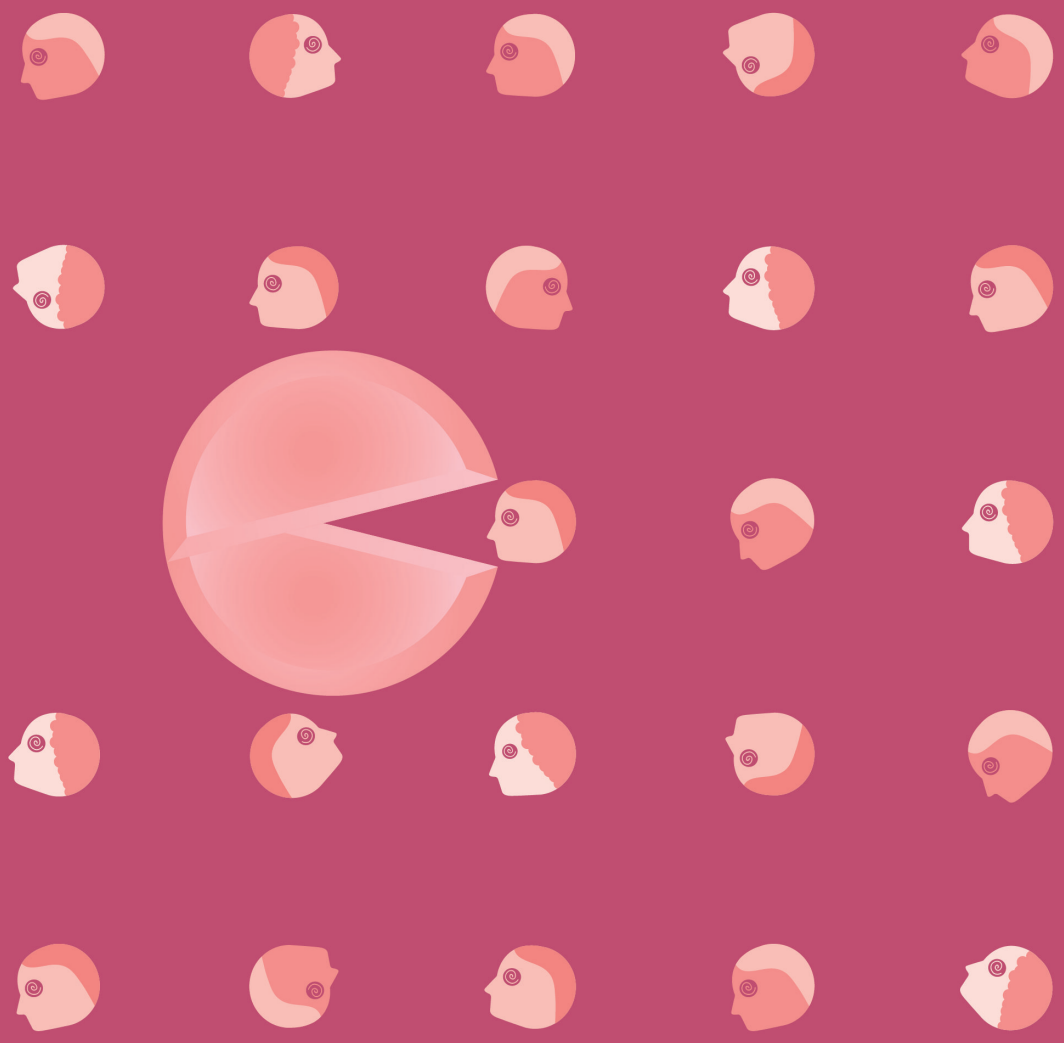
Drugs, Behavior, and Modern Society

Charles F. Levinthal



9th Edition

Drugs, Behavior, and Modern Society

NINTH EDITION

Charles F. Levinthal
Hofstra University

Content Management: Tanimaa Mehra, Preeti Sharma
Content Production: Lisa Mafrici, Colleen McQuaid
Product Management: Tanimaa Mehra, Kelli Strieby
Product Marketing: Wayne Stevens

Please contact https://support.pearson.com/getsupport/s/with any queries on this content

Cover Image by **Pearson Education, Inc.**

Library of Congress Cataloging-in-Publication Data

Names: Levinthal, Charles F.
Title: Drugs, behavior, and modern society / Charles F. Levinthal, Hofstra University.
Description: Ninth edition. | Hoboken, NJ: Pearson Education, Inc., [2023] | Includes bibliographical references and index.
Identifiers: LCCN 2021058634 (print) | LCCN 2021058635 (ebook) | ISBN 9780135385340 (paperback) | ISBN 9780135385883 (spiral bound) | ISBN 9780135385913 (epub)
Subjects: LCSH: Drugs. | Drug abuse. | Drugs--Physiological effect. | Psychotropic drugs. | Psychopharmacology.
Classification: LCC HV5801 .L49 2023 (print) | LCC HV5801 (ebook) | DDC 363.290973--dc23/eng/20211209
LC record available at https://lccn.loc.gov/2021058634
LC ebook record available at https://lccn.loc.gov/2021058635

ScoutAutomatedPrintCode

Pearson

Access Code Card
ISBN-10: 0-135-38596-2
ISBN-13: 978-0-135-38596-8
Rental
ISBN-10: 0-135-38534-2
ISBN-13: 978-0-135-38534-0

Pearson's Commitment to Diversity, Equity, and Inclusion

Pearson is dedicated to creating bias-free content that reflects the diversity, depth, and breadth of all learners' lived experiences.

We embrace the many dimensions of diversity, including but not limited to race, ethnicity, gender, sex, sexual orientation, socioeconomic status, ability, age, and religious or political beliefs.

Education is a powerful force for equity and change in our world. It has the potential to deliver opportunities that improve lives and enable economic mobility. As we work with authors to create content for every product and service, we acknowledge our responsibility to demonstrate inclusivity and incorporate diverse scholarship so that everyone can achieve their potential through learning. As the world's leading learning company, we have a duty to help drive change and live up to our purpose to help more people create a better life for themselves and to create a better world.

Our ambition is to purposefully contribute to a world where:

- Everyone has an equitable and lifelong opportunity to succeed through learning.
- Our educational content accurately reflects the histories and lived experiences of the learners we serve.
- Our educational products and services are inclusive and represent the rich diversity of learners.
- Our educational content prompts deeper discussions with students and motivates them to expand their own learning (and worldview).

Accessibility

We are also committed to providing products that are fully accessible to all learners. As per Pearson's guidelines for accessible educational Web media, we test and retest the capabilities of our products against the highest standards for every release, following the WCAG guidelines in developing new products for copyright year 2022 and beyond.

You can learn more about Pearson's commitment to accessibility at **https://www.pearson.com/us/accessibility.html**

Contact Us

While we work hard to present unbiased, fully accessible content, we want to hear from you about any concerns or needs with this Pearson product so that we can investigate and address them.

Please contact us with concerns about any potential bias at **https://www.pearson.com/report-bias.html**

For accessibility-related issues, such as using assistive technology with Pearson products, alternative text requests, or accessibility documentation, email the Pearson Disability Support team at **disability.support@pearson.com**

Pearson

This page is intentionally left blank

Dedicated to My Grandchildren
With Abundant Love

Aaron Matthew Levinthal
Michael Samuel Levinthal
Zoe Ann Levinthal
Emily Clare Levinthal
Andrew Miller Levinthal

This page is intentionally left blank

Brief Contents

This page is intentionally left blank

Contents

Preface

From the Author

I welcome all of you to the Ninth Edition of *Drugs, Behavior, and Modern Society*. As always, the overarching goal has been to provide a valuable learning experience and a greater understanding of the complex world of drug-taking behavior. Throughout the chapters of this book, the focus will be on the relevance of drugs and drug-taking behavior in your daily lives as well as the contemporary society in which we live.

There is no need for a background in biology, sociology, psychology, or chemistry to receive benefit from the contents of this book. The only requirement is a sense of curiosity about the range of drugs that affect our minds and our bodies and a concern about the social and personal challenges that drugs bring to our daily lives. These challenges can be framed in terms of three fundamental *themes of understanding:*

- ***Understanding the patterns of drug-taking behavior throughout history***—Present-day issues concerning drug misuse and abuse are issues that society has confronted for a long time. Drugs and drug-taking behavior are consequences of a particularly human need to feel stronger, more alert, calmer, more distant and dissociated from our surroundings, or simply to feel good. It is the misuse and abuse of chemical substances to achieve these ends that have resulted in major problems in the United States and around the world.
- ***Understanding the diversity of psychoactive drugs in our society***—There is an enormous diversity among drugs that affect the mind and the body. There is a great need to educate ourselves not only about drugs such as cocaine, amphetamines, opioids, hallucinogens, and marijuana but also about drugs that are legally sanctioned and readily available to us, specifically alcohol and nicotine. *Drugs, Behavior, and Modern Society* is a comprehensive survey of all types of psychoactive drugs, addressing the issues of drug-taking behavior from psychological, biological, and sociological perspectives.
- ***Understanding the impact of society on drug-related issues in our lives***—Like it or not, the decision to use drugs is one of life's choices within our contemporary society, regardless of your racial, ethnic, or religious background, how much money you have, where you live, how much education you have acquired, your age, or your gender identity. As has been demonstrated through our collective experiences during the days of the COVID pandemic, our behaviors will be continually influenced by changes in the social environment around us.

The Ninth Edition: The Old and the New

As far as the contents of this new edition are concerned, let's say that there are some things that are *old* and some things that are *new.*

On the one hand, the Ninth Edition of *Drugs, Behavior, and Modern Society* continues to maintain standards of clarity, readability, comprehensiveness, and organization that have been set by previous editions, as well as a commitment to the importance of historical story-telling as a meaningful context to the technical material in the chapters.

On the other hand, the story of drug-taking behavior through the years is like a breathless ride on a high-speed train with twists and turns and a series of unknown territories just around the bend. It is obvious that certain patterns of drug-taking behavior and associated social issues have changed dramatically since the previous edition of this book. In fact, there are a number of subjects addressed in the new edition that hardly existed at the time the Eighth Edition was released. Some examples include: significant groundbreaking developments in understanding the neurochemical basis for behavioral addiction (Chapter 3). the impact of synthetic opioids such as fentanyl on opioid overdose fatalities (Chapter 4), significant advancements in the medical applications of medical cannabis (Chapter 7), and the long-term implications of current levels of nicotine vaping and the use of e-cigarettes (Chapter 10).

Most importantly, the Ninth Edition has provided a comprehensive in-depth examination of the impact of the COVID pandemic on a range of issues related to substance abuse and substance abuse treatment. A four-part series entitled "Life in the Time of COVID" focuses on specific aspects of drug-taking behavior when living under the conditions of an ongoing pandemic: Substance abuse (Chapter 1), alcohol abuse (Chapter 8), nicotine vaping (Chapter 10) and online substance abuse treatment services (Chapter 17).

Content Highlights

Beyond the subject matter, there are several features contained in the book itself that are new to the Ninth Edition. Several special boxed and interactive features throughout the book are designed to enhance your experience as a reader and serve as valuable learning aids.

New To This Edition

By the Numbers ...

At the beginning of each chapter, an updated feature called **By the Numbers ...** provides an often surprising and provocative insight into current viewpoints and research through current statistical information. A brief, quantitative format draws you into the chapter and sets the stage for further exploration.

Portraits

Seventeen **Portrait** features, one in each chapter, take you into the lives of individuals who either have influenced our thinking about drugs in our society or have been affected by present-day drug use or abuse. Individuals highlighted in new Portraits for the Ninth Edition include a one-time elusive but presently incarcerated Mexican drug trafficking kingpin (El Chapo, Chapter 2), a Russian sports physician who directed and later exposed the state-run doping program of athletes during the 2012 and 2014 Olympic Games (Dr. Grigory Rodchenkov, Chapter 12), and a leading public-health official who has led the re-evaluation of the substance-abuse treatment industry (Dr. Mark Willenbring, Chapter 17). Continuing Portrait subjects include a leading research scientist investigating the neural basis of addiction (Dr. Nora Volkow, Chapter 3), a convicted killer (David Lafer, Chapter 4), a movie star (Robert Downey Jr., Chapter 5), a cultural icon (Timothy Leary, Chapter 6), the founder of psychoanalysis and one-time cocaine enthusiast (Sigmund Freud, Chapter 10), and a depressive U.S. President (Abraham Lincoln, Chapter 15).

