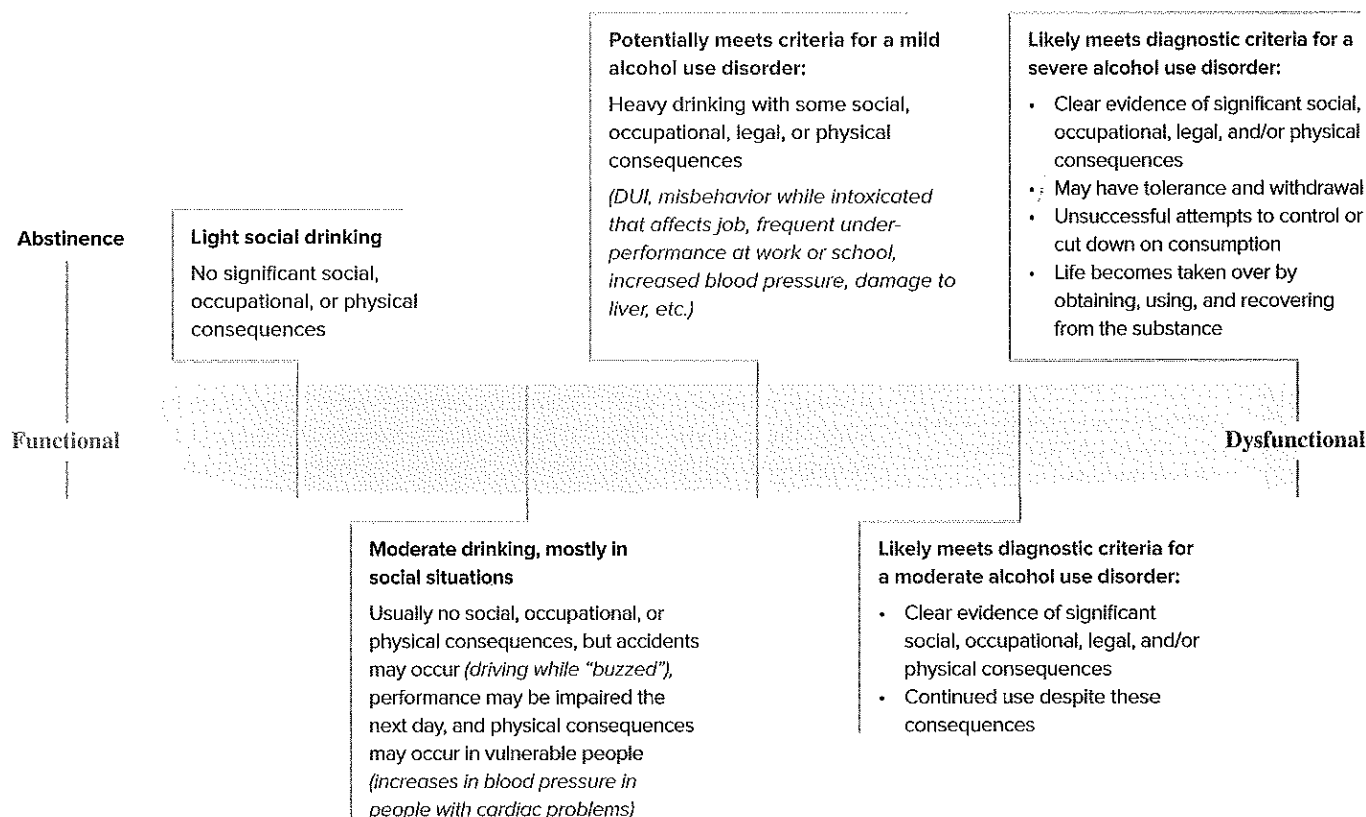


Substance Use Along the Continuum



As a student, you likely know more people along the continuum of substance use than along any continuum in the rest of this book. TV shows and movies often show substance use as a rite of passage into adulthood—think of the college drinking scenes in movies like *Animal House*—and statistics suggest there is some truth in this portrayal. Illegal drug use is highest among young adults (Figure 1; Substance Abuse and Mental Health Services Administration [SAMHSA], 2008b), with about 20 percent of college students reporting current use.

At one end of the continuum are people who abstain completely. Some of these do not enjoy the effects of substances; others live in cultures or follow religions that prohibit the use of alcohol or drugs. Globally, 46 percent of men and 73 percent of women abstain from alcohol, with most of these people concentrated in a belt stretching from North Africa across the eastern Mediterranean, south central Asia, and Southeast Asia to the islands of Indonesia (WHO, 2011). In other areas of the world, such as Europe, less than 20 percent of the population abstain from alcohol.

Further along the continuum are people who use drugs and alcohol "recreationally." Nearly half the U.S. population admits to having tried an illegal substance at some time in their life, and approximately 14 percent have used one in the past year (SAMHSA, 2008b).

Although movies and TV often make substance use seem cool, the consequences are staggeringly serious. There are more deaths from traffic accidents involving substance-impaired drivers than from all other types of accidents. In 2008, 15 percent of drivers in the United States reported driving under the influence of alcohol, and another 5 percent reported driving under the influence of an illicit drug (SAMHSA, 2008c). Over 10 percent of emergency room visits in the United States are related to the misuse of alcohol or of illegal or prescription drugs (SAMHSA, 2008a).

At the other end of the continuum are individuals who build their lives around substances. Their immoderate substance use impairs their everyday functioning—they may avoid job and family responsibilities, act impulsively or bizarrely, or endanger their own and others' lives. These people have a substance use disorder.

Extraordinary People

Celebrity Drug Abusers



Whitney Houston died of a drug overdose in 2012. © Patrick Seeger/dpa/Corbis

Whitney Houston was one of the most successful music artists of all time, selling over 170 million albums, singles, and music videos and winning more awards for her music than any other female artist. Her single "I Will Always Love You" from the movie *The Bodyguard*, which she also starred in, be-

came the best-selling single in history by a female artist. She rode the top of the pop charts through the 1980s and 1990s, but then the hits stopped coming and her album sales plummeted as stories emerged about drug use leading to bizarre behavior and the loss of her once extraordinary voice. In a 2002 interview on *ABC News*, she admitted to abusing cocaine, marijuana, and pills. She attempted comebacks, but her voice was often frayed and shaky in public appearances. Then, in February 2012, Whitney Houston, age 48, was found drowned in the bathtub of a Beverly Hills hotel room. A coroner's report ruled the death an accident due to the effects of cocaine, marijuana, and multiple other drugs in her system and to heart damage associated with her long-term drug abuse.

Whitney Houston is only one in a long line of celebrity drug abusers who have died early as a result of their drug use. Heath Ledger's portrayal of the

Joker in *The Dark Knight* won him an Oscar in 2009. However, the actor was not present to accept his award because on January 22, 2008, he had died of an overdose of prescription drugs, including oxycodone, hydrocodone, Valium, Restoril, Xanax, and doxylamine (a sleep aid). Ledger was 28 and on the brink of a promising career. Many other celebrities have had public problems with drugs and alcohol, including Kate Moss, Britney Spears, Lindsey Lohan, Robert Downey Jr., Drew Barrymore, and Courtney Love. Celebrities who have died from drug-related causes include Michael Jackson, D.J. AM, Chris Farley, Philip Seymour Hoffman, Prince, Russell Jones (Ol' Dirty Bastard), Amy Winehouse, and Rick James. As guitarist Keith Richards of the Rolling Stones said, "I used to know a few guys that did drugs all the time, but they're not alive anymore. . . . And you get the message after you've been to a few funerals."

Are celebrities more vulnerable to drug addiction than regular folks? Probably not. As we discuss in this chapter, alcohol and drug use disorders are among the most common mental health problems in the United States and around the world. Celebrities have more money to buy illicit drugs, and drugs and alcohol are a big part of the social scene in the entertainment industry. Some celebrities can't handle the pressure to stay on top of their field and may turn to drugs to cope. Also, when celebrities do abuse drugs or alcohol, the media broadcast their missteps widely. But much celebrity drug abuse probably is due to the same biological and psychosocial factors that contribute to drug and alcohol use disorders in noncelebrities.

Everyone has temptations, and some people have more trouble resisting them than others. In this chapter, we consider disorders that involve chronic difficulties in resisting the desire to drink alcohol or take drugs, known in the *DSM-5* as **substance use disorders**. We also consider **gambling disorder**, which involves the inability to resist the impulse to gamble, because the behavioral patterns and causes of this disorder appear to be similar to the behavioral patterns and causes of the substance use disorders (Denis, Fatsèas, & Auriacombe, 2012).

We begin with the substance use disorders. A **substance** is any natural or synthesized product that has psychoactive effects—it changes perceptions,

thoughts, emotions, and behaviors. Some of the substances we discuss in this chapter are popularly referred to as drugs (e.g., cocaine and heroin). People who abuse these drugs are often referred to as *drug addicts*. Yet a person need not be physically dependent on a substance, as the term *addict* implies, in order to have a problem with it. For example, some club-goers who are not physically addicted to Ecstasy or Molly still may think they need the drug to have a good time.

Societies differ in their attitudes toward substances with psychoactive effects, with some seeing their use as a matter of individual choice and others seeing it as a grave public health and security concern.

Within the United States, attitudes have varied greatly over time and across subgroups (Keyes et al., 2011). U.S. ambivalence toward alcohol use is nicely illustrated in a letter from former Congressman Billy Mathews to one of his then-constituents, who wrote: "Dear Congressman, how do you stand on whiskey?" Because the congressman did not know how the constituent stood on alcohol, he fashioned the following safe response:

My dear friend, I had not intended to discuss this controversial subject at this particular time. However, I want you to know that I do not shun a controversy. On the contrary, I will take a stand on any issue at any time, regardless of how fraught with controversy it may be. You have asked me how I feel about whiskey. Here is how I stand on the issue.

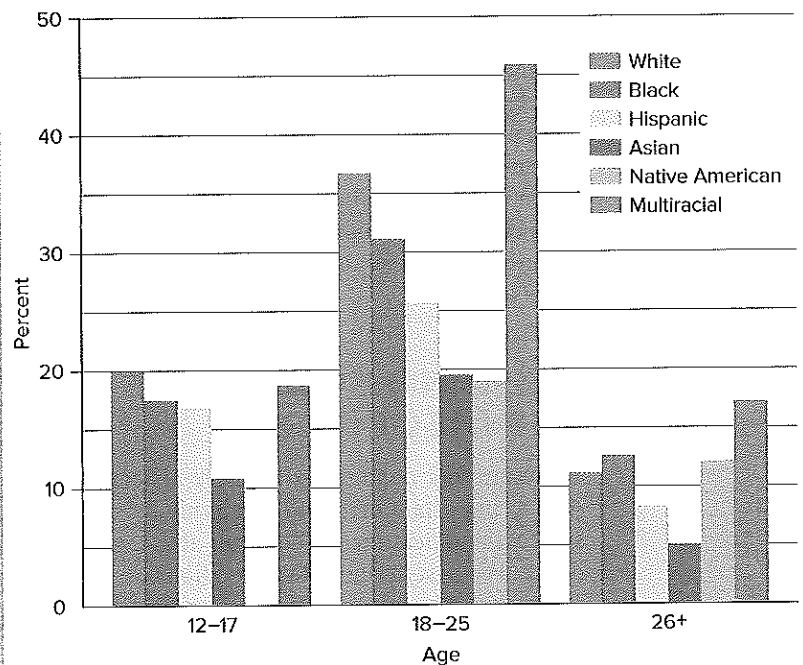
If when you say whiskey, you mean the Devil's brew; the poison scourge; the bloody monster that defiles innocence, dethrones reason, destroys the home, creates misery, poverty, fear; literally takes the bread from the mouths of little children; if you mean the evil drink that topples the Christian man and woman from the pinnacles of righteous, gracious living into the bottomless pit of degradation and despair, shame and helplessness and hopelessness; then certainly, I am against it with all of my power.

But, if when you say whiskey, you mean the oil of conversation, the philosophic wine, the ale that is assumed when great fellows get together, that puts a song in their hearts and laughter on their lips, and the warm glow of contentment in their eyes; if you mean Christmas cheer; if you mean that stimulating drink that puts the spring in the old gentleman's step on a frosty morning; if you mean the drink that enables the man to magnify his joy and his happiness and to forget, if only for a little while, life's great tragedies and heartbreaks and sorrows; if you mean that drink, the sale of which pours into our Treasury untold millions of dollars which are used to provide tender care for little crippled children, our blind, our deaf, our pitiful aged and infirm; to build highways, hospitals, and schools; then certainly, I am in favor of it. This is my stand, and I will not compromise. Your congressman. (Quoted in Marlatt, Larimer, Baer, & Quigley, 1993, p. 462)

Many substances have been used for medicinal purposes for centuries. As long ago as 1500 BCE, people in the Andes highlands chewed coca leaves

FIGURE 1

Illicit Drug Use. In the United States, ethnic and age groups have different rates of drug use.



Source: SAMHSA, 2008c.

Note: Illicit drugs include marijuana, cocaine, heroin, hallucinogens, inhalants, or prescription drugs used nonmedically. No estimate is given for Native Americans 12-17 years old because of a low response rate.



Coca-Cola originally contained cocaine. © Bettmann/Corbis

to increase their endurance (Cocores, Pottash, & Gold, 1991). Coca leaves can be manufactured into cocaine, which was used legally throughout Europe and the United States into the twentieth century to relieve fatigue. It was an ingredient in the original Coca-Cola drink and in more than 50 other widely available beverages and elixirs.

Psychoactive substances also have traditionally appeared in religious ceremonies. When chewed, peyote causes visual hallucinations of colored lights or of geometric forms, animals, or people. Native groups in North America have used it in religious rituals for hundreds of years.

DEFINING SUBSTANCE USE DISORDERS

There are four conditions that have historically been seen as important in defining individuals' use of substances: intoxication, withdrawal, abuse, and dependence. We first define these conditions.

Substance intoxication is a set of behavioral and psychological changes that occur as a result of the physiological effects of a substance on the central nervous system. People become intoxicated

soon after they ingest a substance, and the more they ingest, the more intoxicated they become. Intoxication declines as the amount of the substance in blood or tissue declines, but symptoms may last for hours or days after the substance no longer is detectable in the body (Virani, Bezchlybnik-Butler, & Jeffries, 2009).

The specific symptoms of intoxication depend on what substance is taken, how much of it is taken and when, the user's tolerance, and the context. For example, you may have observed that alcohol makes some people aggressive and others withdrawn. Short-term, or acute, intoxication can produce symptoms different from those of chronic intoxication. The first time people take a moderate dose of cocaine, they may be outgoing and upbeat. With chronic use over days or weeks, they may begin to withdraw socially (Virani et al., 2009). People's expectations about a substance's effects also can influence the types of symptoms they show. People who expect marijuana to make them relaxed may experience relaxation, whereas people who are frightened of disinhibition may experience anxiety (Ruiz, Strain, & Langrod, 2007).

The setting also can influence the types of intoxication symptoms people develop. People who consume a few alcoholic drinks at a party may become uninhibited and loud, but when they consume the same amount at home alone they may become tired and depressed (Brick, 2008). The environment can also influence how maladaptive the intoxication is. People who drink alcohol only at home may be less likely to cause harm to themselves or others than are people who drink at bars and drive home under the influence of alcohol. The diagnosis of intoxication with a substance is given only when the behavioral and psychological changes the person experiences are significantly maladaptive, that is, when they substantially disrupt the person's social and family relationships, cause occupational or financial problems, or place the individual at significant risk for adverse effects, such as a traffic accident, severe medical complications, or legal problems. For example, getting into a fist fight while clearly under the influence of a substance would merit a diagnosis of intoxication. Substance intoxication is common among individuals with a substance use disorder, but also occurs among those without a substance use disorder.

Substance withdrawal is a set of physiological and behavioral symptoms that result when people who have been using substances heavily for prolonged periods of time stop or greatly reduce their use. Symptoms typically are the opposite of those of intoxication. The diagnosis of withdrawal from a



The setting in which a person becomes intoxicated can influence the type of symptoms people develop. People who consume a few alcoholic drinks at a party may become uninhibited and loud, but when they consume the same amount at home alone they may become tired and depressed. © John Rensten/Getty Images

substance requires significant distress or impairment in a person's everyday functioning.

The *DSM-IV* distinguished between *substance abuse* and *substance dependence*. The diagnosis of **substance abuse** was given when a person's recurrent use of a substance resulted in significant harmful consequences comprising four categories. First, the individual fails to fulfill important obligations at work, school, or home. He or she may fail to show up at work or for classes, may be unable to concentrate and therefore performs poorly, or may even consume the substance at work or at school. Second, the individual repeatedly uses the substance in situations in which it is physically hazardous to do so, such as while driving. Third, the individual repeatedly has legal problems as a result of substance use, such as arrests for drunk driving or for the possession of illegal substances. Fourth, the individual continues to use the substance despite repeated social or legal problems as a result of use. The *DSM-IV* diagnosis of substance abuse required that the person show repeated problems in at least one of these categories within a 12-month period.

