

YOU KNOW YOU HAVE MASTERED THE MAIN TOPICS IN THIS CHAPTER IF YOU ARE ABLE TO . . .

- ∞ Define consciousness and discuss the different levels of consciousness.
- ∞ Explain the factors that control sleep, theories on the purpose of sleep, the stages of sleep, and disorders of sleep.
- ∞ Discuss dreams and three theories that attempt to explain the purpose of dreams.
- ∞ Introduce the phenomenon of hypnosis and two theories suggesting the underlying mechanism.
- ∞ Describe properties and potential dangers of psychoactive drugs including stimulants, depressants, narcotics, and hallucinogens.
- ∞ Talk about the effects of sleep deprivation

RAPID REVIEW

Consciousness is defined as a person's awareness of the world around him or her. **Waking consciousness** is defined as the state of awareness where our thoughts and feelings are clear and organized. **Altered states of consciousness** describe a shift in the quality or pattern of a person's awareness. Examples of altered states of consciousness include using drugs, daydreaming, being hypnotized, or simply sleeping.

The sleep-wake cycle is a **circadian rhythm**, meaning one cycle takes about a day to complete. The cycle is regulated by the **suprachiasmatic nucleus (SCN)** located in the hypothalamus. The SCN responds to changes in daylight and regulates the release of **melatonin** from the pineal gland and body temperature accordingly. By the end of the day, higher melatonin levels and lower body temperature cause people to feel sleepy. In addition, high levels of serotonin are believed to produce feelings of sleepiness. The sleep-wake cycle tends to shift to a 25-hour cycle when subjects do not have access to the sun or clocks. **Sleep deprivation**, or loss of sleep, results in an increase in **microsleeps**, concentration problems, and an inability to perform simple tasks. Participants in a number of sleep deprivation studies reported that they were unaware of their impaired functioning. Two theories are currently proposed for why we sleep. The **adaptive theory** suggests that we sleep to avoid predators, while the **restorative theory** states that sleep is needed to replenish chemicals and repair cellular damage. Both theories are probably partially correct.

Based on brain wave activity recorded with the use of an EEG, sleep has been divided into two different types, **rapid eye movement (REM) sleep** and **non-REM sleep**. Non-REM sleep is a deep, restful sleep and consists of four stages. Stage 1 sleep is also called light sleep and occurs when brain activity begins to shift from **alpha** to **theta wave** activity. Many people experience a **hypnic jerk** in this stage when their body jerks suddenly and wakes them up. As body temperature continues to drop and heart rate slows, **sleep spindles** begin to appear on the EEG recording, signaling Stage 2 of non-REM sleep. Stage 3 occurs when the slow, large **delta waves** first appear; and when delta waves account for more than 50 percent of the total brain activity, the person is said to be in Stage 4, the deepest stage of sleep.

After a person cycles through Stages 1-4 and back, instead of entering Stage 1, people experience REM sleep. During this type of sleep, the brain is active and displays **beta wave** activity, the eye exhibits rapid movements, and the skeletal muscles of the body are temporarily paralyzed. This paralysis is referred to as **REM paralysis**. When a person is wakened from this type of sleep they often report being in a dream state. Most likely, around 90 percent of dreams take place in REM sleep, although dreams also do occur in non-REM sleep. Contrary to popular belief, people do not go crazy when deprived of REM sleep; however, they do spend longer amounts of time in REM sleep when allowed to sleep normally again. This phenomenon is known as **REM rebound**. **Nightmares** are bad dreams and typically occur in REM sleep. **REM behavior disorder** is a rare disorder in which a person's muscles are not paralyzed during REM sleep, allowing them to thrash about and even get up and act out their dreams.

There are a large number of disorders associated with sleep. **Sleepwalking**, or somnambulism, occurs in Stage 4, as well as the rare disorder of **night terrors**. Most people state that they are not aware of the actions they committed during a sleepwalking episode. The explanation of "sleepwalking" has

been used as a successful defense in several trials for murder, but in these cases, the term sleepwalking is more likely referring to the condition known as REM behavior disorder. **Insomnia** is the inability to get to sleep, stay asleep, or get a good night of quality sleep. **Sleep apnea** is a disorder in which a person actually stops breathing for brief periods throughout the night. **Narcolepsy** is a genetic disorder in which a person suddenly enters REM sleep during the day. The attack can occur many times throughout the day and without warning. The attacks often occur with cataplexy, or a sudden loss of muscle tone.

Several theories have been proposed to explain why dreams occur. Sigmund Freud believed that dreams represented our unconscious thoughts and desires. He called the actual content of our dream the **manifest content** and the real meaning of the dream the **latent content**. The **activation-synthesis hypothesis** was originally proposed by Hobson and McCarley and suggests that dreams are caused by lower brain areas activating the cortex and the cortex fitting together (or synthesizing) the random input from the lower brain. The **activation-information mode model (AIM)** expands on the activation-synthesis model in an attempt to explain the meaningful, realistic, and consistent nature of many dreams. AIM proposes that the cortex uses information from the previous days as it pieces together the input coming from the lower brain. A considerable amount of information is known about the content of dreams. Most dreams tend to reflect events in everyday life as well as the “personality” of the dreamer’s culture. Men tend to dream about males, weapons, tools, cars, roads; and their dreams occur in outdoor or unfamiliar settings containing more physical aggression than women’s dreams. Men also report more sexual dreams. Women tend to dream about men and women equally; they also are more likely to report dreams about people they know, family, home, concerns about their appearances and dreams in which they are the victims of aggressive acts. Dreams of being naked in public appear to be common in many cultures.