Drugs ... in Focus

There are many fascinating stories to tell about the role of drugs in our history and our present-day culture, along with important facts and serious issues surrounding drug use. A total of 42 **Drugs ... in Focus** features are presented in the Ninth Edition. The topics of these features cover a wide range, from the origins of the word *coca* in Coca-Cola (Chapter 5) and possible hallucinogenic witchcraft in seventeenth century Salem, Massachusetts (Chapter 6) to the history of hemp growing in America (Chapter 7) and present-day uses of "truth serum" in terrorist interrogations (Chapter 13).

Health Line

Helpful information regarding the effectiveness and safety aspects of particular drugs, specific aspects of drug-taking behavior, and new medical applications can be found in 30 **Health Line** features throughout the book. Health Line topics include understanding the neurological basis for drug craving (Chapter 3), the controversy over the use of stimulant medications as "smart pills" (Chapter 5), concerns over new synthetic cannibanoids such as Spice (Chapter 7), the risks involved in smoking mentholated cigarettes among Black Americans (Chapter 10), "doctor-shopping" and prescription pain medications (Chapter 14), and alcohol prevention programs like Alcohol 101 on college campuses (Chapter 16), to name a few. About a third of the Health Line features are new to the Ninth Edition.

Health Alert

Information of a more critical nature is provided in 21 **Health Alert** features. You will find important facts that you can use to recognize the signs of drug misuse or abuse and ways in which you can respond to emergency drug-taking situations, as well as useful Internet links where you can go for assistance. Health Alert topics include the risks in consuming cocaine when combined with alcohol (Chapter 5), emergency guidelines for adverse reactions to LSD (Chapter 6) or alcohol (Chapter 8), and the dangers of Rohypnol as a date-rape drug (Chapter 13). New Health Alert features for the Ninth Edition include guidelines for intervening in an opioid overdose emergency (Chapter 2), guidelines for the administration of naloxone (Chapter 4), health concerns over excessive consumption of energy shots (Chapter 11), and protective strategies for drug-facilitated sexual assaults (Chapter 13).

Quick Concept Checks

Sometimes, when the material gets complicated, it is good to have a quick way of finding out whether you understand the basic concepts being explained. Each chapter of this book includes, from time to time, updated **Quick Concept Checks**, where you can evaluate your understanding of the subject matter. In Revel, this feature has been specially designed in an interactional format. Examples include self-assessments through matching, fill-in-the-blanks, or sorting tasks, interpretations of a graph or diagram, and opportunities to reflect upon the applications of principles you have learned to a real-world situation.

Apart from these, each chapter begins with learning objectives, which are repeated in each of the relevant modules of the respective chapters. Research shows that students learn material better when they are tested frequently. Thus, in Revel, each chapter is interspersed with self-assessments and writing assessments, as well as the test questions at the end of every chapter, which should be helpful learning aids.

Revel™

Revel: Inspire engagement through active learning

Revel® improves results by empowering students to actively participate in learning. More than a digital textbook,

Revel delivers an engaging blend of author content, media, and assessment.

With Revel, students read and practice in one continuous experience. Interactive content and assessments integrated throughout the narrative provide opportunities for students to explore and apply concepts. And Revel is mobile and user-friendly, so students can learn on the go—anytime, anywhere, on any device.

Learn more about Revel: www.pearsonhighered.com/revel/

Instructor Resources

This text is available in a variety of formats—digital and print. To learn more about our programs, pricing options, and customization, visit **www.pearsonhighered.com**.

Pearson Education is pleased to offer the following supplements to qualified adopters.

- Instructor's Manual and Test Bank: This Instructor's Manual and Test Bank provides instructors with support material, classroom enrichment information, and wealth of assessment questions. Corresponding to the chapters in the text, each of the manual's 17 chapters contains discussion questions, lecture outlines, video suggestions, and a test bank, which includes an extensive set of multiple choice, true/false and essay questions.
- MyTest Test Bank: This test bank is available in computerized format, which allows instructors to easily create and print quizzes and exams. Questions and tests can be authored online, allowing instructors ultimate flexibility and the ability to efficiently manage assessments anytime, anywhere. Instructors can easily access existing questions, edit, create, and store using simple drag-and-drop Word-like controls. For more information, go to **www.PearsonMyTest.com**.
- PowerPoint Presentation: The PowerPoint Presentation is an exciting interactive tool for use in the classroom. Each chapter pairs key concepts with images from the textbook to reinforce student learning.

About the Author

Dr. Levinthal has written numerous books, including *Introduction to Physiological Psychology* (Prentice-Hall, 1979, 1983, 1990), *Messengers of Paradise: Opiates and the Brain* (Anchor Press/Doubleday, 1988), *Point/Counterpoint: Opposing Perspectives on Issues of Drug Policy* (Allyn and Bacon, 2003), *Drugs, Behavior, and Modern Society* (Allyn and Bacon, 1996, 1999, 2002, 2005, 2008; Pearson Education, 2010, 2012, 2014), *Drugs, Society, and Criminal Justice* (Pearson Education, 2006, 2008, 2012, 2016), and *Drugs, Society, and Criminal Justice*, 5e with Lori Brusman-Lovins (Pearson Education, 2020). He served on the Faculty in the Department of Psychology at Hofstra University from 1971 to 2014 and as Department Chair from 2005 to 2013. His undergraduate and graduate teaching included courses in Biopsychology, Neural Bases of Behavior, Cognition and Perception, Drugs and Behavior, Statistics, and Research Methods. His journal articles and edited book publications have centered on areas of conditioning and learning, substance abuse and misuse, cognitive decision-making and risk theory, and reading disabilities and assessment. Among other honors, Dr. Levinthal was elected as a Fellow of the American Psychological Association in 2010.

An Invitation to the Readers from the Author

I welcome your reactions to *Drugs, Behavior, and Modern Society,* Ninth Edition. My email address is Charles.f.levinthal@hofstra.edu. I look forward to hearing from you.

Acknowledgments

In the course of preparing the Ninth Edition, I have been assisted by a number of colleagues and health-care professionals in the field of substance abuse and received much encouragement, and expert advice. I am particularly indebted to Dr. Holly Hedegaard at the National Center for Health Statistics, Centers for Disease Control and Prevention, for helping me to access the voluminous amount of statistical data in substance use and abuse, Dr. Mitchell L. Schare at Hofstra University for his valuable insights into substance abuse counseling, and Dr. Patrick M. O'Malley at the Institute for Social Research, the University of Michigan for his expertise in the field of adolescent drug-taking behavior.

In addition, I am pleased to have worked with a wonderful team at Pearson Education. I am especially indebted to my editors, Tanimaa Mehra, Preeti Sharma, and Lisa Mafrici at Pearson Education as well as Abinaya Rajendran at Integra Software Services. Their professionalism and collegiality are greatly appreciated.

Finally, on a personal note, there are others who have given me their support over the years and to whom my appreciation goes beyond words. As always, I thank my dear family for being a continual source of strength and encouragement. I am grateful to my sons, David and Brian, and to my daughters-in-law, Sarah and Karen, for their love and understanding. I am especially grateful to my wife, Beth, for her abiding love, support, and complete faith in my abilities. The Ninth Edition is dedicated to my grandchildren, whom I love without measure. Their names are listed on the Dedication Page of this book.

Charles F. Levinthal

Chapter 1
Drugs and Behavior Today

Learning Objectives

1.1 Review the two basic ways of looking at the relationship between drug-taking behavior and society

1.2 Discuss the definitions and distinctions that are made in describing drugs and forms of drug use

1.3 Review the origins and history of drugs and drug-taking behavior

1.4 Discuss the extent of drug use in the nineteenth century

1.5 Examine the growth of problems related to drug dependence in light of advancements in medicine

1.6 Review the present-day patterns of drug use in the United States

1.7 Review the principal risk and protective factors that influence drug-taking behavior

1.8 Review the criteria listed in the DSM-5 that form the basis for a clinical diagnosis of problematic drug-taking behavior

In late 2017, Juvenile Court Judge Marilyn Moores in Marion County, Indiana, faced a unique set of challenges: presiding over critical social welfare services in the throes of a public health crisis. The opioid abuse epidemic was raging in her community. In the neonatal intensive care unit (NICU) of the local hospital, newborn babies were suffering symptoms of opioid withdrawal from an addiction they had acquired in utero. Across town, police officers were discovering young children abandoned in their car seats, their father overdosed and unconscious in the front.

Runaway teenagers were sleeping in the Department of Child Services offices. Returning them back to their parents and a home where opioid abuse prevailed was out of the question, and alternative homes could not be quickly found. By state law, child welfare agencies would have mandated them to make "reasonable efforts" to reunify parents with their children, but these were not ordinary times. Even if the parents demonstrated that they were drug-free, there was too great a chance of a relapse. Nationwide, most frequently reported drug overdose cases in 2017 were among individuals 25 to 44 years old—precisely the age group of parents with young children. It was a statistical fact all too familiar to the citizens of Marion County.

SOURCE: Adapted from Scott, S. (2017, December 17). The foster care system is flooded with children of the opioid epidemic. Interview with Juvenile Court Judge Marilyn Moores. NPR News, WNYC Radio, New York. Retrieved from https://www.npr.org/2017/12/23/573021632/the-foster-care-system-is-flooded-with-children-of-the-opioid-epidemic/.

By the numbers…

93,331	Number of drug overdose deaths recorded in the United States in 2020. Sixty percent of these deaths were due to ingestion of a synthetic opioid, such as fentanyl or fentanyl analog (see Chapter 4).
72,151	The number of drug overdose deaths recorded in the United States in 2019.
53,000	The number of drug overdose deaths recorded in the United States in 2015.
25-44	Consistently each year, the most frequent age-group category of individuals who have died from a drug overdose.

SOURCES: Ahmad, F. B., Rossen, L. M., and Sutton, P. (2021, April). Provisional drug overdose death counts, 2020. National Center for Health Statistics. Atlanta, GA: Centers for Disease Control and Prevention. Retrieved from https://www.cdc.gov/nchs/nvss/vsrr/drug-overdose-data.htm/. Elflein, J. (2020, January 30). Number of U.S. drug overdose deaths 2015–2017, by age. Statista.com. Retrieved from https://www.statista.com/statistics/611017/drug-overdose-deaths-number-in-the-us-by-age. Katz, J., Goodnough, A., and Sanger, M. (2020, July 15). In shadow of pandemic, U.S. drug overdose deaths resurge to record. *The New York Times*. Retrieved from https://www.nytimes.com/interactive/2020/07/15/upshot/drug-overdose-deaths.html/. National Institute on Drug Abuse. (2020, March 10). Overdose death rates. Retrieved from https://www.drugabuse.gov/related-topics/trends-statistics/overdose-death-rates/.

There is no question that we live in a world where drugs are all around us. Over the years, we have been confronted with a range of social problems that drug abuse has brought to communities across America. Importantly, we have contended with a range of personal problems that drug abuse can bring to our families and, of course, ourselves.

For several years, the number of cases of opioid abuse and opioid overdose fatalities across America had increased

steadily to become a genuine national public health crisis. By 2019, an epidemic of opioid abuse, fueled by the influx and availability of synthetic opioids, was raging.

Approximately 72,000 Americans died of a drug overdose in 2019 alone, with more than 51,000 of the deaths involving the abuse of either heroin or a synthetic opioid such as fentanyl. Drug overdose deaths had exceeded the number of lives lost from motor vehicle accidents, gun-related violence, and AIDS combined. Over a three-year span (2017–2019), more than 148,000 American lives were lost to opioid abuse *alone*. As a result of drug overdose deaths across the entire population from 2014 to 2017, the estimated life expectancy in the United States actually declined, reversing a trend that had been steadily rising year-to-year over the course of several decades.

During this time, no geographic region, racial or ethnic group, or socioeconomic category of Americans escaped this national calamity. First responders in health care and public safety were being overwhelmed. Coroners (calling themselves "last responders") found themselves struggling to find extra room in morgues for all the overdose victims. In some communities, drug-related car crashes became so commonplace that rescue crews would immediately administer the opioid antidote naloxone (Narcan) to any unresponsive driver they found on the presumption that an opioid overdose was the cause of the accident. The criminal justice system was overburdened with greatly increased numbers of opioid abusers among the population of drug-law offenders. Meanwhile, large quantities of heroin and fentanyl continued to be smuggled across our borders and from overseas, with only a small fraction confiscated by federal authorities (see Chapter 2). Despite the increased availability of Narcan for reversing the fatal consequences of an opioid overdose (see Chapter 4), the death toll continued to rise. Overdose fatalities involving methamphetamine (meth) and cocaine were increasing as well.

