bandura also specified the importance of social context in learning and maintained that much of what we learn depends on our interactions with other people around us.

4. Prepared learning reflects the recognition that biology and genetics influence what we learn and how readily we do so. This view is based on the observation that we learn to associate fears and phobias with certain types of objects or situations that have some evolutionary basis in promoting survival (e.g., snakes or spiders). Over the course of evolution certain unconditioned and conditional stimuli become more readily associated for their survival value and this preparedness is passed on via genetics.

B. Cognitive science and the unconscious

1. Advances in cognitive science have revolutionized our conceptions of the unconscious. Examples include the concepts of blind sight (unconscious vision), dissociation between behavior and unconsciousness (hypnotism), and implicit memory (i.e., acting on the basis of things that have happened in the past but being unable to remember the past events).
2. One method for exploring the unconscious (or black box) is the **Stroop color naming paradigm**, where subjects are shown a variety of words printed in different color inks. Delays in color naming occur when the meaning of the word attracts the subject's attention despite efforts to concentrate on the color of the word.

C. **Cognitive-behavioral therapy (CBT)** refers to the integration of cognitive procedures and behavioral techniques directly into therapy. Among the originators of CBT was Aaron T. Beck, who developed methods for dealing with faulty attributions and attitudes associated with learned helplessness and depression. Albert Ellis’ rational-emotive-behavior therapy is another form of CBT. CBT examine in some detail appropriate and unrealistic thoughts and thinking processes via having the patient monitor their thoughts. Therapy is then directed at elucidating these thoughts and working to develop a different set of attitudes and attributions, as well as changing certain behaviors.

V. **The Role of Emotions in Psychopathology**

A. **Emotion** means to elicit or evoke motion (e — motion). Excessive or disruptive emotions are often intimately tied with forms of psychopathology.

B. The physiology and purpose of fear

1. The physiologist Walter Cannon speculated that **fear** activates the cardiovascular system, blood vessels constrict, arterial pressure rises while blood flow is decreased to the extremities, breathing becomes faster, increased amounts of sugar are released from the liver into the bloodstream, hearing becomes more acute, digestive activity is suspended, shivering and piloerection also occur.

2. Fear is the subjective feeling of terror, a strong motivation for behavior (escape or fighting), and a complex physiological arousal response. This fight or flight reaction was fundamentally important in the course of evolution and is very much with us today in normal behavior and in several forms of psychopathology.

C. **Emotional phenomena**

1. Defining emotion is difficult, but most agree that it is an **action tendency** to behave in a certain way that is elicited by an external event, a feeling state, and one accompanied by a possibly characteristic physiological response. Emotions function to ensure that we pass our genes on to subsequent generations.

2. **Emotions** are usually short-lived, temporary states lasting several minutes to several hours. **Mood** is a more persistent period of affect or emotionality. **Affect** usually refers to the momentary emotional tone that accompanies what we say or do, but can also be used generically to summarize commonalities among emotional states that are characteristic of an individual.
D. **The components of emotions**

1. Emotion is comprised of three components that are often considered in isolation from the others: behavior, physiology, and cognition. Walter Cannon viewed emotion as primarily a brain function, whereas Richard S. Lazarus emphasizes the cognitive aspects of emotion. Many theorists believe that the cognitive and emotional systems interact and overlap, but are fundamentally separate.

E. **Anger and your heart**

1. Sustained anger and hostility appear closely related to the development of heart disease. This may occur because the ability of the heart to efficiently pump blood throughout the body drops significantly when one is angry (placing the person at increased risk of disturbances in heart rhythm) but not during stress or exercise.

F. **Emotions and psychopathology**

1. Suppressing almost any kind of emotional response (e.g., anger or fear) increases sympathetic nervous system activity and can even help produce the unwanted emotional state and related thoughts. Emotions affect cognitive processes, and many basic emotions (e.g., fear, anger, sadness or distress, excitement) seem to play a direct role in psychological disorders (e.g., anxiety, depression, mania) and may even define them.

VI. **Cultural, Social, and Developmental Factors**

A. **Cultural factors** influence the form and content of psychopathology and differ among cultures and social groups that may co-exist in close proximity. Voodoo, the evil eye, and other fears represent phenomena that are strongly tied to changes in the social environment.

B. **Gender** exerts a strong and puzzling effect on psychopathology. Females are at higher risk for developing particular kinds of phobias (e.g., insect, small animal phobias) and eating disorders, whereas social phobias affect men and women equally. The difference may have to do with cultural expectations of men and women and gender roles.

C. The number and frequency of **social relationships** and contacts is strongly related to mortality. Social relationships seem to protect individuals against high blood pressure, depression, alcoholism, arthritis, progression of AIDS, low birth weight in newborns, and susceptibility to catching a cold and infection.

D. Older persons with few meaningful contacts and little social support report high levels of depression and unsatisfactory quality of life. If they became physically ill, they often receive more substantial family support which serves to reestablish their social bonds and makes life worth living.
E. Psychological disorders are global phenomena. Approximately 10 — 20% of all primary medical services in poor countries are sought by patients with psychological disorders; record numbers of men are committing suicide in Micronesia; alcoholism levels among adults in Latin America have risen to 20%. Treatments for disorders that are successful in the United States often cannot be administered in countries where mental health services are limited (e.g., China). Social and cultural factors maintain disorders as most societies do not have the means of alleviating and preventing them.

VII. Life-Span Development

A. To completely understand psychopathology, one must appreciate how disorders change with time. Persons are not their disorders and are often not disordered at all times and particularly over time. Just like a fever, clinicians and researchers recognize that a particular behavior or disorder may have multiple causes.

B. For example, the principle of equifinality is used in developmental psychopathology to indicate that there may be a number of paths to a given outcome. These different paths may result from psychological factors that interact with biological components during various stages of development.