Sleep, Dreams, and Body Rhythms

Module 9

We spend about one-third of our lives in bed, but how much is known about sleep and dreaming? It turns out we know quite a bit, and some of what we know will likely surprise you.

Learning Goals

- **9-1** Explain what psychologists mean by consciousness.
- **9-2** Identify different body rhythms, and explain how they affect us.
- **9-3** Describe what happens to your body when you don't get enough sleep.
- **9-4** Describe the benefits of sleeping.
- **9-5** Explain the stages we go through when we sleep.
- **9-6** Explain why REM sleep is described as paradoxical.
- **9-7** Describe the four modern explanations for why we dream.
- **9-8** Define sleep disorders, and describe how they interfere with our sleep cycles.

Consciousness

9-1 What do psychologists mean by consciousness?

Has this ever happened to you? You're watching a movie with friends or family late at night, and no matter how hard you fight it, you simply cannot keep your eyes open. Or perhaps you've waged a similar struggle while reading a textbook (but definitely not your psychology text). You fight it, but soon you nod off—sleep wins again.

You don't stand much of a chance in the tiredness battle; virtually every night, sleep wins. And when you do stay up later than you should, the effects are often obvious. The day a 10-page paper is due, I can easily spot those students who, having waited until the last minute, spent most of the previous night at a keyboard. Fighting the nods (heads bobbing downward), they suddenly jerk upright after a brief trip to never-never land.

To nod off is to temporarily lose waking **consciousness,** or awareness of yourself and your environment. Once a person is in sleep's grasp, consciousness ceases as certain parts of the brain's cortex stop sending messages that would otherwise keep you awake.[1] Depriving yourself of sleep alters your body's natural rhythms, making it difficult to maintain normal waking consciousness. Indeed, your body has several naturally occurring rhythms that affect wakefulness and sleep.

consciousness
Awareness of yourself and your environment.

Antonio Guillem Fernández/Alamy stock Photo

Bored Senseless or Sleep Deprived? This student has clearly lost any struggle to stay awake.

pseudoscientific claim Any assertion that appears scientific but is not based on science.

biological rhythms Periodic physiological fluctuations.

circadian [ser-KAY-dee-un] rhythms Biological rhythms (for example, of temperature and wakefulness) that occur approximately every 24 hours.

ultradian [ul-TRAY-dee-un] rhythms Biological rhythms that occur more than once each day.

LIFE MATTERS

Lack of sleep affects our emotional memories. In a study conducted by Walker at the University of California (2006), participants who were deprived of sleep were at least twice as likely to remember negative words as they were to remember positive or neutral words. Participants who rested typically had no difference between their memories of positive, negative or neutral words. Not sleeping enough can literally make you perceive your world as being more negative.

MAKE IT STICK!

1. Awareness of yourself and your environment is called _____.
2. True or false? Your body has one naturally occurring rhythm that affects sleep.

Body Rhythms

9-2 What are body rhythms, and how do they affect us?

An e-mail's subject line, Reliably Predict Your Mood for Free, once caught my eye. Closer investigation showed the predictions were anything but reliable—and certainly not free. This advertisement pitched something called a biorhythm chart, which was a good example of a **pseudoscientific claim**—an assertion that attempts to appear scientific but is not really based on science. The e-mail guaranteed that after I typed in the time and date of my birth, the chart could accurately predict my good and bad days, my illnesses and accidents, and even the best days for me to gamble. (Gullibility level was not predicted.)

Researchers have found that pseudoscientific biorhythm charts are useless.[2] Your body does, however, have real **biological rhythms**—periodic physiological fluctuations—that affect such things as body temperature, blood pressure, and the effectiveness of medicines. These biological rhythms fall into three main categories:

1. **Circadian (ser-KAY-dee-un) rhythms** are biological rhythms that occur approximately once every 24 hours (*circa* and *dies* in Latin mean *about* and *day*, respectively). The sleep–wake cycle is an example of a circadian rhythm. Your body temperature, which drops at night, is another example of a circadian rhythm.
2. **Ultradian (ul-TRAY-dee-un) rhythms** are biological rhythms that occur more than once a day. The most studied ultradian rhythm is the way we cycle through various stages of sleep each night. (You'll read more about these sleep stages shortly.)
3. **Infradian (in-FRAY-dee-un) rhythms** are biological rhythms that occur once a month or once a season. Examples include a woman's monthly menstrual cycle and a bear's winter hibernation (one season).

We are aware of some of these biological rhythms as we cycle through them, but most run on autopilot, rarely generating a thought. An understanding of your body's natural rhythms may help you get more out of your day—and night.

MAKE IT STICK!

1. The migration of monarch butterflies from the U.S. to Mexico that occurs every year is an example of a(n)
   a. ultradian rhythm.
   b. circadian rhythm.
   c. infradian rhythm.
   d. pseudoscientific rhythm.
2. Biological rhythms (for example, of temperature and wakefulness) that occur approximately every 24 hours are called _____ rhythms.

Sleep and Sleep Deficit

infradian [in-FRAY-dee-un] rhythms Biological rhythms that occur once a month or once a season.

9-3 What happens to your body when you don't get enough sleep?

Live to be 90, and you will have spent about 30 years of your life in bed with your eyes closed. Ironically, few of us know much about what happens when we're asleep. Like most adults, I get around 8 hours of sleep per night. Most students your age get below-average sleep, and that's not good. Look at the research on sleep deprivation:

- Lack of sleep makes it more difficult for your body to fight illness.
- Sleep deprivation increases levels of the stress hormone cortisol, and that makes it harder for you to learn and remember things.
- Sleep deprivation increases appetite and eating, leading to weight gain.
- Sleep debt also contributes to high blood pressure, irritability, and premature aging.