Making matters worse in 2020, a combination of living under the circumstances of the COVID-19 pandemic and an upsurge in the availability of the synthetic opioid fentanyl made the struggle with drug abuse in America even more difficult than before (see Health Line 1.2). Emergency drug overdose cases increased by 18 percent in March 2020, by 29 percent in April, and by 42 percent in May, when compared to respective months in 2019. In some communities, the increase in emergency calls for drug overdoses was even greater. Substance abuse treatment programs needed to be modified due to restrictions in social interaction that were imposed by the pandemic. The drug overdose death toll for the calendar year 2020 exceeded 93,000 American lives, roughly 29 percent higher than during the calendar year 2019. By the spring of 2021, in a clear sign that the drug abuse crisis was far from over, rising numbers of overdose deaths were being recorded. From April 2020 to April 2021, total drug-related fatalities exceeded 100,000 cases, the highest level ever recorded to date for a 12-month period.[1]

Certainly, the struggle with drug abuse has been a continuing public health issue for a very long time. Opioid abuse has dominated the drug-abuse headlines in recent years, but the fact is that over several decades drug abuse has taken many different forms. Public health officials have seen a rise and fall in the abuse of cocaine and methamphetamine (meth) in addition to heroin and other opioids. Overdose deaths involving cocaine and meth abuse in 2019 represented less than 25 percent of the total, but the percentage increased to 47 percent in 2020. The surge in overdose deaths over a single year's time was attributed largely to cases involving a combination or contamination with fentanyl.

Yet at the same time, it should be pointed out that the social and personal issues regarding opioids, cocaine, and methamphetamine in present-day American life need to be viewed in the context of more widespread patterns of drug-taking behavior involving two other drugs that are *legally sanctioned for adult consumption*.

The drugs are alcohol and nicotine.

Each year, the consumption of alcoholic beverages and nicotine-related products contributes to *far greater numbers of deaths* than the consumption of opioids, cocaine, and methamphetamine combined. Consequently, if we are to view the total picture of drug use and abuse in America today, we need to address issues that pertain to drugs that are *legally* sanctioned in our society as well as drugs that are not.

Chapters 8, 9, and 10 will examine the range of issues surrounding alcohol and nicotine consumption in detail. Meanwhile, here are some brief facts about the impact of alcohol and nicotine as we enter the third decade of the twenty-first century:

- Each year, approximately 95,000 Americans die of some form of alcohol-related disease. More than 14 million Americans meet the diagnostic criteria for having an alcohol use disorder (see Chapter 9). More than seven million children in the United States live at home with at least one parent who has an alcohol problem. In 2020, approximately one in five Americans (22 percent) over the age of twelve reported having engaged in binge alcohol drinking (as defined for men consuming five drinks or for women consuming four drinks on a single occasion at least once in the past month). Approximately one in sixteen Americans (6 percent) over the age of twelve and one in twelve (8 percent) between the ages of eighteen and twenty-five reported heavy alcohol drinking (as defined by binge drinking on five or more days in the past month). Despite all U.S. states prohibiting underage drinking, approximately one in five individuals (19 percent) aged twelve to twenty reported alcohol

use in the past month. Among young adults nationwide, binge drinking continues to be a major problem and a significant factor in cases of rape, assault, and other forms of violent behavior (see Chapter 8).[2]

- As a major component of the tobacco plant, the consumption of nicotine accounts for the dependence-producing consequences of tobacco use. Along with the ingestion of tars and carbon monoxide, nicotine consumption is responsible for the significant health hazards attributed to tobacco smoking. More than 480,000 American lives are lost each year, a number equivalent to the demise of an entire population of a midsize U.S. city, due to tobacco-related diseases such as lung cancer, heart disease, and other disorders. The number of deaths includes more than 41,000 deaths that have resulted from involuntary exposure to secondhand smoke. Worldwide, more than five million people die each year from tobacco-related diseases, with projections expected to escalate to eight million by 2030. On the one hand, the rate of cigarette smoking among secondary school students has continued to decline over the past ten years or so. In 2020, only one in fifty high school seniors reported smoking cigarettes on a daily basis. On the other hand, the prevalence rate of ingesting nicotine alone through the practice of nicotine vaping has increased dramatically (see Chapter 10). In 2020, one in four twelfth graders, one in five tenth graders, and one in ten eighth graders reported nicotine vaping *in the past month*. Historically, more than 80 percent of adult smokers have reported that they had smoked their first cigarette (and consequently became introduced to nicotine) prior to the age of eighteen. Consequently, there is considerable concern that nicotine vaping among adolescents has initiated a level of nicotine dependence with the potential for continuance into adulthood.[3]

Adding to the multitude of problems surrounding drug abuse has been the diversion of prescribed opioid medications for pain control. Consumption levels of opioid medications such as morphine and oxycodone in the United States have declined sharply from the peak year of 2011 when it became clear that the availability of opioid medications for pain control could lead to drug diversion and abuse. Yet the United States continues to lead the rest of the world by far in this respect. In 2015, for example, Americans consumed about 194 milligrams of oxycodone (a powerful opioid medication), more than eighteen times the consumption rate in the rest of the world. In the same year, Americans consumed about 61 milligrams of morphine per capita, more than twelve times the consumption rate in the rest of the world.[4] The role of overprescribed opioid pain medications in fostering the current opioid abuse epidemic will be discussed in Chapter 4.

Joshua Coleman on Unsplash

Nonmedical use of legally sanctioned prescription medications represents a major element in the overall substance abuse problem in America.

On a personal level, it is clear that the decision to use drugs, whether legally sanctioned or not, is one of life's choices for individuals at all segments of present-day society. The availability of drugs and the consequences of drug-taking behavior can be seen in the workplace and retirement communities as well as on street corners, in school yards, and on college campuses. Drug-taking behavior is going on in every community, large or small. The social and personal problems extend in one way or another to men and women of all ages, ethnic and racial groups, geographic regions, and socioeconomic levels. None of us should believe ourselves to be exempt.[5]

The overall goal of *Drugs, Behavior, and Modern Society* is to present the basic facts and issues concerning the wide range of drugs and the many forms of drug-taking behavior in our society today. The focus will be exclusively on **psychoactive drugs**, defined as those specific chemical substances that alter our feelings, our thoughts, our perceptions of the world, and our behavior. These specific drugs have the ability to alter the functioning of the brain and hence produce changes in our behavior and experience.

1.1 Understanding Drug-Taking Behavior and Society

1.1 Review the two basic ways of looking at the relationship between drug-taking behavior and society.

We begin with two important questions about the complex interplay of drug-taking behavior and society itself.

First of all, *what is the impact of our society on drug-taking behavior?*

There are a number of societal influences, referred to as sociological risk factors, arising from our present-day culture and our everyday surroundings that increase

the likelihood of certain undesirable forms of drug-taking behavior. In many cases, risk factors arise from psychological and sociological influences in combination. For example, drug use can be considered, at least in part, as a consequence of how we feel about ourselves in relation to our family, to our friends and acquaintances, to our life experiences, and to the community in which we live. Misleading or unsubstantiated information gained through social media and other sources might figure into our decision to use certain drugs. Significant risk factors also arise from biological features in one's own genetic history. In many cases, a genetic predisposition toward drug use interacts with psychological and sociological risk factors in our lives.

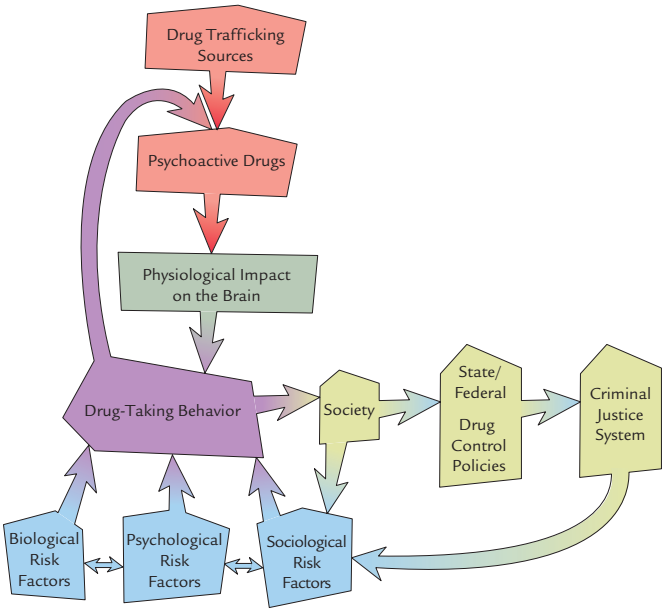
In the end, biological, psychological, and sociological factors that influence drug-taking behavior are not easily teased apart. It is for that reason that we consider a **biopsychosocial model** as a way of understanding the full range of motivating circumstances that might exist (Figure 1.1). We will see the importance of considering the biopsychosocial model of drug-taking behavior in the development of effective programs for drug-abuse prevention and treatment (see Chapters 16 and 17).

Second, we can ask the question in reverse: *What is the impact of drug-taking behavior on society? Specifically, what are the consequences of drug-related violence and crime as well as other forms of antisocial behavior?*

As a nation, we have over the years established drug-control policies at the federal, state, and local levels (Chapter 2) in an effort to mitigate the negative impact of drug-taking behavior on individuals and society at large. At the federal level, the Drug Enforcement Administration (DEA), an agency in the U.S. Department of Justice, has the principal responsibility for the control of international and domestic drug trafficking and the enforcement of federal drug laws.

It is possible, however, that efforts to reduce the negative impact of drug-taking behavior can end up accomplishing the exact opposite. As shown in Figure 1.1, the implementation of certain drug-control policies can become sociological risk factors. It has been argued that through the criminalization of certain forms of drug-taking behavior, prevalence rates have *risen* rather than *declined* (see Chapter 2). In other words, the criminal justice system itself can function as a behavioral "feedback loop" that *increases* rather than *reduces* the incidence of drug-taking behavior. The impact of the criminal justice system on drug-taking behavior in America will be discussed in Chapter 2.

Figure 1.1 Understanding the interplay of drug-taking behavior and society



1.2 Definitions and Distinctions

1.2 Discuss the definitions and distinctions that are made in describing drugs and forms of drug use

Whichever way we look at the relationship between drug-taking behavior and society, the fact remains that drugs have a profound impact on our daily lives—all the more reason to be clear on the meanings of the terms we use. This section covers the principal definitions and distinctions among terms that will form the basis for understanding drugs, behavior, and society.

1.2.1 What Is a Drug?

It seems as if it should be relatively easy to define what we mean by the word **drug**.

Minimally, there should be a set of criteria that can be used to distinguish a "drug" from a "nondrug." Unfortunately, it is more challenging than we might expect it to be.

The standard approach is to characterize a drug as *a chemical substance that, when taken into the body, alters the structure or functioning of the body in some way.* In doing so, we are accounting for examples such as medications used for the treatment of physical and mental disorders as well as alcohol, nicotine, and the typical street drugs. Unfortunately,

this broad definition also could refer to ordinary food and water. Because it does not make much sense for nutrients to be considered drugs, we need to refine our definition, adding the phrase *excluding those nutrients considered to be related to normal functioning*.[6]

Even with this qualification, however, we may be on slippery ground. It is true that we have now effectively eliminated the cheese in your next pizza from consideration as a drug, but what about some exotic ingredient in the sauce? Sugar is safely excluded, even though it has significant energizing and therefore behavioral effects on us, but what about the cayenne pepper that burns your tongue? Where do we draw the line between a drug and a nondrug in this case? Health Line 1.1 provides some interesting examples of certain foods that have "drug-like" effects on the body.

Health Line 1.1

Defining Drugs: Olive Oil, Curry Powder, and a Little Grapefruit?

An ever-increasing number of reminders about the blurriness of the distinction between drugs and nondrugs come from research on the chemical properties of specific foods we eat on a daily basis. For example, in 2005 it was found that freshly pressed olive oil contains large amounts of oleocanthal, a compound that inhibits the activity of cyclooxygenase enzymes in exactly the same way as ibuprofen, a popular nonsteroidal anti-inflammatory medication (see Chapter 14). Essentially, olive oil reduces inflammation in the body in a drug-like manner. By this definition, olive oil could be classified as a drug.

This discovery provides a biochemical clue to understanding the well-documented but somewhat puzzling health benefits of a Mediterranean (olive oil–based) diet, which has been documented as leading to a lower risk of cancer, heart disease, and other chronic disorders despite the heavy emphasis on dietary fat and salt. Recent research has indicated that this specific diet may also lower the risk of clinical depression.