The diagnosis of **substance dependence** in the *DSM-IV* was closest to what people often refer to as *drug addiction*. People who are dependent on, or addicted to, a substance often show **tolerance**—they experience diminished effects from the same dose of a substance and need more and more of it to achieve intoxication. People who have smoked cigarettes for years often smoke more than 20 cigarettes a day, an amount that would have made them violently ill when they first began smoking. A person highly tolerant of a substance may have a very high blood level of it without being aware of its effects. The risk for tolerance varies greatly among substances. Alcohol, opioids, stimulants, and nicotine have high risks for tolerance, whereas cannabis and PCP appear to have lower risks (Brick, 2008). People who are physiologically dependent on a substance often show severe withdrawal symptoms when they stop using it. Sometimes the substance must be withdrawn gradually to prevent the symptoms from becoming overwhelming or dangerous (Brick, 2008). Users may continue to take the substance to relieve or avoid withdrawal symptoms.

Physiological dependence (evidence of tolerance or withdrawal) was not required for a diagnosis of substance dependence in the *DSM-IV*, however. A person needed only to use a substance compulsively despite experiencing significant social, occupational, psychological, or medical problems as a result. The diagnosis of substance dependence preempted the diagnosis of substance abuse. Some

individuals abused substances for years, severely disrupting their lives, without qualifying for a diagnosis of substance dependence.

The *DSM-5* combined substance abuse and dependence into one diagnosis, substance use disorder, because of difficulties in distinguishing between abuse and dependence in clinical and research settings and because of the low reliability of the diagnosis of substance abuse (Hasin et al., 2012). The *DSM-5* diagnostic criteria for substance use disorder include impaired control, the continued use of substances despite negative social, occupational, and health consequences, risky use, as well as evidence of tolerance or withdrawal (see Table 1). Users must show two or more of the symptoms associated with substance use disorder over the course of a year to receive the diagnosis. The criterion in the *DSM-IV* regarding legal problems was dropped because such problems were relatively rare among adults and thus were not very informative, but a criterion of craving was added because it is a common and diagnostically important symptom among people with substance use issues (Hasin et al., 2012). Clinicians also rate the severity of the substance use disorder as mild (two or three of the criteria are met), moderate (four or five criteria are met), or severe (six or more criteria are met).

One study reanalyzed data from a large, nationally representative sample of the United States to determine the effects of changes from the *DSM-IV* to the *DSM-5* criteria for the diagnosis of alcohol-related disorders and found that the 12-month prevalence of alcohol use disorder based on the *DSM-5* criteria (10.8 percent) was quite similar to the combined 12-month prevalence of *DSM-IV* diagnoses of alcohol abuse or alcohol dependence (9.7 percent) (Agrawal, Heath, & Lynskey, 2011). This suggests that the combined prevalences of abuse and dependence diagnoses for each substance based on the *DSM-IV* criteria can be used to estimate the prevalence of substance use disorders for each substance discussed in this chapter.

DSM-5 recognizes 10 substance classes around which substance use disorders emerge. This chapter organizes these substance use disorders into five categories: (1) central nervous system depressants, including alcohol, barbiturates, benzodiazepines, and inhalants; (2) central nervous system stimulants, including cocaine, amphetamines, nicotine, and caffeine; (3) opioids, including heroin and morphine; (4) hallucinogens and phencyclidine (PCP); and (5) cannabis. We consider the characteristics of the problems people experience from using substances in each category and then discuss certain other drugs commonly misused.

TABLE 1 Criteria for Substance Use Disorder*Impaired centre control*

1. The substance is taken in increasingly larger amounts or over a longer period of time than originally intended.
2. The substance user craves the use of the substance.
3. The substance user feels an ongoing desire to cut down or control substance abuse.
4. Much time is spent in obtaining, using, or recovering from the substance.

Social impairment

5. The ongoing use of the substance often results in an inability to meet responsibilities at home, work, or school.
6. Important social, work-related, or recreational activities are abandoned or cut back because of substance use.
7. Ongoing substance use despite recurring social or relationship difficulties caused or made worse by the effects of the substance.

Risky use

8. Ongoing substance use in physically dangerous situations such as driving a car or operating machinery.
9. Substance use continues despite the awareness of ongoing physical or psychological problems that have likely arisen or been made worse by the substance.

Pharmacological criteria

10. Changes in the substances user's tolerance of the substance is indicated by the need for increased amounts of the substance to achieve the desired effect or by a diminished experience of intoxication over time with the same amount of the substance.
11. Withdrawal is demonstrated by the characteristic withdrawal syndrome of the substance and/or taking the same or similar substance to relieve withdrawal symptoms.

Source: Generally two or more of the above criteria are required to make a diagnosis of substance abuse disorder.

DEPRESSANTS

Depressants slow the central nervous system. In moderate doses, they make people relaxed and somewhat sleepy, reduce concentration, and impair thinking, judgment, and motor skills. In heavy doses, they can induce stupor or even death (see Table 2).

Alcohol

Alcohol's effects on the brain occur in two distinct phases (Brick, 2008). In low doses, alcohol causes many people to feel more self-confident, more relaxed, and perhaps slightly euphoric. They may be less inhibited, and this disinhibitory effect may be what many people find attractive. At increasing

TABLE 2 Intoxication with and Withdrawal from Depressants

The depressant drugs depress activity in the central nervous system.

Drug	Intoxication Symptoms	Withdrawal Symptoms
Alcohol	Behavioral symptoms (e.g., inappropriate sexual or aggressive behavior, mood lability, impaired judgment)	Autonomic hyperactivity (e.g., sweating, fast pulse)
Benzodiazepines	Sleepiness	Hand tremor
Barbiturates	Slurred speech	Insomnia
	Incoordination	Nausea or vomiting
	Unsteady gait	Transient hallucinations or illusions
	Involuntary eye movement	Psychomotor agitation
	Impairment in attention or memory	Anxiety
	Stupor or coma	Seizures



Drinking alcohol with food leads to a slower absorption rate of the alcohol. © Philip Lee Harvey/Getty Images

doses, however, alcohol induces many of the symptoms of depression, including fatigue and lethargy, decreased motivation, sleep disturbances, depressed mood, and confusion. Also, although many people take alcohol to feel sexier (mainly by reducing their sexual inhibitions), even low doses can impair sexual functioning.

People intoxicated by alcohol slur their words, walk unsteadily, have trouble paying attention or remembering things, and are slow and awkward in their physical reactions. They may act inappropriately, becoming aggressive or belligerent, or saying rude things. Their moods may swing from exuberance to despair. With extreme intoxication, people may fall into a stupor or a coma. Often, they do not recognize that they are intoxicated or may flatly deny it. Once sober, they may have amnesia, known as a *blackout*, for the events that occurred while they were intoxicated (Ruiz et al., 2007).

One critical determinant of how quickly people become intoxicated with alcohol is whether their stomach is full or empty. An empty stomach speedily delivers alcohol to the small intestine, where it is rapidly absorbed into the body. A person with a full stomach may ingest significantly more drinks before reaching a dangerous blood-alcohol level or showing clear signs of intoxication (Brick, 2008). People in countries where alcohol is usually consumed with meals, such as France, show lower rates of alcohol use disorders than do people in countries where alcohol often is consumed on an empty stomach.

The legal definition of alcohol intoxication is much narrower than the criteria for a diagnosis of

alcohol intoxication. Most U.S. states consider a person to be under the influence of alcohol if his or her blood-alcohol level is 0.08 or above. As Table 3 indicates, it does not take many drinks for most people to reach this level. It takes less alcohol to reach a high blood-alcohol level in women than in men because women generally are smaller and have a lower body water content than men, leading to higher concentrations of alcohol in the blood for a given dose. Deficits in attention, reaction time, and coordination arise even with the first drink and can interfere with the ability to operate a car or machinery safely and to perform other tasks requiring a steady hand, coordination, clear thinking, and clear vision. These deficits are not always readily observable, even to trained eyes. People often leave parties or bars without appearing drunk but having a blood-alcohol level well above the legal limit (Brick, 2008).

Heavy drinking can be part of the culture of a peer group, but it still can lead to alcohol use disorder in some members. Drinking large quantities of alcohol can be fatal, even in people who are not chronic alcohol abusers. About one-third of such deaths result from respiratory paralysis, usually due to a final large dose of alcohol in people who are already intoxicated. Alcohol can also interact fatally with a number of substances, including some antidepressant drugs (Brick, 2008).

Unintentional alcohol-related injuries due to automobile accidents, drowning, burns, poisoning, and falls account for approximately 600,000 deaths per year internationally (WHO, 2005). Nearly half of all fatal automobile accidents and deaths due to falls or fires and over one-third of all drownings are alcohol-related (Fleming & Manwell, 2000; Hunt, 1998). Even being a little "buzzed" (i.e., having a blood alcohol level of 0.02 percent) is associated with a significantly increased risk of having an automobile accident compared to being completely sober (Phillips & Brewer, 2011). More than half of all murderers and their victims are believed to be intoxicated with alcohol at the time of the murders, and people who attempt or commit suicide often do so under the influence of alcohol.

The symptoms of alcohol withdrawal manifest in three stages (Brick, 2008). The first, which usually begins within a few hours after drinking has been stopped or sharply curtailed, includes tremulousness (the "shakes"), weakness, and profuse perspiration. The person may complain of anxiety (the "jitters"), headache, nausea, and abdominal cramps and may retch and vomit. He or she is flushed, restless, and easily startled but alert. The EEG pattern may be mildly abnormal. The person may begin to see or hear things, at first only with eyes shut but

TABLE 3 Relationships Among Sex, Weight, Oral Alcohol Consumption, and Blood-Alcohol Level

It doesn't take very many drinks for most people to reach a blood-alcohol level of 0.08, which is the legal definition of intoxication in most states.

Total Alcohol Content (Ounces)	Beverage Intake*	Blood-Alcohol Level (Percent)					
		Female (100 lb)	Male (100 lb)	Female (150 lb)	Male (150 lb)	Female (200 lb)	Male (200 lb)
1/2	1 oz spirits	0.045	0.037	0.03	0.025	0.022	0.019
	1 glass wine						
	1 can beer						
1	2 oz spirits	0.090	0.075	0.06	0.050	0.045	0.037
	2 glasses wine						
	2 cans beer						
2	4 oz spirits	0.180	0.150	0.12	0.100	0.090	0.070
	4 glasses wine						
	4 cans beer						
3	6 oz spirits	0.270	0.220	0.18	0.150	0.130	0.110
	6 glasses wine						
	6 cans beer						
4	8 oz spirits	0.360	0.300	0.24	0.200	0.180	0.150
	8 glasses wine						
	8 cans beer						
5	10 oz spirits	0.450	0.370	0.30	0.250	0.220	0.180
	10 glasses wine						
	10 cans beer						

*In 1 hour

*100-proof spirits (50 percent alcohol)

Source: Data from Ray & Ksir, 1993, p. 194.

later also with eyes open. Those whose alcohol use disorder is moderate may experience only this first stage of withdrawal, and the symptoms may disappear within a few days.

The second stage includes convulsive seizures, which may begin as soon as 12 hours after drinking stops but more often appear during the second or third day. The third stage of withdrawal is characterized by **delirium tremens**, or **DTs**. Auditory, visual, and tactile hallucinations occur. The person also may develop bizarre, terrifying delusions, such as the belief that monsters are attacking. He or she may sleep little and may become agitated and disoriented. Fever, profuse perspiration, and an irregular heartbeat may develop. Delirium tremens is fatal in approximately 10 percent of cases. Death may occur from hyperthermia (extremely high body temperature) or the collapse of the peripheral vascular

system. Fortunately, only about 11 percent of individuals with severe alcohol use disorder ever experience seizures or DTs (Schuckit, Tip, Reich, & Hesselbrock, 1995). These symptoms are more common in people who drink large amounts in a single sitting and have an existing medical illness.

Alcohol Misuse

As noted in Substance Use Along the Continuum, alcohol use and misuse span a broad range from people who completely abstain from drinking alcohol to those who drink alcohol occasionally in social situations, to those who drink more frequently and heavily, and finally to those for whom alcohol use creates significant social, occupational, and health problems. Near the maladaptive end of the continuum are people who engage in heavy drinking (two or more drinks per day for men, one or more drinks per day for

women) or binge drinking (five or more drinks within a couple of hours for men, four or more drinks within a couple of hours for women). Heavy drinking and binge drinking are associated with significant health problems (Paul et al., 2011). Large nationwide studies in the United States find that about 7 percent of adults are heavy drinkers, and 17 to 23 percent of adults report binge drinking at least once in the last month (Paul et al., 2011; SAMHSA, 2008c). Binge drinking on college campuses is common. Nationwide, 35 percent of college students report binge drinking in the past month, compared to 32 percent of 18- to 22-year-olds not in college (Johnston, O'Malley, Bachman, & Schulenberg, 2012). Binge drinking is especially common among members of fraternities and sororities, with 75 percent of members saying they binge drink (Wechsler et al., 2002).

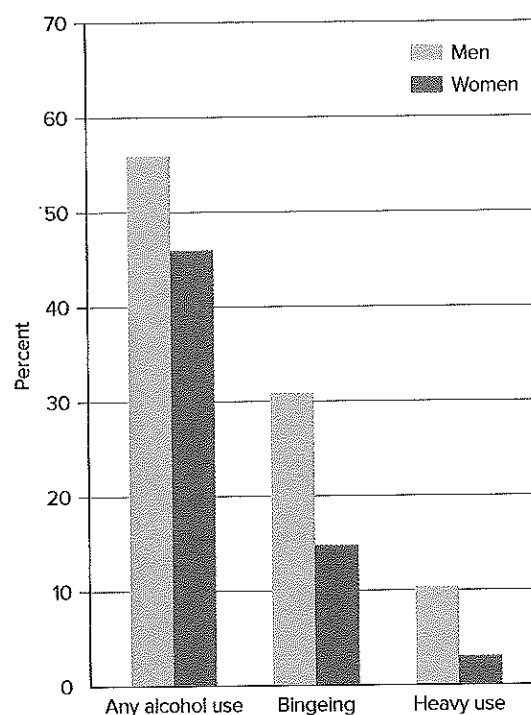
Gender and Age Differences In most nations of the world, men are more likely to drink alcohol than are women, and also are more likely to drink heavily or binge drink (Wilsnack et al., 2009). Similarly, across all age groups, males are much more likely to develop alcohol use disorders than are females, as can be seen in Figure 2. The gender gap in alcohol use is much greater among men and women who subscribe to traditional gender roles, which condone drinking for men but not for women (Huselid & Cooper, 1992; Wilsnack et al., 2009). Similarly, the gender gap is greater among U.S. ethnic minority groups that more widely accept traditional gender roles, such as Hispanics and recent Asian immigrants, than among European Americans, due largely to high percentages of minority women who completely abstain from alcohol. We discuss other contributors to the gender differences in substance use later in this chapter.

Strong age differences in alcohol use disorders decline with age. There are many reasons for this decline. First, with age the liver metabolizes alcohol at a slower rate, and the lower percentage of body water increases the absorption of alcohol. As a result, older people become intoxicated faster and experience the negative effects of alcohol more severely and more quickly. Second, as people grow older, they may become more mature in their choices, including choices about drinking alcohol to excess. Third, older people have grown up under stronger prohibitions against alcohol use and abuse than have younger people. Fourth, people who have used alcohol excessively for many years may die from alcohol-related diseases before they reach old age (Sher, Grekin, & Williams, 2005).

Although alcohol use is illegal for persons under 21 years of age in the United States, one-third of 8th graders and 70 percent of 12th graders have tried

FIGURE 2

Gender Differences in Alcohol.
Men engage in more alcohol use than women do.



Source: SAMHSA, 2008c.

Note: Bingeing is defined as five or more drinks on the same occasion at least once in the past 30 days. Heavy use is defined as five or more drinks on the same occasion on at least 5 different days in the past 30 days.

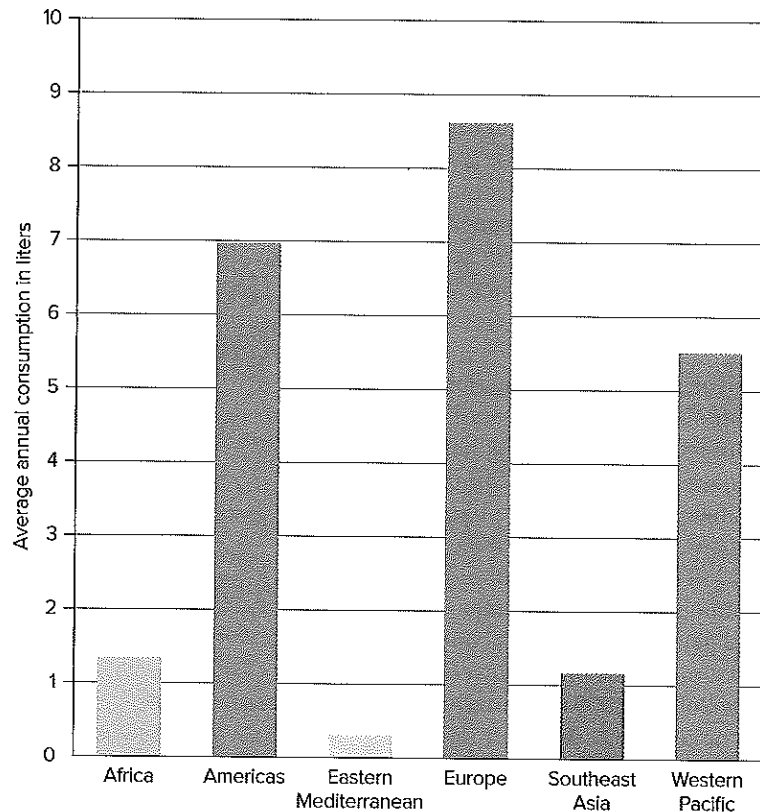
alcohol (Johnston et al., 2012). Of particular concern, 22 percent of 12th graders report having engaged in binge drinking in the last year. Several studies suggest that the use of alcohol and the prevalence of alcohol-related problems have been increasing among young people in recent decades and that the age at which alcohol is first consumed is decreasing (e.g., Grucza, Bucholz, Rice, & Bierut, 2008; Keyes et al., 2008, 2010). The earlier the age of onset of drinking and drinking-related problems, the more likely individuals are to develop alcohol use disorders (Alvanzo et al., 2011).

