EIGHTH EDITION

Drug Use and Abuse

Stephen A. Maisto | Mark Galizio | Gerard J. Connors

GLOSSARY OF DRUG SLANG

burned out	poor psychological functioning in someone who has taken drugs for too long
buzz, flash, rush	euphoric reaction to a drug
chasing the dragon	inhaling the fumes of heroin and/or crack that has been melted over a flame
cold turkey	abrupt drug withdrawal
crash	the end of a drug experience
cut	to adulterate a drug
dabbing	smoking hash oil concentrates
huffing	inhaling solvents such as glue
hook up, connect, score	make a drug purchase
jones, jonesing	experiencing drug withdrawal
junkie	heroin addict
k-hole	under the influence of ketamine, unable to move
line	a measured amount of cocaine
mainline	an intravenous drug injection
roached	under the influence of Rohypnol (roofies)
rolling	under the influence of MDMA (Ecstasy)
speedball	combination of heroin and cocaine or amphetamine
stoned	intoxicated
tripping	hallucinating, usually associated with LSD or psilocybin
tweeking	prolonged drug use, usually meth
vaping	using (inhaling the vapors from) electronic cigarettes
works, rig	equipment for injecting drugs

SLANG NAMES FOR DRUGS

2-CB (and related drugs)	nexus, bees
amphetamines	addys, crank, crystal, dexies, ice, meth, speed
cocaine	blow, C, coke, crack, freebase, girl, lady, rock, snow, white
heroin	boy, China white, H, horse, junk, scag, smack
ketamine	special K
LSD	acid, blotter, Lucy, sugar, sunshine, tabs, windowpane
marijuana	420, dagga, dank, doobie, ganja, grass, herb, kif, Mary Jane, pot, reefer, rope, spliff, sinsemilla, bud, skunk, etc.
hash oil concentrates	dabs, crumble, wax, butter
mescaline	buttons, mesc, peyote
MDMA	adam, E, Ecstasy, M&Ms, roll, X, XTC, jellies, beans
nitrous oxide	balloons, laughing gas, whippets
phencyclidine	angel dust, animal tranquilizer, lovely, PCP, sherm
psilocybin	shrooms, caps, fungus
salvinorin A	salvia, sage, Mexican mint
synthetic cathinones	bath salts, meow, plant food
synthetic THC	spice, K2

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Stephen A. Maisto
Syracuse University

Mark Galizio
University of North Carolina Wilmington

Gerard J. Connors
Research Institute on Addictions, University at Buffalo

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***Drug Use and Abuse,* 8th Edition**
Stephen A. Maisto, Mark Galizio, and Gerard J. Connors

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Cover Image Credit: seqoya/Fotolia LLC; aragami12345s/Shutterstock.com

Production Management and Composition: Lumina Datamatics, Inc.

Library of Congress Control Number: 2017952330

ISBN: 978-1-337-40897-4

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Printed in the United States of America
Print Number: 01 Print Year: 2017

To Joseph A. Maisto
S. A. M.

To Kate and Annie
M. G.

To Elyse and Guy
G. J. C.

ABOUT THE AUTHORS

Stephen A. Maisto
received a PhD in experimental psychology from the University of Wisconsin—Milwaukee and completed a postdoctoral respecialization in clinical psychology from George Peabody College of Vanderbilt University. He is a professor of psychology at Syracuse University. He has been engaged in research, teaching, clinical practice, and clinical training in the assessment and treatment of the substance use disorders for well over 30 years. Dr. Maisto has published over 300 articles, 30 book chapters, and several books on substance use and the substance use disorders. His current research is supported by the National Institute on Alcohol Abuse and Alcoholism and the Department of Veterans Affairs. Dr. Maisto is a member of the American Psychological Association (Fellow, Divisions of Clinical Psychology and Addictive Behaviors), Association for Psychological Science, Research Society on Alcoholism, and the Association for Behavioral and Cognitive Therapies. Dr. Maisto was appointed editor for *Psychology of Addictive Behaviors*, a journal published by the American Psychological Association, for the term January 1, 2008 to December 31, 2013.

Mark Galizio
received his PhD in experimental psychology in 1976, from the University of Wisconsin—Milwaukee. He is professor of psychology at the University of North Carolina Wilmington, where he has taught and conducted research for over 30 years. He has published extensively in the areas of behavioral pharmacology and behavior analysis and has served as associate editor of the *Journal of the Experimental Analysis of Behavior*. His research has been supported by grants from the National Institute on Drug Abuse, the National Institute of Neurological Disorders and Stroke, and the National Science Foundation. He is a fellow of the Association for Behavior Analysis, International and the American Psychological Association (Divisions of Psychopharmacology and Substance Abuse, Behavior Analysis, Behavioral Neuroscience and Comparative Psychology, and Experimental Psychology) and is past president of the Division of Behavior Analysis.

Gerard J. Connors
is a senior research scientist at the Research Institute on Addictions at the University at Buffalo. He earned his doctoral degree in clinical psychology from Vanderbilt University in 1980. Dr. Connors's research interests include substance use and abuse, relapse prevention, self-help group involvement, early interventions with heavy drinkers, and treatment evaluation. He is a member of the American Psychological Association (Fellow, Divisions of Clinical Psychology and Addictive Behaviors), Research Society on Alcoholism, and Association for Behavioral and Cognitive Therapies. Dr. Connors has authored or coauthored numerous scientific articles, books, and book chapters. His current research activities are funded by grants from the National Institute on Alcohol Abuse and Alcoholism.

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PREFACE

We began writing the first edition of this text in the late 1980s. At that time, drug use and related problems were of major interest and concern in the United States and in other countries. Awareness, interest, and concern about drug use have not abated since that time, nor has the need for a general undergraduate text to educate college students on the biological, psychological, and social factors that influence drug use and its effects. Therefore, we have completed this eighth edition, which retains many features of previous editions but also reflects changes that have occurred in this very dynamic area of study since the seventh edition was published in 2015.

As in all of the text's previous editions, the central theme of this edition is that a drug's effects are determined not only by its chemical structure and interaction in the body but also by drug users' biological and psychological characteristics and the setting in which they use the drug. This central theme is reflected in the inclusion of chapters on pharmacology and psychopharmacology, and is continued throughout the presentation of individual drugs or drug classes and in the discussion of prevention and treatment. The text examines the complexity of human drug consumption on biological, psychological, and social levels. Although the text is scholarly, it is understandable to students with little background in the biological, behavioral, or social sciences.

The text also retains a number of pedagogical features designed to increase students' interest and learning. **Diagnostic pretests** at the beginning of each chapter challenge students to test their knowledge of drugs while drawing their attention to important concepts or facts that follow in the chapter. Pretest answers and explanations at the end of each chapter provide an important review of the main concepts. The **margin glossary** helps students identify and define important terms within the text. **Margin quotes** help bring abstract concepts to life through personal accounts, comments, and quips about drug use and its ramifications. **Drugs and Culture boxes** explore variations in drug use and its consequences. They highlight the importance of differences in drug use that are associated with factors such as a person's sex, race, and ethnic background. Finally, **Contemporary Issue boxes** discuss current controversies involving drugs or drug use, as well as events related to such controversies.

New in This Edition

As mentioned earlier, drugs and drug use are popular and dynamic areas of study. For example, when the seventh edition was published in 2015, synthetic designer drugs like "Spice" and "bath salts" had recently emerged as international phenomena. These designer drugs are sold on the Internet, often legally. The eighth edition chronicles the impact of this drug trade, with a focus on the legal changes in the United States designed to address the problem (Synthetic Drug Abuse Prevention Act of 2012, Chapter 2) and reviews of the major drugs involved: synthetic cathinones or bath salts (Chapter 6), synthetic opiate drugs (Chapter 10), synthetic cannabinoids or Spice (Chapter 11), and phenethylamine hallucinogens (2C-B, Chapter 12).