A More Likely Cause of Accidents
Lack of sleep is a greater cause of accidental death than drunk driving for truck drivers (National Transportation Safety Board, 1995).

xiao yu/Shutterstock

With the evidence mounting against late nights, you'd think that a movement toward turning lights out earlier would gain momentum. *Wrong*. Many studies find that teenagers are getting almost 2 hours less sleep now than they did 70 years ago, before the days of cell phones, social media, and Netflix. Four out of five students are "dangerously sleep deprived," according to sleep researcher **William Dement**.[3] Dement states, "The brain keeps an accurate count of sleep debt," which helps explain why many high school students sleep effortlessly until noon on weekends if allowed. He matter-of-factly adds that given the damage a lack of rest inflicts on your brain, a large sleep debt "makes you stupid." Research also shows that losing an hour of sleep can make us more accident prone (See **Figure 9.1**). Are you getting the sleep you need? To find out, answer the questions in Psychology in the Real World: Are You Sleep Deprived? Most teens need 9 hours of sleep each

Peter Menzel/Science Source

WILLIAM DEMENT (1928–)
Sleep researcher who coined the term *rapid eye movement (REM).*

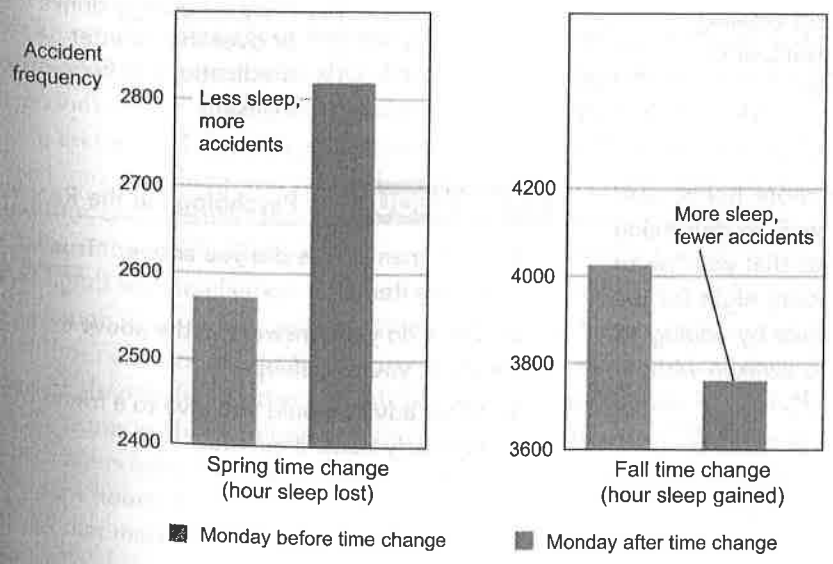

FIGURE 9.1 Spring Forward, Fall Back?
Compare the frequency of accidents on the Mondays before and after we lose an hour to daylight saving time in the spring. In the fall, the opposite trend appears. (Data from National Transportation Safety Board, 1995.)

PSYCHOLOGY IN THE REAL WORLD

Are You Sleep Deprived?

Cornell University psychologist James Maas reports that most college students suffer the consequences of sleeping less than they should. To see if you are headed toward being in that group, answer the following true–false questions:

True	False	
____	____	1. I often need an alarm clock in order to wake up at the appropriate time.
____	____	2. It's often a struggle for me to get out of bed in the morning.
____	____	3. Weekday mornings I often hit the snooze bar several times.
____	____	4. I often feel tired and stressed out during the week.
____	____	5. I often feel moody and irritable; little things upset me.
____	____	6. I often have trouble concentrating and remembering.
____	____	7. I often feel slow with critical thinking, problem solving, and being creative.
____	____	8. I need caffeine to get going in the morning or make it through the afternoon.
____	____	9. I often wake up craving junk food, sugars, and carbohydrates.
____	____	10. I often fall asleep watching TV.
____	____	11. I often fall asleep in boring meetings or lectures or in warm rooms.
____	____	12. I often fall asleep after heavy meals.
____	____	13. I often fall asleep while relaxing after dinner.
____	____	14. I often fall asleep within 5 minutes of getting into bed.
____	____	15. I often feel drowsy while driving.
____	____	16. I often sleep extra hours on the weekends.
____	____	17. I often need a nap to get through the day.
____	____	18. I have dark circles around my eyes.
____	____	19. I fall asleep easily when watching a movie.
____	____	20. I rely on energy drinks or over-the-counter medications to keep me awake.

If you answered *true* to four or more items, consider yourself seriously sleep deprived. To determine your sleep needs, Maas recommends that you "go to bed 15 minutes earlier than usual every night for the next week—and continue this practice by adding 15 more minutes each week—until you awaken without an alarm clock and feel alert all day."[4]

Source: Maas Robbins Alertness Questionnaire [MRAQ] adapted with permission from Maas & Robbins, 2010.

THINK ABOUT . . . Psychology in the Real World

1. How many times did you answer "True" to the above items?
2. What do your answers to the above items say about you as a sleeper?
3. What advice would you give to a friend who is seriously sleep deprived?

night, and 80 percent of all teens in the United States wish they slept more on school nights.[5] If you need an alarm to interrupt the sleep your body still wants, you're not getting enough.

MAKE IT STICK!

1. True or false? Sleep deprivation can lead to increased appetite and obesity.
2. True or false? Looking older than you really are can be a result of not sleeping enough.
3. Sleep deprivation increases the hormone called _____, which can hinder memory.

Why We Sleep

9-4 How do we benefit from sleeping?