Another example is the spice turmeric, used commonly in commercial curry powders as well as adding the bright yellow color in many mustards. The active ingredient of turmeric, called *curcumin*, has been credited with several medicinal benefits. Curcumin apparently has antioxidant, anti-inflammatory, antiviral, antibacterial, and antifungal properties with potential benefits in the treatment of cancer, diabetes, arthritis, Alzheimer's disease, and other chronic disorders. In 2005 alone, nearly 300 technical and scientific papers cited the drug-like activity of curcumin—three times the number reported in 2000. If the regulatory hurdles established by the U.S. Food and Drug Administration with respect to long-term safety can be overcome, curcumin could provide an inexpensive alternative to several currently available prescription drugs.

Still another example is grapefruit. A common flavonoid called *naringenin*, found in grapefruit, has a specific inhibitory effect on the secretion of the hepatitis C virus from infected liver cells. Nontoxic amounts of naringenin reduced hepatitis C virus secretion by as much as 80 percent. People taking certain prescription medications must be careful if they are eating grapefruit at the same time. The interaction effects from the consumption of various foods and drugs will be covered in Chapter 3.

As we continue to learn more about the therapeutic or drug-interacting effects of common foods and spices, the customary exclusion of nutrients in the definition of drugs becomes increasingly problematic. In the future, we might be hearing people say that they are taking olive oil, curry powder, or a little grapefruit extract for "medicinal reasons."

SOURCES: Beauchamp, G. K., Keast, R. S. J., More, D., Lin, J., Pika, J., Han, Q., Lee, C. H., Smith, A. B., and Breslin, P. A. S. (2005). Phytochemistry: Ibuprofen-like activity in extra-virgin olive oil. *Nature*, 437, 45–46. Hampton, T. (2008, April 2). Grapefruit compound battles hepatitis C. *Journal of the American Medical Association*, 1532. Sanchez-Villegas, A., Delgado-Rodriguez, M., Alonso, A., Schlatter, J., et al. (2009). Association of the Mediterranean dietary pattern with the incidence of depression. *Archives of General Psychiatry*, 66, 1090–1098. Stix, G. (2007, February). Spice healer. *Scientific American*, pp. 66–69.

Two major lessons can be learned from the difficulties we have in arriving at this seemingly simple task. The first lesson is that there is probably no perfect definition that would distinguish a "drug" from a "nondrug" without leaving a number of cases that fall within some kind of gray area. The best we can do is to set up a definition, as we have done, that handles *most* of the substances we are likely to encounter.

The second lesson is more subtle but with far-reaching implications. We tend to draw a distinction between drugs and nondrugs not in terms of physical or physiological characteristics but rather in terms of whether the substance in question *was intended to be used primarily as a way of inducing a bodily or psychological change*. By this reasoning, if the pizza maker intended to put that spice in the pizza to make it taste better, the spice would not be considered a drug; it would simply be another ingredient in the recipe. If the pizza maker intended the spice to intoxicate you, raise your blood pressure, or quicken your heart rate, then it could possibly be considered a drug. In other words, the designation of a chemical substance as a drug cannot be made without considering *how it might be used*.

Ultimately, the problem is that we are trying to reach a consensus on a definition that fits our intuitive sense of what constitutes a drug. We may find it difficult to define pornography, for example, but (as has been said in the halls of the U.S. Supreme Court) we know it when we see it. It may be the same with drugs. Whether we realize it or not, when we discuss the topic of drugs and drug-taking

behavior, we are operating within a context of social and cultural values, a group of shared attitudes about what kind of behavior (that is, what kind of drug-taking behavior) is acceptable and what kind is not. These values and attitudes have manifested themselves over the years in the form of social legislation and enforcement through a criminal justice system, designed for the purpose of regulating the use of specific drugs and specific forms of drug-taking behavior (see Chapter 2).

1.2.2 Instrumental Drug Use versus Recreational Drug Use

What could be the intent or motivation of the drug user with respect to this kind of behavior? Based upon the intent of the individual, drug use can be categorized as either instrumental or recreational.[7]

By **instrumental use**, we mean that a person is taking a drug with a specific socially approved goal in mind. The user may want to stay awake longer, fall asleep more quickly, or recover from an illness or its aftereffects. If you are a medical professional on call over a long period of time, taking a drug with the goal of staying alert is considered acceptable by most people as long as the drug does not interfere with one's duties. Recovery from an illness and achieving some reduction in pain are goals that are unquestioned. In these cases, drug-taking behavior occurs *as a means toward an end that has been defined by our society as legitimate*.

The instrumental use of drugs can involve prescription and nonprescription (over-the-counter, abbreviated OTC) drugs that are obtained and taken for a particular medical purpose. Examples include an antidepressant prescribed for depression, a cold remedy for a cold, an anticonvulsant drug to control epileptic seizures, or insulin to maintain the health of a person with diabetes.

In contrast, **recreational use** means that a person is taking the drug not as a means toward a socially approved goal but for the purposes of acquiring the effects of the drug itself. The motivation, generally speaking, is to experience a pleasurable feeling or achieve a positive state of mind. *Whatever happens as a consequence of recreational drug-taking behavior is viewed not as a means to an end but as an end onto itself.* Smoking tobacco is a form of recreational drug-taking behavior as is involvement with street drugs, in that the goal in both cases is to alter one's mood or state of consciousness.

This seems simple enough, but there will be instances in which the distinction is less than clear. Drinking an alcoholic beverage, for example, is considered as recreational drug-taking behavior under most circumstances, but when moderate amounts are recommended by a physician for a specific therapeutic or preventive purpose (see Chapter 8), alcohol drinking might be considered instrumental in nature. You can see that whether drug use is judged to be recreational or instrumental is determined in no small part by the circumstances under which the behavior takes place. As we will see, social attitudes toward forms of drug-taking behavior have had a significant impact on the establishment of drug-control policies and drug-control laws.

1.2.3 Illicit (Illegal) versus Licit (Legal) Drugs

Psychoactive drugs that traditionally receive the greatest amount of attention are the ones officially defined in the United States as **illicit (illegal) drugs**. By definition, criminal penalties are imposed on their possession, manufacture, or sale, according to federal and/or state-level statutes. The best-known examples of illicit drugs are heroin, cocaine, and (except in some U.S. states) marijuana as well as "club drugs" such as methamphetamine (meth), Ecstasy, LSD, PCP, ketamine (when used for nonmedical purposes), and GHB. Other equally important psychoactive substances are **licit (legal) drugs**, such as alcohol, nicotine in tobacco products, caffeine, and prescription medicines used to treat a wide range of mental disorders. In the cases of alcohol and nicotine in tobacco products, legal access carries a minimum-age requirement. In the case of prescription medicines, legal access requires approval by a licensed health care professional. In the case of caffeine, there are no restrictions at all to its legal access.

The designation of a specific drug as being either illicit (illegal) or licit (legal) depends upon the society or community within which legality is defined. In short, the legal status of a form of drug-taking behavior is established on the basis of historical, cultural, and sometimes religious decisions rather than on the physical properties of the drug itself. Tobacco, for example, has deeply rooted associations in American history, dating to precolonial days. Although tobacco use is objectionable to many individuals and harmful to the health of the smoker and others, tobacco remains a legal commodity, though presently under federal regulations.

Alcohol is another example in that its legality depends on the society in which alcohol is consumed. Except for a period between 1920 and 1933 known as the Prohibition Era, alcohol has been a drug with legal status in the United States within the bounds of the law despite the fact that alcohol consumption can be harmful to individuals who become inebriated, potentially harmful to others who may be impacted by the drinker's drunken behavior, and harmful to one's health when consumed on a chronic basis (see Chapters 8 and 9). Elsewhere in the world, the legality of a drug or class of drugs is determined on the basis of religious attitudes in a particular society. A prominent example is the illegality of alcohol consumption in nations where the legal system has incorporated the teachings of the Islamic religion.

In the United States, the legal or illegal status of marijuana is complicated by two important considerations. The first is the specific region within the United States having jurisdictional authority over marijuana use. On a federal level, marijuana use continues to be officially designated as an illegal act, while in an increasing number of U.S. states it is not. The issues surrounding the present-day jurisdictional conflict between the federal government and U.S. states with respect to marijuana use will be examined in Chapter 7.

The second consideration has to do with the *circumstances of marijuana use*—that is, whether marijuana is used for recreational or instrumental purposes. An increasing number of U.S. states have currently legalized recreational marijuana use by adults. Where recreational marijuana use remains illegal, penalties for violations have been reduced (decriminalized) to relatively minor levels (such as a fine). Finally, dozens of U.S. states have legalized instrumental marijuana use for specific medical purposes (referred to as *medical marijuana)*.

As of 2021, the legal status of marijuana use in the United States can be summarized as follows:

- A total of eighteen states (Alaska, Arizona, California, Colorado, Connecticut, Illinois, Maine, Massachusetts, Michigan, Montana, Nevada, New Jersey, New Mexico, New York, Oregon, Vermont, Virginia, and Washington) as well as the District of Columbia have legalized *recreational marijuana use* for individuals 21 years or older. Generally speaking, marijuana smoking in public spaces remains prohibited, and commercial marijuana growers and commercial dispensaries (retail stores selling marijuana) are required to obtain state-issued licenses to operate on a legal basis. In some instances, local communities within those states that have legalized recreational marijuana use are permitted to retain the right to prohibit, if they choose, marijuana dispensaries or marijuana use in general within their jurisdictions.
- A majority among the fifty U.S. states have either decriminalized recreational marijuana use or legalized it within their jurisdictions.
- In a relatively short period of time, the status of medical marijuana in the United States has changed dramatically, with present availability in about three-fourths of all U.S states.

1.2.4 Misuse, Abuse, and Dependence

Distinctions also need to be made with regard to the terms we use in describing the *long-time* consequences of drug-taking behavior. These consequences fall into three categories: drug misuse, drug abuse, and drug dependence.

Drug misuse typically applies to cases in which a drug is used with an instrumental goal in mind but in an inappropriate manner. For example, drug doses may be increased beyond the level recommended for its use in the mistaken idea that if a little is good, more is even better. Or doses may be decreased from the level recommended for its use with the intention of saving money by making the drug supply last longer. Prescription drugs may be continued longer than they were intended to be used or combined with some other drug. In the case of alcohol misuse, the social or celebratory occasions of alcohol drinking may develop into a state of intoxication that can lead to inappropriate behaviors that are harmful to the drinker or to others.

Drug misuse of prescription or nonprescription drugs can be dangerous and potentially lethal, particularly when alcohol is combined with medications that depress the nervous system. Drugs with this property include antihistamines, antianxiety medications, and sleeping medications. Even if alcohol is not involved, however, drug combinations still represent serious health risks, particularly for the elderly, who often take many individual medications. This population is especially vulnerable to the hazards of drug misuse.

In contrast, **drug abuse** is typically applied to cases in which a licit or illicit drug is used in ways that produce some form of physical, mental, or social impairment. The primary motivation for individuals involved in drug abuse is recreational. Drugs with abuse potential include not only the common street drugs but also legally available psychoactive substances, such as caffeine and nicotine (stimulants), alcohol, sedatives, and inhaled solvents (depressants), and a number of prescription or OTC medications designated for medical purposes but used by some individuals exclusively on a recreational basis. In Chapter 4, we will examine significant concerns about the abuse of prescription pain medications, such as Vicodin, Percocet, and OxyContin (see Drugs . . . in Focus 1.1).

Drugs . . . in Focus 1.1

Understanding Drug Names

The names we give to specific drugs can range from a tongue-twisting generic or pharmaceutical name to a catchy commercial or brand name used for marketing purposes to one of many often-colorful and ever-changing street slang terms used by the drug-using community. It is important to keep straight the different circumstances in which a drug name is used. We will focus on four major categories: brand names, generic names, natural-product names, and street names.