Numerous other changes have occurred in the field since publication of the seventh edition. Each chapter of the eighth edition has been updated to represent findings from the latest research, as well as to reflect social and legal changes related to drugs. Among the many revisions, we present the latest survey data available at this writing on patterns of drug use in the United States and in other countries worldwide. Chapter 2, "Drug Use: Yesterday and Today," includes new information on the voter and legislative approvals in multiple states to regulate, tax, and control marijuana use and distribution, updates on the continuing movement to legalize the use of marijuana for medical reasons, and new coverage on the synthetic opioid fentanyl being used alone or mixed with heroin.

Chapter 3, "Drugs and the Nervous System," adds detail on how drugs affect neurotransmission processes.

Chapter 6, "Cocaine, Amphetamines, and Related Stimulants," adds information on the changing trends in cocaine and methamphetamine use, as well as new information about synthetic cathinones (bath salts).

Chapter 7, "Nicotine," has updated National Survey on Drug Use and Health (NSDUH) data on the epidemiology of nicotine use in the United States, along with an expanded and updated section on the treatment of nicotine addiction. The latter includes how the concept of precision medicine is influencing the pharmacological treatment of tobacco cigarette smoking. Chapter 7 also features updated material on the harm-reduction approach to cigarette smoking, including expanded discussion of products billed as "safer" alternatives to traditional cigarettes, such as the electronic cigarette and smokeless tobacco products.

Chapter 8, "Caffeine," includes the latest data on caffeine effects, including a variety of apparent health benefits of coffee. Also included are new insights on the metabolism of caffeine, including the genetics of caffeine consumption. The chapter also features coverage of caffeine withdrawal as a clinical phenomenon. The latest information on the combined use of alcohol and caffeine is also provided.

Chapter 9, "Alcohol," has new epidemiological data on alcohol consumption in the United States and around the world, as well as the health "benefits" of moderate alcohol consumption. Chapter 9 also contains updated data on the effects of a pregnant woman's moderate alcohol use on the health of the fetus that she is carrying.

Chapter 10, "Opiates," provides extensive new coverage of the dramatic increase in use of heroin, prescription opiates, and synthetic opiates. Two new sections are included on the events that led to the opiate epidemic and the current status and impact of the epidemic. The increase in opiate overdose deaths is chronicled and we add a new box on treating overdose with naloxone.

The chapter on marijuana (Chapter 11) includes the latest epidemiological data on marijuana use around the world, including use among youth. Chapter 11 also contains the latest information on the therapeutic uses of marijuana, on the relationship between cannabis use and various mental health outcomes, and on newer methods of consumption (such as vaping and dabbing).

Chapter 12 covers the exciting new research on psychological effects of hallucinogens, especially psilocybin and MDMA. New sections expand coverage of the therapeutic uses of hallucinogens like psilocybin for anxiety and depression, MDMA for post-traumatic stress disorder, and ketamine for depression. A new box discusses the potential and challenges for medical use of hallucinogens.

Chapter 13, "Psychotherapeutic Medications," includes the most recent data on the nature and extent of mental illness in the United States. It also includes the latest information on newly prescribed psychotherapeutic medications, with discussion of their benefits and side effects. Chapter 13 also provides coverage of the use of

psychotherapeutic medications during pregnancy, which often has been a difficult and challenging issue for pregnant women and their physicians alike.

Chapter 14, "Other Prescription and Over-the-Counter Drugs," adds coverage of the controversial plant compound "kratom" which has become popular in recent years.

Chapter 15, "Treatment of Substance Use Disorders," includes a new Contemporary Issue Box on the use of telehealth (the use of technology, such as electronic medical records, smart phones, and web-based applications to support the delivery of health care, health-related education, and other health-related services and functions) in efforts to help patients sustain changes that they make in treatment, added discussion of the effectiveness of mutual help support groups such as Alcoholics Anonymous, and updated information on the integration of the Affordable Care Act in our discussion of economics and the stepped-care approach to substance use disorders treatment.

Chapter 16, "Prevention of Substance Abuse," covers the latest trends in prevention interventions, including temperament-based programs that focus on traits, such as sensation-seeking and anxiety sensitivity, uniquely associated with risk for subsequent development of a drug-related problem. Updates on the broad array of negative consequences associated with problematic use of alcohol among college students, including deaths, assault, sexual abuse, and academic problems, are provided.

Accompanying the eighth edition are both new and expanded supplements that will help instructors with class preparation and help students by providing opportunities for review, including an Instructor's Manual, Test Bank, Instructor PowerPoints, an online companion website, and MindTap. The Instructor's Manual provides chapter outlines, learning objectives, key terms, glossary terms and definitions, and useful web links. The Instructor's Manual follows the text chapter by chapter with organized material to aid in planning an effective, engaging course. To aid instructors in integrating technology into their classroom, the manual also includes a MindTap Integration Chart and Educator's Guide, designed to highlight important activities and content found in MindTap.

The Test Bank is available in Cognero electronic format, an online system which allows instructors to author, edit, and manage test bank content from multiple Cengage solutions. Instructors may also easily create multiple test versions in an instant and deliver tests from a chosen Leaning Management System (LMS), the classroom, or anywhere else internet access is available. The test bank features multiple choice, true/false, and essay questions. Questions are tagged to Bloom's Taxonomy and to the associated text content.

Instructor PowerPoint presentations accompany each chapter. These slides address all major topics covered within the text in an easy-to-use and condensed format. Slides may be used to guide classroom presentations or conversations, as a classroom handout for student preparation, or as an additional student resource for chapter review. Instructors may customize the slides to best suit their course.

A student companion website offers text-specific review and enrichment materials, including tutorial quizzes, flashcards, and an online glossary. An instructor companion website features the instructor's manual, PowerPoint lectures, and test bank materials.

The eighth edition also includes MindTap. MindTap®, a digital teaching and learning solution, helps students be more successful and confident in the course—and in their work with clients. MindTap guides students through the course by combining the complete textbook with interactive multimedia, activities, assessments, and learning tools. Readings and activities engage students in learning core concepts, practicing needed skills, reflecting on their attitudes and opinions, and applying what

they learn. Instructors can rearrange and add content to personalize their MindTap course, and easily track students' progress with real-time analytics. And, MindTap integrates seamlessly with any learning management system.

Acknowledgments

This text could not have been completed without the help of a number of people. We want to thank the many talented folks at both Cengage Learning and Lumina Datamatics, Inc., who provided guidance through content development, permissions, and production. This book would not be possible without all of you.

We also want to thank other special people who helped us in completing the eighth edition. Stephen Maisto would like to thank his wife, Mary Jean Byrne-Maisto, for her love and support in finishing this edition. He also would like to thank his outstanding graduate student, Dezarie Moskal, for all of her help in preparing this edition. Mark Galizio thanks his wife, Kate Bruce, and daughter, Annie. Their love and support make it all worthwhile. Mark also thanks the many students at the University of North Carolina Wilmington who provide continuing challenges and inspiration. Gerard Connors thanks his wife, Lana Michaels Connors, for her constant support and love throughout the preparation of the eighth edition. Finally, all three authors would like to thank Mark R. Duerr for his tireless assistance and patience in preparing the chapters for this edition.

Stephen A. Maisto
Mark Galizio
Gerard J. Connors

CHAPTER ONE

Drug Use and Abuse

What Do You Think? True or False?

Answers are given at the end of the chapter.

___ 1. Because the effects of drugs are both predictable and obvious, it is relatively easy to define drug abuse.

___ 2. A drug's street name sometimes describes the actual effects of that drug.

___ 3. A person's reaction to a drug depends mostly on the biological action of the drug in the body.

___ 4. Because drug use is complicated, it is impossible to estimate patterns of drug use for the population of a whole country.

___ 5. Within the United States, similar patterns of alcohol and other drug use are found even among different subgroups of the population.

___ 6. The highest rates of alcohol and other drug use are found among 18- to 25-year-olds.

___ 7. A person's use of more than one drug at a time is of little concern because it happens so infrequently.

___ 8. The total economic cost of alcohol and drug abuse in the United States is about $1 billion annually.

___ 9. The chemical action of alcohol and other drugs causes violence and crime.

___10. Modern researchers rely on definitions of alcohol and other drug use that are free of social or cultural biases.

___11. A diagnosis of drug use disorder is made when a person has become either physically or psychologically dependent on a drug.