What causes us to sleep? Good question! Truth is, we still have no complete answer to the question of why we sleep. But scientists have gathered some partial answers by looking at the brain and nervous system.

The control center for the 24-hour rhythm of waking and sleeping appears to be the brain's hypothalamus (see **Figure 9.2**). You have a regulator in your hypothalamus that monitors changes in light and dark. Perceiving key changes in light level, your hypothalamus sends messages to parts of your brain and body, initiating the changes that will cause consciousness to fade and put you to sleep.[6] These physiological changes often involve the increase or decrease of hormones (chemical messengers) in your bloodstream.

One such hormone, **melatonin,** helps regulate the sleep–wake cycle.[7] Wake up in the morning and turn on the light or open the curtains, and the melatonin levels that built up while you slept will start to drop. Your melatonin levels will continue to drop until the next time you turn out the lights, close your eyes, and go to sleep. Some people with insomnia respond favorably to medically controlled amounts of melatonin supplements.

So, we know something about *how* we go to sleep, but *why* do we need to sleep? Why can't we simply stay up, day after day, doing the things we want to do? Two possible reasons revolve around the concepts of preservation and restoration.

If you've ever walked through your home in the dark without turning on lights and crashed into something, you can understand how sleep might help keep us safe. Such nighttime crashes must have been even more common for our ancestors, who lived in caves and on cliffs. Traveling or hunting at night (well before the invention of the flashlight!) was treacherous, and perhaps those who attempted it did not survive long enough to reproduce and pass along their genes. Sleep provides *protection* from nighttime's dangers, at least for daytime mammals like us who don't see well in the dark. The sleep cycles of other animals have adapted in different ways, depending on such factors as ability to hide and the need for nourishment.[8] Bats, for example, sleep 20 hours a day. Cats sleep twice as much as humans, but elephants drift off for only 3 to 4 hours. The adaptation theory suggests that we sleep at times of the night or day that maximize our safety and survival.

Scott Camazine & Sue Trainor/Science Source

FIGURE 9.2
Sleep Command Center
The hypothalamus, colored green in this MRI brain scan photograph, sends messages to other parts of the brain saying, Time to sleep.

melatonin Hormone that helps regulate daily biological rhythms.

Another prominent theory suggests that sleep is restorative, allowing us to recuperate from the everyday wear and tear we put ourselves through. While sleeping we undergo a rebuilding process as tissues are renewed, memories are consolidated, and things learned on the previous day are reorganized.

Getting your sleep also helps you be creative. After struggling with a problem, insightful solutions are more likely found by those who have slept on it than those who stayed awake.[9] Sleep helps you connect the dots between different pieces of unusual information.[10] In essence, sleep helps you be smart.

MAKE IT STICK!

1. True or false? Sleeping on it might actually help you solve a problem you'd been working on the night before.
2. What is the name of the hormone that regulates daily biological rhythms such as the sleep-wake cycle?
3. Which sleep theory would say we sleep at night because it's safer?

Sleep Stages, REM Sleep, and Dreaming

Many people think of sleep and dreaming as virtually identical processes. In fact, your brain, your voluntary muscles, and your eyes are doing very different things while dreaming compared to their actions during the basic stages of sleep.

Stages of Sleep

9-5 What stages do we go through when we sleep?

The sleep–wake cycle itself is circadian, but we also have a 90-minute *ultradian* rhythm cycling throughout our night's sleep. During the 90-minute ultradian cycle, two types of sleep occur in a series of regular, repeating stages. How do we know this? Because sleep researchers have measured the brain waves, eye movements, and muscle tension of sleeping people. The challenges in gathering sleep data are twofold:

1. The person whom you're studying must be asleep.
2. The person must also agree to have a bunch of electrodes attached to his or her head (see **Figure 9.3**). The electrodes, which are connected to an **electroencephalograph (EEG),** are collecting brain wave measurements (not delivering shocks!), so the procedure is painless.

electroencephalograph (EEG) Machine that amplifies and records waves of electrical activity as they sweep across the brain's surface; electrodes placed on the scalp measure these waves.

Fortunately, thousands of volunteers have agreed to sleep under observation with electrodes on. Would you volunteer to be a participant in a sleep study? For a few minutes, let's suppose you would. Here's what would happen.

As you relax, drifting from wakefulness to sleep, your brain waves cycle more and more slowly. You might yawn, which speeds up heart rate in an attempt to move you toward alertness, but it's a losing battle.[11] As you nod off for the benefit of science, you will cycle through three stages of relatively quiet sleep, all referred

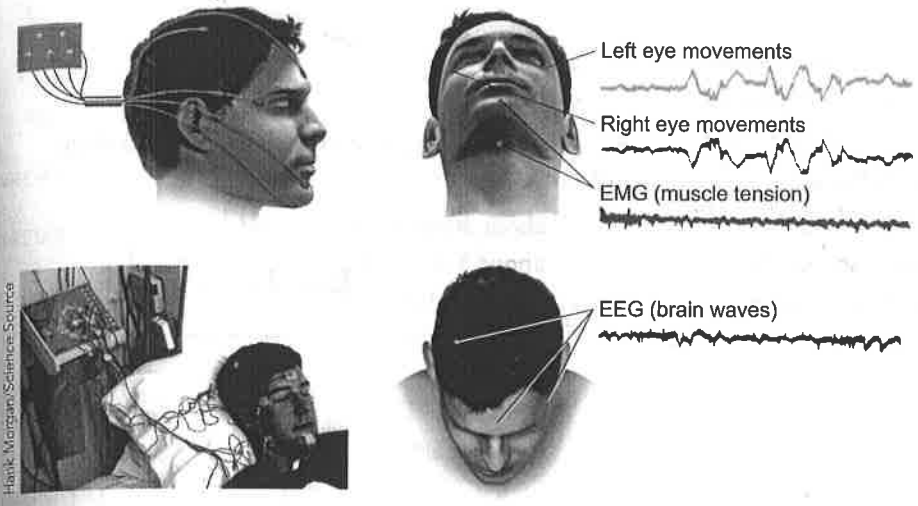

FIGURE 9.3
Measuring Sleep
Sleep researchers use electrodes to measure brain waves (using an electroencephalograph, or EEG), eye movements, and muscle tension (using an electromyograph, or EMG) while we sleep. They can use the changes in these measurements to label the different stages of sleep and dreaming.