- **Brand names**
  Once a pharmaceutical manufacturer receives governmental approval for marketing a newly developed drug, it is given exclusive rights, referred to as a *drug patent*, to create a specific brand name identifying the drug that is being sold. The drug patent is granted for a fixed period of twenty years, beginning from the first year of an arduous multistage FDA approval process (see Chapter 14). During this time, the brand name becomes a registered trademark that cannot be used by any other manufacturer for the life of the patent. As examples, while under patent, the drug Januvia, developed for the treatment of Type 2 diabetes mellitus, was marketed under that brand name by AstraZeneca Pharmaceuticals, and the cholesterol-lowering drug Crestor was marketed under that brand name by Merck & Co., Inc. Unfortunately, there are so many patented drugs and brand names for drugs currently in the marketplace that chances are relatively good that two or more entirely different-acting medications might have similar-looking names and therefore become easily confused with each other (see Health Alert 14.1). The letter "Z" seems to be particularly attractive for advertising purposes. Consider the following medications: Zyrtec (for allergy relief), Zocor (for elevated cholesterol), Zofran (for nausea and vomiting), and Zoloft (for depression**)**. The letter "X" is also popular and sometimes combined with "Z" (as in the antihistamine Xyzal). The theory seems to be that certain letters or letter-combinations that are seldom used in ordinary words will make a brand name more noticeable and better remembered by the consumer.
- **Generic names**
  Every pharmaceutical drug has a generic name as well. Doctors and other designated health care professionals will often write prescriptions for a specific drug using its generic name (even if the patent has not yet expired) rather than its brand name since it is considerably less expensive. Once a drug patent has expired, a drug formerly available under its brand name becomes available under its generic name, sometimes alongside its brand name equivalent. For example, the nonprescription analgesic drug Tylenol is marketed by McNeil Consumer HealthCare in North America and its "sibling" Panadol is marketed by GlaxoKlineSmith in the United Kingdom and other countries outside North America. Since the patents have long since expired, they are also marketed as generic drugs under their generic names, acetaminophen and paracetamol (para-acetylaminophenol), respectively. Illicit drugs are referred to by federal and state authorities by their generic names unless they are botanical products (see later). Examples are cocaine hydrochloride, heroin, dextroamphetamine, methamphetamine, lysergic acid diethylamide (LSD), and phencyclidine.
- **Natural-product names**
  In some cases, drug names refer to (1) plants from which the drugs originate (examples: marijuana, opium, coca, amanita mushrooms); (2) chemical entities isolated directly from plants (examples: morphine and codeine from opium poppies, cocaine hydrochloride from the coca plant, THC from marijuana, psilocybin from psilocybe mushrooms, mescaline from peyote cactus); or (3) chemical entities derived directly or indirectly from plants through a specific chemical process (examples: drinkable alcohol created from the fermentation of grains, free-base cocaine and crack cocaine created from a chemical modification of cocaine hydrochloride).
- **Street names**
  Street names refer to slang terms generated by a subculture of drug users for a particular illicit drug or combination of illicit drugs. Any listing of street names is bound to be incomplete, as the slang names are constantly changing. Nonetheless, some street names have been around for a long time. Examples are "speed" for methamphetamine; "smack" for white heroin; "black tar" for Mexican heroin; "speedball" for a combination of heroin and cocaine; "grass," "weed," and "pot" for marijuana; and "coke" for cocaine.

The term **drug dependence** is typically applied to circumstances that extend beyond the consequences of drug abuse. These circumstances include more intense drug experiences on the part of the user, such as feelings of intense craving for the drug and preoccupation in obtaining it as well as tendencies to increase the amount of the drug when repeated administrations produce a diminished effect (drug tolerance) and display withdrawal symptoms when drug use has stopped.

It is important to note that in many instances when making a determination of misuse, abuse, or dependence as problematic aspects of drug-taking behavior, judgments cannot be easily made or implied as to the motivation of the individual involved or the consequences that may result. On these occasions, it will be appropriate to refer to the drug-taking behavior as simply *drug use.*

Health Alert 1.1

Drug Abuse and the College Student: A Self-Assessment

A cutoff score of five or more "yes" responses to the following twenty-five questions in the following Rutgers Collegiate Substance Abuse Screening Test (RCSAST) has been found effective in correctly classifying 94 percent of young adults in a clinical sample as problem users and 89 percent of control individuals as nonproblem users, according to a research study conducted at Rutgers University.

It is important to understand that the RCSAST does not by itself determine the presence of problems related to substance abuse or dependence (see Chapter 2). The RCSAST has been designed as one part of a larger assessment battery aimed at identifying which young adults experience problems due to substance use and specifically what types of problems an individual may be experiencing.

Here are the RCSAST questions you may want to ask yourself:

1. Have you gotten into financial trouble as a result of drinking or other drug use?
2. Is alcohol or other drug use making your college life unhappy?
3. Do you use alcohol or other drugs because you are shy with other people?
4. Has drinking alcohol or using other drugs ever caused conflicts with close friends of the opposite sex?
5. Has drinking alcohol or using other drugs ever caused conflicts with close friends of the same sex?
6. Has drinking alcohol or using other drugs ever damaged other friendships?
7. Has drinking alcohol or using other drugs ever been behind your losing a job (or the direct reason for it)?
8. Do you lose time from school due to drinking and/or other drug use?
9. Has drinking alcohol or using other drugs ever interfered with your preparations for exams?
10. Has your efficiency decreased since drinking and/or using other drugs?
11. Do you drink alcohol or use other drugs to escape from worries or troubles?
12. Is your drinking and/or using other drugs jeopardizing your academic performance?
13. Do you drink or use other drugs to build up your self-confidence?
14. Has your ambition decreased since drinking and/or drug using?
15. Does drinking or using other drugs cause you to have difficulty sleeping?
16. Have you ever felt remorse after drinking and/or using other drugs?
17. Do you drink or use drugs alone?
18. Do you crave a drink or other drug at a definite time daily?
19. Do you want a drink or other drug the next morning?
20. Have you ever had a complete or partial loss of memory as a result of drinking or using other drugs?
21. Is drinking or using other drugs affecting your reputation?
22. Does your drinking and/or using other drugs make you careless of your family's welfare?
23. Do you seek out drinking/drugging companions and drinking/drugging environments?
24. Has your physician ever treated you for drinking and/or other drug use?
25. Have you ever been to a hospital or institution on account of drinking or other drug use?

SOURCE: Bennett, M. E., McCrady, B. S., Frankenstein, W., Laitman, L. A., Van Horn, D. H. A., and Keller, D. S. (1993). Identifying young adult substance abusers: The Rutgers Collegiate Substance Abuse Screening Test. *Journal of Studies in Alcohol, 54,* 522–527. Reprinted with permission of the authors.

Journal Prompt

Distinguish between drug use, misuse, and abuse. Cite an example of each and explain how the example fits the criteria for inclusion in the three categories of drug-taking behavior.

1.2.5 Drug Abuse versus Substance Abuse

Because the general public often fails to recognize alcohol and nicotine as drugs (see Chapters 8 and 10), health care professionals and researchers have felt the need to substitute the word *substance* instead of *drug* in their terminology when referring to drug-related diagnoses and treatments. Consequently, problems of drug-taking behavior are referred to as consequences of substance misuse, substance abuse, or substance dependence, respectively.

In guidelines for the diagnosis and treatment of problems related to substance use, the American Psychiatric Association and associated health professional organizations draw upon specific behavioral criteria rather than the pharmacological features of the drugs involved or some inherent characteristic of the user. For example, the degree of impaired control that an individual has over their substance use is assessed by occasions in which a substance is taken in large amounts or over a longer period of time than the individual originally intended or by evidence of a persistent desire to cut down or regulate a pattern of substance use. In the most current guidelines adopted in 2013, referred to as the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition* (DSM-5), behavioral criteria that had formerly been used to designate conditions of substance abuse and substance dependence as separate entities in earlier versions of the guidelines are now combined (with some modification) into a single condition, referred to as *substance use disorder*. Under the general diagnosis of substance use disorder, problems associated with drug use are now considered along a continuum, ranging from relatively mild to severe. (See a more complete discussion of the DSM-5 on pages 23–24.)

Drugs . . . in Focus 1.2

On the Matter of "Addiction"

It should be noted that usage of the term *addiction* has been conspicuously absent in the text so far, which is consistent with the practice of health care professionals when making diagnostic judgments of an individual's drug-related problems. As we all know, *addiction* is a commonly used term to describe excessive drug-taking behavior as well as excessive behaviors of many types. The names of substance abuse treatment agencies and programs typically include the term *addiction* to describe the nature of their services, since people who require such services are more likely to readily understand what addiction means.

Nonetheless, it is important that we use terms like *addiction* and *addict*, but only with some degree of caution. While it is clear that individuals in these situations have little or no capability of stopping their behavior, the important question to ask is "Why is this happening?" Too often, labeling someone as a "drug addict" carries the implication that there has been a significant failure on the part of the individual in dealing effectively with their life. In other words, there has been a breakdown in one's ability to exert a degree of self-control. In a survey conducted in 2018, more than half of all Americans (53 percent) viewed opioid abuse as a medical problem that required treatment, but more than four out of ten considered it to be a result of a lack of willpower or discipline. One-third of those surveyed viewed opioid abuse as a character flaw, and fewer than one in five were willing to be associated with an opioid-abuse individual as a friend, coworker, or neighbor. In many instances, a significant stigma is attached to substance abusers.

Moreover, too often, there is an attitude that, under these circumstances, such problems can never be resolved (as implied in the expression "Once an addict, always an addict"). Feelings of shame and denial can reduce the likelihood that professional treatment will be sought (see Chapter 17). While the term *addiction* is commonly used in the research literature (see Chapter 3), the reference in that context is to a system of *neurochemical processes in the brain* that underlies substance-abuse problems. In this context, there are no judgments made with regard to the motivation or circumstances of the abuser.

SOURCES: Associated Press. (2018, April 6). Majority in U.S see addiction as disease, but stigma persists. *Newsday*, p. A34. The Center for Public Affairs Research (2018, April). Americans recognize the growing problem of opioid addiction. Chicago, IL: The Associated Press-NORC at the University of Chicago.

Before examining the major role that drugs play in our lives today, it is important to understand the issues in a historical context. This section reviews the history of drug-taking behavior and the changing attitudes we have held toward psychoactive drugs in general.

1.3 Drugs in Early Times

1.3 Review the origins and history of drugs and drug-taking behavior

Try to imagine the accidental circumstances under which a psychoactive drug might have been discovered. Thousands of years ago, perhaps a hundred thousand years ago, the process of discovery would have been as natural as eating, and the motivation as basic as simple curiosity. In cool climates, next to a cave dwelling may have grown a profusion of blue morning glories or brightly colored mushrooms, plants that produce hallucinogens similar to LSD. In desert regions, yellow-orange fruits grew on certain cacti, the source of the hallucinogenic drug peyote. Elsewhere, poppy plants, the source of opium, covered acres of open fields. Coca leaves, from which cocaine is made, grew on shrubs along the mountain valleys throughout Central and South America. The hardy cannabis plant, the source of marijuana, grew practically everywhere.

Some of this curiosity may have been sparked by observing the unusual behavior of animals as they fed on these plants. Within their own experience, people made the connection, somewhere along the line, between the chewing of willow bark (the source of modern-day aspirin) and the relief of a headache or between the eating of the senna plant (a natural laxative) and the relief of constipation.[8]

Of course, some of these plants made people sick, and many of them were poisonous and caused death. However, it is likely that the plants that had the strangest impact on humans were the ones that produced hallucinations. Having a sudden vision of something totally alien to everyday life must have been overwhelming, like a visit to another world. Individuals with prior knowledge about such plants, as well as about plants with therapeutic powers, would eventually acquire great power over others in the community.

The accumulation of knowledge about consciousness-altering substances would mark the beginning of **shamanism**, a practice among primitive societies, dating back by some estimates more than forty thousand years, in which an individual called a **shaman** acts as a healer through a combination of trances and plant-based medicines, usually in the context of a local religious rite. Shamans still function today in remote areas of the world, often alongside practitioners of modern medicine. As we will see in Chapter 6, hallucination-producing plants of various kinds play a major role in present-day shamanic healing.

With the development of centralized religions in Egyptian and Babylonian societies, the influence of shamanism gradually declined. The power to heal through one's knowledge of drugs passed into the hands of the priesthood, which placed greater emphasis on formal rituals and rules than on hallucinations and trances.

Victor Englebert/Science Source

In a wide range of world cultures throughout history, hallucinogens have been regarded as having deeply spiritual powers. Under the influence of drugs, this modern-day shaman communicates with the spiritual world.