___12. Definitions of addiction emphasize overwhelming involvement with a drug.

___13. The continued use of any drug will eventually lead to tolerance of and physical dependence on that drug.

Athletic	Legal	Religious
Biological	Medical	Social/cultural
Economic	Political	
Educational	Psychological	

Q: How are these 10 systems alike?

A: They influence or are influenced by alcohol and other drug use.

This one-question quiz shows that drugs[1] may affect us in many ways, whether or not we use them. Although what we see and hear in the media often focuses on the negative consequences of drug use, drugs are popular all over the world because people perceive that they benefit from using drugs. For example, on an *individual* level, people say that drugs make them feel more relaxed, socialize more easily, feel sexier, escape boredom, and feel more confident and assertive. Drugs have also helped to ease a lot of suffering in humans and other animals when used for specific medical purposes. On a *group* or *community* level, drugs have been used for thousands of years as part of social and religious rituals. Drugs are used for such purposes less for the effects of the drug's chemistry than for social or cultural reasons. One society may condone the use of a drug—say, alcohol in the United States and European

[1]Sometimes in this text we use the phrase *alcohol and drugs*; at other times, we use *drugs* as the inclusive term. Because alcohol is a drug, saying "alcohol and drugs" is redundant. However, we do so on occasion, when it seems useful, to distinguish alcohol from all other drugs.

countries—whereas another society condemns it—such as the Islamic countries of Iran and Saudi Arabia. This complex picture of human drug use suggests that many different factors influence drug use.

What influences drug use and how that use affects us make up the subject of drugs and human behavior and are what this text is about. Because our subject matter is so wide-ranging, this introductory chapter spans a variety of topics. We include formal definitions throughout the chapter, beginning with terms such as *pharmacology*, *drug*, and *drug abuse*.

Introducing a lot of terms in one chapter might be confusing at first, but there is no need to feel that you have to grasp all the terms immediately. Because the terms will be used repeatedly throughout the book, you will have time to learn them. By introducing the terms now, we give you the vocabulary to read later chapters more easily.

In this chapter, we also explain the drug-classification systems used in this book and then move to a discussion of who uses drugs. The final sections of the chapter cover ways to define harmful drug use. The chapter closes with a brief overview of the rest of the text.

"Food is good. Poison is bad. Drugs may be good or bad, and whether they are seen as good or bad depends on who is looking at them."

(Weil & Rosen, 1983, p. 10)

Pharmacology and Drugs

Humans have used drugs for several thousand years, but the scientific study of drugs is more recent. The scientific study of drugs is called **pharmacology**, which is concerned with all information about the effects of chemical substances (drugs) on living systems. Pharmacology is considered a part of biology and is allied with physiology and biochemistry (Blum, 1984). **Psychopharmacology** is an area within the field of pharmacology that focuses on the effects of drugs on behavior. Although *psychopharmacology* is a joining of the words ***psychology*** and *pharmacology*, it is now recognized that understanding how drugs affect human behavior requires knowledge about social and environmental factors as well. This book is about human psychopharmacology.

pharmacology
The scientific study of drugs concerned with all information about the effects of drugs on living systems.

psychopharmacology
The subarea of pharmacology that concerns the effects of drugs on behavior.

psychology
The scientific study of behavior.

Drugs are easy enough to talk about, or so it seems from the numbers and variety of people who do so. However, defining *drug* is not so simple. Although they have run into confusion along the way, experts have arrived at a workable definition. According to a World Health Organization (WHO) report published in 1981, **drug** is defined in the broadest sense as "any chemical entity or mixture of entities, other than those required for the maintenance of normal health (like food), the administration of which alters biological function and possibly structure" (p. 227). This definition remains useful today (Advokat, Comaty, & Julien, 2014; United Nations Office on Drugs and Crime, 2003).

drug
Broadly defined as any chemical entity or mixture of entities not required for the maintenance of health but that alters biological function or structure when administered.

These fundamental definitions bring us to the questions: What is drug *use*, and what is drug *abuse*? We discuss these distinctions in more detail later in this chapter, but it is important for you to get an idea at the outset of what is called drug use and drug abuse. Abuse has been referred to in different ways when people write about drugs, and there is no generally accepted definition. In such circumstances, one way to define a term is by a consensus of experts. A study by Rinaldi et al. (1988) achieved such a consensus definition for a number of terms used in research and clinical work on alcohol and drugs. In the Rinaldi et al. study, the experts defined **drug abuse** as "any use of drugs that causes physical, psychological, legal, or social harm to the individual or to others affected by the drug user's behavior." Often the term "drug misuse" is used interchangeably with "drug abuse."

drug abuse
Any use of drugs that causes physical, psychological, legal, or social harm to the individual user or to others affected by the drug user's behavior.

As you can see, the definition of abuse centers on the consequences of drug users' behavior, both to themselves and to others in their social environment. Our opening question on the 10 systems and drug use comes into sharper relief with this definition of abuse. The definition also illustrates the difficulties in defining abuse. A major problem is that the behavior that causes consequences in one community or culture may not cause them in another, or not to the same degree. Therefore, the goal to have a standard reference for drug abuse has proved elusive. Nevertheless, in writing and other forms of communication about alcohol and other drugs, the word *abuse* is used frequently, and thus efforts to arrive at a more generally applicable definition should continue. For now, however, our initial definition of abuse is sufficient for understanding what we say in the first part of this chapter.

If *abuse* is drug use with negative consequences, then drug *use* may be viewed as the larger category, with drug abuse as a subset. Drug consumption that does not meet the criteria for drug abuse is referred to as drug use.

Drug Classification

As the WHO panel of experts understood, their definition of *drug* is very broad. To make the definition useful for research and practical purposes, it is necessary to order the substances that fit the definition of drug into smaller categories. Pharmacologists have done this with their many systems for classifying drugs. These classification systems have been based on the primary properties of drugs to communicate a drug's nature and the ways it can be used. Following are some of the major ways of classifying drugs:

1. By origin. An example is drugs that come from plants, such as the opiates, which are derived from the opium poppy. The "pure" (nonsynthetic) opiates include compounds such as morphine and codeine. Heroin, which is a semisynthetic compound, is often called an opiate drug. Because this classification distinguishes only the source of the drug, a given drug class may include many drugs that have different chemical actions.
2. By therapeutic use, or according to similarity in how a drug is used to treat or modify something in the body. For example, with this system, amphetamines are called appetite-suppressant drugs. Note that the reasons some drugs are used can be much different from their therapeutic effects. Amphetamines are often used nonmedically because of their stimulant effects. Similarly, morphine may be used medically as a powerful painkiller, but street users most commonly take morphine for its euphoric effects.
3. By site of drug action, which pertains to where in the body the drug is causing physical changes. For example, alcohol is often called a depressant drug because of its depressant action on the central nervous system (CNS). Conversely, because of its CNS stimulant properties, cocaine is often called a stimulant drug. The utility of this system is limited when a drug affects several different body sites. One example is the CNS stimulant cocaine, which also has local anesthetic (pain-reducing) effects. Furthermore, drugs that differ widely in chemical structure or mechanisms of action may affect the same body site.
4. By chemical structure. For example, the barbiturates (such as phenobarbital, amobarbital, and secobarbital) are synthetic compounds derived from the chemical structure of barbituric acid, the synthetic compound that forms the chemical base for barbiturate drugs.

5. By mechanism of action, which means how a drug produces its **drug effects**. This is a good system in principle, and ongoing research in pharmacology is directed at specifying the mechanisms of action of an increasing number of drugs.
6. By street name, which comes from drug "subcultures" and the street drug market. For example, amphetamines are called "speed," and drugs like the barbiturates or depressants such as methaqualone (Quaalude) are called "downers." As these examples show, street names sometimes reflect actual drug effects (Brands, Sproule, & Marshman, 1998, pp. 11–13).

drug effects
The action of a drug on the body. Drug effects are measured in different ways.