to as stages of *non–rapid eye movement sleep,* before you go into a more active dreaming state (see **Figure 9.4**). You will not be able to tell the exact moment you enter *NREM 1* (or non–rapid eye movement stage 1), but a sleep researcher, noticing your slowed breathing and irregular brain waves, could accurately point to these first moments of sleep, which rarely last longer than 5 minutes (see **Figure 9.5**). It would be easy to awaken you from this stage, and if the sleep researcher did, you'd probably insist you had not been sleeping.

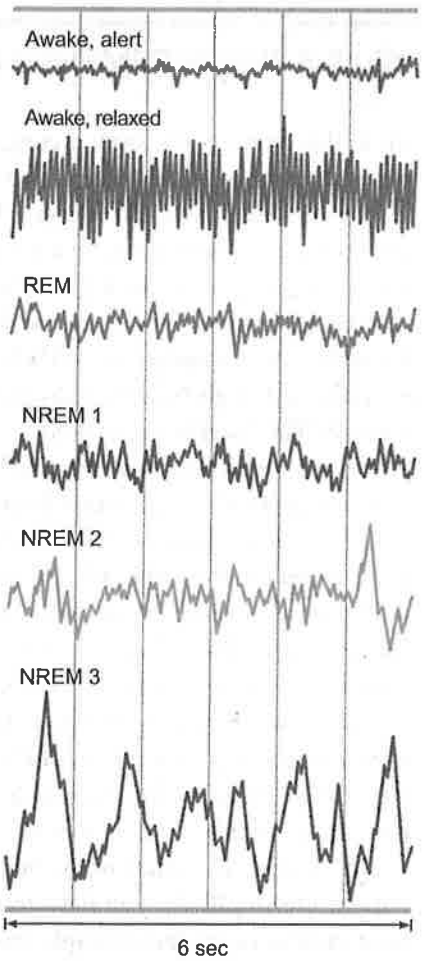

FIGURE 9.4
Brain Waves and Sleep Stages
Brain waves slow as we cycle into the deeper stages of sleep.

But let's imagine that the researcher did not awaken you. As you exit NREM 1, your brain waves cycle more slowly and you slide into the deeper sleep of *NREM 2*. The first time you enter NREM 2, your stay lasts 20 minutes. Over the course of the night, you will spend up to half of your entire time asleep in this stage.

About 30 minutes after you fall asleep, your brain waves begin to slow way down as you drop into *NREM 3*. This is a stage called *slow-wave sleep*. Your brain waves slow to less than 1 cycle per second in NREM 3, compared with the 15 or so cycles per second you experienced just after you closed your eyes. The first time you travel through this ultradian cycle, the rejuvenating sleep of NREM 3 will last about 30 minutes.

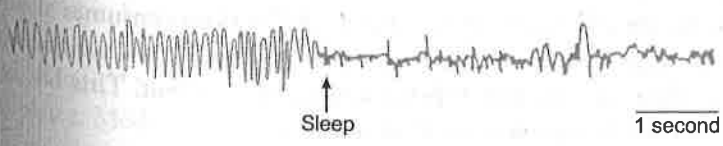

FIGURE 9.5
Entering the Land of Nod
You wouldn't be able to say precisely when you fell asleep last night, but a sleep researcher charting your brain waves could pinpoint the time accurately. (Data from Dement, 1999.)

MAKE IT STICK!

1. A sleep researcher looking at a computer printout of brain waves sees a pattern of long, slow waves (one per second). Which stage is the sleeper in?
   a. NREM 1
   b. REM sleep
   c. NREM 3
   d. NREM 5
2. Where do researchers most often connect the electrodes when attempting to measure sleep cycles?
   a. neck
   b. heart
   c. hands
   d. head
3. About how long does the first NREM 3 stage last?
   a. about 30 minutes
   b. about 5 minutes
   c. about an hour
   d. about 2 hours

REM Sleep

9-6 Why is REM sleep described as paradoxical?

rapid eye movement (REM) sleep Recurring sleep stage during which vivid dreams commonly occur.

Up to this point, you've been cycling down through the three stages of *non–rapid eye movement sleep*, or NREM sleep. After you reach NREM 3, your brain waves will begin to pick up a little speed and strength. You will move back up through NREM 2 and 1, and then you will enter your first period of rapid eye movement sleep, or **REM sleep**, a recurring sleep stage during which your eyes move rapidly under your closed lids and you dream vividly. Your initial REM period will not last long, and after it ends, the cycle will start again from NREM 1. This 90-minute ultradian rhythm continues all night, although NREM 3 drops out of the cycle after the second or third time through. The last 4 hours of sleep, assuming you get the 8 to 9 hours you're supposed to, are pretty much spent alternating between NREM 2 and REM (see **Figure 9.6**).

LIFE MATTERS

Napping is one of our favorite pastimes, but in order to get the best bang for your buck, what amount of time is the most beneficial? According to Sleep.Org, a 90-minute nap is best, because you actually can complete a full sleep cycle. If you don't have 90 minutes to spare, 20 minutes will do.