The most dramatic testament to the development of priestly healing during this period is a 65-foot-long Egyptian scroll known as the **Ebers Papyrus**, named after a British Egyptologist who acquired it in 1872. This mammoth document, dating from 1500 B.C., contains more than eight hundred prescriptions for practically every ailment imaginable, including simple wasp stings and crocodile bites, baldness, constipation, headaches, enlarged prostate glands, sweaty feet, arthritis, inflammations of all types, heart disease, and cancer. More than a hundred of the preparations contained castor oil as a natural laxative; some contained "the berry of the poppy," which we now recognize as the Egyptian reference to opium. Other ingredients were quite bizarre: lizard's blood, the teeth of swine, the oil of worms, the hoof of an ass, putrid meat with fly specks, and crocodile dung (excrement of all types being highly favored for its ability to frighten off the evil spirits of disease).[9]

How successful were these strange remedies? It is impossible to know because no records were kept on what happened to the patients. Although some of the ingredients (such as opium and castor oil) had true medicinal value, much of the improvement from these concoctions may have been psychological rather than physiological. In other words, improvements in the patient's condition resulted from the patient's *belief* that they would be helped—a phenomenon known as the **placebo effect**. Psychological factors have played a critical role throughout the history of drugs. The importance of the placebo effect as an explanation of some drug effects will be examined in Chapter 3.

Along with substances that had genuine healing properties, some psychoactive drugs were put to less positive use. In the early Middle Ages, Viking warriors ate the mushroom *Amanita muscaria*, known as fly agaric, and experienced a tremendous increase in energy, which resulted in wild behavior in battle. They were called Berserkers because of the bear skins they wore, but this is the origin of the word *berserk* as a reference to reckless and violent behavior. At about the same time, witches operating on the periphery of European society created "witch's brews," mixtures made of various plants such as mandrake, henbane, and belladonna that produced strange hallucinations and a sensation of flying. The toads that they included in their recipes didn't hurt either: We know now that the sweat glands of certain toads contain a chemical related to dimethyltryptamine (DMT), a powerful hallucinogenic drug (see Chapter 6).[10]

1.4 Drugs in the Late Nineteenth Century

1.4 Discuss the extent of drug use in the nineteenth century.

By the end of the nineteenth century, the medical profession had made significant strides with respect to medicinal healing. Morphine was identified as the active ingredient in opium, a drug that had been in use for at least three thousand years and had become the physician's most reliable prescription for the control of pain due to disease and injury. The invention of the syringe made it possible to deliver the morphine directly and speedily into the bloodstream. Cocaine, having been extracted from coca leaves, was used as a stimulant and antidepressant. Sedative powers to calm the mind or induce sleep had been discovered in bromides and chloral hydrate.

There were also new drugs for specific purposes or diseases. Anesthetic drugs were discovered that made surgery painless for the first time in history. Some diseases could actually be prevented through the administration of vaccines, such as the vaccine against smallpox introduced

by Edward Jenner in 1796 and the vaccine against rabies introduced by Louis Pasteur in 1885. The discovery of new pharmaceutical products marked the modern era in the history of healing.[11]

The social picture of drug-taking behavior during this time, however, was more complicated. By the 1890s, prominent leaders in the medical profession and social reformers had begun to call attention to societal problems resulting from the widespread and uncontrolled access to psychoactive drugs. Remedies called **patent medicines**, sold through advertisements, peddlers, or general stores, contained opium, alcohol, and cocaine and were promoted as answers to virtually all common medical and nonmedical complaints.

Opium itself was cheap, easily available, and completely legal. Most people, from newborn infants to the elderly, in the United States and Europe "took opium" during their lives. The way in which they took it, however, was a critical social factor. The respectable way was to drink it, usually in a liquid form called *laudanum*. By contrast, the smoking of opium, as introduced by Chinese immigrants imported for manual labor in the American West, was considered degrading and immoral. Laws prohibiting opium smoking began to be enacted in 1875. Considering the tolerant attitude toward opium drinking, the strong emotional opposition to opium smoking may be viewed as more anti-Chinese than anti-opium (see Chapter 4).[12]

Like opium, cocaine was in widespread use and was taken quite casually in a variety of forms during this period. The original formula for Coca-Cola, as the name suggests, contained cocaine until 1903 (see Chapter 5), as did Dr. Agnew's Catarrh Powder, a popular remedy for chest colds. In the mid-1880s, Parke, Davis, and Company (since 2002, merged with Pfizer, Inc.) was selling cocaine and its botanical source, coca, in more than a dozen formulations, including coca-leaf cigarettes and cigars, cocaine inhalants, a coca cordial, and an injectable cocaine solution.[13]

Bettmann/Getty Images

Around 1900, heroin was advertised as a completely safe remedy for common ailments, along with aspirin. No one knows how many people became dependent on heroin as a result.

A Viennese doctor named Sigmund Freud, later to gain a greater reputation for his psychoanalytic theories than for his ideas concerning psychoactive drugs, promoted cocaine as a "magical drug." In an influential paper published in 1884, Freud recommended cocaine as a safe and effective treatment for morphine addiction. After a friend and colleague became heavily addicted to cocaine, however, Freud reversed his position regarding its safety, regretting for the rest of his life that he had been initially so enthusiastic in recommending its use (see Chapter 5).[14]

1.5 Drugs and Behavior in the Twentieth Century

1.5 Examine the growth of problems related to drug dependence in light of advancements in medicine

The twentieth century brought significant changes in the social context of drug-taking behavior. Due to important medical advancements, the treatment of major diseases and disorders could be achieved through instrumental drug use. At the same time, however, recreational drug use would present increasingly difficult social problems in the areas of public and personal health.

1.5.1 Drugs and Behavior in the First Half of the Twentieth Century

By 1900, the promise of medical advances in the area of drugs was beginning to be matched by concern about the dependence that some of these drugs could produce. For a short period of time after its introduction in 1898, heroin (a derivative of morphine) was completely legal and considered safe. Physicians were impressed with its effectiveness in the treatment of coughs, chest pains, and the respiratory difficulties associated with pneumonia and tuberculosis. This was an era in which antibiotic drugs were unavailable, and pneumonia and tuberculosis were among the leading causes of death.[15]

Some physicians even recommended heroin as a treatment for morphine addiction. Its powerful addictive properties, however, soon became evident. The enactment of laws restricting access to heroin and certain other psychoactive drugs, including marijuana, would eventually follow in later years, a topic discussed further in Chapter 2.

At the beginning of the twentieth century, neither the general public nor the government considered alcohol as a drug. Nonetheless, the American temperance movement

dedicated to the prohibition of alcohol consumption, led by the Women's Christian Temperance Union and the Anti-Saloon League, was a formidable political force. In 1920, the Eighteenth Amendment to the U.S. Constitution took effect, ushering in the era of National Prohibition, which lasted for thirteen years.

Although successful in substantially reducing the rates of alcohol consumption in the United States as well as the number of deaths from alcohol-related diseases, Prohibition also succeeded in establishing a nationwide alcohol distribution network dominated by sophisticated criminal organizations.[16] Violent gang wars arose in major American cities as one group battled another for control over the liquor trade.

By the early 1930s, whatever desirable health-related effects Prohibition may have brought were perceived to be overshadowed by the undesirable social changes that had come along with it. Since its end in 1933, the social problems associated with the era of Prohibition have often been cited as an argument against the continuing restriction of psychoactive drugs in general.

1.5.2 Drugs and Behavior from 1945 to 1960

In the years following World War II, for the first time, physicians were able to control bacteria-borne infectious diseases through the administration of antibiotic drugs. Although *penicillin* had been discovered in a particular species of mold by Alexander Fleming in 1928, techniques for extracting large amounts from the mold were not perfected until the 1940s. During that time, Selman Waksman found that a species of fungus had powerful antibacterial effects; it was later to be the source of the drug *streptomycin*.

In the field of psychiatry, advances in therapeutic drugs did not occur until the early 1950s, when quite accidentally a group of psychoactive drugs were discovered that relieved schizophrenic symptoms without producing heavy sedation. The first of these, **chlorpromazine** (brand name: Thorazine), reduced the hallucinations, agitation, and disordered thinking common to schizophrenia. Soon after, there was a torrent of new drugs, forming the basis not only for the treatment of schizophrenia but also the treatment of mental illness in general. It was a revolution in psychiatric care, equivalent to the impact of antibiotics in medical care a decade earlier.

With regard to the recreational drug scene in post–World War II America, a number of features stand out. Smoking was considered romantic and sexy, and cigarette smoking was commonplace. In 1955, regular cigarette smoking involved more than half of all male adults and more than one-quarter of all female adults in the United States. It was the era of the two-martini lunch; social drinking was at the height of its popularity and acceptance. Cocktail parties dominated the social scene. There was little or no public awareness that alcohol or tobacco use constituted drug-taking behavior. In contrast, the general perception regarding certain drugs such as heroin, marijuana, and cocaine was simple and negative: They were considered bad, they were illegal, and "no one you knew" had anything to do with them. Illicit drugs were regarded as the province of criminals, the urban poor, and nonwhites.[17] The point is that an entire category of drugs was, during this period, outside the mainstream of American life. Furthermore, an atmosphere of fear and suspicion surrounded people who took such drugs. For the vast majority of Americans, illicit drugs were not considered an issue in their personal lives.

1.5.3 Drugs and Drug-Taking Behavior: From the Sixties to the Nineties

During the 1960s, basic premises of American life—the beliefs that working hard and living a good life would bring happiness and that society was stable and calm—were being undermined by disturbing events: President John F. Kennedy was assassinated in 1963; Dr. Martin Luther King Jr. and Senator Robert Kennedy were gunned down in 1968. We worried about the continuing Cold War, nuclear annihilation, and the war in Vietnam.

College students, in particular, found it difficult to be as optimistic about the future as their parents had been. To many of them, the reality of the Vietnam War represented all that had gone wrong with the previous generation.[18] At the same time, many young people were searching for new answers to old problems, and their search led to experimentation with drugs that their parents had been taught to fear. The principal symbol of this era of defiance against the established order, and indeed against anyone over thirty years old, was marijuana. No longer would marijuana be something foreign to middle-class America. Along with other drugs such as LSD, stimulants ("uppers"), and depressants ("downers"), marijuana became part of the lives of sons and daughters in our own families and in our own neighborhoods. Adding to the turbulence of this period was a disturbing increase in heroin abuse across the country. The issues surrounding drug abuse, once a problem associated with ethnic minority populations, inner cities, and the poor, were now too close to our personal lives for most of us to ignore.

Heroin abuse was on the rise even for Americans outside the United States. Reports surfaced that gave estimates of up to 15 percent in the prevalence rate of heroin abuse among American troops in Vietnam. The possibility that large numbers of soldiers returning to the United States

Clayton Call/Redferns/Getty Images

The famous Woodstock Festival concert drew an estimated 500,000 people to a farm in upstate New York in the summer of 1969. According to historian David Musto, the peacefulness of such a gigantic gathering is considered to have been due at least in part to the widespread use of marijuana as opposed to alcohol.

would exacerbate the situation created great anxiety. Fortunately, this possibility did not materialize. Nonetheless, the mood of the country was toward greater aggressive action toward illicit drugs. Under President Richard Nixon, elected in 1968 on a platform of law and order, illicit drug use became a major political issue. He declared a "total war on drugs," ordering his senior staff to make the reduction of drug abuse one of its top priorities. The term *war on drugs* stuck and has been with us to various degrees ever since. In 1970, the Nixon administration persuaded Congress to pass the Comprehensive Drug Abuse Prevention and Control Act, popularly known as the "Controlled Substances Act." The act was passed to consolidate the large number of diverse and overlapping drug laws as well as the duplication of efforts by several different federal agencies. The act established five schedules for the classification of drugs based on their approved medical uses, potential for abuse, and potential for producing dependence. As a result of the 1970 Controlled Substances Act, the control of drugs was placed under federal jurisdiction regardless of state regulations. The 1970 act also shifted the administration of drug enforcement from the Treasury Department to the Justice Department, creating the Drug Enforcement Administration (DEA). The DEA was given control over all drug-enforcement responsibilities, except those related to ports of entry and borders, which were given to the U.S. Customs Service (now renamed the U.S. Customs and Border Patrol). DEA agents were to conduct drug investigation, collect intelligence about general trends in drug trafficking and drug production, and coordinate efforts among federal, state, and local law enforcement agencies.

In addition to the emphasis on the control of drug-taking behavior during the 1970s, there was also a significant effort toward understanding the ways drugs affect the functioning of the brain. The government began to finance basic brain research that was related to drug-taking behavior. The timing could not have been better because during the 1970s, a new branch of science, called **neuroscience**, was being established, with the intent on bringing together researchers from formerly separate scientific fields in a new collaborative effort to understand the relationship between brain functioning and human behavior. In the area of drug research, pharmacologists (those who specialize in the study of drugs) were joined by biochemists, psychologists, and psychiatrists, among others. One of the important discoveries that emerged from this era was the identification of receptors in the brain that are tailored specifically to respond to drugs taken into the body. The findings of neuroscience research relevant to understanding drug-taking behavior will be discussed in Chapter 3 and in several of the chapters that follow.