"I don't do drugs. I am drugs."
Salvador Dali

The topics of this text's drug chapters (Chapters 6 through 14) were determined according to several different ways of classifying drugs. One of the ways to classify drugs, by their effects, applies to virtually all of the drugs covered in this text. We are most interested in **psychoactive** drugs—those that affect mood, thinking, and behavior. Some substances have been designated formally as psychoactive, such as alcohol, whereas others have not, such as aspirin. Psychoactive drugs are most important in this text because they are the ones that people are most likely to use, sometimes in ways that create serious problems for them. This text mainly concerns the nonmedical use of psychoactive drugs, but we also discuss medical uses.

psychoactive
Pertaining to effects on mood, thinking, and behavior.

The Drug Experience

As we said earlier, people like many of the experiences they have when they take drugs. This raises an important question: What causes the "drug experience"? The drug's chemical action is part of the answer, but how much? Not too long ago, the chemical actions of drugs were viewed as the primary reason people experienced certain changes when they took different drugs. However, research from different disciplines, such as pharmacology, psychology, and sociology, has shown that the drug experience is a product of more factors than just the drug's pharmacological action.

Generally, we can look at three sets of factors, one pharmacological and two nonpharmacological. The first set includes *pharmacological factors*, and three of them stand out. First are the chemical properties and action on the body of the drug used. Another is **drug dosage** (or dose), which is the measure of how much of the drug is consumed. The third pharmacological factor is the **route of drug administration**, or the way the drug enters the body. This is important because the route affects how much of a dosage reaches its site(s) of action and how quickly it gets there. Chapter 4 discusses in detail major routes of drug administration and their effects on the drug experience.

drug dosage
Measure of the quantity of drug consumed.

route of drug administration
The way that drugs enter the body.

The second set of factors is nonpharmacological and consists of the *characteristics of the drug user*. Included are such factors as the person's genetic makeup (biologically inherited differences among people govern their bodies' reaction to the ingestion of different drugs), gender, age, drug tolerance, and personality. An important part of personality is the person's **psychological set** about a drug, which refers to knowledge, attitudes, expectations, and thoughts about a drug. For example, sometimes the strong belief that a drug will produce a certain effect will be enough to produce the effect, even though the person has ingested a chemically inactive substance (**placebo**).

psychological set
An individual's knowledge, attitudes, expectations, and other thoughts about an object or event, such as a drug.

placebo
In pharmacology, a chemically inactive substance.

The third and last set of factors, also a nonpharmacological one, is the *setting in which a drug is used*. The factors in this group span a wide range and include laws pertaining to drug use in the community where the drug is taken, the immediate physical environment where the drug is used, and whether other people are present at the time of drug use.

Together, these three sets of factors influence what people experience when they take a drug. You may have guessed that the path to a drug experience is not always easy to chart. However, many people are trying to do just that—to understand how drugs affect people. The accumulated knowledge from these efforts is the foundation of this book.

Alcohol and Drug Use in the United States

"I could have easily gotten stoned [before coming to this interview]; it wouldn't have bothered me. It depends on the situation. I wouldn't like to smoke [marijuana] in the middle of the day if I have things to do. Or I wouldn't smoke in the middle of a class. Things like that."

Research participant (Zinberg, 1984, p. 140)

The way the popular media tell it, it may seem as if virtually everyone has positive experiences using drugs because everyone seems to be using them. However, scientists learned long ago that our impressions or feelings about a subject often are inaccurate, and to find out what is really going on, it is best to study the subject systematically. This means using the scientific method, which is the major way we have learned as much as we do know about drugs. One of the best ways to answer questions about the uses of alcohol and drugs in a community or larger region is to do a survey study. When we want to learn about a whole country, we do what is called a national survey study.

In the United States, national survey studies of alcohol and drug use have involved interviewing a sample of individuals (in this case, age 12 or older) across the country. Such studies generally ensure that those interviewed are as similar as possible to the U.S. population as a whole—regarding, for example, factors such as gender, age, race, region of the country, and rural versus urban living environments. The national survey data give us the best estimate we have of what the findings would be if we studied every person in the population aged 12 and older. In the United States, that means about 255 million people.

The U.S. federal government goes to great trouble and expense to support these national surveys of drug use, because the knowledge gained from them is extremely valuable in making legal, tax, educational, and health policy decisions. More narrowly, we are interested in the information from national surveys for this text because many

Dmitriy Shironosov/Alamy stock photo

Thomas Baker/Alamy stock photo

People use drugs in a variety of situations and experience different reactions to them.

CONTEMPORARY ISSUE BOX 1.1

U.S. Society and Drug Use

Learning about alcohol and drug use in the United States is important. One reason is the sheer number of people in the United States who use alcohol or other drugs. Another reason is the negative consequences associated with alcohol and drug use, which are discussed later in more detail. A third reason is the amount of controversy that drugs, especially illicit drugs, create. Despite the prevalence of drug use among U.S. citizens, popular opinion in the country has been to eradicate illicit drug use, at times ranking such use among the nation's top problems. Indeed, a 2007 survey conducted by the University of Michigan involved collection of data on adults' perceptions of the main problems threatening children's and adolescents' well-being, and "drug abuse" was number 2 in the top 10. (Interestingly, smoking tobacco and alcohol abuse were numbers 1 and 4, respectively.) Think of some of the major headline events that have occurred and the controversies they have generated in the last few years. Some of them touch upon the basic constitutional rights of Americans:

- The right of the federal government and other public and private employers to conduct urine screens (tests for drug taking) of employees as a way to control drug abuse in the workplace
- The question of whether intravenous drug users should be supplied with clean syringes free of charge as a way of preventing the spread of human immunodeficiency virus (HIV) infection
- The continuing debate on whether marijuana should be available as a prescription drug, and, more recently, whether it should be legally available to adults for recreational purposes
- Some proposed legal penalties related to selling or using drugs—the requirement of life sentences for drug dealers who are convicted twice of selling drugs to teenagers and the imposition of the death penalty for dealers when a murder occurs during a drug deal

Many Americans use alcohol or other drugs. However, the country's attitudes toward such use, especially regarding illicit drugs, are far from permissive. Society's proposed and actual solutions to drug use in the United States have far-reaching legal, social, and financial implications. Which stand out to you?

people do not know the typical patterns of drug use among Americans. For example, the popular media expose us primarily to extreme cases of use and problems associated with it. The national survey data on alcohol and drug use give us a more balanced reference for understanding any one person's or group's use. In the same way, our brief review of national survey data in this chapter will help you understand drug use patterns and related problems that we write about in later chapters of this book.

National Household Survey

To provide you with an overview of current alcohol and drug use, we used a national survey that is conducted annually by the Office of Applied Studies within the Substance Abuse and Mental Health Services Administration. The National Survey on Drug Use and Health (NSDUH) includes households in all 50 U.S. states and the District of Columbia. In this section, we refer to findings from the 2015 survey (Center for Behavioral Health Statistics and Quality, 2016).

This survey included individuals 12 years of age or older. Personal and self-administered interviews were completed with 68,073 respondents. As it was a household survey, people such as military personnel in military installations, individuals in long-term hospitals, and prisoners were excluded from the sample. As a result, the data cannot be viewed as completely representative of everyone in the 50 states. Nevertheless, the NSDUH provides the best single description of frequency and quantity of drug use among a broad age range of people in U.S. society.

prevalence
The general occurrence of an event, usually expressed in terms of percentage of some population. Another common statistic in survey studies is *incidence*, or the number of first-time occurrences of an event during some time period.