Cultural and Ethnic/Racial Differences

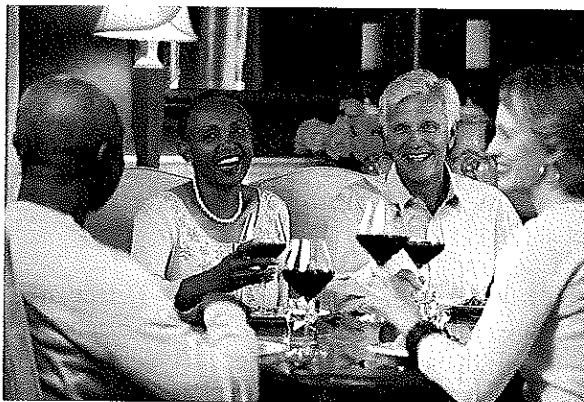
Cultures differ markedly in their use of alcohol and rates of alcohol-related problems (Figure 3). Consumption in the Russian Federation is high among both men and women, and the rates of negative health consequences due to alcohol are highest in this and surrounding countries (Rehm et al., 2009).

FIGURE 3

Consumption of Pure Alcohol in Various Regions of the World. Cultures vary greatly in their consumption of alcohol. (Southeast Asia includes India and neighboring countries. Western Pacific includes Australia, China, Japan, and the Pacific Rim Countries.)



From *Global Status Report on Alcohol*, World Health Organization, 2001, www.who.in. Reprinted with permission from the World Health Organization.



As people grow older, they may become more mature in their choices, including choices about drinking alcohol to excess.

© Ariel Skelley/Getty Images RF

Low rates of consumption in some African and middle eastern countries are tied to Islam's prohibitions against alcohol.

Ethnic groups within the United States differ substantially in their alcohol use. One group at high risk for alcohol-related problems is Native Americans, 43 percent of whom meet the criteria for alcohol abuse or alcohol dependence at some time in their life (Hasin, Stinson, Ogburn, & Grant, 2007). Deaths related to alcohol are as much as five times more common among Native Americans than in the general U.S. population (Manson et al., 1992). This higher rate of alcohol-related problems has been tied to excessive rates of poverty and unemployment, lower levels of education, and a greater sense of helplessness and hopelessness (Manson et al., 1992).

SHADES OF GRAY

As you may have observed, binge drinking on the weekends is fairly common on college campuses. Read about Nick and his friends, who may resemble people you know.

Nick began drinking in high school, but his drinking escalated when he moved away from home for college. After just a couple of weeks there, Nick became friends with a group that liked to party on the weekends. On Thursday nights, they would drink and get so loud and obnoxious that their neighbors in the dorm would sometimes complain. They would sleep off their hangovers on Friday, miss classes, and then begin drinking again from Friday afternoon through Saturday, finally stopping on Sunday to sleep and recover. Nick

was able to keep decent grades through his first year, despite missing many classes. In sophomore year, classes in his major were harder, and he would abstain from drinking from Sunday afternoon until noon on Thursday. But Thursday afternoon he would get the keg of beer for his friends, and the old pattern would kick in.

One night during a drinking game, Nick accidentally punched a hole in the wall of his dorm room and was kicked off campus as a result. Between this incident and his declining grades, his parents threatened to stop paying his college tuition.

Would you diagnose Nick with an alcohol use disorder? (Discussion appears at the end of this chapter.)

Long-Term Effects of Alcohol Misuse

Heavy and prolonged use of alcohol can have toxic effects on several systems of the body, including the stomach, esophagus, pancreas, and liver (Paul et al., 2011). One of the most common medical conditions associated with alcohol misuse is low-grade hypertension. This condition, combined with increases in the levels of triglycerides and low-density lipoprotein (or “bad”) cholesterol, puts alcohol abusers at increased risk for heart disease. Heavy alcohol use increases the risk of cancer, particularly breast cancer in women (Chen et al., 2011). People with alcohol use disorders often are malnourished, in part because chronic alcohol ingestion decreases the absorption of critical nutrients from the gastrointestinal system and in part because they tend to “drink their meals.” Some show a chronic thiamine (vitamin B₁) deficiency, which can lead to several disorders of the central nervous system, including numbness and pain in the extremities, deterioration in the muscles, and the loss of visual acuity for both near and far objects (Martin & Bates, 1998). Heavy prolonged use of alcohol is a risk factor for dementia, a permanent substance-induced major neurocognitive disorder involving loss of intellectual abilities, including memory, abstract thinking, judgment, and problem solving, and often accompanied by personality changes such as increased paranoia (see the chapter “Neurodevelopmental and Neurocognitive Disorders”). Subtler deficits due to central nervous system damage (e.g., substance-induced mild neurocognitive disorder) are observed in many chronic abusers of alcohol, even after they quit drinking (Martin & Bates, 1998).

As noted earlier, binge drinking is relatively common among adolescents and young adults. There

is increasing evidence that heavy and prolonged use of alcohol during adolescence and early adulthood may have permanent negative effects on the brain, which is undergoing massive developmental changes during these periods of life (Jacobus & Tapert, 2013). Neuroimaging studies show changes in the structure and functioning of several areas of the brain in adolescents and young adults who binge-drink frequently or are chronic heavy drinkers, changes associated with deficits in performance on a variety of cognitive tests. The few longitudinal studies that have been done suggest that these deleterious effects of alcohol consumption may persist even after people stop drinking.

Some studies indicate that moderate alcohol consumption, particularly of red wine, carries health benefits. Red wine contains antioxidants that can increase good cholesterol, along with other chemicals that can help prevent damage to blood vessels and reduce bad cholesterol, producing positive cardiac effects (Fillmore et al., 2006; Le Strat & Gorwood, 2011). Several studies suggest that individuals who consume one or two drinks a day have better physical health and lower mortality rates than individuals who abstain from alcohol (Corrao, Bagnardi, Zamboni, & La Vecchia, 2004; Rehm, Greenfield, & Rogers, 2001). However, abstainers and moderate drinkers differ on many other variables that can affect health. Abstainers are more likely than moderate drinkers to be older, less well educated, physically inactive, and overweight and to have diabetes, hypertension, and high cholesterol (Naimi et al., 2005). Some people classified as abstainers drank heavily earlier in life and have quit due to negative health effects (Fillmore et al., 2006). These factors make the potential health benefits of moderate drinking less clear.

Benzodiazepines and Barbiturates

Like alcohol, benzodiazepines and barbiturates depress the central nervous system. Intoxication with and withdrawal from these substances are similar to alcohol intoxication and withdrawal. Users may initially feel euphoric and become disinhibited but then experience depressed moods, lethargy, perceptual distortions, loss of coordination, and other signs of central nervous system depression.

Benzodiazepines (such as Xanax, Valium, Halcion, Librium, and Klonopin) and **barbiturates** (such as Seconal) are legally manufactured and sold by prescription, usually as sedatives for the treatment of anxiety and insomnia. Benzodiazepines are also used as muscle relaxants and antiseizure medicines. In the United States, approximately 90 percent of people hospitalized for medical care or surgery are prescribed sedatives (Virani et al., 2009). Large quantities of these substances end up on the black market, however. They are especially likely to be abused in combination with other psychoactive substances to produce greater feelings of euphoria or to relieve the agitation created by other substances. Abuse of prescription sedatives and tranquilizers has increased in recent years. Nationwide studies find that about 9 percent of adults, 9.6 percent of college students, and close to 5 percent of teenagers report using prescription sedatives or tranquilizers in the last year for nonmedical purposes (Johnston et al., 2012; McCabe, Cranford, & West, 2008). *DSM-5* classifies problematic misuse of these drugs as sedative, hypnotic, or anxiolytic use disorders.

Barbiturates and benzodiazepines cause decreases in blood pressure, respiratory rate, and heart rate. In overdose, they can be extremely dangerous and even cause death from respiratory arrest or cardiovascular collapse. Overdose is especially likely when people take these substances (particularly benzodiazepines) with alcohol. These were among the drugs that Heath Ledger overdosed on (see this chapter's Extraordinary People).

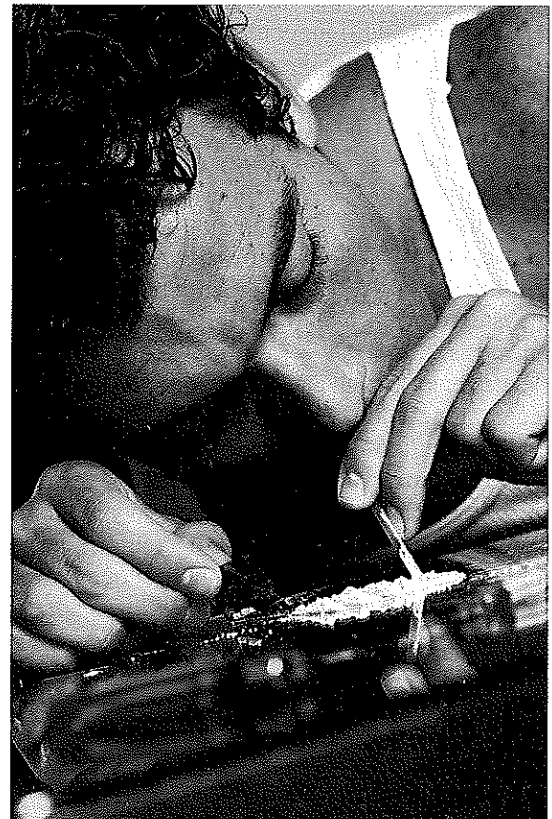
STIMULANTS

Stimulants activate the central nervous system, causing feelings of energy, happiness, and power; a decreased desire for sleep; and a diminished appetite (see Table 4). Cocaine and the amphetamines (including the related methamphetamines) are the two types of stimulants associated with severe substance use disorders. Both impart a psychological lift or rush. They cause dangerous increases in blood pressure and heart rate, alter the rhythm and electrical activity of the heart, and constrict the blood vessels,

which can lead to heart attacks, respiratory arrest, and seizures. In the United States, toxic reactions to cocaine and the amphetamines account for more than a third of drug-related emergency room visits (SAMHSA, 2008a). Prescription stimulants, including Dexedrine and Ritalin, are used to treat asthma and other respiratory problems, obesity, neurological disorders, attention-deficit/hyperactivity disorder (ADHD; see the chapter “Neurodevelopmental and Neurocognitive Disorders”), and a variety of other conditions. Use of these prescription stimulants for nonmedical purposes has increased sharply in recent decades (McCabe et al., 2008). Caffeine and nicotine also are stimulants, and although their psychological effects are not as severe as those of cocaine and amphetamines, these drugs—particularly nicotine—can have long-term negative effects.

Cocaine

Cocaine, a white powder extracted from the coca plant, is one of the most addictive substances known. People snort the powder or inject it intravenously. In



Cocaine use causes dangerous increases in blood pressure and heart rate, alterations in the rhythm and electrical activity of the heart, and constricted blood vessels, which can lead to heart attacks, respiratory arrest, and seizures. © Medioimages/PictureQuest RF

TABLE 4 Intoxication with and Withdrawal from Stimulants

The stimulants activate the central nervous system.

Drug	Intoxication Symptoms	Withdrawal Symptoms
Cocaine and amphetamines	Behavioral changes (e.g., euphoria or affective blunting; changes in sociability; hypervigilance; interpersonal sensitivity; anxiety, tension, or anger; impaired judgment) Rapid heartbeat Dilation of pupils Elevated or lowered blood pressure Perspiration or chills Nausea or vomiting Weight loss Psychomotor agitation or retardation Muscular weakness Slowed breathing Chest pain Confusion, seizures, coma	Dysphoric mood Fatigue Vivid, unpleasant dreams Insomnia or hypersomnia Increased appetite Psychomotor retardation or agitation
Nicotine	Not a diagnosis in the <i>DSM-5</i>	Dysphoria or depressed mood Insomnia Irritability, frustration, or anger Anxiety Difficulty concentrating Restlessness Decreased heart rate Increased appetite or weight gain Marked fatigue or drowsiness Dysphoric mood or irritability Flulike symptoms (e.g., nausea or vomiting)
Caffeine	Restlessness Nervousness Excitement Insomnia Flushed face Frequent urination Stomach upset Muscle twitching Rambling flow of thought or speech Rapid or irregular heartbeat Periods of inexhaustibility Psychomotor agitation	

the 1970s, even more powerful freebase cocaine appeared when users developed a method for separating the most potent chemicals in cocaine by heating it with ether. Freebase cocaine is usually smoked in a water pipe or mixed in a tobacco or marijuana cigarette. *Crack* is a form of freebase cocaine boiled down into tiny chunks, or rocks, and usually smoked.

Initially, cocaine produces an instant rush of intense euphoria, followed by heightened self-esteem, alertness, energy, and feelings of competence and creativity. Users crave increasing amounts of the substance, for both its physiological and its psychological effects

(Ruiz et al., 2007). When taken repeatedly or at high doses, however, it leads to grandiosity, impulsiveness, hypersexuality, compulsive behavior, agitation, and anxiety reaching the point of panic and paranoia. Stopping cocaine use can induce exhaustion and depression.

Cocaine activates those areas of the brain that register reward and pleasure. Normally, a pleasurable event releases dopamine into the synapses in these areas. Dopamine then binds to receptors on neighboring synapses (Figure 4). Cocaine blocks the reuptake of dopamine into the transmitting neuron, causing it to accumulate in the synapse and

maintaining the pleasurable feeling (Ruiz et al., 2007). The rapid, strong effects of cocaine on the brain's reward centers make this substance more likely than most to lead to a stimulant use disorder. The following case study illustrates this process.

CASE STUDY

Dr. Arnie Rosenthal is a 31-year-old white male dentist, married for 10 years with two children. His wife insisted he see a psychiatrist because of uncontrolled use of cocaine, which over the past year had made it increasingly difficult for him to function as a dentist. During the previous 5 years he used cocaine virtually every day, with only occasional 1- or 2-week periods of abstinence. For the past 4 years Rosenthal wanted to stop, but his desire was overridden by a "compulsion" to take the drug.

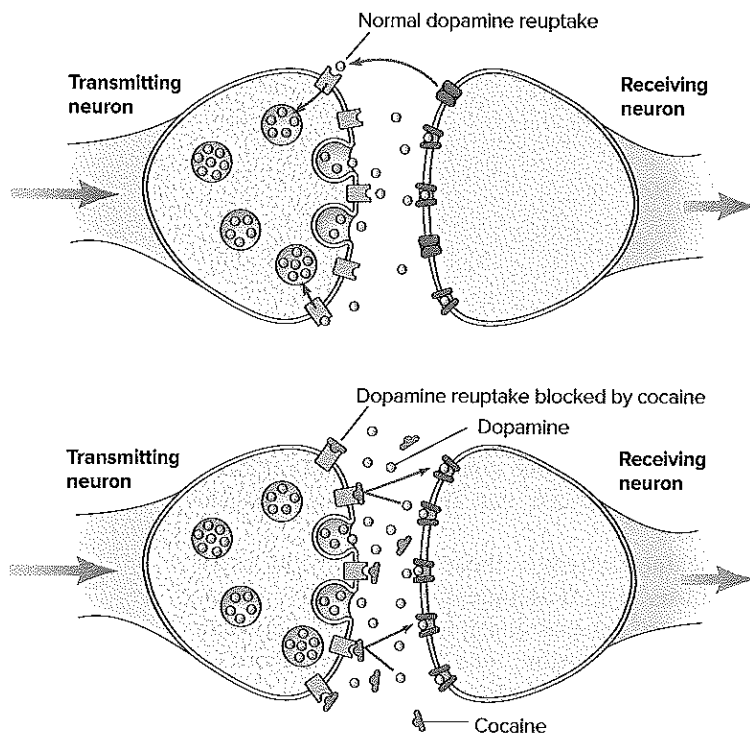
He began using marijuana after being married a year, smoking a joint each day after school

and spending the evening staring at TV. When he graduated from dental school his wife was pregnant, and he was "scared to death" at the prospect of being a father. His deepening depression was characterized by social isolation, increased loss of interests, and frequent temper outbursts. He needed intoxication with marijuana, or occasionally sedatives, for sex, relaxation, and socialization. Following the birth of the child he "never felt so crazy," and his marijuana and sedative use escalated. Two years later, a second child was born. Dr. Rosenthal was financially successful, had moved to an expensive suburban home with a swimming pool, and had two cars and "everything my parents wanted for me." He was 27 years old, felt he had nothing to look forward to, and felt painfully isolated; drugs were no longer providing relief.