With the decade of the 1980s came significant changes in the mood of the country, dominated by a general reaction to social and political attitudes of earlier decades. The focus of media attention was now on the image of the "yuppie," a young, upwardly mobile professional, instead of the "hippie." The political climate grew more conservative in all age groups. In the area of illicit drugs, concerns about heroin dependence were being overshadowed by a new fixation on cocaine. At first, cocaine took on an aura of glamor, and (because it was so expensive) cocaine became a symbol of material success. The media spotlight shone on a steady stream of celebrities in entertainment and sports who used cocaine. Not long after, however, the very same celebrities who had accepted cocaine into their lives were experiencing the dark consequences; many were in rehabilitation programs, and some had died from cocaine overdoses.

Making matters worse, a smokable and cheap form of cocaine called *crack* succeeded in extending the problems of cocaine dependence to the inner cities of the United States, to segments of American society that did not have the financial resources to afford cocaine itself. In the glare of intense media attention, crack dependence soon took on all the aspects of a national nightmare. Fortunately, by the end of the 1990s, the extent of crack abuse had greatly diminished, and the urban violence and social upheaval associated with it had declined, only to be replaced with a rise in methamphetamine (meth) abuse. Unlike the case of crack cocaine abuse, individuals engaging in meth abuse were concentrated in nonurban regions of the country (see Chapter 5).[19]

Quick Concept Check 1.1

Understanding the History of Drugs and Behavior

Check your understanding of the changes in drug-taking behavior over history by matching the statement (on the left) with the appropriate historical period (on the right).

1. Opium and castor oil are first documented as therapeutic drugs.	a. approximately 1500 B.C.
2. Marijuana use symbolizes a generation's defiance of establishment values.	b. late 1700s to late 1880s
3. Waksman discovers the anti-bacterial effects of streptomycin.	c. late 1800s
4. Opium use extends to all levels of Western society.	d. late 1940s
5. Cocaine use is at its peak as a symbol of glamor and material success.	e. mid-1950s
6. Heroin is first introduced as a treatment for morphine addiction.	f. late 1960s to early 1970s
7. Widespread use of anti-schizophrenic drugs in mental hospitals begins.	g. early 1980s
8. Vaccines against smallpox and rabies are introduced.	

Answers: 1. a 2. f 3. d 4. b 5. g 6. c 7. e 8. b

1.5.4 Global Politics and National Security: 2001–Present

After the events of September 11, 2001, the war on terrorism became a dominant concern. As a response, President George W. Bush combined programs aimed at drug-abuse control with programs aimed at enhancing national security. In effect, the war on drugs became intertwined with the war against terrorism in one all-encompassing policy. Foreign aid to Colombia was increased enormously, not only to fight drug trafficking but to support Colombia's domestic war against insurgent groups within the country.[20]

At the same time, efforts to control global drug trafficking began to be in conflict with economic and political aspects of U.S. foreign policy. International relations with the country of Mexico, for example, became strained by the fact that Mexico continued to be a major trafficking route not only for cocaine from South America and heroin from Mexico itself but also as a source of marijuana cultivation, a manufacturing source of methamphetamine, and a trafficker of illegal medications. Efforts to reduce the cultivation of opium in the rugged, mountainous areas of Afghanistan were intertwined with efforts to control the political influence of regional warlords, whether they had terrorist associations or not. China remains a major U.S. trade partner in providing basic ingredients for many licit prescription medications, as well as one of the sources of illicit synthetic opioids. The interconnected and sometimes opposing goals of America's drug-control policy and global foreign policy continue to be a major challenge in the effort to regulate drug-taking behavior both in the United States and around the world.[21]

1.6 Patterns of Drug-Taking Behavior in the United States

1.6 Review the present-day patterns of drug use in the United States

How is it possible to obtain information that would give us a statistical picture of drug-taking behavior today? It is safe to assume that we cannot conduct large-scale random drug testing. The only alternative we have is simply to ask large numbers of randomly selected people about their drug-taking behavior through self-reports and generate the statistics based upon their responses. We encourage honesty and arrange data-collection procedures so as to convince the respondents that their answers are confidential, but the fact remains that any questionnaire is inherently flawed because there is no way to verify the truthfulness of what people say about themselves. Nevertheless, questionnaires are all we have, and the statistics on drug use are based on such survey measures.

Two principal sources of information provide a snapshot picture of the overall prevalence rates for both illicit and licit drug-taking behavior. Comprehensive reports of prevalence rates of Americans across the life span are obtained through the annual National Survey on Drug Use and Health (NSDUH) under the auspices of the U.S. Department of Health and Human Services. Prevalence rates among secondary school students as early as eighth graders, as well as college students, and young adults, are estimated each year through the Monitoring the Future (MTF) survey, conducted by the University of Michigan.

We begin with NSDUH statistics related to current levels of drug-taking behavior in the U.S. population aged twelve years or older in 2020. Current alcohol and tobacco use is defined as any drug use in the past month. Current illicit drug use is defined as any use in the past year. Examples include use of inhalants, hallucinogens, cocaine, methamphetamine, heroin and marijuana as well as the misuse

of prescription drugs. In the NSDUH survey, marijuana is classified as an illicit drug, owing to the official position of the U.S. federal government regarding its legal status.

1.6.1 Substance Use among Individuals Aged Twelve and Older

Approximately 139 million people reported in 2020 that they drank alcohol in the past month, and 52 million people used tobacco products. These numbers are not mutually exclusive, however, because many respondents had used both tobacco products and alcohol during this time. In any case, the statistics indicate that alcohol use outnumbers tobacco product use by more than two to one. Details about alcohol and tobacco use will be examined in Chapters 8 and 10, respectively.[22]

Approximately 50 million Americans aged twelve years or older (18 percent of the population) reported in 2020 using marijuana in the past year. By federal standards of drug legalization, marijuana use represented 84 percent of illicit drug-taking behavior. Since the statistics are based on nationwide prevalence rates, they do not reflect the considerable differences in the prevalence of marijuana use within those U.S. states where it is legally sanctioned and those U.S. states where it is not.

In second place to marijuana was the misuse of prescription pain relievers by an estimated 9.3 million people in the past year. Considerably smaller numbers of people were past year users of the other illicit drugs (Figure 1.2).[23]

Which illicit drug is the most dangerous in terms of potential death: heroin or cocaine? We need to compare the number of heroin overdose deaths relative to the number of heroin users against the number of cocaine overdose deaths relative to the number of cocaine users. In 2020, for example, the number of heroin overdose deaths was substantially greater than cocaine overdose deaths despite far fewer numbers of heroin users relative to cocaine users. Therefore, it can be concluded that there is a far greater chance of death from heroin than from cocaine. There is no question that cocaine use is dangerous in its own right, but relatively speaking heroin is by far the more dangerous drug. This is particularly true when heroin has been combined with fentanyl (see Chapter 4).

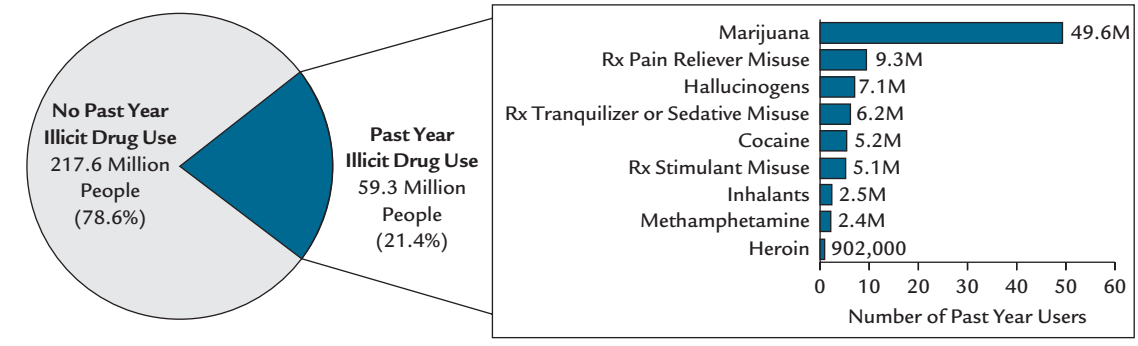
Statistical trends concerning all aspects of substance abuse on a national level can be followed by access to reports of the National Survey on Drug Use and Health, published annually through the Substance Abuse and Mental Health Services Administration (SAMHSA). Health Line 1.2 examines the special challenges among substance abuse during the COVID pandemic.

Health Line 1.2

Life in the Time of COVID, Part I: Substance Abuse

Life is difficult enough for individuals who are contending with problems of substance abuse without also contending with the multiple stressors of a global pandemic. In 2020, when the COVID crisis was at its peak, millions of unemployed Americans faced an uncertain financial future, and an entire nation worried about being infected by the virus and spreading it to others around us. As "stay-at-home" orders and community lockdowns restricted access to everyday social pursuits that had been enjoyed in normal times, most of us became increasingly bored. Many of us felt depressed under the weight of social isolation and anxious about what would happen next. Unfortunately, there were also increased opportunities for exposure to misinformation on social media regarding prevention and treatment. Fact-checking needed to be carried out on a continual basis, but often it was not. As Tedros Ghebreyesus, director-general of the World Health Organization, expressed it at the time, "We're not just fighting an epidemic; we're fighting an infodemic."

Figure 1.2 Prevalence of illicit drug use in the past year among Americans twelve years or older in 2020



Rx = prescription.

SOURCE: Center for Behavioral Health Statistics and Quality. (2021, October). *Key substance use and mental health indicators in the United States. Results from the 2020 National Survey on Drug Use and Health.* Rockville, MD: Center for Behavioral Health Statistics and Quality, Substance Abuse and Mental Health Services Administration, Figure 9.

Over the years, public health researchers have identified stress, anxiety, and depression as three major risk factors for substance abuse. Not surprisingly, on a national level, reported drug overdose cases in 2020 were close to 30 percent higher than the year earlier. In one county in Virginia, twice as many fatal drug overdoses were reported in the early months of 2020 than in the entire previous year. The increased availability of synthetic opioids (specifically fentanyl) at this time made a drug overdose far more deadly than ever before.

Current substance abusers participating in treatment were particularly vulnerable during this time. Traveling outside the home to clinics to access methadone and other medications for treating opioid use disorder (see Chapter 4) was limited, as was access to needle exchange programs. Rehab facilities faced challenges in handling new admissions and maintaining ongoing outreach programs. Social distancing made it difficult for substance abusers to attend peer-support groups within a recovery community, a vital source of emotional and spiritual guidance that is critical for those struggling to stay in recovery. Virtual group support meetings were substituted, but their effectiveness was unclear when assessed against meetings involving the physical presence of others. Opioid abusers who had been using drugs with a friend and were now using them alone had no one nearby who could potentially administer Narcan or call 911 in the event of an opioid overdose.

Dealing with stress and anxiety during national crises through drug-taking behavior is nothing new. In the aftermath of Hurricane Katrina in 2006, survivors were smoking cigarettes, consuming alcohol, and experiencing alcohol consumption problems at higher rates than in normal times, according to data collected by the University of South Carolina. A 2008 analysis published by the Centers for Disease Control and Prevention found that the hospitalization rate for alcohol use disorders rose 35 percent in the wake of Hurricane Katrina.The specific impact of the COVID pandemic on alcohol abuse will be examined in Chapter 8 (see Health Line 8.2).

SOURCES: Davis, C. (2000, March 30). The trauma of the coronavirus pandemic could cause a nationwide spike in alcohol and drug use, experts say. *Business Insider.* Retrieved from https://www.businessinsider.com/experts-say-corona/. Greenspoon, P. (2020, April 19). A tale of two epidemics: When COVID-19 and opioid addiction collide. Harvard Health Publishing, Harvard Medical School, Boston, MA. Retrieved from https://www.health.harvard.edu/a-tale-of-two-epidemics-when-covid-19-and-opioid-addicition-collide-2020042019569/. Katz, J., Goodnough, A., and Sanger, M. (2020, July 15). In shadow of pandemic, U.S. drug overdose deaths resurge to record. *The New York Times.* Retrieved from https://www.nytimes.com/interactive/2020/07/15/upshot/drug-overdose-deaths.html/. Pennycook, G., McPhetres, J., Zhang, Y., Lu, J. G., and Rand, D. G. (2020). Fighting COVID-19 misinformation on social media: Experimental evidence for a scalable accuracy-nudge intervention. *Psychological Science, 31*, 770–780. Quotation on p. 770. Sternlicht, A. (2020, April 5). The opioid epidemic meets the COVID-19 panic with potentially deadly results. *Forbes Magazine.* Retrieved from https://www.forbes.com/sites/alexandrasternlicht/2020/04/05/the-opioid-epidemic-meets-the-COVID-19-pandemic-with-potentially-deadly-results/#7c9a759515bd/. Wan, W., and Long, H. (2020, July 1). "Cries for help": Drug overdoses are soaring during the coronavirus pandemic. *The Washington Post.* Retrieved from https://www.washingtonpost.com/health/2020/07/01/corononavirus-drug-overdose/.