In the 2015 NSDUH, a variety of data about drug use in the United States were collected. We first discuss data on the overall **prevalence** of use in the last year and the last month respectively for different drugs, including alcohol and tobacco cigarettes. In this case, "use" means the person used the reference drug at least once during the time in question; "past month" and "past year" are from the time the respondents give information about their drug use. We also offer counterpart prevalence data from the 2014 survey when they are available to allow for comparison with the 2015 data. Table 1.1 presents this first set of percentages. Several findings stand out in Table 1.1. First, alcohol leads the use list, followed by cigarettes in a distant second place. Marijuana heads the list of illicit drug use (drug use not in accordance with legal restrictions). Note that, although it now is legal in several U.S. states to use marijuana, in the 2015 NSDUH marijuana was defined as an illicit drug. The rank order of prevalence of use among alcohol, tobacco cigarettes, and marijuana holds up for use both in the past year and in the past month.

Table 1.1 gives you an overall picture of drug use, but as we noted before, drug use differs with characteristics of people. Tables 1.2 and 1.3 give you an initial look at some of the characteristics that are highly associated with drug use differences. Table 1.2 centers on age differences in drug use in the past year and month, as reported in the 2015 national survey. As you can see in Table 1.2, individuals in the age range 18–25 have the most prevalent substance use. Over three of every four of these respondents said they used alcohol in the last year, and over one of every three of them reported at least one occasion of illicit drug use in the past year. In Table 1.3, we provide 2015 substance use data for the past month according to ethnic or racial group and gender. The most striking findings in Table 1.3 are the gender differences. Men were almost one and two-thirds times as likely as women to report any illicit drug use in the past month, and about 20% more likely than women to report any alcohol use. For ethnic or racial differences, whites showed the highest rate of alcohol use in the last month, followed by Hispanics and blacks, who did not differ by much. For use of any illicit drug in the last month, Hispanics showed the highest prevalence, followed by whites and blacks.

TABLE 1.1 Percentages of Individuals Aged 12 and Older Who Reported Use of Drugs for the Past Year and Past Month, 2014 and 2015

	Past Year		Past Month	
Drug	**2014**	**2015**	**2014**	**2015**
Marijuana	13.2	13.5	8.4	8.3
Cocaine	1.7	1.8	0.6	0.7
Inhalants	N/A	1.0	N/A	0.2
Hallucinogens	N/A	1.8	N/A	0.5
Heroin	0.3	0.3	0.2	0.1
Nonmedical use of any psychotherapeutic	N/A	7.1	N/A	2.4
Alcohol	66.6	65.7	52.7	51.7
Cigarettes	24.8	23.1	20.8	19.4

Note: Psychotherapeutic drugs include any prescription-type stimulant, sedative, tranquilizer, or analgesic. They do not include over-the-counter drugs. "Use" means used at least one time. N/A = due to change in 2015 survey design, data not available.

Source: Center for Behavioral Health Statistics and Quality (2016).

TABLE 1.2 Percentages of Individuals in Different Age Groups Who Reported Use of Drugs for the Past Year and Past Month, 2015

	Past Year			Past Month		
Drug	**12–17**	**18–25**	**≥26**	**12–17**	**18–25**	**≥26**
Any illicit drug	17.5	37.5	14.6	8.8	22.3	8.2
Alcohol	22.7	75.5	69.2	9.6	58.3	55.6
Cigarettes	8.1	35.0	22.9	4.2	26.7	20.0

Note: Any illicit drug use includes the nonmedical use of psychotherapeutics or the use of marijuana, cocaine (including crack), inhalants, hallucinogens, heroin, or methamphetamine.

Source: Center for Behavioral Health Statistics and Quality (2016).

TABLE 1.3 Percentages of Individuals Aged 12 and Older of Different Ethnic and Gender Groups Who Reported Any Illicit Drug or Alcohol Use in the Past Month, 2015

	Any Illicit Drug	Alcohol
Ethnic/Racial Group		
White	8.9	57.0
Black	8.8	43.8
Hispanic	9.2	42.4
Gender		
Male	12.9	56.2
Female	7.8	47.4

Note: Any illicit drug use includes the nonmedical use of psychotherapeutics or the use of marijuana, cocaine (including crack), inhalants, hallucinogens, heroin, or methamphetamine.

Source: Center for Behavioral Health Statistics and Quality (2016).

Summary of Survey Data

The NSDUH data suggest that people in the United States use a variety of drugs, and that some drugs are used far more commonly than others. For example, alcohol and nicotine use are considerably more prevalent than the use of any illicit drug. Furthermore, characteristics of the respondents can make a considerable difference in the prevalence of substance use, as we saw for age, gender, and ethnic or racial groups in the 2015 data.

Multiple Drug Use

The person who is counted in the percentage of, say, marijuana users in a survey sample may be the same person who increases the percentage of alcohol users. Such multiple drug use (also called **polydrug use**) is extremely important because of the effects that drug combinations have on the body. We explore those effects in detail in Chapter 4. For now, it is important for you to know that polydrug use is a critical health and social problem.

polydrug use
A person's regular use of more than one drug.

Using multiple substances on one occasion is not uncommon. For example, according to the 2015 NSDUH data, 6.4% of past-month alcohol users used

CONTEMPORARY ISSUE BOX 1.2

Survey Data on Drug Use: Are They Accurate?

There are compelling reasons for conducting national survey studies of drug use and its consequences. Such information can help a society formulate effective legal and social policies on the use of specific drugs. National survey data also may help to identify groups within a population that are at the greatest risk for experiencing health or other problems related to drug use, which could help in creating more effective prevention programs.

These and other benefits of national survey data on drug use are significant, but a big question is whether the information that is obtained reflects a society's *actual* drug use. That is, are the data accurate?

There are several reasons for asking this question. For example, even the largest surveys rarely collect data from every person in a target population, so it is possible that the sample of people chosen to participate in the survey is biased in some way. This means that the sample might not reflect the population's characteristics on sex, race, religion, or education of the respondent, all of which could be associated with the main behavior of interest (here, drug use). In addition, because many of the drugs asked about are illegal for nonmedical use, or for any use at all, people may be reluctant to admit to a researcher that they have used a particular drug or have used it in particular amounts or frequency. Furthermore, as surveys typically ask about past behavior, memory limits may interfere with the collection of accurate information, regardless of the respondent's intention to tell the truth.

These and other problems are real and must be addressed if national survey data on drug use are to have the utility that they are intended to have. Fortunately, the challenge to collect accurate survey information has been an active research area over the years, and methods of representative sampling and data collection to assure confidentiality or anonymity of responses have led to better survey design and procedures. These advances have resulted in data that meet high standards of reliability and accuracy. This is not to say that national survey data provide a literal picture of drug use in a population, but that the picture is getting clearer and more detailed as survey research methods continue to improve.

If you were designing a survey to study some behavior, such as drug use, in a given population, what potential sources of bias in the data would you consider? How would you handle them?

"I think I did every drug known to mankind, smoked crack, boozed, dropped acid, you name it."

Kid Rock

marijuana on an occasion within two hours of their alcohol use. This pattern of use was most prevalent among 12- to 17-year-olds and 18- to 25-year-olds compared to older age respondents. The respondents who reported "binge" drinking (five or more drinks at the same time or within a few hours of each other) in the past month were considerably more likely to report concurrent alcohol–illicit drug use than were the respondents who did not binge drink (drank alcohol but did not meet the criterion for "binge" drinking [32% vs. 20%]).

In its extreme, multiple drug use can include taking drugs with different or opposite physical effects in sequence on the same occasion. In such cases, the motive for use seems to be change, positive or otherwise, from one drug experience to another. An instance of extreme polydrug use, excerpted from Goldman (1971) and cited in Mendelson and Mello (1985, pp. 200–201), illustrates how people may use one type of drug after another, without apparent rhyme or reason. The example involves the famous comedian Lenny Bruce, who died in 1966, at age 40, and an associate of his:

> The night before, they ended a very successful three-week run in Chicago by traveling to the Cloisters (in New York City) and visiting the home of a show-biz druggist—a house so closely associated with drugs that show people call it the "shooting gallery." Terry smoked a couple of joints, dropped two blue tabs of mescaline, and skin-popped some Dilaudid; at the airport bar he also downed two double Scotches. Lenny did his usual number: 12, 1/16-**grain** Dilaudid pills counted out of a big brown bottle, dissolved in a 1-cubic centimeter (cc)

grain
As a measure, a unit of weight equal to 0.0648 gram.