During REM sleep, your brain patterns most closely resemble those of NREM 1 sleep. Looks can be deceiving, however, because REM sleep is actually quite different from the other sleep stages. During REM, your eyes dart about under closed eyelids, your pulse speeds up, and your breathing becomes faster and irregular. Blood flows into the genitals at a rate faster than it can be removed (which can result in morning erections in males that are unrelated to actual dream content). But despite all this internal activity, the electrode measuring muscle tension in your chin would show a flat line on the EEG because you are, in essence, temporarily paralyzed during REM sleep—your brainstem blocks messages from the part of your brain that controls movement.

REM sleep is sometimes called *paradoxical* sleep because of its contrasting nature. During REM, you have active brain waves, you are processing input from your environment (for example, you might incorporate external noises into your dreaming), and you can be awakened more easily than at any other sleep stage. Yet you are still definitely asleep.

What's going on in our brains to produce all that internal activity? We're dreaming. More than 80 percent of people awakened during REM sleep report that the wake-up call interrupted a dream. REM sleep consumes about 25 percent of your nightly sleep, which means that you spend 100 minutes each night dreaming, whether you remember a second of it or not. This holds true for everyone. We *all* dream every night of our lives.

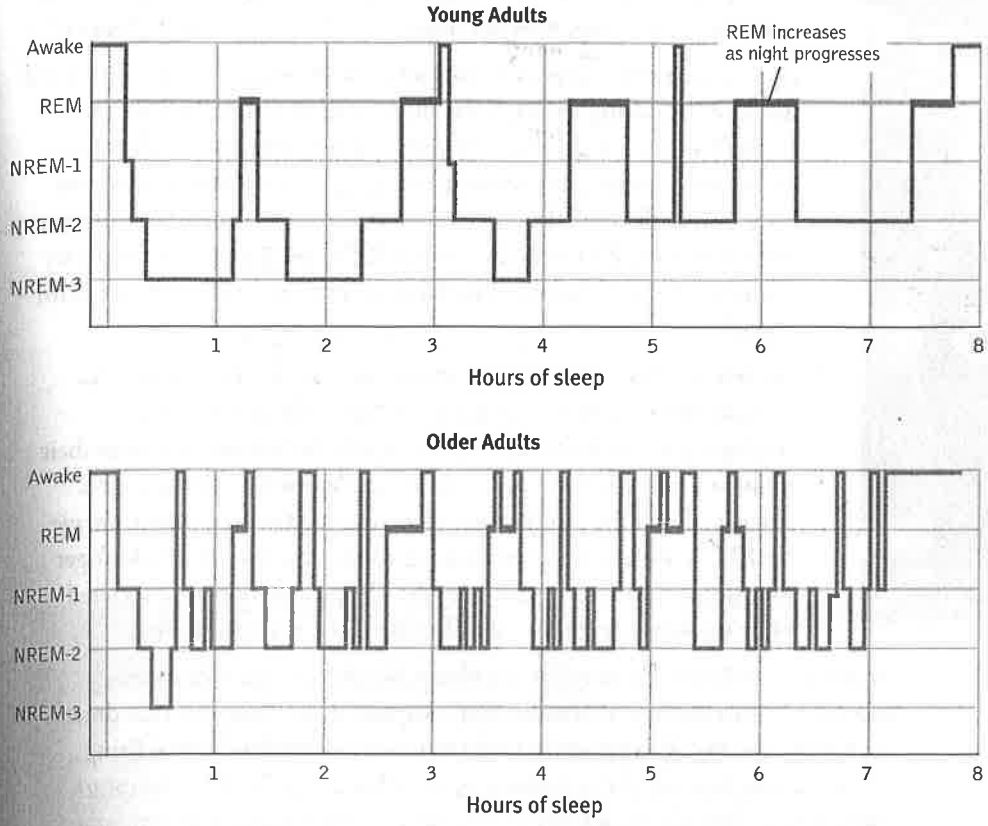

FIGURE 9.6
A Good Night's Sleep
We cycle through sleep stages all night. Young adults get restorative, deep sleep the first half of the night, then end up cycling through REM and Stage 2. As we age, we get less deep sleep, and wake up more often (Data from Kamel & Gammak, 2006; Neubauer, 1999).

MAKE IT STICK!

1. When you fall asleep,
   a. you immediately begin to dream.
   b. your brain stops sending messages that keep you awake.
   c. your brain stops sending messages that keep you asleep.
   d. your body enters a paralyzed state.
2. What kind of rhythm is NREM/REM cycle?
   a. ultradian
   b. circadian
   c. paradoxical
   d. pseudoscientific
3. True or false? REM brain waves cannot be measured on an electroencephalograph (EEG) like those of the other stages.

Why Do We Dream?

9-7 What are the four modern explanations for why we dream?

There are several theories of why we dream. Sigmund Freud created psychology's earliest dream theory. In his book *The Interpretation of Dreams,* published more than a century ago, Freud wrote that dreams were the key to understanding things that trouble us. He also believed that dreams were expressions of wish fulfillment and erotic wishes.[12] Sleep has remained an important subject of psychological study ever since. Modern theories of dreaming offer at least four more plausible

The Meaning of Dreams? Marc Chagall's painting *I and the Village* captures what a dream can look like to the dreamer: colorful, confusing, and possibly filled with meaning.

explanations—information processing, physiological function, activation synthesis, and cognitive development (all summarized in **Table 9.1**):

1. *Information processing*—Dreams serve an important memory-related function by sifting through the day's experiences and tying up loose ends. In other words, think of your brain as a computer that loses its Internet connection when it first goes to sleep but then comes back online during REM sleep to sort through some of the previous day's activities. Research shows that REM sleep facilitates memory storage, and the amount of REM sleep increases following stressful times.[13, 14]

2. *Physiological function*—Neural activity during REM sleep provides periodic stimulation for our brains. Infants, whose brains are developing at a fantastic rate, spend significantly more time than their adult counterparts do in REM sleep (see **Figure 9.7**). Psychologists discovered that the pituitary gland secretes a growth hormone *during* NREM 3. Weren't we always told as young children, If you don't get your sleep, it will stunt your growth? The growth hormone secreted while we sleep suggests we should have listened to this advice.