Rosenthal tried cocaine for the first time and immediately felt good. "I was no longer depressed. I used cocaine as often as possible because all my problems seemed to vanish, but I had to keep doing it. The effects were brief and it was very expensive, but I didn't care. When the immediate effects wore off, I'd feel even more miserable and depressed so that I did as much cocaine as I was able to obtain." He is now continuously nervous and irritable. (Spitzer, R. L., Skodol, A. E., Gibbon, M., & Williams, J. B. W., 1983, *Psychopathology: A Case Book*, pp. 81–83. Copyright © 1983 The McGraw-Hill Companies, Inc. Reprinted with permission.)

FIGURE 4

Effects of Cocaine on Dopamine Systems. Cocaine blocks transporters for the reuptake of dopamine, resulting in excess dopamine in the synapses.



Cocaine's effects wear off quickly, and the dependent person must take frequent doses to maintain a high. Tolerance also can develop, and the individual must obtain larger and larger amounts to experience a high (Ruiz et al., 2007). People with cocaine-related stimulant use disorder spend huge amounts of money on the substance and may engage in theft, prostitution, or drug dealing to obtain enough money to purchase it. Desperation can lead frequent users to participate in extremely dangerous behaviors. Many contract HIV, the virus that causes AIDS, by sharing needles with infected users or by having unprotected sex in exchange for money or cocaine (Ruiz et al., 2007).

Other frequent medical complications of cocaine use are heart rhythm disturbances and heart attacks; respiratory failure; neurological effects, including strokes, seizures, and headaches; and gastrointestinal complications, including abdominal pain and nausea. Physical symptoms include chest pain, blurred vision, fever, muscle spasms, convulsions, and coma (Ruiz et al., 2007).

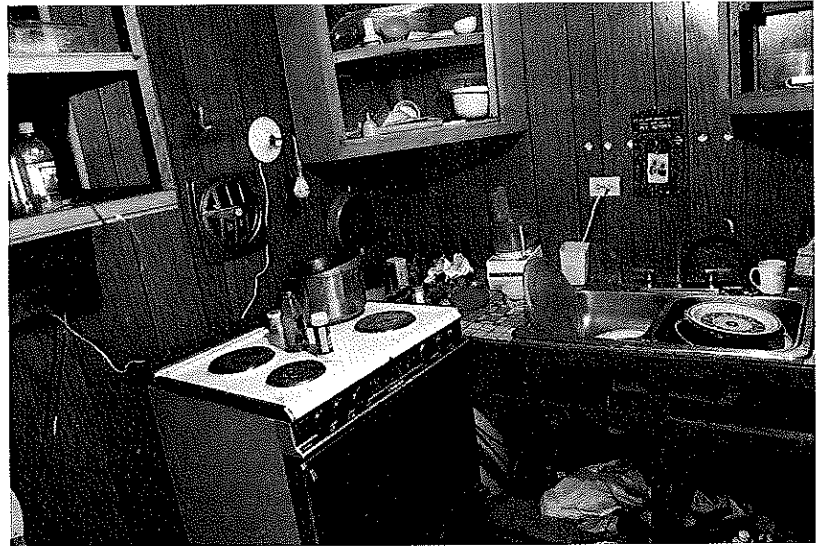
A large percentage of people who grew up in the 1960s and 1970s have tried cocaine, but these percentages are much lower in more recent generations: A nationwide study in the United States found that 48 percent of individuals who graduated from high school in 1979 had tried cocaine at some time in their life, compared to about 20 percent of individuals who had graduated from high school between 1980 and 1995 (Johnston et al., 2012). Among U.S. college students, 5.5 percent report ever having used cocaine, whereas 12 percent of 18- to 22-year-olds not in college report ever having used cocaine; among high school students, about 3.5 percent report ever having used cocaine (Johnston et al., 2012).

Amphetamines

Amphetamines and the related *methamphetamines* are stimulants prescribed for the treatment of attention problems (e.g., Ritalin, Adderall), narcolepsy, and chronic fatigue. They also are found in antihistamines (e.g., Sudafed) and diet drugs. Many stimulants are used appropriately under the supervision of a physician, but a great many doses are diverted to illegal use and abuse (Ruiz et al., 2007). Because of the potential for abuse, most states regulate over-the-counter sales of diet drugs and antihistamines. On the street, amphetamines are known as “speed,” “meth,” and “chalk.” They are most often swallowed as pills but can be injected intravenously, and methamphetamine can be snorted (“crank”) or smoked (“crystal meth” or “ice”). Owing in part to its easy and inexpensive manufacture, methamphetamine use is widespread in the United States. As of 2012, 1.2 million Americans reported using the drug (SAMHSA, 2014).

Amphetamines release the neurotransmitters dopamine and norepinephrine and block their reuptake. The symptoms of intoxication are similar to those of cocaine intoxication: euphoria, self-confidence, alertness, agitation, and paranoia (Ruiz et al., 2007). Like cocaine, amphetamines can produce perceptual illusions. The movement of other people and objects may seem distorted or exaggerated. Users may hear frightening voices making derogatory statements about them, see sores all over their body, or feel snakes crawling on their arms. They may have delusions of being stalked that lead them to act out violently. Some users know that these experiences are not real, but others lose their grip on reality and develop amphetamine-induced psychotic disorders (Ruiz et al., 2007).

Legal problems typically arise for amphetamine abusers due to aggressive or inappropriate behavior while intoxicated or as a result of buying the drug



On the street, amphetamines are known as “speed,” “meth,” and “chalk.” They are most often swallowed as pills but can be injected intravenously, and methamphetamine can be snorted (“crank”) or smoked (“crystal meth” or “ice”). Serious health problems can result from their use. © The Washington Times/ZUMAPRESS/Newscom

illegally. Tolerance develops quickly, as does physical dependence. Users may switch from swallowing pills to injecting amphetamines intravenously. Some go on a *speed run*, in which they inject amphetamines frequently over several days without eating or sleeping. Then they crash into a devastating depression. Acute withdrawal symptoms typically subside within a few days, but chronic users may experience mood instability, memory loss, confusion, paranoid thinking, and perceptual abnormalities for weeks, months, or even years. They often battle the withdrawal symptoms with another speed run (Ruiz et al., 2007).

Abuse of amphetamines and methamphetamines can lead to a number of medical issues, particularly cardiovascular problems—including rapid or irregular heartbeat, increased blood pressure, and irreversible, stroke-producing damage to the small blood vessels in the brain. Elevated body temperature and convulsions can occur during overdoses, leading to death. People who share needles to inject amphetamines risk contracting HIV or hepatitis (Brick, 2008). With extended use, people become irritable and hostile and need more stimulants to avoid withdrawal symptoms. Their personal relationships and health decline. Between 1995 and 2002, emergency room visits involving amphetamines increased 54 percent in the United States (SAMHSA, 2005).

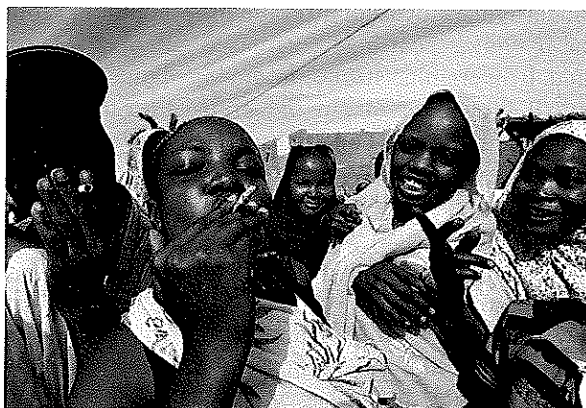
Abuse of these drugs has risen in recent years. In 2011, 8.2 percent of 12th-graders reported using

amphetamines or methamphetamines (Johnston et al., 2012). College students trying to stay up late to study may take them; nationwide studies find that 13.4 percent of college students report ever having used amphetamines or methamphetamines, with 9.3 percent reporting their use in the last year (Johnston et al., 2012). Employers may even provide amphetamines to their employees to increase productivity.

Nicotine

All the substances discussed thus far, except alcohol, are illegal for nonprescription use, and many laws regulate the use of alcohol. One of the most addictive substances known, however, is fully legal for use by adults and readily available to adolescents—**nicotine**.

Nicotine is an alkaloid found in tobacco. Cigarettes, the most popular nicotine delivery device, get this substance to the brain within seconds. In the United States, 70 percent of people over age 12 have smoked cigarettes at some time in their life, and about 28 percent currently are smokers (Johnston et al., 2012; SAMHSA, 2008c). Smoking usually begins in the early teens. A 2011 survey of 12th-graders found that 40 percent had smoked a cigarette at some time in their life and that 10 percent were smoking daily (Johnston et al., 2012). Rates of cigarette use are much higher in Europe and many developing nations (Danielsson, Wennberg, Hibell, & Romelsjö 2012). Over two-thirds of people who begin smoking become dependent on nicotine, a rate much higher than is found with most other psychoactive substances (Lopez-Quintero et al., 2011). Tobacco use has declined in the United States and other industrialized countries over the past few decades, thanks in part to significantly increased taxes on tobacco products, laws restricting their use in public



While the rate of cigarette smoking has decreased in the United States, it is on the rise in many developing countries around the world. © KAMBOU SIA/AFP/Getty Images

places, and lawsuits limiting tobacco companies' ability to advertise. In contrast, tobacco use is increasing in developing countries.

Nicotine operates on both the central and the peripheral nervous systems. It helps release several biochemicals in the brain, including dopamine, norepinephrine, serotonin, and the endogenous opioids. Although people often say they smoke to reduce stress, nicotine's physiological effects actually resemble the fight-or-flight response (see the chapter "Trauma, Anxiety, Obsessive-Compulsive, and Related Disorders")—several systems in the body are aroused, including the cardiovascular and respiratory systems. The subjective sense that smoking reduces stress actually may reflect the reversal of the tension and irritability that signal nicotine withdrawal. In other words, nicotine addicts need nicotine to feel normal to counteract its effects on the body and the brain (Ruiz et al., 2007). *DSM-5* recognizes nicotine dependence as a tobacco use disorder.

In 1964, based on a review of 6,000 empirical studies, the surgeon general of the United States concluded that smoking, particularly cigarette smoking, causes lung cancer, bronchitis, and probably coronary heart disease. Mortality rates for smokers are 70 percent greater than for nonsmokers, meaning that a person between ages 30 and 35 who smokes two packs a day will die 8 to 9 years earlier than a nonsmoker. Each year, an estimated 443,000 people in the United States die prematurely from smoking-related coronary heart disease, lung cancer, emphysema, or chronic bronchitis or from exposure to secondhand smoke. An additional 8.6 million people have a serious illness related to smoking (CDC, 2009). Women who smoke while pregnant give birth to smaller babies. The longer a person smokes and the more he or she smokes each day, the greater the health risks.

When chronic heavy smokers try to quit or are prohibited from smoking for an extended period, such as while at work or on an airplane, they show severe withdrawal symptoms. They become depressed, irritable, angry, anxious, frustrated, restless, and hungry; they have trouble concentrating; and they desperately crave another cigarette. These symptoms are immediately relieved by smoking, another sign of physiological dependence (Ruiz et al., 2007).

Because nicotine is relatively cheap and available, dependents tend not to spend much time trying to obtain it. They may panic, however, if they run out of cigarettes and replacements are not available. They also may spend a large part of their day smoking or chewing tobacco, and they continue to use nicotine even though it is damaging their health (e.g., after they have been diagnosed with emphysema). They may skip social activities where smoking is not

allowed or recreational activities such as sports because they have trouble breathing.

Electronic cigarettes, also called e-cigarettes, first appeared in 2004. By 2013 the number of users around the world had reached several million. The e-cigarette is an electronic device that vaporizes a flavored liquid that is inhaled, a practice called vaping. The fluid usually includes nicotine. Although there is general agreement that e-cigarettes are less harmful to health than cigarettes, long-term health effects are not known. There is some evidence that e-cigarettes can help people to quit smoking, although regulated replacement products and medications are generally viewed as safer (McRobbie, Bullen, Hartmann-Boyce, & Hajek, 2014).

Over 70 percent of people who smoke say they want to quit (Goldstein, 1998). Quitting is difficult, however, in part because the withdrawal syndrome is difficult to withstand. Only about 7 percent of smokers who try to stop smoking are still abstinent after 1 year, and most relapse within a few days of quitting (National Institute on Drug Abuse [NIDA], 2002b). The craving can remain after a smoker quits, with 50 percent of people who quit smoking reporting they have desired cigarettes in the past 24 hours (Goldstein, 1994). Nicotine patches and gum can help fight this urge.

Caffeine

Caffeine is by far the most heavily used stimulant, with 75 percent of it ingested in coffee (Chou, 1992). A cup of brewed coffee has about 100 milligrams of caffeine, and the average U.S. adult drinks about two cups per day. Other sources include tea (about 40 milligrams of caffeine per 6 ounces), caffeinated soda (45 milligrams per 12 ounces), over-the-counter analgesics and cold remedies (25 to 50 milligrams per tablet), weight-loss drugs (75 to 200 milligrams per tablet), and chocolate and cocoa (5 milligrams per bar).

Caffeine stimulates the central nervous system, increasing the levels of dopamine, norepinephrine, and serotonin. It also increases metabolism, body temperature, and blood pressure. People's appetite wanes, and they feel more alert. But in doses equivalent to just two to three cups of coffee, caffeine can cause unpleasant symptoms, including restlessness, nervousness, and hand tremors. People may experience an upset stomach and feel their heart beating rapidly or irregularly. They may have trouble going to sleep later on and may need to urinate frequently. These are symptoms of caffeine intoxication. Extremely large doses of caffeine can cause extreme agitation, seizures, respiratory failure, and cardiac problems.

The *DSM-5* specifies that a diagnosis of caffeine intoxication should be given only if an individual experiences significant distress or impairment in functioning as a result of the symptoms. Someone who drinks too much coffee for several days in a row during exam week, for example, might be so agitated that she cannot sit through her exams and so shaky that she cannot drive a car; such a person could be given a diagnosis of caffeine intoxication.

Some heavy coffee drinkers who joke that they are "caffeine addicts" actually cannot be diagnosed with caffeine use disorder, according to the *DSM-5*, because dependence on the drug seems not to cause significant social and occupational problems. Still, caffeine users can develop tolerance and undergo withdrawal if they stop ingesting caffeine. They may require several cups of coffee in the morning to feel "normal" and may experience significant headaches, fatigue, and anxiety if they do not get their coffee.

OPIOIDS

Morphine, heroin, codeine, and methadone are all **opioids**. They are derived from the sap of the opium poppy, which has been used for thousands of years to



Severe intoxication from heroin use can lead to unconsciousness, coma, and seizures. © Michaela Begsteiger/Getty Images RF

TABLE 5 Intoxication with and Withdrawal from Opioids

The opioids include morphine, heroin, codeine, and methadone.

Drug	Intoxication Symptoms	Withdrawal Symptoms
Opioids	Behavioral changes (e.g., initial euphoria followed by apathy, dysphoria, psychomotor agitation or retardation; impaired judgment) Constriction of pupils Drowsiness or coma Slurred speech Attention and memory problems	Dysphoric mood Nausea or vomiting Muscle aches Tearing or nasal mucus discharge Dilation of pupils Goose bumps Sweating Diarrhea Yawning Fever Insomnia

relieve pain. Our bodies produce natural opioids, including endorphins and enkephalins, to cope with pain. For example, a sports injury induces the body to produce endorphins to reduce pain and avoid shock. Doctors also may prescribe synthetic opioids, such as hydrocodone (Lorcet, Lortab, Vicodin) or oxycodone (Percodan, Percocet, OxyContin) for pain.

Morphine was widely used as a pain reliever in the nineteenth century, until it was found to be highly addictive. Heroin was developed from morphine in the late nineteenth century and was used for a time for medicinal purposes. By 1917, however, it was clear that heroin and all the opioids have dangerous addictive properties, and Congress passed a law making heroin illegal and banning the other opioids except for specific medical needs. Heroin remained widely available on the street, however (Winger et al., 1992).

When used illegally, opioids often are injected into the veins (mainlining), snorted, or smoked. The initial symptom of opioid intoxication often is euphoria (see Table 5). People describe a sensation in the abdomen like a sexual orgasm, referring to it as a thrill, kick, or flash. They may have a tingling sensation and a pervasive sense of warmth. They pass into a state of drowsiness, during which they are lethargic, their speech is slurred, and their mind may be clouded. They may experience periods of light sleep with vivid dreams. Pain is reduced (Ruiz et al., 2007). A person in this state is referred to as being *on the nod*. Severe intoxication can lead to unconsciousness, coma, and seizures.

Opioids can suppress the respiratory and cardiovascular systems to the point of death. The drugs are especially dangerous when combined with depressants, such as alcohol or sedatives. Withdrawal

symptoms include dysphoria, an achy feeling in the back and legs, increased sensitivity to pain, and a craving for more opioids. The person may experience nausea, vomiting, profuse sweating and goose bumps, diarrhea, and fever (Ruiz et al., 2007). These symptoms usually appear within 8 to 16 hours of last use and peak within 36 to 72 hours. In chronic or heavy users, they may continue in strong form for 5 to 8 days and in a milder form for weeks to months.