CONTEMPORARY ISSUE BOX 1.3

Nonmedical Use of Prescribed Drugs

You may have noticed in Table 1.1 that the illicit drug with the second highest prevalence, after marijuana, is "nonmedical use of any psychotherapeutic." These data reflect the alarm in recent years among drug enforcement officials in the United States because of what seems to be a sharp increase in the nonmedical use of prescribed drugs. Painkillers such as OxyContin that became available relatively recently have been identified as a major source of the increased abuse rates, but many other drugs meant to be used as medical treatments to alleviate physical or psychological suffering are abused too. Another example especially prevalent on college campuses is the nonmedical use of prescription stimulant medications.

Two factors that may contribute to the increased abuse of medications are "doctor shopping" to get multiple prescriptions to treat a single physical or psychological ailment and the advertisement of prescription drugs over the Internet. Sales of drugs over the Internet are difficult for officials to track.

The abuse of prescription drugs is associated with the same kinds of physical, psychological, and social problems that come with the abuse of any other drug. Therefore, it is important to find ways to prevent or reduce such abuse. One way is for the federal government to provide resources to the individual states to develop computerized drug-prescription monitoring systems (which monitor who writes the prescriptions and who gets them). Such systems may help to address the doctor-shopping problem. Can you think of other solutions to the abuse of prescription drugs?

ampoule of Methedrine, and heated in a blackened old spoon. The resulting soup was drawn into a disposable needle and then whammed into mainline (intravenously) until you feel like you're living inside an igloo. Lenny also was into mescaline that evening: Not just Terry's two little old-maidish tabs, but a whole fistful, chewed up in his mouth and then washed down with a chocolate Yoo-Hoo.

International Comparisons of Drug Use

The national surveys on drug use that the United States conducts provide extremely useful information. It would be valuable if similar data were available annually from other countries so that comparisons would be possible. Unfortunately, population surveys of both alcohol and other drug use that different countries, including the United States, typically have done have not been designed with consideration of how other countries have designed their surveys, so comparisons of findings across countries can be difficult. Fortunately, the WHO initiated the "Global Burden of Disease" project in 1990, which was designed to gather health-related information from individual countries worldwide that would help to estimate the status of health-related concerns and problems and related risk factors for disease. Such data help nations to formulate evidence-based public health programs and policies. To place this WHO initiative in some context, global burden of disease refers to mortality and disability from major diseases, injuries, and risk factors.

One such risk factor is alcohol and other drug use. A paper by Degenhardt, Chiu, Sampson, Kessler, Anthony, Angemeyer, et al. (2008) is a report of lifetime alcohol and other drug use in each of 17 countries. These countries had agreed to participate in the "World Mental Health Survey" study, which was part of the ongoing Global Burden of Disease initiative. Each of these countries agreed to conduct population surveys of (among other health-related information) lifetime alcohol and other drug use.

The data were collected by personal interviews conducted during 2002–2003, and the interviews followed a standardized format across the participating countries. The geographic span covered is impressive, as seen by the list of participating countries: Belgium, China, Columbia, France, Germany, Italy, Japan, Lebanon, Mexico, Netherlands, New Zealand, Nigeria, South Africa, Spain, Ukraine, and the United States. Across the 17 countries there were 54,069 respondents to questions about lifetime alcohol and other drug use.

The results show interesting similarities and differences across the countries. For example, the large majority (typically, mid-80% to mid-90% range, except for Italy at 73%) of respondents in the Americas, Europe, Japan, and New Zealand reported alcohol use, compared to much smaller percentages in the Middle East, Africa, and China (generally, 40% to 60% range). In addition, the United States and New Zealand showed the highest percentage of cannabis use at about 42%, but cannabis use was below 5% in Asian countries. The United States stood out by far with lifetime use of cocaine at 16%, whereas all other countries were below 5%.

Several demographic variable correlates of use were similar to what we saw in the 2015 NSDUH survey. For example, across all countries, a higher proportion of males used all drugs compared to females. In addition, younger adults were more likely to have used all drugs compared to older adults.

"No animal ever invented anything as bad as drunkenness or as good as drink."

Lord Chesterton

Although the data on lifetime use of alcohol and other drugs provided by Degenhardt et al. (2008) are limited, they do provide a systematic look at how different countries compare. Cross-national data can be a valuable vehicle to understanding how cultural, legal, psychological, and biological factors affect alcohol and other drug use. We hope the material we present in the rest of this book begins to help you to do that as well.

DRUGS AND CULTURE BOX 1.4

The National Survey of Drug Use and Health and Subgroup Differences

You know from our discussion that the National Survey of Drug Use and Health data give us a great description of drug use among people living in the United States. At the same time, a general description of findings from national surveys does not tell us as much as it seems to. We must take into account the differences in use patterns according to characteristics—such as age, gender, and race—of the user and the user's environment—such as area of residence and local laws and policies regarding alcohol and drug use.

Demographic group differences in drug use reflect differences in complex historical or current factors common to certain groups of people or regions. Therefore, drug use differences could reflect biological, psychological, or social/environmental factors that distinguish one group from other groups or from the population as a whole. These factors are so complex that certain groups have been designated "special populations." This label emphasizes that, to understand a particular group's drug use, we need to understand its unique history and current circumstances. Groups that today are considered special populations by experts who study drug use include women (because traditionally women have received far less attention from alcohol and other drug researchers than have men), Native Americans, African Americans, Hispanics, the homeless, and sexual minorities.

The drug chapters in this text incorporate cultural and regional differences with features such as a historical account of the drug or drug class in question, and with attention to special cultural differences in use of the drug.

Given the importance of subgroup differences within a total survey sample, how might you adjust the sampling in a national survey to get a more accurate look at a subgroup that is of particular interest to you?

Negative Consequences of Alcohol and Drug Use

Describing alcohol and drug use returns us to the question of the consequences of such use. We saw that people experience positive consequences from their use of drugs. They may also experience negative effects, which definitions of drug abuse try to capture. One way to look at the negative consequences of alcohol and drug use for society is to conduct "cost-of-illness" studies. The purpose of these studies is to quantify in dollars what society "pays" for its members incurring specific illnesses. It is important to add that focusing on economic factors does not mean that no psychological costs are associated with illness. However, psychological consequences are not easily quantified and thus are much more difficult to analyze.

Two major "illness" distinctions that have been studied in detail are alcohol abuse and other drug abuse. In such research, "drug abuse" concerns the use of illegal drugs and the nonprescription use of drugs typically used for therapeutic purposes. Nicotine use has not been included. (This is not to understate the costs of nicotine use to U.S. society. The costs are substantial and are reviewed in Chapter 7.)

The U.S. National Institute on Drug Abuse website (drugabuse.gov, accessed December 23, 2016) provided estimated economic costs of alcohol abuse and other drug abuse to U.S. society. The estimated cost of alcohol abuse was about $224 billion, and the estimated cost of drug abuse was $193 billion. The total: $417 billion. Most people cannot even conceptualize what $1 billion is, never mind hundreds of billions of dollars. To help you understand how much money we are talking about, here is one illustration: A wealthy woman gives her sister $1 million to put in a drawer, telling her she can spend $1,000 a day and to call when the money is spent. Three years later, the sister calls. If the original sum had been $1 billion, the sister would not have called for 3,000 years. In any case, our difficulty in picturing billions of dollars does not make the cost of alcohol and drug abuse any less real.

The costs come from a wide range of sources, although the costs are not distributed in the same proportions for alcohol and drug abuse. The sources include illness, death, medical expenses, and crime. As you might expect, crime-related costs are especially significant for drug abuse.