3. *Activation synthesis*—Rather than ascribing any physiological or memory-related status to dreams, this activation synthesis theory suggests that dreams are simply the mind's attempt to make sense out of random neural firing in the various regions of the sleeping brain. That is, the brain's attempt to interpret random neural activity during sleep is what causes a dream.

4. *Cognitive development*—Dreams also reflect what we've learned and what we know.[15] That is, the dreams of a third-grader are far less dynamic and active and tell less of a story than those of a 20-year-old. If we've never heard of a Native American sweat lodge or the ceremonies that take place inside such a lodge, we're not going to dream about them (see Table 9.1).

We are not the only animals who experience REM sleep. We don't know whether other animals are having dreams, but nearly all animals, from sheep to walruses, show measurable REM periods while hooked up to an EEG during sleep. (Just how do they keep electrodes on walruses?) Such evidence suggests a biological *need*

TABLE 9.1 Dream Theories

Theory	Explanation	Critical Considerations
Information processing	Dreams help us sort out the day's events.	But why do we sometimes dream about things we have not experienced?
Physiological function	Regular brain stimulation from REM sleep may help develop and preserve neural pathways.	This may be true, but it does not explain why we experience meaningful dreams.
Activation synthesis	REM sleep triggers neural activity that evokes random visual memories, which our sleeping brain weaves into stories.	The individual's brain is weaving the stories, which still tells us something about the dreamer.
Cognitive development	Dream content reflects dreamers' cognitive development—their knowledge and understanding.	This theory does not address the neuroscience of dreams.

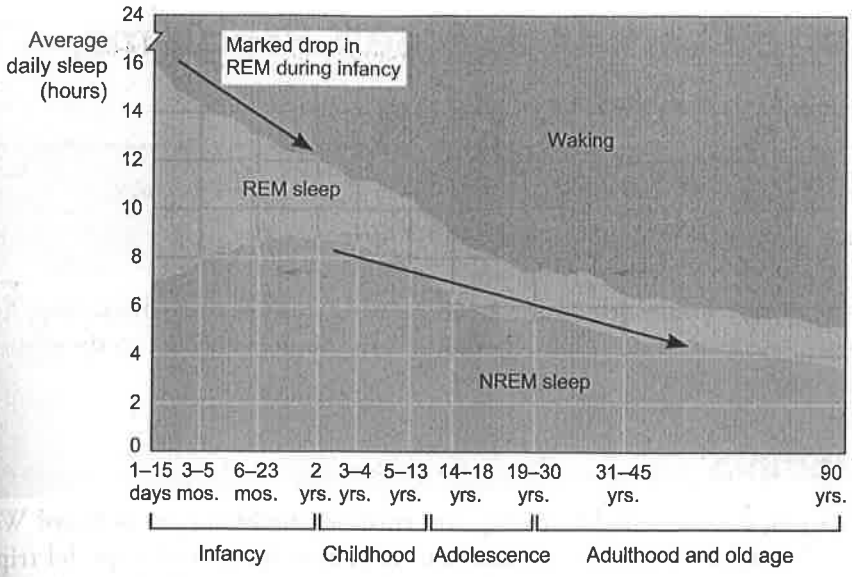

FIGURE 9.7
Sleep and Age
Sleep patterns change as we grow older. (From Snyder & Snyder, 1972.)

Nadezhda Kharitonova/Shutterstock

samantha grandy/Shutterstock

Cat Nap
The cat in NREM sleep (left) is sleeping comfortably. On entering REM sleep, the cat's brain stops sending the signals to the muscles that let the cat hold its head off the floor.

for REM sleep. We do know that people don't feel rested unless their sleep has contained REM periods. Also, when finally allowed to sleep after a period of sleep deprivation, we tend to dive straight into REM sleep rather than following the normal cycle. Furthermore, REM does not occur in fish, whose behavior (unlike mammals') is governed more by instinct and less by learning, supporting the information-processing model of why we dream. The truth behind dreams, once discovered, will surely encompass both psychological and biological explanations.

MAKE IT STICK!

1. Which of the following dream theories is considered a modern explanation of dreams?
   a. Symbolic interpretations of repressed memories
   b. Freudian dream analysis
   c. Random neural firing
   d. Precognition and clairvoyance
2. Which of the following theories would most likely explain dreaming as the mind's attempt to make sense of random neural firing in the brain?
   a. Activation synthesis
   b. Information processing
   c. Cognitive development
   d. Freudian dream analysis
3. Which of the following theories would most likely explain dreaming as simply a part of the maturational process?
   a. Cognitive development
   b. Information processing
   c. Activation synthesis
   d. Freudian dream analysis

Sleep Disorders, Sleep Problems, and Improving Sleep

9-8 What are sleep disorders, and how do they interfere with our sleep cycles?

Not everyone follows the normal sleep patterns we've been discussing. Some people experience serious sleep disruptions or problems related to sleep, such as insomnia, sleep apnea, and narcolepsy.