Most street heroin is cut with other substances, so users do not know the actual strength of the drug or its true contents, leaving them at risk for overdose or death. Users also risk contracting HIV through contaminated needles or through unprotected sex, which many opioid abusers exchange for more heroin. In some areas of the United States, up to 60 percent of chronic heroin users are infected with HIV. Intravenous users also can contract hepatitis, tuberculosis, serious skin abscesses, and deep infections. Women who use heroin during pregnancy risk miscarriage and premature delivery, and children born to mothers with opioid use disorders are at increased risk for sudden infant death syndrome (Brady, Back, & Greenfield, 2009).

The use and misuse of prescription opioid pain relievers such as oxycodone or Vicodin have increased significantly in the past decade and were among the prescription drugs involved in Heath Ledger's overdose. One-third of middle-aged adults in the United States report having used these drugs for nonmedical purposes sometime in their life. Thirteen percent of 12th-graders, 12 percent of college students, and 18 percent of 18- to 22-year-olds not in college report having ever used these drugs for nonmedical purposes (Johnston et al., 2012).

HALLUCINOGENS AND PCP

Most of the substances discussed so far can produce perceptual illusions and distortions when used in large doses. The **hallucinogens** and *phencyclidine* (PCP) produce perceptual changes even in small doses (see Table 6). The hallucinogens are a mixed group of substances, including lysergic acid diethylamide (LSD) and peyote. The psychoactive effects of LSD were first discovered in 1943 when Dr. Albert Hoffman accidentally swallowed a minute amount and experienced visual hallucinations. He later purposefully swallowed a small amount of LSD and reported its effects.

PROFILES

As far as I remember, the following were the most outstanding symptoms: vertigo, visual disturbances; the faces of those around me appeared as grotesque, colored masks; marked motor unrest, alternating with paresis; an intermittent heavy feeling in the head, limbs, and the entire body, as if they were filled with metal; cramps in the legs, coldness, and loss of feeling in the hands; a metallic taste on the tongue; dry constricted sensation in the throat; feeling of choking; confusion alternating between clear recognition of my condition, in which state I sometimes observed, in the manner of an independent, neutral observer, that I shouted half insanely or babbled incoherent words. Occasionally, I felt as if I were out of my body. The doctor found a rather weak pulse but an otherwise normal circulation. Six hours after ingestion of the LSD my condition had already improved considerably. Only the visual disturbances were still pronounced. Everything seemed to sway and the proportions were distorted like the reflections in the surface of moving water. Moreover, all objects appeared in unpleasant, constantly changing colors, the predominant shades being sickly green and blue. When I closed my eyes, an unending series of colorful, very realistic and fantastic images surged in upon me. A remarkable feature was the manner in which all acoustic perceptions (e.g., the noise of a passing car) were transformed into optical effects, every sound causing a corresponding colored hallucination constantly changing in shape and color like pictures in a kaleidoscope. (Hoffman, 1968, pp. 185–186)

TABLE 6 Intoxication with Hallucinogens and PCP

The hallucinogens and PCP cause a variety of perceptual and behavioral changes.

Drug	Intoxication Symptoms
Hallucinogens	Behavioral changes (e.g., marked anxiety or depression, the feeling that others are talking about you, fear of losing your mind, paranoia, impaired judgment) Perceptual changes while awake (e.g., intensification of senses, depersonalization, illusions, hallucinations) Dilation of pupils Rapid heartbeat Sweating Palpitations Blurring of vision Tremors Incoordination
PCP	Behavioral changes (e.g., belligerence, assaultiveness, impulsiveness, unpredictability, psychomotor agitation, impaired judgment) Involuntary rapid eyeball movement Hypertension Numbness Loss of muscle coordination Problems speaking due to poor muscle control Muscle rigidity Seizures or coma Exceptionally acute hearing Perceptual disturbances

As Hoffman describes, one symptom of intoxication from LSD and other hallucinogens is *synesthesia*, the overflow from one sensory modality to another. People say they hear colors and see sounds. They feel at one with their surroundings, and time seems to pass very slowly. Moods also may shift from depression to elation to fear. Some people become anxious. Others feel a sense of detachment and a great sensitivity for art, music, and feelings. These experiences lent the drugs the label *psychedelic*, from the Greek words for “soul” and “to make manifest.” LSD was used in the 1960s as part of the consciousness-expanding movement (Winger et al., 1992).

The hallucinogens are dangerous drugs, however. Although LSD was legal for use in the early

1960s, by 1967 reports of “bad acid trips,” or “bummers,” had become common, particularly in the Haight-Ashbury district of San Francisco, where many LSD enthusiasts from around the United States congregated (Smith & Seymour, 1994). Symptoms included severe anxiety, paranoia, and loss of control. Some people on bad trips would walk off a roof or jump out a window, believing they could fly, or walk into the sea, believing they were “one with the universe.” For some, the anxiety and hallucinations were severe enough to produce psychosis requiring hospitalization and long-term treatment. Some people reexperience their psychedelic experiences, especially visual disturbances, long after the drug has worn off and may develop a distressing or impairing hallucinogen persisting perception disorder.

Phencyclidine (PCP)—also known as angel dust, PeaCePill, Hog, and Tranq—is manufactured as a powder to be snorted or smoked. Although PCP is not classified as a hallucinogen, it has many of the same effects. At lower doses, it produces a sense of intoxication, euphoria or affective dulling, talkativeness, lack of concern, slowed reaction time, vertigo, eye twitching, mild hypertension, abnormal involuntary movements, and weakness. At intermediate doses, it leads to disorganized thinking, distortions of body image (e.g., feeling that one’s arms are not part of one’s body), depersonalization, and feelings of unreality. A user may become hostile, belligerent, and even violent (Morrison, 1998). At higher doses, PCP produces amnesia and coma, analgesia sufficient to allow surgery, seizures, severe respiratory problems, hypothermia, and hyperthermia. The effects begin immediately after injecting, snorting, or smoking and peak within minutes. Symptoms of severe intoxication can persist for several days; people with PCP intoxication may be misdiagnosed as having a psychotic disorder unrelated to substance use (Morrison, 1998).

Phencyclidine or other hallucinogen use disorder is diagnosed when individuals repeatedly fail to fulfill major role obligations at school, work, or home due to intoxication with these drugs. They may use the drugs in dangerous situations, such as while driving a car, and they may have legal troubles due to their possession of the drugs. Because the drugs can cause paranoia or aggressive behavior, frequent users may find their work and social relationships affected. About 11 percent of the U.S. population reports having tried a hallucinogen or PCP, but only 0.4 percent report having used it in the past month (Johnston et al., 2012; SAMHSA, 2002). Use is higher among teenagers and young adults, however,

with 5.8 percent of 12th-graders, 4.1 percent of college students, and 6.4 percent of 18- to 22-year-olds not in college reporting use of a hallucinogen in the past year (Johnston et al., 2012).

CANNABIS

The leaves of the **cannabis** (or hemp) plant can be cut, dried, and rolled into cigarettes or inserted into food and beverages. In North America, the result is known as marijuana, weed, pot, grass, reefer, and Mary Jane. Cannabis is the most commonly used illegal drug, with 42 percent of adults in the United States and 23 percent of Europeans having used the drug (Degenhardt et al., 2008; European Monitoring Centre for Drugs and Drug Action, 2011; Johnston et al., 2012). About half of older adolescents and young adults say they have used cannabis at some time in their life, and about 20 percent have used it in the last year (Johnston et al., 2012).

Intoxication usually begins with a “high” feeling of well-being, relaxation, and tranquility (see Table 7). Users may feel dizzy, sleepy, or dreamy. They may become more aware of their environment, and everything may seem funny. They may become grandiose or lethargic. People who already are very anxious, depressed, or angry may become more so (Ruiz et al., 2007). The symptoms of cannabis intoxication may develop within minutes if the drug is smoked but may take a few hours to develop if it is taken orally. The acute symptoms last 3 to 4 hours, but some symptoms may linger or recur for 12 to 24 hours.

Although people often view cannabis as a benign or safe drug, it can significantly affect cognitive and motor functioning. People taking cannabis may believe they are thinking profound thoughts, but their short-term memory is impaired to the point that they cannot remember thoughts long enough to express them in sentences. Motor performance also is impaired. People’s reaction times are slower and their concentration and judgment are deficient, putting them at risk for accidents. The cognitive impairments caused by cannabis can last up to a week after heavy use stops (Pope et al., 2001). These effects appear to be greater in women than in men (Pope et al., 1997).

The physiological symptoms of cannabis intoxication include increased or irregular heartbeat, increased appetite, and dry mouth. Cannabis smoke is irritating and increases the risk of chronic cough, sinusitis, bronchitis, and emphysema. It contains even larger amounts of known carcinogens than does tobacco and thus creates a high risk of cancer. The chronic use of cannabis lowers sperm count in

TABLE 7 Intoxication and Withdrawal Symptoms with Cannabis

Cannabis is the most commonly used illegal drug in the United States.

Drug	Intoxication Symptoms	Withdrawal Symptoms
Cannabis	Behavioral changes (e.g., impaired motor coordination, euphoria, anxiety, sensation of slowed time, impaired judgment) Red eyes Increased appetite Dry mouth Rapid heartbeat	Irritability, anger, or aggression Nervousness or anxiety Sleep difficulty Decreased appetite or weight loss Restlessness Depressed mood Stomach pain, shakiness, sweating, fever, chills, headache

men and may cause irregular ovulation in women (Ruiz et al., 2007).

At moderate to large doses, cannabis users experience perceptual distortions, feelings of depersonalization, and paranoid thinking. Some find these hallucinogenic effects pleasant, but others become frightened. Some users may have severe anxiety episodes resembling panic attacks. Several studies have found that cannabis use significantly increases the risk of developing a psychotic disorder (e.g., Kuepper et al., 2011). Physical tolerance to cannabis can develop, with users needing greater amounts to avoid the symptoms of withdrawal, which include loss of appetite, hot flashes, runny nose, sweating, diarrhea, and hiccups (Kouri & Pope, 2000). Seven to 10 percent of the U.S. population would qualify for a diagnosis of cannabis use disorder (Kendler & Prescott, 1998; SAMHSA, 2008c).

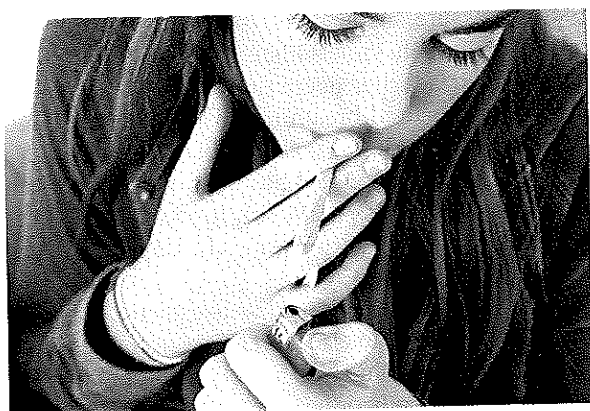
In recent years several states have legalized the medicinal and recreational use of cannabis, although

it remains illegal at the federal level. The federal government allows exemptions on the basis of mandated regulation. As of 2016, cannabis is fully legal in Alaska, Colorado, Oregon, and Washington State and in several smaller jurisdictions. According to a Pew Research Center survey, a majority of Americans are in favor of complete or partial legalization of cannabis (Pew Research Center for the People and the Press, 2013).

INHALANTS

Inhalants are volatile substances that produce chemical vapors, which can be inhaled and which depress the central nervous system (see Table 8; Virani et al., 2009). One group of inhalants is solvents, including gasoline, glue, paint thinners, and spray paints. Users may inhale vapors directly from the can or bottle containing the substance, soak a rag with the substance and hold the rag to their mouth and nose, or place the substance in a paper or plastic bag and inhale the gases from the bag. The chemicals rapidly reach the lungs, bloodstream, and brain. Another group of inhalants is medical anesthetic gases, such as nitrous oxide ("laughing gas"), which also can be found in whipped cream dispensers and products that boost octane levels. Nitrites, another class of inhalants, dilate blood vessels and relax muscles and are used as sex enhancers. Illegally packaged nitrites are called "poppers" or "snappers" on the street (NIDA, 2002a). In diagnosing an inhalant use disorder, *DSM-5* recommends specifying the particular substance involved when possible (e.g., solvent use disorder).

A nationwide study of adults found that less than 2 percent reported ever having used inhalants, with about 75 percent of users being male (Howard et al.,



Seven to 10 percent of the U.S. population would qualify for a diagnosis of cannabis use disorder. © BSIP SA/Alamy

TABLE 8 Intoxication with Inhalants

Inhalants have a variety of effects depending on the specific drug.

Drug	Intoxication Symptoms
Inhalants	Behavioral changes (e.g., belligerence, assaultiveness, apathy, impaired judgment)
	Dizziness
	Nystagmus
	Incoordination
	Slurred speech
	Unsteady gait
	Lethargy
	Depressed reflexes
	Psychomotor retardation
	Tremor
	Generalized muscle weakness
	Blurred vision or diplopia
	Stupor or coma
	Euphoria

2010). Adolescents report higher levels of use, with about 10 percent of teenagers reporting ever having used inhalants (Johnston et al., 2012). Some studies find that nearly all the children on some Native American reservations have experimented with inhaling gasoline.

Chronic users of inhalants may have a variety of respiratory irritations and rashes. Inhalants can cause permanent damage to the central nervous system, including degeneration and lesions of the brain; this damage can lead to cognitive deficits, including severe dementia. Recurrent use can also cause hepatitis and other liver and kidney disease. Death can occur from depression of the respiratory or cardiovascular system. Sudden sniffing death is due to acute heartbeat irregularities or loss of oxygen. Users sometimes suffocate when they fall unconscious with an inhalant-filled plastic bag over their nose and mouth. Users also can die or be seriously injured when the inhalants induce the delusion that they can do fantastic things, such as fly, and they then jump off a cliff or a tall building to test their perceived ability (Virani et al., 2009).

OTHER DRUGS OF ABUSE

Drug sellers are creative in coming up with new psychoactive substances. Often these substances initially have legitimate medicinal purposes and

then are hijacked or transformed into street drugs. In this section, we discuss ecstasy (3,4-methylenedioxymethamphetamine, or MDMA), GHB (gamma-hydroxybutyrate), ketamine, and rohypnol (flunitrazepam).

Ecstasy has the stimulant effects of an amphetamine along with occasional hallucinogenic properties (NIDA, 2009). It is fairly popular with young adults; 6.8 percent of college students and 13.0 percent of 18- to 22-year-olds not in college report having used ecstasy at some time (Johnston et al., 2012). Users experience heightened energy and restlessness and claim that their social inhibitions decrease and their affection for others increases. Even short-term use can have long-term negative effects on cognition and health, however. People who use ecstasy score lower on tests related to attention, memory, learning, and general intelligence than do people who do not use the drug. The euphoric effects of ecstasy, and some of the brain damage, may be due to alterations in the functioning of serotonin in the brain—serotonin levels in ecstasy users are half those in people who are not users (Gold, Tabrah, & Frost-Pineda, 2001). Long-term users risk several cardiac problems and liver failure and show increased rates of anxiety, depression, psychotic symptoms, and paranoia (Gold et al., 2001). Another effect of ecstasy is teeth-grinding; some users suck a baby pacifier at parties to relieve this effect.

GHB is a central nervous system depressant approved for the treatment of the sleep disorder narcolepsy (NIDA, 2008a). At low doses, it can relieve anxiety and promote relaxation. At higher doses, it can result in sleep, coma, or death. In the 1980s, GHB was widely used by bodybuilders and athletes to lose fat and build muscle and was available over the counter in health food stores. In 1990, it was banned except under the supervision of a physician due to reports of severe side effects, including high blood pressure, wide mood swings, liver tumors, and violent behavior. Other side effects include sweating, headache, decreased heart rate, nausea, vomiting, impaired breathing, loss of reflexes, and tremors (NIDA, 2008a). GHB is also considered a *date-rape drug* because it has been associated with sexual assaults (NIDA, 2008a). It goes by the street names Grievous Bodily Harm, G., Liquid Ecstasy, and Georgia Home Boy.

Ketamine is a rapid-acting anesthetic that produces hallucinogenic effects ranging from rapture to paranoia to boredom (NIDA, 2008a). Ketamine can elicit an out-of-body or near-death experience. It also can render the user comatose. It has effects similar to those of PCP, including numbness, loss of coordination, a sense of invulnerability, muscle rigidity,

aggressive or violent behavior, slurred or blocked speech, an exaggerated sense of strength, and a blank stare. Because ketamine is an anesthetic, users feel no pain, which can lead them to injure themselves (NIDA, 2008a).

A ketamine high usually lasts 1 hour but can last as long as 4 to 6 hours, and it takes 24 to 48 hours for users to feel normal again. Large doses can produce vomiting and convulsions and may lead to oxygen starvation in the brain and muscles. One gram can cause death. Ketamine is another date-rape drug used to anesthetize victims (NIDA, 2008a).

A widely known date-rape drug is *rohypnol*, which goes by the slang names Roofies, Rophies, Roche, and the Forget-Me-Not Pill. It is a benzodiazepine and has sedative and hypnotic effects (NIDA, 2008a). Users may experience a high, as well as muscle relaxation, drowsiness, impaired judgment, blackouts, hallucinations, dizziness, and confusion. Rohypnol tablets can easily be crushed and slipped into someone's drink. Rohypnol is odorless, colorless, and tasteless, so victims often don't notice that their drink has been altered. Side effects can include headaches, muscle pain, and seizures. In combination with alcohol or other depressants, rohypnol can be fatal (NIDA, 2008a).