Hypnosis is a state of consciousness in which a person is especially susceptible to suggestion. Hypnosis can reduce the sensation of pain, create temporary states of amnesia, and affect sensory perception; but it cannot increase physical strength, enhance memory, or regress a person back to their childhood. One theory of hypnosis proposed by Ernst Hilgard suggests that the hypnotized person is in a state of dissociation with one part of the brain unaware of the activities happening under hypnosis and another part aware and simply watching what is happening. Hilgard called the part of the conscious that was aware of the activities the hidden observer. The **social-cognitive explanation** of hypnosis states that people who are hypnotized are not in an altered state but are simply playing the role they feel is expected of them in the situation.

A **psychoactive drug** is any drug that alters a person’s thinking, perception, or memory. **Physical dependence** on a drug occurs when the user’s body does not function normally without the drug. Two signs of physical dependence are drug tolerance and symptoms of **withdrawal** when deprived of the drug. **Psychological dependence** occurs when a drug is needed to maintain a feeling of emotional or psychological well-being. Psychoactive drugs can be classified into major categories including stimulants, depressants, narcotics, and psychogenic drugs.

Stimulants are a class of drugs that increase the activity of the nervous system and the organs connected to it. Specifically, stimulants activate the fight-or-flight response of the sympathetic nervous system. **Amphetamines** are man-made stimulants and include drugs such as benzedrine, methedrine, and dexedrine. Large doses of amphetamines can lead to a severe mental disturbance and paranoia called amphetamine psychosis. **Cocaine** is a naturally occurring stimulant found in coca plant leaves. Cocaine produces feelings of happiness, energy, power, and pleasure and also reduces pain and suppresses appetite. Cocaine is highly addictive and can cause convulsions and death even in first-time users. Signs of cocaine abuse include compulsive use, loss of control, and disregard for the consequences of use. **Nicotine** is a mild yet toxic naturally-occurring stimulant that raises blood pressure, accelerates the heart, and provides a rush of sugar into the bloodstream. Nicotine has been found to be more addictive than heroin or alcohol and is linked to nearly 430,000 deaths in the United States each year. **Caffeine** is a third naturally occurring stimulant that increases alertness and can enhance the effectiveness of certain pain relievers.

Depressants are drugs that slow down the central nervous system and include **barbiturates**, **benzodiazepines**, and **alcohol**. Barbiturates have a strong sedative, or sleep-inducing, effect and are known as the major tranquilizers. The minor tranquilizers, or benzodiazepines, have a relatively minor depressant effect and are used to lower anxiety and reduce stress. Some common benzodiazepines

include Valium, Xanax, Halcion, Ativan, Librium, and Rohypnol (also known as the date rape drug). The most commonly used and abused depressant is alcohol.

Narcotics reduce the sensation of pain by binding to and activating the receptor sites for endorphins. All narcotics are derived from the plant-based substance of opium. **Opium** itself is made from the opium poppy and reduces pain as well as increases feelings of well-being. **Morphine** is made from opium and is used for the short-term relief of severe pain. Due to its highly addictive nature, the use of morphine is carefully controlled. **Heroin** is also made from opium but is not used as a medicine due to the fact that it is more addictive than morphine or opium. Narcotics are thought to be so addictive because they mimic the action of endorphins and subsequently cause the body to stop producing its own endorphins so that without the drug, there is no protection from pain. **Methadone** is made from opium but does not produce the feelings of euphoria produced by morphine and heroin. Methadone can be used to attempt to control heroin dependency. In addition to methadone treatment, heroin addiction is treated with behavioral therapies such as contingency management therapies and cognitive approaches such as cognitive-behavior interventions.

Hallucinogens are psychogenic drugs that create false sensory perceptions, also known as hallucinations. **Lysergic acid diethylamide (LSD)** is synthesized from a grain fungus and is one of the most potent hallucinogens. Phenyl cyclohexyl piperidine or **PCP** is a synthesized drug that can act as a hallucinogen, stimulant, depressant, or analgesic depending on the dosage. PCP has also been shown to lead to acts of violence against others or suicide. **MDMA** or Ecstasy is an amphetamine that also produces hallucinations. Because of their stimulant and hallucinogenic properties, PCP and MDMA are now classified as stimulatory hallucinogenics. Naturally occurring hallucinogenics include **mescaline**, **psilocybin**, and **marijuana**. The effects of marijuana are more mild than other hallucinogens, yet marijuana use can lead to a powerful psychological dependency.

Sleep deprivation is a serious and pervasive problem in the United States and has been linked to a large percentage of fatal road accidents in addition to higher levels of stress, anxiety, and depression. Causes of sleep deprivation include sleep apnea, narcolepsy, sleepwalking, night terrors, and personal choice.

STUDY HINTS

1. Use the space below to create a visual summary of the brain wave and physiological changes that occur as your body moves from an awake state through the stages of sleep typical for one night of sleep. Use arrows to indicate the progression through the stages throughout the course of a night.

Stage	Brain wave activity	Other descriptions
Awake		
non-REM Stage 1		
non-REM Stage 2		
non-REM Stage 3		
non-REM Stage 4		
REM		