Insomnia

insomnia Recurring problems in falling asleep or staying asleep.

sleep apnea Sleep disorder characterized by temporary cessations of breathing during sleep and consequent momentary reawakenings.

Ever spent a restless night, tossing and turning, unable to get to sleep? We all have. Thoughts of taking an important test, anticipation of a special trip, or distress over someone we love all carry the potential to block the sleep we'd like to have. Happily, difficulty in getting to sleep is rare for most of us. Those less fortunate have **insomnia,** recurring problems in falling asleep or staying asleep. For those with insomnia, getting to sleep or remaining asleep can be a real nightmare.

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Actually, my species is not nocturnal: I'm just a teenager . . .

Oral medications for insomnia may actually worsen the problem. Sleeping pills, with sales increasing over 60 percent since the start of this century, can be addictive, and they inhibit or suppress REM sleep, leaving the sleep-hungry person feeling even worse than before.[16] And people who drink booze to help them sleep? Tell them not to! Alcohol keeps the drinker from getting into REM sleep, leading to next-day crankiness and all kinds of other problems associated with REM deprivation. Drinking before sleeping is a bad idea.

Stanley Coren's research sheds some interesting light on insomnia. Coren asked insomnia sufferers to estimate how long it took to get to sleep. He found that those who had trouble sleeping estimated that it took them twice as long to get to sleep as it actually did. Furthermore, they dramatically miscalculated the amount of time they slept, estimating they'd slept half the time they actually had. Perhaps we should keep this research in mind the next time we think we haven't slept much the night before. It's a lot easier to remember, and exaggerate, the times during the night when we were awake than the times we were asleep.

Sleep Apnea

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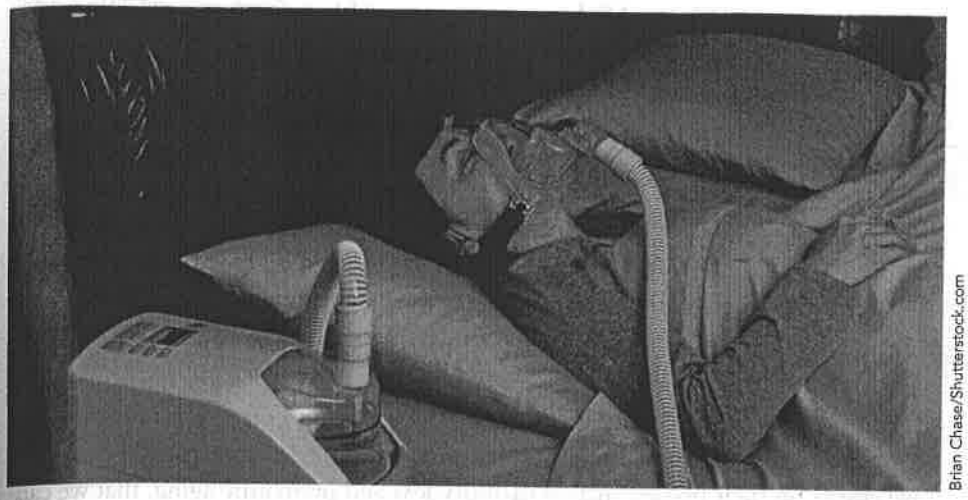
Losing one night's sleep may not cause significant damage, but **sleep apnea**—a disorder characterized by repeated awakenings throughout the night as a result of not being able to breathe—can leave you exhausted. A person with sleep apnea is a loud snorer who stops breathing at the peak of a heavy, inhaled snore, and whose breathing may cease for as long as a minute. The only way the person can breathe again is to briefly awaken, which may happen more than 400 times a night. Apnea (meaning *with no breath*) sufferers experience dreadful sleepiness even after a full night's sleep, but they may be unaware they are having such poor-quality sleep.

Millions of Americans suffer from sleep apnea. The most common treatment involves use of a continuous positive airway pressure (CPAP) machine, which helps the person breathe during the night.



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Sleeping Aid Those with sleep apnea can turn to this continuous positive airway pressure, or CPAP, machine (and others like it) to help them get the sleep they need.

Narcolepsy

Can you imagine what it would be like to suddenly fall asleep because something made you laugh, cry, or feel infuriated? Such is the life of a person with **narcolepsy** (*narco* meaning *numbness, lepsy* meaning *seizure*), a sleep disorder characterized by uncontrollable sleep attacks. Narcolepsy is a rare disease (striking 1 in 2000 people) that runs in families. Those with narcolepsy experience sleep attacks when their nervous systems become aroused, often from a strong emotion.[17] When an attack occurs, they fall immediately into REM sleep, often at a dangerous time. Imagine being cut off in traffic, becoming angry at the other driver, and then instantly lapsing into sleep? That would simply be terrible #badtiming.

narcolepsy Sleep disorder characterized by uncontrollable sleep attacks; the sufferer may lapse directly into REM sleep, often at inopportune times.

In recent years, researchers have isolated a narcolepsy-causing gene in dogs and have linked narcolepsy to the absence of the neurotransmitter hypocretin.[18, 19] Both of these developments raise hope for the development of a lasting treatment that would, in essence, cure narcolepsy. Until then, physicians will continue to treat narcolepsy with a form of REM-inhibiting stimulant. If you don't have narcolepsy now, chances are you never will; the onset of this disorder accompanies puberty.