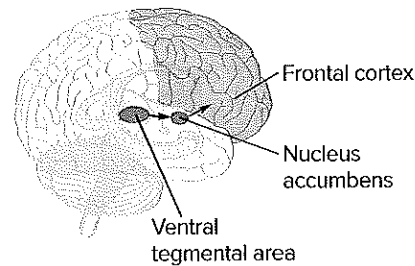
THEORIES OF SUBSTANCE USE DISORDERS

All the substances we have discussed have powerful effects on the brain that determine their rewarding effects. Whether individuals ever use substances and whether their use progresses into a substance use disorder depend on a complex interplay of biological, psychological, and social vulnerabilities (Koob & Volkow, 2010).

Biological Factors

The brain appears to have its own "pleasure pathway" that affects our experience of reward. This pathway begins in the ventral tegmental area in the midbrain, then progresses through an area of the limbic system called the nucleus accumbens and on to the frontal cortex. It is particularly rich in neurons sensitive to the neurotransmitter dopamine (Koob & Volkow, 2010).

Some drugs, such as amphetamines and cocaine, directly increase the availability of dopamine in this pathway, producing a strong sense of reward or a "high." Cocaine clears out of the brain more rapidly than do amphetamines, which explains why users on a binge need to use cocaine much more



The brain's "pleasure pathway" begins in the ventral tegmental area, then goes through the nucleus accumbens and on to the frontal cortex. It is rich in neurons sensitive to dopamine.

frequently to maintain a high than do those using amphetamines (Koob & Volkow, 2010). Snorting, smoking, or injecting drugs delivers them to the brain much faster than taking them orally and thus produces a quicker, more intense reaction. Other drugs increase the availability of dopamine more indirectly. For example, the neurons in the ventral tegmental area are inhibited from continuously firing by GABA neurons, so the firing of GABA neurons reduces the high caused by activity in the dopamine neurons. The opiate drugs inhibit GABA, which stops the GABA neurons from inhibiting dopamine, making dopamine available in the reward center (Koob & Volkow, 2010).

Other areas of the frontal cortex, including the orbitofrontal cortex, the dorsolateral frontal cortex, and the inferior frontal gyrus, play important roles in controlling the urge to drink alcohol or use drugs (Bechara, 2005; Goldstein & Volkow, 2002). Individuals whose reward network overpowers their control network may be more likely to use substances (Goldstein & Volkow, 2002; Hutchison, 2010).

The chronic use of psychoactive substances alters the reward centers, creating a craving for these substances (Robinson & Berridge, 1993). The repeated use of substances such as cocaine, heroin, and amphetamines causes the brain to reduce its production of dopamine, with the result that dopamine receptors in the brain become less sensitive. As the brain produces less dopamine, more of the drug is needed to produce the desired effects. If the individual stops taking the drug, the brain does not immediately compensate for the loss of dopamine, and withdrawal symptoms occur. Also, because the brain is not producing its typical amount of dopamine, the person may feel sad and unmotivated and may have difficulty experiencing pleasure from other sources, such as food or happy events. Craving for the drug sets in because only the drug can produce pleasure (Robinson & Berridge, 1993).

Psychoactive drugs also affect a number of other biochemical (including glutamate) and brain systems. Alcohol produces sedative and antianxiety effects largely by enhancing the activity of the neurotransmitter GABA in the septal/hippocampal system. Alcohol also affects serotonin systems, which are associated with changes in mood (Brick, 2008).

Although individuals who have used a substance for an extended period experience decreased sensitivity to the rewarding aspects of the substance, they become more sensitive to cues associated with their substance use, such as the locations where they typically use the substance or the paraphernalia associated with it. These conditioned responses to drug cues can induce powerful cravings that can lead to relapse (Koob & Volkow, 2010). Stress also activates reward systems, creating cravings. In addition, chronic use of drugs seems to lead to disrupted activity in frontal regions of the brain involved in impulse control, making it even more difficult for individuals to resist cravings.

Genetic factors regulate the functioning of the neurotransmitter systems involved in the rewarding effects of substance use. Family history, adoption, and twin studies all suggest that genetics plays a substantial role in determining who is at risk for substance use disorders, with about 50 percent of the variation in risk for substance use disorders attributable to genetic factors (see reviews by Urbanoski & Kelly, 2012; Young-Wolff, Kendler, Ericson, & Prescott, 2011). There seems to be a common underlying genetic vulnerability to substance use disorders in general, rather than to use of specific substances, perhaps accounting for the fact that individuals who use one substance are likely to use several.

Much research has focused on the genes that control the dopamine system, given its importance in the reinforcing properties of substances. Genetic variation in the dopamine receptor gene (labeled DRD2) and the dopamine transporter gene (labeled SLC6A3) influences how the brain processes dopamine, thereby affecting how reinforcing a person finds substances such as nicotine (Nemoda, Szekely, & Sasvari-Szekely, 2011). In addition, the genes that control GABA have also been implicated in substance use disorders, particularly alcohol use disorders.

Psychological Factors

Social learning theories (see the chapter “Theories and Treatment of Abnormality”) suggest that children and adolescents may learn substance use behaviors from the modeling of their parents and important others in their culture. Even as preschoolers,



Children may learn substance-related behaviors from their parents. © Laurence Cartwright Photography/Getty Images

the children of heavy drinkers are more likely than other children to be able to identify alcoholic drinks and view alcohol use as a part of daily life (Zucker, Kincaid, Fitzgerald, & Bingham, 1995). Children whose parents abuse alcohol by frequently getting drunk or by driving while intoxicated learn that these are acceptable behaviors and thus are more likely to engage in them (Chassin, Pitts, DeLucia, & Todd, 1999).

Because alcohol-related problems are more common among males than females, most of the adults modeling inappropriate use of alcohol are male. In turn, because children are more likely to learn from adults who are similar to themselves, male children and adolescents may be more likely to learn these behaviors than female children and adolescents. Thus, maladaptive patterns of alcohol use may be passed down through the males in a family through modeling (Chassin et al., 1999).

The cognitive theories of alcohol use disorders have focused on people's expectations of alcohol's effects and their beliefs about the appropriateness of using it to cope with stress (Marlatt, Baer, Donovan, & Kivlahan, 1988). People who expect alcohol to reduce their distress and who do not have more adaptive means of coping (e.g., problem-solving skills or supportive friends or family) are more likely than others to drink alcohol when they are upset and to have social problems related to drinking (Cooper et al., 1992). In long-term studies of the sons of parents with alcohol use disorders, men who used alcohol to cope and relax were more likely to develop alcohol use disorders themselves (Schuckit, 1998).

One personality characteristic consistently related to an increased risk of substance use disorders is behavioral undercontrol, or the tendency to be impulsive, sensation-seeking, and prone to antisocial behaviors such as violating laws. People with high

levels of behavioral undercontrol take psychoactive drugs at an earlier age, ingest more psychoactive drugs, and are more likely to be diagnosed with substance use disorders (McGue et al., 2001; White, Xie, & Thompson, 2001). Behavioral undercontrol runs strongly in families, and twin studies suggest that this may be due in part to genes (Rutter, Silberg, O'Connor, & Simonoff, 1999). Thus, genetics may influence behavioral undercontrol, which in turn influences the risk that individuals will develop substance use disorders.

Sociocultural Factors

The reinforcing effects of substances—the highs produced by stimulants, the calming and “zoning out” effects of the depressants and the opioids—can be more attractive to people under chronic stress. Thus, rates of substance use disorders are higher among people living in poverty, women in abusive relationships, and adolescents whose parents fight frequently and violently (Hughes et al., 2010; Zucker, Chermack, & Curran, 1999). For these people, the effects of substances may be especially reinforcing. They also may think that they have little to lose.

Subtler environmental reinforcements and punishments clearly influence people's substance use habits. Some societies discourage any use of alcohol, often due to religious beliefs, and alcohol abuse and dependence are rare in these societies. Other societies, including many European cultures, allow

the drinking of alcohol but strongly discourage excessive drinking and irresponsible behavior while intoxicated. Alcohol-related disorders are less common in these societies than in societies with few restrictions, either legal or cultural, on alcohol use (Sher et al., 2005).

Gender Differences

Substance use, particularly alcohol use, is more acceptable for men than for women in many societies (Hughes et al., 2010). Heavy drinking is part of what “masculine” men do and is modeled by heroes and cultural icons. In contrast, until recently heavy drinking signified that a woman was “not a lady.” Societal acceptance of heavy drinking by women has increased in recent generations, as has the rate of alcohol use among young women (Nolen-Hoeksema, 2004).

Women tend to be less likely than men to carry risk factors for substance use disorders (Nolen-Hoeksema, 2004). They appear less likely to have personality traits associated with substance use disorder (behavioral undercontrol, sensation seeking). They also appear less motivated to use alcohol to reduce distress and less likely to expect drug consumption to have a positive outcome (Nolen-Hoeksema & Harrell, 2002).

Women suffer alcohol-related physical illnesses at lower levels of exposure to alcohol than men do (Fillmore et al., 1997). In addition, heavy alcohol use is associated with reproductive problems in women.



Women suffer the effects of excessive alcohol use at lower doses than men do.

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Women may be more likely to experience greater cognitive and motor impairment due to alcohol than do men and to suffer physical harm and sexual assault following alcohol use (Abbey, Ross, McDuffie, & McAuslan, 1996).

When they do use alcohol, women may notice that they feel intoxicated much sooner than do men, and they may be more likely to find these effects aversive or frightening, leading them to limit their consumption (Nolen-Hoeksema, 2004). This lower consumption, in turn, protects women against developing tolerance to high doses of alcohol and lowers their risk of developing alcohol-related social and occupational problems.

When women become substance abusers, their patterns and reasons for use tend to differ from those of men. Men tend to begin using substances in the context of socializing with male friends, while women most often are initiated by family members, partners, or lovers (McCrary et al., 2009). One study found that 70 percent of female crack users were living with men who also were substance users, and many were living with multiple people who were abusers (Inciardi, Lockwood, & Pottieger, 1993). Perhaps because women's drug use is more closely tied to their intimate relationships, studies have found that treatments that include their partners tend to be more effective in reducing substance use disorders in women (McCrary et al., 2009).

TREATMENTS FOR SUBSTANCE USE DISORDERS

The treatment of substance-related disorders is challenging, and media accounts of celebrity drug abusers who are in rehab one month, out the next, and back a short time later suggest that it seldom is effective. Meta-analyses and reviews of existing treatments suggest that, as a whole, they help only about 17 to 35 percent of people with substance use disorders abstain for up to 1 year (Hutchison, 2010). Here we review the most common and best-supported biological and psychosocial treatments.

Biological Treatments

Medications can help wean individuals off a substance, reduce their desire for it, and maintain their use at a controlled level (O'Malley & Kosten, 2006).

Antianxiety Drugs, Antidepressants, and Drug Antagonists

Although many people with substance use disorders can withstand withdrawal symptoms if given emotional support, others may require medication. For

people dependent on alcohol, a benzodiazepine, which has depressant effects similar to those of alcohol, can reduce tremors and anxiety, decrease pulse and respiration rate, and stabilize blood pressure (Ntais, Pakos, Kyzas, & Ioannidis, 2005). The dosage is decreased each day so that a patient withdraws from the alcohol slowly but does not become dependent on the benzodiazepine.

Antidepressant drugs sometimes are used to treat individuals with substance dependence who are depressed, but their efficacy in treating either alcohol or other drug problems or depression without psychotherapy has not been consistently supported (Nunes & Levine, 2004). People have widely different responses to the SSRIs.

Antagonist drugs block or change the effects of the addictive drug, reducing the desire for it. Naltrexone and naloxone are opioid antagonists—they block the effects of opioids such as heroin. Theoretically, this can reduce the desire for and therefore the use of the addictive drug. The opioid antagonists must be administered very carefully, however, because they can cause severe withdrawal reactions in people addicted to opioids (O'Malley & Kosten, 2006).

Naltrexone has also proven useful in treating alcohol dependents and abusers, possibly because it blocks the effects of endorphins during drinking. People dependent on alcohol who take naltrexone report a diminished craving for alcohol and thus drink less (O'Malley & Kosten, 2006).

The drug acamprosate affects glutamate and GABA receptors in the brain, which are involved in the craving for alcohol. Meta-analyses of clinical trials show that acamprosate can help people maintain abstinence from alcohol better than a placebo (O'Malley & Kosten, 2006).

A drug that can make alcohol actually punishing is disulfiram, commonly called Antabuse (Carroll, 2001). Just one alcoholic drink can make people taking disulfiram feel sick and dizzy and can make them vomit, blush, and even faint. People must be very motivated to remain on disulfiram, and it works to reduce their alcohol consumption only as long as they continue to take it.

The pharmacological treatment of nicotine dependence uses two general approaches (Mooney & Hatsukami, 2001). Most common is nicotine replacement therapy—the use of nicotine gum or a nicotine patch, nasal spray, or inhaler to prevent withdrawal effects. It is hoped that the individual will gradually reduce use of the nicotine replacement while slowly being weaned off nicotine's physiological effects.

The other approach is the use of prescription medication that reduces the craving for nicotine. One drug approved for this use is the antidepressant

bupropion (marketed for smoking cessation as Zyban). A drug called varenicline (Chantix), which binds to and partially stimulates nicotine receptors, also has been shown to reduce cravings for nicotine products and decrease their pleasurable effects (Jorenby et al., 2006).

Methadone Maintenance Programs

Gradual withdrawal from heroin can be achieved with **methadone**. This drug is itself an opioid, but it has less potent and less long-lasting effects than heroin when taken orally. The person dependent on heroin takes methadone to reduce extreme negative withdrawal symptoms. Those who take heroin while on methadone do not experience heroin's intense psychological effects, because methadone blocks receptors for heroin (O'Malley & Kosten, 2006).

Although the goal of treatment is for individuals eventually to withdraw from methadone, some patients use it for years under a physician's care. Such methadone maintenance programs are controversial. Some people believe they allow the heroin dependent to simply transfer dependency to another substance that is legal and provided by a physician. Others believe methadone maintenance is the only way to keep some heroin dependents from going back on the street and relapsing. Studies find that patients in such programs are much more likely to remain in psychological treatment than are patients who try to withdraw from heroin without methadone

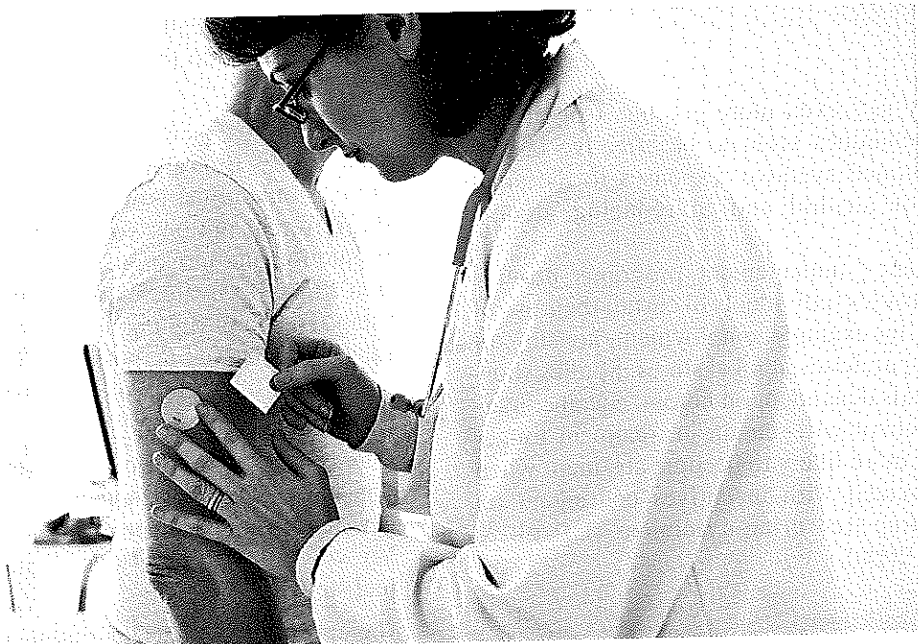
and also are less likely to relapse into heroin use (Mattick et al., 2003).

Psychosocial Treatments

Several behavioral and cognitive techniques have proven helpful in the treatment of substance use disorders (Carroll & Rounsaville, 2006). The techniques have certain goals in common. The first is to motivate the individual to stop using the addictive drug. People who enter treatment often are ambivalent about stopping use and may have been forced into treatment against their will. The second goal is to teach patients new coping skills to replace the use of substances to cope with stress and negative feelings. The third goal is to change the reinforcements for using substances—for example, an individual may need to disengage from social circles that encourage drug use. The fourth is to enhance the individual's support from nonusing friends and family members. The final goal often is to foster adherence to pharmacotherapies in conjunction with psychotherapy.

Behavioral Treatments

Behavioral treatments based on aversive classical conditioning are sometimes used alone or in combination with biological or other psychosocial therapies (Finney & Moos, 1998; Schuckit, 1995). Drugs such as disulfiram (Antabuse) that make the ingestion of



Nicotine replacement therapy aims to decrease substance abuse over time by weaning the user to lower doses, as well as breaking links between the behavior of smoking and its perceived positive physiological consequences. © Shutterstock RF

alcohol unpleasant or toxic are given to people who are alcohol dependent. Eventually, through classical conditioning, people develop conditioned responses to alcohol—namely, nausea and vomiting. Then, through operant conditioning, they learn to avoid alcohol in order to avoid the aversive response. Aversive conditioning is effective in reducing alcohol consumption, at least in the short term (Schuckit, 1995). “Booster” sessions often are needed to reinforce this conditioning, because its effects tend to weaken with time.