Cost-of-illness studies give us a reasonable, well-rounded estimate of what society pays for its members' involvement with alcohol and other drugs. The multibillion-dollar cost estimates are staggering but ironically understate the impact. Some of the consequences of alcohol and drug use become clear when we think about what events make up the cost computations. For example, lifetimes of individuals will not be lived fully because the individuals were born with fetal alcohol syndrome (see Chapter 9). Hospital emergency room resources are used for overdoses of cocaine, heroin, and MDMA (see Chapters 6, 10, and 12, respectively). Then there is the suffering of a family who lost one of its young members because he was shot and killed in a robbery to obtain drugs. Maybe you have experienced what it is like to lose a friend or family member in one of the thousands of fatal alcohol-related traffic accidents that occur every year in the United States. It is important to step away from the statistics to look at these and other realities that make up the true costs of alcohol and drugs to society.

> *"Unlike others, he (a heroin addict) could not find a vocation, a career, a meaningful, sustained activity around which he could wrap his life. Instead he relied on the addiction to provide a vocation around which he could build a reasonably full life and establish an identity."*
>
> Psychologist Isidor Chein (quoted in Krogh, 1991, p. 133)

Defining Harmful Drug Use

Discussing cost-of-illness research brings our focus back to what might be called harmful drug use, or use that is associated with detrimental consequences to drug users or to others. Indeed, to reflect on harmful use, cost-of-illness studies have used terms like *alcohol abuse* and *drug abuse*. Yet, in the beginning of this chapter, we

mentioned the widely different meanings of these terms. This is a problem, because it hampers communication about drug use. The lack of standard definitions also tends to slow the advance of knowledge. If there is disagreement about what it is we are trying to gain knowledge about, you can see why scientific advances might be impeded.

Use of the *DSM*

In the United States and other countries, providers of care for physical and mental illness have handled problems of definition by developing systems of definitions of illnesses, or *diagnostic systems.* A diagnosis typically is based on a cluster of symptoms that is given a name (the diagnosis). The advantage is that, say, if two physicians are communicating about pneumonia in a patient and they are following the same diagnostic system, then each knows exactly what the referent of the other is when the term *pneumonia* is used. That is, a specific cluster of symptoms is being referred to. It also is possible to create diagnostic systems of mental illnesses. In the United States, the primary organization responsible for doing that has been the American Psychiatric Association (APA). Since the early 1950s, the APA has published formal diagnostic systems of different mental illnesses or disorders in its *Diagnostic and Statistical Manual of Mental Disorders* (*DSM*). The most recent version (systems are revised because of ongoing research that provides new information about different disorders) appeared in May 2013, and is called *DSM*-5. The *DSM*-5 has a section called "substance-related" (alcohol- or other drug-related) disorders, which includes definitions of "substance use disorders."

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The sometimes tragic consequences of drug use have drawn national attention and response.

CONTEMPORARY ISSUE BOX 1.5

Drugs, Criminal Activity, and Aggression

We have noted how costs associated with criminal behavior are especially significant for drug abuse. The association of alcohol, drugs, and crime is one we happen to see and hear about continually in the popular media.

The problem of drugs, alcohol, and crime is an old, much-studied one. It should be clear that we are dealing with associations, or correlations, and not causes. For example, the pharmacological effects of cocaine are not known to *cause* a person to commit murder. Yet the high positive correlation between drugs and crime remains a fact: As drug use in a community increases, the occurrence of certain kinds of crimes tends to increase as well, depending on the drug.

Much of the earlier and still more recent research on drugs and crime has concerned heroin. Most crimes committed by heroin addicts are either violations of the drug laws or ways to get money to buy more heroin. Therefore, the addict's most commonly committed crimes are burglary, larceny, assault, and other street crimes. These crimes are indeed serious and sometimes result in injury or death to the victims. The direct intent of the crime is not to harm the victim, however, but to get money. This same motive probably applies to much of the violence related to cocaine, and to conflicts over money among cocaine dealers and their customers.

Surprisingly, the use of some drugs has no relationship to criminal activity; there may even be a negative association between use of the drug and crime. Use of hallucinogens, for example, is not associated with crime, and marijuana seems to fall in the same category. The evidence is mixed for barbiturates and tranquilizers: Some studies show no relationship, but others suggest that the relationship between use and crime is the same for barbiturates and alcohol.

Alcohol intoxication has a high correlation with criminal activity. Because alcohol is legal and very available, little violence is connected with violating drug laws or stealing to obtain alcohol. Most of the crimes associated with alcohol intoxication are assaultive, which means that they are committed with the intent to harm the victim. Alcohol is correlated with other types of crime as well, such as aggravated assault, homicides, property offenses, sexual offenses, and check fraud.

Therefore, one point is clear: Some types of drug use are associated with criminal activity. But what is the explanation? Pharmacology figures complexly in the answer but seems to be only one of many factors. Others include the person's expectations about the drug's effects, the setting where the drug is being used, and personality characteristics of the user.

The drug–crime problem is a good example of how a society and its individual members are affected by drug use. It also illustrates that drug use and its effects on users are influenced by many factors working together.

Table 1.4 lists the criteria for defining substance use disorder according to *DSM*-5 (American Psychiatric Association, 2013). It is important to make a few comments about the criteria. Most generally, the same criteria are applied in describing the "symptoms" or criteria that constitute a substance use disorder for all drugs and drug classes that people tend to use for nonmedical reasons. That includes all the drugs we discuss in this text. Another important point is that prior editions of the *DSM* distinguished between dependence and abuse. However, that distinction is not made in *DSM*-5, due to research findings since the last major *DSM* was published in 1994.

Criteria 1 through 9 focus on what traditionally has been called "compulsive drug use," or drug **addiction**. In essence, the individual's life centers on drug use and its procurement to the point of reduced attention to or outright neglect of other aspects of life. Similarly, drug use persists despite the risk of incurring serious consequences by doing so. Individuals with addictions also have an inability to stop or to reduce drug use for any length of time, if that is the intention. This phenomenon has been called "loss of control." The last two criteria introduce two terms: *tolerance* and *withdrawal*. We have more to say about them later in this chapter and in other chapters in this text. At least 2 of the 11 criteria listed in Table 1.4 must be met for the diagnosis of substance use disorder.

addiction
In reference to drugs, overwhelming involvement with using a drug, getting an adequate supply of it, and having a strong tendency to resume use of it after stopping for a period.

TABLE 1.4 *DSM-5* Diagnostic Criteria for Current Substance Use Disorder

Substance use disorder is a problematic pattern of substance use leading to clinically significant impairment or distress, as manifested by at least two of the following, occurring within a 12-month period:

1. The substance is often taken in larger amounts or over a longer period than was intended;
2. Users have a persistent desire or unsuccessful efforts to cut down or control use of the substance;
3. A great deal of time is spent in activities necessary to obtain the substance (e.g., visiting multiple doctors or driving long distances), to use the substance (e.g., chain-smoking), or to recover from its effects;
4. Users have cravings, or strong desires, to use the substance;
5. Recurrent use of the substance results in a failure to fulfil major role obligations at work, school, or home;
6. Use of the substance is continued despite having persistent or recurrent social or interpersonal problems caused, or exacerbated, by the substance;
7. Use of the substance is recurrent so that important social, occupational, or recreational activities are given up or reduced;
8. Use of the substance is recurrent in situations in which it is physically hazardous;
9. Use of the substance is continued despite knowledge of having a persistent or recurrent physical or psychological problem that is likely to have been caused or exacerbated by the substance; and
10. Tolerance has developed, as defined by either of the following:
    (a) Need for markedly increased amounts of the substance to achieve intoxication or desired effect, or
    (b) Markedly diminished effect with continued use of the same amount of the substance.
11. Withdrawal is experienced, as manifested by either of the following:
    (a) The characteristic withdrawal syndrome for the substance, or
    (b) The same (or closely related) substance is taken to relieve or avoid withdrawal symptoms.

Specify current severity: Mild, presence of two to three symptoms; Moderate, presence of four to five symptoms; Severe, presence of six or more symptoms.

Source: From the *Diagnostic and Statistical Manual of Mental Disorders*, Fifth Edition. Copyright 2013. American Psychiatric Association.