NREM Sleep Arousal Disorders

NREM sleep arousal disorders tend to occur when the brain is partially in NREM and partially awake. Most are treatable and do not have some kind of underlying condition. Examples include

- **Somnambulism,** or sleepwalking. Is it dangerous to awaken a sleepwalker? *No,* but it is pretty hard to awaken someone who is walking around with brain waves revving at 1 cycle per second. Is the sleepwalker acting out a dream? Again, *no.* Remember, most dreams occur during REM sleep, and during that type of sleep, we lose our ability to move around.
- **Night terrors** are characterized by every indication of being terrified. Night terrors most often afflict children, who look like they are awake and terrified even though they are sound asleep. The child rarely has any memory of the event when told about it in the morning. Night terrors are different from nightmares, which are dreams (so they occur during REM

somnambulism Sleepwalking, which usually starts in the deeper stages of NREM sleep; the sleepwalker can walk and talk and is able to see but rarely has any memory of the event.

night terrors Sleep-related problem characterized by high arousal and an appearance of being terrified; unlike nightmares, they occur during NREM 3 sleep, occur within 2 or 3 hours of falling asleep, and are seldom remembered.

"Wait! Don't! It can be dangerous to wake them!"

Danger? Although it may be difficult, awakening this sleepwalker would definitely be the right decision.

sleep). Night terrors occur within a few hours of falling asleep, during NREM 3 sleep.

- *Bruxism* is teeth grinding that sounds as though two bricks are being rubbed together. Adults with this problem often wear some kind of tooth guard to keep from wearing away enamel.
- *Enuresis* is bed wetting.
- *Myoclonus* is a sudden jerking of a body part that occurs in NREM 1 or 2. Everyone experiences myoclonus now and then, but acute cases can result in daytime sleepiness, similar to the sleepiness accompanying sleep apnea.

Some people appear to get by on as few as 4 hours of sleep per night. However, most of these brief sleepers experience negative effects on their bodies, such as memory loss and premature aging, that we cannot immediately see. So, when you're tired and it's time to sleep, pay attention to your body. Ignore that last text message, resist the urge to check your Instagram account, and give in to the gentle tyrant that is your need for sleep.

Improving Sleep

Do you have trouble falling asleep? Do you often wake up during the night? If so, don't sweat it. There are several steps you can take to improve the quality of your sleep while reducing the anxiety you might experience when sleep does not come easily. Consider the following:

- Stop using your cell phone at least 2 hours before turning off the lights. Looking at your phone stimulates your brain and makes it harder for you to sleep. Research shows that the more you use your phone around bedtime, the longer it takes you to fall asleep. Shutting off your phone is likely the number one thing you should do if you are having trouble getting to sleep.
- Do not consume caffeinated beverages or foods after 3:00 P.M. Skip that soda with dinner, and turn away from late-night chocolate snacks.
- Exercise daily, but avoid late-night exercise.
- Drink milk, which aids in the production of a chemical (serotonin) in your body that promotes sleep.
- Dim the lights at night, and relax before bedtime.
- Accept that as a human being, you experience stress. Conflict during the day might naturally lead to a crummy night's sleep.
- Get up at the same time every morning. Sleeping late on weekends can make it difficult to get to sleep on Sunday night, leaving you extra tired on Monday morning. Naps can have the same effect: You may not be able to fall asleep at your normal bedtime.
- Avoid nighttime activities that rile you up. Angry text messages, action-packed video games, or emotional arguments right before attempting to sleep are not good ideas.
- Try not to worry when you can't get to sleep. Remember that it's normal to take 15 minutes or more to fall asleep at night. Besides, sleeping poorly for one night won't cause any great harm, and often you'll be able to sleep better the following night.

MAKE IT STICK!

1. A friend tells you her father is obese and snores loudly at night. Which of the following sleep disorders might you discuss with your friend?
   a. Enuresis
   b. Sleep apnea
   c. Narcolepsy
   d. Bruxism
2. Recurring problems in falling asleep or staying asleep are characteristic of what sleep disorder or problem?
   a. Insomnia
   b. Sleep apnea
   c. Bruxism
   d. Somnambulism
3. What do we call a sudden sleep attack?
   a. Night Terrors
   b. Sleep apnea
   c. Narcolepsy
   d. Somnambulism
4. Sleepwalking is also called
   a. enuresis.
   b. somnambulism.
   c. myoclonus.
   d. bruxism.

Module 9 Summary and Assessment

Sleep, Dreams, and Body Rhythms

9-1 What do psychologists mean by consciousness?

- Consciousness is the degree to which we are aware of our environment and ourselves.

9-2 What are body rhythms, and how do they affect us?

- We go through three types of body rhythms that occur in regular cycles—circadian, ultradian, and infradian—and that affect our consciousness and physiological processes.

9-3 What happens to your body when you don't get enough sleep?

- Sleep deprivation causes physiological changes that can dramatically affect our moods, health, and ability to perform physically and mentally.

9-4 How do we benefit from sleeping?

- Sleep helps restore our body physically and protect us from nighttime hazards.

9-5 What stages do we go through when we sleep?

- We cycle through three stages of non–rapid eye movement (NREM) sleep every night.
- The stages of sleep describe different levels of brain activity, measured by brain waves.

9-6 Why is REM sleep described as paradoxical?

- The REM stage of sleep is sometimes called paradoxical because of its contrasting nature. During REM, we have active brain waves, we can process input from our environment, and we can be awakened more easily than at any other sleep stage.

9-7 What are the four modern explanations for why we dream?

- The four modern explanations of dreams focus on how dreams may be related to information processing, physiological function, activation synthesis, and cognitive development.

9-8 What are sleep disorders, and how do they interfere with our sleep cycles?

- Sleep disorders interfere with our sleep cycles and can affect us mentally and physically during our waking life.
- Insomnia is the most common sleep disorder, but it is treatable.
- Apnea and narcolepsy (less common) are two serious sleep disorders.