Covert sensitization therapy uses imagery to create associations between thoughts of alcohol use and thoughts of highly unpleasant consequences. An example of a sensitization scene that a therapist might take a client through begins as described in the following profile.

PROFILES

You finish the first sip of beer, and you . . . notice a funny feeling in your stomach. . . . Maybe another drink will help. . . . As you tip back . . . that funny feeling in your stomach is stronger, and you feel like you have to burp. . . . You swallow again, trying to force it down, but it doesn't work. You can feel the gas coming up. . . . You swallow more, but suddenly your mouth is filled with a sour liquid that burns the back of your throat and goes up your nose. . . . [You] spew the liquid all over the counter and sink. . . . (Rimmele, Miller, & Dougher, 1989, p. 135)

The imagery gets even more graphic. Covert sensitization techniques seem to be effective in creating conditioned aversive responses to the sight and smell of alcohol and in reducing alcohol consumption.

Contingency management programs provide reinforcements for individuals to curtail their use of substances—for example, employment, housing, or vouchers for purchases at local stores. Studies show that individuals dependent on heroin, cocaine, marijuana, or alcohol will remain in treatment longer and be much more likely to become abstinent when they are provided with incentives contingent on submitting drug-free urine specimens (Carroll & Rounsaville, 2006).

Cognitive Treatments

Interventions based on the cognitive models of alcohol abuse and dependency help clients identify

situations in which they are most likely to drink and lose control over their drinking, as well as their expectations that alcohol will help them cope in those situations (Daley & Marlatt, 2006). Therapists work with clients to challenge these expectations by reviewing alcohol's negative effects on the clients' behavior. Perhaps a client was feeling anxious at a recent party and began to drink heavily. The therapist might have the client recount his embarrassing behavior while intoxicated, challenging the notion that the alcohol helped him cope effectively. Therapists also help clients learn to handle stressful situations in adaptive ways, such as seeking the help of others or engaging in active problem solving. Finally, therapists help clients learn to say “No, thanks” when they are offered a drink and to deal with social pressure by using assertiveness skills.

Following is an excerpt from a discussion between a therapist and a client with alcohol-related problems (adapted from Sobell & Sobell, 1978, pp. 97–98) in which the therapist is helping the client generate strategies for coping with the stress of a possible job promotion. The therapist encourages the client to brainstorm coping strategies and refrains from evaluating them for the moment so the client will feel free to generate as many strategies as possible.

Client: I've been offered the job I've been telling you about. It's a huge promotion. But now I have to make the decision about whether or not to move my entire family across the country to take it. I know my wife and kids don't want to move. And now I am really nervous about whether or not I can even do this new job. I don't have all the skills.

Therapist: Yes, that's a big decision for you and your family. But rather than worrying about the skills problem just now, why don't we explore the different options you have relating to the promotion and move. You know, for now, you don't have to evaluate your options, only list them. The point right now is to come up with as many alternatives as possible. You're not yet acting on anything, only considering your possibilities.

Client: You know, I've been pretty tense and you know what has happened before when I get nervous. I've been drinking quite a lot. My wife is pretty angry about it. And I don't feel so well.

Therapist: Well, in a way, drinking is one option. But what other ways can you think of to deal with the problem of the promotion and move?

Client: I've been thinking that because the new company has an educational benefit, I could take courses to learn more about management. Maybe even get my MBA. But I have no idea about how I could hold down the job, go to school, and be in any way present to my family.

Therapist: Well, remember. Right now we're not talking about how you would do any of this; we're only coming up with options. You're doing really well. Let's keep going.

Client: I could always just stay where I am. The family would be happier, even if I might not be so happy at work. But it means a lot to me that they are happy too. Or I could ask my new boss to give me time to get up to speed with my new responsibilities.

Therapist: Good. Keep going.

Client: What would happen if I take the new job, settle my family in a new state, and then find out that I can't get that kind of support?

Therapist: Well, what do you think would happen? What are your options?

Client: I think I really want the job. Maybe I should just be in touch with the person who hired me and tell her about my concerns. After all, they are willing to move me across the country; they must really want me. I need some time and some more education.

Therapist: You've identified a lot of options today. Why don't we spend some time evaluating each before you make a final decision?

The therapist helps the client evaluate the effectiveness of each option and anticipate any negative consequences. In this case, the client decides to accept the promotion but to take some courses at the local college to increase his business background. The two discuss the stresses of managing a new job and classes, and they generate ways the client can manage these stresses other than by drinking.

In most cases, therapists using cognitive-behavioral approaches encourage their clients to abstain from alcohol, especially when they have a history of frequent relapses into abuse. When a client's goal is to learn to drink socially and the therapist believes the client can achieve this goal, therapy may focus on teaching the client to engage in social, or controlled, drinking.

Studies have shown that cognitive-behavioral approaches are effective in treating abuse and dependence on alcohol, cannabis, nicotine, heroin, amphetamines, and cocaine (Dennis et al., 2000;

McCrary, 2001; Mooney & Hatsukami, 2001; Waldron et al., 2001).

Motivational Interviewing

If individuals are not motivated to curtail their substance use, no treatment will be effective. William Miller (1983; Miller & Rose, 2009) developed **motivational interviewing** to elicit and solidify clients' motivation and commitment to changing their substance use. Rather than confronting the user, the motivational interviewer adopts an empathic interaction style, drawing out the user's statements of desire, ability, reasons, need, and, ultimately, commitment to change. The interviewer focuses on the client's ambivalence, helping the client voice his or her own arguments for change. Many controlled studies find that just four sessions of motivational interviewing lead to sustained reductions in substance use, particularly alcohol use (e.g., Ball et al., 2007; Carroll et al., 2006; see review in Miller & Rose, 2009).

Relapse Prevention

Unfortunately, the relapse rate for people undergoing any kind of treatment for an alcohol use disorder is high. The **abstinence violation effect** contributes to relapse. It has two components. The first is a sense of conflict and guilt when an abstinent alcohol abuser or dependent violates abstinence and has a drink. He or she may continue to drink to try to suppress the conflict and guilt. The second component is a tendency to attribute a violation of abstinence to a lack of willpower and self-control rather than to situational factors. Thus, the person may think, "I'm an alcoholic and there's no way I can control my drinking. The fact that I had a drink proves this." This type of thinking may pave the way to continued, uncontrolled drinking.

Relapse prevention programs teach people who abuse alcohol to view slips as temporary and situationally caused (Donovan & Witkiewitz, 2012). Therapists help clients identify high-risk situations, such as parties, and either avoid them or develop effective coping strategies for them. A client who decides to go to a party may first practice with the therapist some assertiveness skills for resisting friends' pressure to drink and write down other coping strategies to use if she feels tempted, such as starting a conversation with a supportive friend or practicing deep-breathing exercises. She also may decide that, if the temptation becomes too great, she will ask a supportive friend to leave the party with her and go somewhere for coffee until the urge to drink passes. Relapse prevention programs have been shown in many studies to reduce the rate of relapse in people with several

types of substance use disorders (Donovan & Witkiewitz, 2012).

These cognitive and behavioral interventions have been combined with training in mindfulness meditation, the nonjudgmental acceptance of one's current emotional and physical state, in the treatment of people with substance use disorders (Bowen, Chawla, & Marlatt, 2010). People are taught to be aware of their internal states and the external triggers for these states and to accept and "ride out" their negative states rather than reacting to them in a habitual manner (i.e., by using a substance). A study of people with alcohol and other substance use disorders showed that adding mindfulness meditation training to the usual treatment led to significant reductions in craving and relapse during the follow-up period (Bowen et al., 2009).

Alcoholics Anonymous

Alcoholics Anonymous (AA) is an organization created by and for people with alcohol-related problems. Its philosophy is based on the disease model of alcoholism, which asserts that, because of biological, psychological, and spiritual deficits, some people will lose all control over their drinking once they have one drink. Therefore, the only way to control alcohol intake is to abstain completely. AA prescribes 12 steps that people dependent on alcohol must take toward recovery. The first step is to admit their dependence on alcohol and their inability to control its effects. AA encourages its members to seek help from a higher power, to admit their weaknesses, and to ask forgiveness. The goal for all members is complete abstinence.

Group members provide moral and social support and make themselves available to one another in times of crisis. Once they are able, they are expected to devote themselves to helping others who are recovering from alcohol dependence. AA members believe that people are never completely cured of alcohol dependence—they are always "recovering alcoholics," with the potential for falling back into uncontrolled drinking after taking only one drink. To motivate others to abstain from alcohol, AA meetings include testimonials from members, as in the following profile.

PROFILES

I am Duncan. I am an alcoholic. . . . I know that I will always be an alcoholic, that I can never again touch alcohol in any form. It'll kill me if I don't keep away from it. In fact, it almost did. . . . I must have been just

past my 15th birthday when I had that first drink everybody talks about. And like so many of them—and you—it was like a miracle. With a little beer in my gut, the world was transformed. I wasn't a weakling anymore, I could lick almost anybody on the block. So, like for so many of you, my friends in the Fellowship, alcohol became the royal road to love, respect, and self-esteem. . . .

Though it's obvious to me now that my drinking even then, in high school, and after I got to college, was a problem, I didn't think so at the time. A couple of minor auto accidents, one conviction for drunken driving, a few fights—nothing out of the ordinary, it seemed to me at the time. True, I was drinking quite a lot, even then, but my friends seemed to be able to down as much beer as I did. I guess the fact that I hadn't really had any blackouts and that I could go for days without having to drink reassured me that things hadn't gotten out of control.

[Later] on, the drinking began to affect both my marriage and my career. With enough booze in me and under the pressures of guilt over my failure to carry out my responsibilities to my wife and children, I sometimes got kind of rough physically with them. I would break furniture, throw things around, then rush out and drive off in the car. I had a couple of wrecks, lost my license for two years because of one of them. Worst of all was when I tried to stop. By then I was totally hooked, so every time I tried to stop drinking, I'd experience withdrawal in all its horrors. I never had DTs, but I came awfully close many times, with the vomiting and the "shakes" and being unable to sit still or to lie down. And that would go on for days at a time. . . . Then, about four years ago, with my life in ruins, my wife given up on me and the kids with her, out of a job, and way down on my luck, the Fellowship and I found each other. Jim, over there, bless his heart, decided to sponsor me—we'd been friends for a long time, and I knew he'd found sobriety through this group. I've been dry now for a little over two years, and with luck and support, I may stay sober. (Spitzer, R. L., Skodol, A. E., Gibbon, M., & Williams, J. B. W., 1983, *Psychopathology: A Case Book*, pp. 81–83. Copyright © 1983 The McGraw-Hill Companies, Inc. Reprinted with permission.)

The practices and philosophies of AA do not appeal to everyone. The emphases on one's powerlessness, need for a higher power, and complete abstinence turn away many. In addition, many people who subscribe to AA's philosophy still find it difficult to maintain complete abstinence, and they "fall off the wagon" throughout their lives. However, many

believe that AA has been critical to their recovery from an alcohol use disorder, and it remains the most common source of treatment for people with alcohol-related problems. There are over 100,000 registered AA groups, and meetings take place all over the United States day and night, providing a supportive community as an alternative to drinking (Tonigan & Connors, 2008). Self-help groups modeled on AA—including Narcotics Anonymous, Cocaine Anonymous, and Marijuana Anonymous—assist people with dependence on other drugs.

Evaluations of AA's effectiveness are complicated by differences between people who might attend and those who would not, the self-help nature of the intervention, and the fact that outcomes often are self-reported (Kelly, 2003). Perhaps as a result, meta-analyses and reviews of studies of AA's effectiveness have produced mixed results, with some analyses suggesting that AA is effective and others suggesting that it is worse than no treatment (Emrick, Tonigan, Montgomery, & Little, 1993; Kaskutas, 2009; Kelly, 2003; Kownacki & Shadish, 1999; Tonigan, Toscova, & Miller, 1996).

Substance Use Treatment for Older Adults

We tend to think of substance use disorders as problems of the young. Indeed, the use of hard drugs, such as cocaine or heroin, is quite rare among the elderly. Many chronic users of illicit substances die before they reach old age, and others outgrow their use. Certain types of substance abuse and dependence are a frequent problem among older people, however, including alcohol-related problems and the misuse of prescription drugs (Lisansky-Gomberg, 2000).

Approximately 2 percent of people over age 65 can be diagnosed with an alcohol use disorder, and about 10 percent can be considered heavy drinkers (Helzer, Burnam, & McEvoy, 1991; Merrick et al., 2008). One-third to one-half of abusers of alcohol first develop problems after age 65 (Liberto, Oslin, & Ruskin, 1996). Moreover, the abuse of and dependence on prescription drugs (e.g., sedative, hypnotic, or anxiolytic use disorders) is a substantial problem among the elderly. Although only 13 percent of the U.S. population is over age 65, this group accounts for one-third of all prescription drug expenditures (NIDA, 2008b). The most commonly prescribed drugs are diuretics, cardiovascular drugs, and sedatives. Older people also are more likely than younger people to purchase over-the-counter drugs, including analgesics, vitamins, and laxatives.

The abuse of drugs such as the benzodiazepines may begin innocently. Physicians frequently prescribe them for older patients, and as many as

one-third of older people take these drugs at least occasionally—for insomnia or after experiencing a loss, for example. As tolerance develops and the withdrawal effects of discontinuing the drug become evident, an individual may try to get more of the drug by copying prescriptions or seeing multiple physicians. Slurred speech and memory problems caused by drug use may be overlooked in the elderly as normal symptoms of old age. Older adults often can hide their drug abuse for a long period of time. Eventually, the side effects of the drugs, the withdrawal symptoms people experience when they try to go off the drugs cold turkey, or the effects of interaction with other medications may land them in a hospital emergency room.

Treatment for older substance abusers is similar to that for younger abusers, although withdrawal symptoms may be more dangerous for older abusers and therefore must be monitored more carefully (Lisansky-Gomberg, 2000). Psychotherapies that have been shown to be useful tend to have the following characteristics (Schonfeld & Dupree, 2002):

- Elders are treated along with people their same age in a supportive, nonconfrontational approach.
- Negative emotional states (such as depression and loneliness) and their relationship to the substance abuse are a focus of the intervention.
- Social skills and social networks are rebuilt.
- Staff members are respectful and are interested in working with older adults.
- Linkages are made with medical facilities and community resources (such as housing services).

Due to increasing longevity and the size of the baby-boomer generation, the proportion of the population that is above age 65 will increase dramatically over the next few decades (King & Markus, 2000). In addition, older Americans will become much more ethnically diverse in the future. Although 85 percent of Americans over age 65 in 1995 were non-Hispanic whites, this proportion is expected to decrease to 66 percent by 2030 (Whitbourne, 2000). In turn, the proportion of older people who are of Hispanic and Asian descent will increase. Much more research is needed on the psychological health needs of older people, particularly older people in ethnic and racial minority groups with substance use disorders.

Comparing Treatments

A large, multi-site clinical trial called Project MATCH compared three interventions designed to help people

with alcohol use disorder: cognitive-behavioral intervention, motivational interviewing and enhancement, and a 12-step program based on the AA model but led by professional counselors (Project MATCH Research Group, 1998). Surprisingly, the study showed that the three interventions were equally effective in reducing drinking behavior and preventing relapse over the following year (Project MATCH Research Group, 1998; Witkiewitz, Van der Maas, Hufford, & Marlatt, 2007).

Another multi-site study of over 1,300 individuals with alcohol use disorder, Project COMBINE, indicated that combining psychosocial intervention with medications did not yield better outcomes than individual therapies (Anton et al., 2006). The psychosocial treatment was a combination of cognitive-behavioral therapy, motivational interviewing, a 12-step program facilitated by a professional, and community support. The medications were either naltrexone, acamprosate, or a combination of the two. Both psychosocial treatment and naltrexone led to significant reductions in drinking, and the combination of the two was not superior to the individual therapies. Acamprosate did not perform better than a placebo either alone or combined with psychosocial treatment (Anton et al., 2006). A similar pattern was found in a 1-year follow-up of the same individuals, with indications that those who received psychosocial treatment were especially likely to have good outcomes whether or not they also received naltrexone (Donovan et al., 2008).

Prevention Programs

Only about 25 percent of people with alcohol use disorder seek treatment (Dawson et al., 2005). About 25 percent may recover on their own, often due to maturation or positive changes in their environment (e.g., getting a good job or marrying a supportive person) that motivate them to control their drinking (Dawson et al., 2005). The remainder of people with significant alcohol problems carry these problems throughout their lives. Some become physically ill or unable to hold a job or maintain a relationship. Others hide or control their alcohol use disorder and may be in relationships with people who facilitate it. Often they have periods of abstinence, sometimes long, but then—perhaps when facing stressful events—they begin drinking again. Therefore, preventing the development of a substance use disorder is very important.