Although *DSM*-5 no longer includes substance dependence as a separate substance use disorder, the term *drug dependence* still is, and likely will continue to be, widely used. In this regard, we would like to define a term that you probably have heard or read because it is so commonly used: **psychological dependence**.

psychological dependence
The emotional state of craving a drug either for its positive effect or to avoid negative effects associated with its abuse.

craving
A term that has been variously defined in reference to drug use; typically a strong or intense desire to use a drug.

Like many terms used in communicating about drugs and their use, *psychological dependence* has had different meanings. So the Rinaldi et al. (1988) consensus definition is useful again. In the Rinaldi study, psychological dependence was defined as "the emotional state of **craving** a drug either for its positive effect or to avoid negative effects associated with its abuse" (p. 557). Interestingly, note that "craving" (for a substance) is one of the 11 criteria for a diagnosis of substance use disorder according to *DSM*-5.

We would like to say a few more words about the *DSM*-5 definitions before concluding our discussion of them. The *DSM*-5 criteria, which are based on the most current knowledge about substance use disorders that comes from research and clinical practice, ease problems in communication because they are clearly written, descriptive criteria. This does not mean that the criteria are perfect; indeed, the expectation is that the criteria will continue to evolve as new knowledge accrues.

In this regard, having a generally accepted definition of a phenomenon makes it far more likely that we will acquire new knowledge about substance use and will eventually have a good understanding of it. Another point you may have noticed is that the *DSM*-5 provides no definition of drug use. In *DSM*-5 terms, *drug use* would be any consumption of alcohol or other drugs and related events that do not meet the criteria for "use disorder."

Although we may never get away entirely from the influence of societal values on definitions of substance use disorders, the creators of *DSM*-5 have considerably advanced our ability to communicate about harmful drug use. Because of this, *DSM*-5 is ubiquitous in alcohol and other drug treatment and research settings in the United States. Accordingly, we follow the *DSM*-5 definitions where relevant in the remaining chapters of this text.

Drug Tolerance, Withdrawal, and Drug-Taking Behavior

The *DSM*-5 criteria for substance use disorder include the term drug **tolerance**, which was defined in parts (a) and (b) of criterion 10 in Table 1.4. Another new term is **withdrawal** symptoms. Withdrawal is a definable illness that occurs with a cessation or decrease in drug use after the body has adjusted to the presence of a drug to such a degree that it cannot function without the drug. Not all drugs are associated with an identifiable withdrawal **syndrome** (also called *abstinence syndrome*). For any drug associated with withdrawal symptoms, the severity of those symptoms may change with the characteristics of the users and their history of use of that drug. Furthermore, psychological symptoms, such as anxiety, depression, and craving for drugs, are often part of withdrawal syndromes. These psychological symptoms strongly influence whether the individual can stop using drugs for any length of time.

tolerance
Generally, increased amounts of a drug needed to achieve intoxication, or a diminished drug effect with continued use of the same amount of a drug.

withdrawal
A definable illness that occurs with a cessation or decrease in use of a drug.

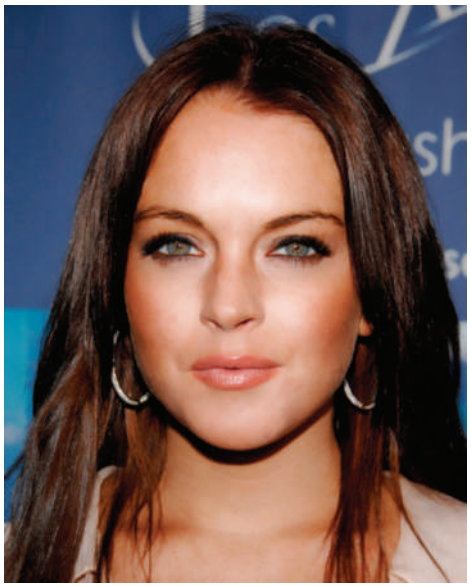
syndrome
In medicine, a number of symptoms that occur together and characterize a specific illness or disease.

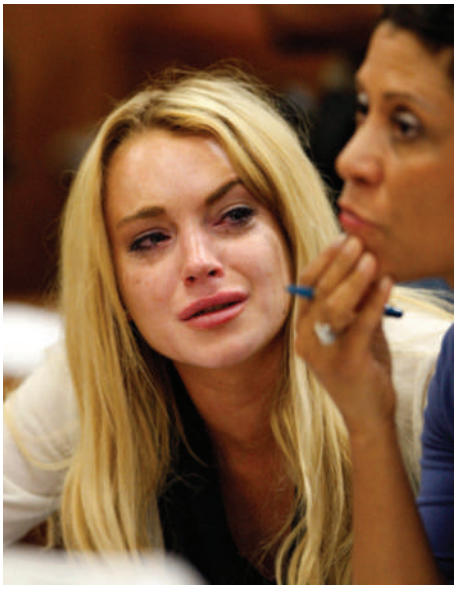
We draw your attention to drug tolerance and withdrawal in this introductory chapter because they are central topics in psychopharmacology. Tolerance and withdrawal are addressed as part of any evaluation or study of a drug. As a result, we discuss these concepts in far more detail in later chapters. It is critical to mention now, however, that tolerance and withdrawal affect drug-use patterns. For example, if tolerance to a drug develops, the individual must consume increasing amounts of it to achieve a desired drug effect. Such a trend in use may affect how much time the person devotes each day to acquiring the drug and to using it. Furthermore, with greater quantities and frequencies of drug use, the person becomes more susceptible to experiencing various negative physical, social, or legal consequences.

Drug withdrawal also makes a person more likely to continue or resume the use of a drug after a period of abstaining. Many studies have shown that relief from withdrawal is a powerful motivator of drug use. In this regard, drug withdrawal may begin when the level of drug in the blood drops. If the user takes more of the drug at this point, the withdrawal symptoms are relieved. Here the motivating force is the "turning off" of unpleasant withdrawal symptoms, which works to perpetuate a powerful cycle of drug use–drug withdrawal–drug use. Withdrawal is also associated with a higher likelihood of resuming drug use following a period of abstinence because of learned reactions to cues in the environment. We describe how this might happen in Chapter 5.

We want to emphasize here that the influences of tolerance and withdrawal are at the heart of psychopharmacology—the incentives or motivators that drive human (and other animal) drug use. Chapter 5, on the principles and methods of psychopharmacology, addresses this topic in detail.

You may have observed from this discussion of drug tolerance, withdrawal, and drug-taking behavior that they may be instrumental in the development of what we





Actress and recording artist Lindsay Lohan's life illustrates a main feature of drug addiction—the neglect of professional responsibilities and personal relationships for the sake of obtaining and using drugs.

defined earlier as drug addiction. Another factor that may be critical to the development of addictive drug-use patterns is "sensitization" (Robinson & Berridge, 2003). The sensitization hypothesis is that one result of repeated use of a drug in interaction with environmental factors is changes in the brain neural pathways (Chapter 3) that may heighten (sensitize) the reward value of that drug. This means that the drug's effects become more appealing to an individual, and therefore procurement of the drug may assume increasing control over his/her behavior. Critically, the brain changes resulting from repeated drug use may be permanent, which is one reason why drug addiction may be such an intractable problem for many people, as we show later in this text.

This discussion shows that using a drug for a long time alters the patterns of use for that drug. Long-term use also relates to the *DSM*-5 criteria. Tolerance, withdrawal, and sensitization may result not only in changes in drug use and preoccupation but also in the likelihood that the person's life and the lives of those around that person are affected by the drug in a snowballing effect, with one consequence building on another. The outcome can reflect some of the criteria included in the *DSM*-5 definition of substance use disorder.

Of course, discussion of the effects of tolerance and dependence on motivations for drug use addresses only a small minority of the different reasons that people use drugs, which takes us back to the 10 systems that influence or are influenced by drug use that we discussed at the beginning of this chapter. In this regard, people give numerous reasons for "why" they use different drugs, and different drugs may be most strongly associated with different reasons. At the same time, multiple drugs may be used for the same reasons. The same drug also may be used for different reasons in different times and places. This suggests that reasons for use are not limited to a drug's pharmacological effects but relate to a variety of other variables as well.