In the United States, young adults between 18 and 24 have the highest rates of alcohol consumption and make up the largest proportion of problem drinkers of any age group. Many colleges

have programs to reduce drinking and drinking-related problems. Programs that emphasize alcohol's health-related consequences tend not to impress young people, who are more likely to focus on the short-term gains of alcohol use. Some college counselors refer students with drinking problems to abstinence programs, such as Alcoholics Anonymous, but students often dislike admitting powerlessness and adopting lifelong abstinence. Finally, many colleges provide alternative activities that do not focus on alcohol. In general, however, prevention programs designed to stop drinking have had limited success.

Psychologist Alan Marlatt and his colleagues at the University of Washington (Marlatt, Blume, & Parks, 2001; Marlatt & Witkiewitz, 2010; Parks, Anderson, & Marlatt, 2001) argued that a more credible approach to college drinking is to recognize it as normative behavior and focus education on the immediate risks of excess (alcohol-related accidents) and the payoffs of moderation (avoidance of hangovers). They view young drinkers as relatively inexperienced in regulating their use of alcohol and in need of skills training to prevent abuse. Learning to drink safely is compared to learning to drive safely in that people must learn to anticipate hazards and avoid "unnecessary accidents."

Based on this **harm reduction model**, the Alcohol Skills Training Program (ASTP) targets heavy-drinking college students for intervention. In eight weekly sessions of 90 minutes each, participants learn to be aware of their drinking habits—including when, where, and with whom they are most likely to overdrink—by keeping daily records of their alcohol consumption and the situations in which they drink. They also are taught to calculate their blood-alcohol level. It often comes as a surprise to them how few drinks it takes to become legally intoxicated.

Next, beliefs about the "magical" effects of drinking on social skills and sexual prowess are challenged. Participants discuss hangovers and alcohol's negative effects on social behaviors, ability to drive, and weight gain. They are encouraged to set personal goals for limiting consumption based on their blood-alcohol level and their desire to avoid drinking's negative effects. They learn skills for limiting consumption, such as alternating alcoholic and nonalcoholic beverages and selecting drinks for quality rather than quantity (e.g., buying two good beers rather than a six-pack of generic). Later, members are taught alternative ways to reduce negative emotional states, such as using relaxation exercises or reducing sources of stress. Finally, via role playing, participants learn skills for resisting peer pressure

and avoiding high-risk situations in which they are likely to overdrink.

Evaluations of ASTP have shown that participants decrease their consumption and alcohol-related problems and increase their social skill at resisting alcohol abuse (Fromme, Marlatt, Baer, & Kivlahan, 1994; Marlatt, Baer, & Larimer, 1995). ASTP was designed for a group format, and the use of group pressure to encourage change and allow role playing has many advantages. Adaptations of this program, delivered in person or in written form as a self-help manual, also have shown positive results (Baer et al., 2001; Baer, Marlatt, Kivlahan, & Fromme, 1992).

GAMBLING DISORDER

More than three-quarters of U.S. adults report having gambled in the past year, but most gamble only occasionally and recreationally (Kessler et al., 2008). As noted earlier, *DSM-5* expanded its chapter on substance-related and addictive disorders to include gambling disorder, which some refer to as a behavioral addiction. The *DSM-5* criteria for gambling disorder are given in Table 9. Less than 1 percent of the

U.S. population meet these criteria (Kessler et al., 2008), but for those who do, their gambling frequently leads to serious financial, relationship, and employment problems. The most common criteria are related to preoccupation with gambling and “chasing” losses.

Pathological gamblers also tend to have problems with substance use, depression, and anxiety and a family history of substance abuse and gambling problems (Grant et al., 2008). Gambling disorder is more common among men than women, among non-Hispanic blacks than other racial/ethnic groups, and among people with less than a college education (Kessler et al., 2008). Men tend to develop the disorder earlier in life, while women are more likely to show mid- or later life onset gambling disorder.

Gambling disorder appears to be related to the same brain areas (i.e., activation of the brain’s reward system) as the substance use disorders and to disruption in systems regulating the neurotransmitter dopamine (Leeman & Potenza, 2012). People with gambling disorder also show high levels of impulsivity, as do people with substance use disorders, as well as poor performance on cognitive

TABLE 9 *DSM-5* Criteria for Gambling Disorder

- A. Persistent and recurrent problematic gambling behavior leading to clinically significant impairment or distress, as indicated by the individual exhibiting four (or more) of the following in a 12-month period:
 1. Needs to gamble with increasing amounts of money in order to achieve the desired excitement.
 2. Is restless or irritable when attempting to cut down or stop gambling.
 3. Has made repeated unsuccessful efforts to control, cut back, or stop gambling.
 4. Is often preoccupied with gambling (e.g., having persistent thoughts of reliving past gambling experiences, handicapping or planning the next venture, thinking of ways to get money with which to gamble).
 5. Often gambles when feeling distressed (e.g., helpless, guilty, anxious, depressed).
 6. After losing money gambling, often returns another day to get even (“chasing” one’s losses).
 7. Lies to conceal the extent of involvement with gambling.
 8. Has jeopardized or lost a significant relationship, job, or educational or career opportunity because of gambling.
 9. Relies on others to provide money to relieve desperate financial situations caused by gambling.
- B. The gambling behavior is not better explained by a manic episode.

Specify if:

Episodic: Meeting diagnostic criteria at more than one time point, with symptoms subsiding between periods of gambling for at least several months.

Persistent: Continuous symptoms for multiple years.

Current Severity: Mild (4–5 criteria met); Moderate (6–7 criteria met); Severe (8–9 criteria met).



Gambling disorder appears to be related to the same brain areas as the substance use disorders and to disruption in systems regulating the neurotransmitter dopamine. © Exactstock/Superstock RF

tasks assessing control over impulses (Potenza et al., 2003).

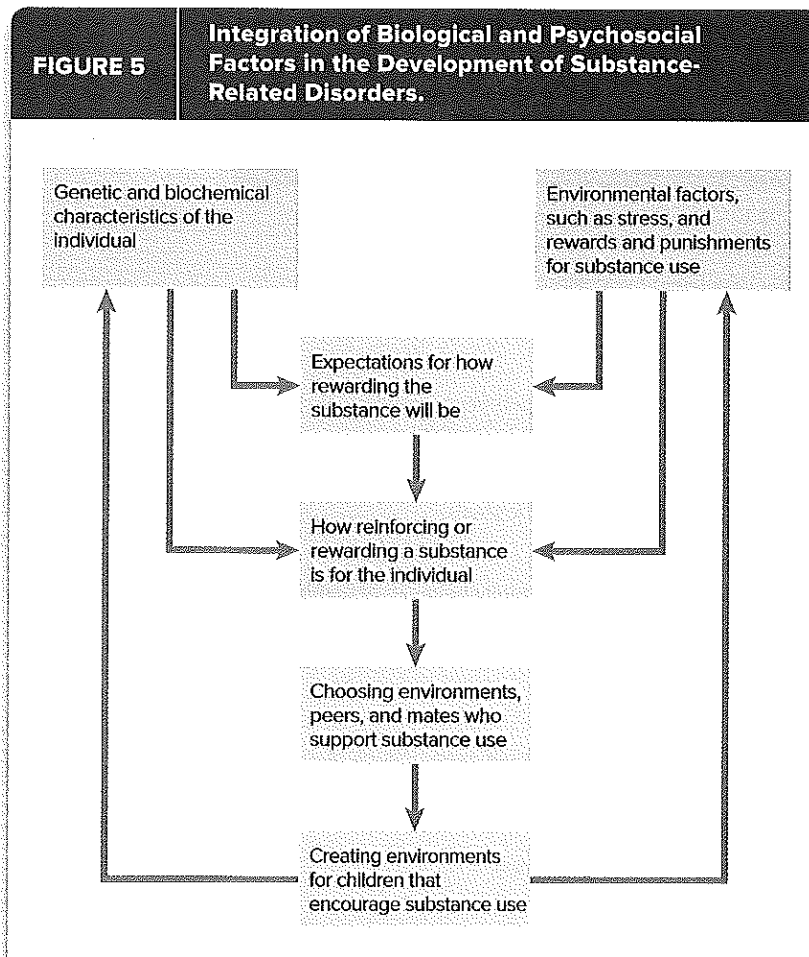
Cognitive-behavioral therapy (CBT) concentrates on changing the individual's distorted beliefs that he or she has more control than the average person over gambling (chance) outcomes, overconfidence, and superstitions and on developing new activities and coping strategies to replace gambling. Controlled studies of CBT have shown that it can help reduce compulsive gambling (Ladouceur et al., 2001, 2003; Pallesen et al., 2005). Serotonin reuptake inhibitors have shown only mixed success in treating pathological gambling (Grant & Potenza, 2006; van Holst, van den Brink, Veltman, & Goudriaan, 2010); naltrexone, which affects reward sensitivity, appears to be more effective than the SSRIs in reducing symptoms (Grant & Kim, 2002). Very few people with gambling disorder ever seek treatment, however (Kessler et al., 2008), and those that do typically have moderate to severe forms of the disorder.

CHAPTER INTEGRATION

The substances discussed in this chapter are powerful biological agents. They affect the brain directly, producing changes in mood, thoughts, and perceptions. Some people may be genetically or biochemically predisposed to find these changes more positive or rewarding than other people do (Figure 5). Rewards and punishments in the environment clearly can affect an individual's choice to pursue the effects of substances, however. Even many long-term chronic substance abusers can abstain given strong environmental and social support for abstinence.

People who find substances more rewarding, for biological and/or environmental reasons, develop expectations that the substances will be rewarding, which in turn enhance how rewarding they actually are. Likewise, heavy substance users choose friends and situations that support their substance use. They tend to find partners who are also heavy substance users, creating a biological and psychosocial environment for their children that increases vulnerability to substance use disorders. Thus, the cycle of familial transmission of substance misuse has intersecting biological and psychosocial components.

Similar processes may play out in gambling disorder. For example, biological factors may influence how rewarding an individual finds gambling. The person will then associate with other gamblers, who reinforce the gambling behavior, and eventually the impulse to gamble may become pathological.



SHADES OF GRAY DISCUSSION

Nick's behaviors definitely meet the criteria for an alcohol use disorder. He is failing to fulfill his obligations at school and is continuing to use alcohol despite social problems (ejection from the campus and his parents' threat to withdraw their support). His hangovers are a sign of withdrawal, he spends much time drinking and recovering, and his drinking is hurting his grades. We don't know whether Nick has developed tolerance to alcohol, although the escalation of his drinking suggests that he needs more alcohol to achieve the desired effect. Nick doesn't seem to have

any intention of cutting back on his drinking, so the criteria for attempting to control his substance use have not been met.

It may seem odd to think of a college student who drinks with his friends as having a psychiatric diagnosis. Some critics argue that the criteria for alcohol use disorders are too broad and that too many individuals meet them. Others argue that simply because a large percentage of the population meet the criteria for abuse or dependence doesn't mean we should ignore their behavior. What do you think?

CHAPTER SUMMARY

- A substance is any natural or synthesized product that has psychoactive effects. The five groups of substances most often leading to substance disorders are (1) central nervous system depressants, including alcohol, barbiturates, benzodiazepines, and inhalants; (2) central nervous system stimulants, including cocaine, amphetamines, nicotine, and caffeine; (3) opioids; (4) hallucinogens and phencyclidine; and (5) cannabis.
- Substance intoxication is indicated by a set of behavioral and psychological changes that occur as a direct result of the physiological effects of a substance on the central nervous system. Substance withdrawal is a set of physiological and behavioral symptoms that result from the cessation of or reduction in heavy and prolonged use of a substance. The specific symptoms of intoxication and withdrawal depend on the substance being used, the amount ingested, and the method of ingestion.
- Substance use disorders are characterized by a maladaptive pattern of substance use leading to significant problems in a person's life, tolerance to the substance, withdrawal symptoms if it is discontinued, and compulsive substance-taking behavior.
- At low doses, alcohol produces relaxation and mild euphoria. At higher doses, it produces classic signs of depression and cognitive and motor impairment. A large proportion of deaths due to accidents, murders, and suicides are alcohol-related. Withdrawal symptoms can be mild or so severe as to be life-threatening. People with alcohol use disorders experience a wide range of social and interpersonal problems and are at risk for many serious health problems.
- Benzodiazepines and barbiturates can cause an initial rush and a loss of inhibitions, followed by depressed mood, lethargy, and physical signs of central nervous system depression. These substances are dangerous in overdose and when mixed with other substances.
- Cocaine activates those parts of the brain that register reward and pleasure and produces an instant rush of euphoria, followed by increased self-esteem, alertness, and energy and a greater sense of competence, creativity, and social acceptability. The user also may experience frightening perceptual changes. The symptoms of withdrawal from cocaine include exhaustion, a need for sleep, and depression. Cocaine's extraordinarily rapid and strong effects on the brain's reward centers seem to make it more likely than most illicit substances to lead to abuse and dependence.
- Amphetamines are readily available by prescription to treat certain disorders but often end up available on the black market. They can make people feel euphoric, invigorated, self-confident, and gregarious, but they also can lead to restlessness, hypervigilance, anxiety, aggressiveness, and several dangerous physiological symptoms and changes.
- Nicotine is widely available. Smoking tobacco is legal, but it causes cancer, bronchitis, and coronary heart disease in users and low birth weights in the children of women who smoke when pregnant. People become physiologically dependent on nicotine and undergo withdrawal when they stop smoking.

- The opioids are developed from the juice of the poppy plant. The most commonly used illegal opioid is heroin. The initial symptom of opioid intoxication is euphoria, followed by drowsiness, lethargy, and periods of light sleep. Severe intoxication can lead to respiratory difficulties, unconsciousness, coma, and seizures. Withdrawal symptoms include dysphoria, anxiety, agitation, sensitivity to pain, and a craving for more of the substance.
- The hallucinogens, phencyclidine (PCP), and cannabis produce perceptual changes, including sensory distortions and hallucinations. These experiences are pleasant for some, frightening for others. Some people experience a sense of euphoria or relaxation from using these substances, and others become anxious and agitated.
- The inhalants are volatile agents that people sniff to produce a sense of euphoria, disinhibition, and increased aggressiveness or sexual performance. They are extremely dangerous; even casual use may cause permanent brain damage or serious disease.
- Some additional drugs of abuse are ecstasy (3,4-methylenedioxymethamphetamine, or MDMA), GHB (gamma-hydroxybutyrate), ketamine, and rohypnol (flunitrazepam). These drugs have several euphoric and sedative effects and are used at dance clubs and sometimes by perpetrators of date rape.
- All substances of abuse have powerful effects on areas of the brain involved in the processing of reward. Repeated use of substances can cause alterations in these brain areas that increase the need for more of the substance in order to experience rewarding effects.
- Evidence indicates that genes play a role in vulnerability to substance use disorders through their effects on the synthesis and metabolism of substances.
- Behavioral theories of alcoholism note that people are reinforced or punished for their alcohol-related behaviors and also engage in behaviors modeled by important others. Cognitive theories argue that people who develop alcohol-related problems have expectations that alcohol will help them feel better and cope better with stressful events. One personality characteristic associated with substance use disorders is behavioral undercontrol.
- Men may have more risk factors for substance use than women, and women may be more sensitive to the negative consequences of substance use than men.
- Medications can ease withdrawal symptoms and reduce cravings for many substances. The symptoms of opioid withdrawal can be so severe that dependents are given methadone as they try to discontinue heroin use. Methadone also blocks the effects of subsequent doses of heroin, reducing the desire to obtain heroin. Methadone maintenance programs are controversial.
- People with alcohol use disorder sometimes respond to behavior therapies based on aversive classical conditioning. They use a drug that makes them ill if they ingest alcohol or imagery that makes them develop a conditioned aversive response to the sight and smell of alcohol. Contingency management programs provide incentives for reducing substance use.
- Cognitive therapies focus on training people with alcohol use disorder in developing coping skills and in challenging positive expectations about alcohol's effects.
- Motivational interviewing attempts to empathetically draw out individuals' motivations and their commitment to change their substance use behavior.
- The abstinence violation effect comprises an individual's feeling of guilt over relapse and attribution of relapse to lack of self-control. Relapse prevention programs help identify triggers for relapse.
- The most common treatment for alcohol use disorder is Alcoholics Anonymous (AA), a self-help group that encourages alcoholics to admit their weaknesses and call on a higher power and on other group members to help them abstain from alcohol.
- Prevention programs based on a harm reduction model seek to teach the responsible use of alcohol.
- Gambling disorder is new to *DSM-5* and represents a behavioral addiction. It is characterized by compulsive gambling even in the face of significant social, financial, and psychological consequences. It seems to share many risk factors and clinical patterns with the substance use disorders.

KEY TERMS

substance use disorders
gambling disorder
substance
substance intoxication
substance withdrawal
substance abuse
substance dependence
tolerance
depressants
delirium tremens (DTs)
benzodiazepines
barbiturates
stimulants
cocaine
amphetamines

nicotine
caffeine
opioids
hallucinogens
phencyclidine (PCP)
cannabis
inhalants
antagonist drugs
methadone
motivational interviewing
abstinence violation effect
relapse prevention programs
Alcoholics Anonymous (AA)
harm reduction model

Chapter 15



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Health Psychology

CHAPTER OUTLINE

Stress Along the Continuum

Extraordinary People: Norman Cousins, *Healing with Laughter*

Psychological Factors
and General Health

Shades of Gray

Psychosocial Factors in Specific Diseases

Interventions to Improve
Health-Related Behaviors

Sleep and Health

Chapter Integration

Shades of Gray Discussion

Chapter Summary

Key Terms