Journal Prompt

Discuss the aspects of the COVID pandemic that have negatively impacted drug-taking behavior and suggest strategies that might be employed to reduce its specific impact on substance abuse.

1.6.2 Substance Use among Secondary School and College Students

Since 1975, the Monitoring the Future (MTF) survey, conducted by the University of Michigan, has provided information about drug use among four special subpopulations in the United States: These subpopulations include three levels of secondary school students (eighth, tenth, and twelfth graders) and college students. In each case, a representative sampling procedure is employed, with more than 47,000 secondary school students and between 900 and 1,500 college students participating.

The advantage of surveying secondary school students from year to year is that we have been able to examine trends in adolescent drug-taking behavior over time and compare the prevalence rates for one drug relative to another over the years. We can assume that the degree of overreporting and underreporting has stayed relatively constant over the years and has not affected the interpretation of general trends. Additionally, it has been possible to predict future changes in prevalence rates among high school seniors based upon present changes in prevalence rates among eighth and tenth graders, since these students progress to higher grades in succeeding years (hence the meaning behind the title of the program).

To examine various degrees of drug use, the MTF survey uses four basic questions regarding drug use:

- "Have you ever used a certain drug in your *lifetime*?" The percentage of those saying "yes" to this question is referred to as the *lifetime prevalence rate*.
- "Have you ever used a certain drug *over the past year*?" The percentage of those saying "yes" to this question is referred to as the *annual prevalence rate*.
- "Have you ever used a certain drug *within the past 30 days*?" The percentage of those saying "yes" to this question is referred to as the *past-month prevalence rate* which may or may not be equivalent to the prevalence rate of "current drug use" in the NSDUH surveys.
- "Have you ever used a certain drug *on a daily basis during the previous 30 days*?" The percentage of those saying "yes" to this question is referred to as the *daily prevalence rate*.

The questions in the MTF survey are designed to examine three important degrees of involvement with respect to a given drug. The first question focuses on the extent of experimentation, including individuals who may have taken a drug only once or twice in their lives but have stayed away from it ever since. The second and third questions focus on the extent of current but moderate drug use. The fourth question focuses on the extent of heavy drug use.

1.6.3 Illicit Drug Use among Secondary School Students

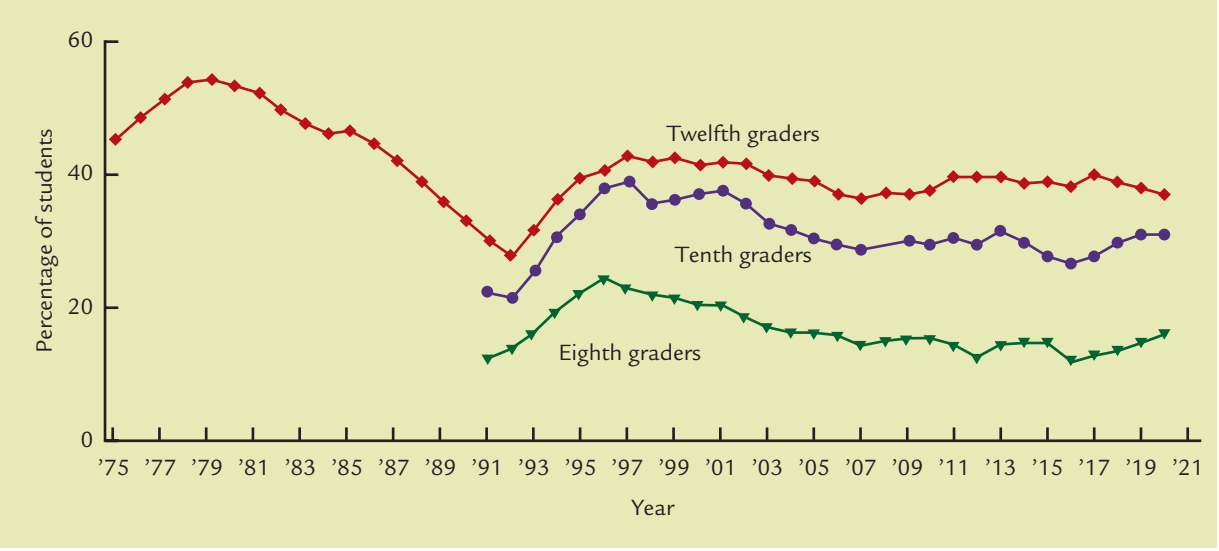
A graph of year-to-year changes in annual prevalence rates for illicit drugs among U.S. high school seniors since the inception of the MTF program in 1975 (Figure 1.3) resembles something of a roller-coaster ride. In 1975, the statistics were looking quite scary. By the end of the 1970s, prevalence rates for illicit drug use had reached historically high levels. In 1979, more than one-half of high school seniors reported using an illicit drug of some kind in the past year. At that time and continuing into the mid-1980s, 12 percent (one in eight seniors) reported using cocaine or crack cocaine in the past year. Fortunately, annual prevalence rates for illicit drug use among high school seniors showed a steep decline through the 1980s, ending at a historically low level (27 percent) around 1992. In other words, illicit drug use had dropped by about 50 percent. But at that point, a dramatic reversal occurred. Prevalence rates took a sharp upward turn during the decade of the 1990s. The bottom line is that, in terms of illicit drug use in this demographic group, the situation in 2020 remains somewhere between the worst of times (in 1979) and the best of times (in 1992). Additional statistics for secondary school students in the eighth and tenth grades began to be collected in 1991.

As shown in Figure 1.3, during the period from 2016 to 2020, prevalence rates among high school seniors have been relatively steady. However, prevalence rates among eighth and tenth graders have increased. This trend among younger secondary school students is particularly concerning since eighth-grade and tenth-grade prevalence rates had fallen in the five years or so prior to 2016. In future years, as eighth and tenth graders advance in grade, it is expected that prevalence rates among high school seniors will show a similar increase.[24]

1.6.4 Illicit Drug Use among College Students

According to the MTF survey, college students in 2020 reported a higher annual prevalence rate (44 percent) in the use of illicit drugs in general relative to high school seniors (36 percent). As is the case with earlier MTF surveys, illicit drug use was clearly dominated by marijuana smoking. Table 1.1 shows the lifetime, annual, and thirty-day prevalence rates among college students with respect to five major types of drugs: the use of marijuana, hallucinogens, cocaine, methamphetamine, and heroin.[25]

Figure 1.3 Trends in annual prevalence of illicit drug use among eighth, tenth, and twelfth graders



NOTE: Updated statistical information from the University of Michigan survey is available at the end of December of each year at http://www.monitoringthefuture.org/.

SOURCE: Based on Johnston, L. D., Miech, R. A., O'Malley, P. M., Bachman, J. G., Schulenberg, J. E., and Patrick, M. E. (2021). *Monitoring the Future national survey results on drug use 1975–2020: Overview, key findings on adolescent drug use*. Ann Arbor: Institute for Social Research, University of Michigan.

Table 1.1 Prevalence rates for six illicit drugs among college students, aged 19–22, in 2020

	EVER IN LIFETIME	IN PAST 12 MONTHS	IN PAST 30 DAYS
Heroin	0.4	0.0	0.0
Cocaine	5.9	3.8	1.4
Hallucinogens	11,2	8.6	2.4
Methamphetamine	0.2	0.0	0.0
Marijuana	55.4	43.9	24.5

NOTE: Marijuana is regarded as an illicit drug in these surveys.

NOTE: For more current information, consult the website for the Monitoring the Future study: http://www.monitoringthefuture.org.

SOURCE: Based on data from Schulenberg, J. E., Patrick, M. E., Johnston, L. D., O'Malley, P. M., Bachman, J. G., and Miech, R. A. (2021). *Monitoring the Future national survey results on drug use 1975–2020; Volume II, college students and adults ages 19–60.* Ann Arbor, MI: Institute for Social Research, The University of Michigan, Tables A-1, A-2, and A-3.

Quick Concept Check 1.2

Understanding Prevalence Rates of Drug Use in the United States

Check your understanding of prevalence rates of drug use in the United States by marking the following statements as true or false.

1. The MTF survey conducted by the University of Michigan represents drug use information from the entire population of seventeen- to eighteen-year-old individuals in the United States.
2. The trend in illicit drug use from the early 1980s to the present has been a steady decline.
3. Prevalence rate for marijuana use among college students is less than the prevalence rate among high school seniors.
4. If the prevalence rate for illicit drug use among eighth graders has increased in 2016 relative to 2015, it is possible to predict that the prevalence rate for illicit drug use among high school seniors in 2020 will have increased relative to the prevalence rate reported by seniors in 2019.
5. Lifetime prevalence rates are indications of the most extreme involvement with illicit drugs.

Answers: 1. false 2. false 3. false 4. true 5. false

1.6.5 Alcohol Use among Secondary School and College Students

Not surprisingly, national surveys indicate that the prevalence-rate percentages for alcohol use are, in general, much higher than for illicit drugs (given the classification of marijuana as an illicit drug). Whereas about 23 percent of high school seniors in 2020 reported use of illicit drugs in the past month, 29 percent drank an alcoholic beverage in the past month, and 14 percent reported an instance of binge drinking, defined as having five or more drinks in a row at least once in the past two weeks. These figures are at historic lows, down substantially from those found in surveys conducted in 1980, when 72 percent of high school seniors reported that they had consumed alcohol in the past month and 41 percent reported binge drinking.[26]

The general decline in alcohol use and heavy drinking among adolescents from 1980 to 2020, particularly since the mid-1990s, stems from a number of factors. National campaigns to reduce drunk driving and the encouragement of nondrinking designated drivers as well as a general disapproval of binge drinking have all played a role. An additional factor is the reduced accessibility to alcohol for this age group; all U.S. states have now adopted a twenty-one-years-or-older requirement. While efforts to reduce underage drinking by enforcing restrictions of alcohol sales to minors has been credited with reducing adolescent alcohol use, however, the statistics show that more work needs to be done. In 2020, 45 percent of eighth graders found it "fairly easy" or "very easy" to obtain alcoholic beverages, down from 71 percent in 2000. About 84 percent of seniors reported the same, down from 95 percent in 2000.[27] The drinking habits of college students have also changed since the mid-1990s. In 2020, 56 percent of college students surveyed drank at least once in the previous month (16 percent less than 1995), and 35 percent reported an instance of binge drinking (38 percent less than 1995).[28]

The problems associated with excessive alcohol use among the general population will be examined in Chapter 9.

1.6.6 Tobacco Use among Secondary School and College Students

Roughly 2 percent of high school seniors in 2020 had established a regular habit of tobacco use by smoking at least one cigarette every day in the past month, down considerably from a prevalence rate of 10 percent as recently as 2011. In 2000, about one in five seniors (21 percent) were daily cigarette smokers. There has been a steady decline in cigarette smoking rates in eighth and tenth graders as well as seniors, owing to the national attention directed toward cigarette smoking among young people. While nicotine consumption through tobacco use has been drastically reduced in recent years, prevalence rates for nicotine consumption has been more than replaced by the administration of nicotine-delivery alternatives (e-cigarettes), which are inhaled through heated vapors (vaped) rather than smoked (see Chapter 10).[29]

It is true that somewhat fewer college students smoke cigarettes than do high school seniors; however, the reason does not lie in changes in smoking behavior from high school to college but rather a distinction between the two populations being studied. Non–college youths one to four years beyond high school were more than eleven times more likely than college students to smoke at least a half-pack of cigarettes per day. Therefore, the difference in smoking rates between seniors and college students is chiefly a result of excluding the heavier smokers in the survey as individuals progress from secondary to postsecondary education.[30]

1.6.7 Drug Use and Perceived Risk of Harm

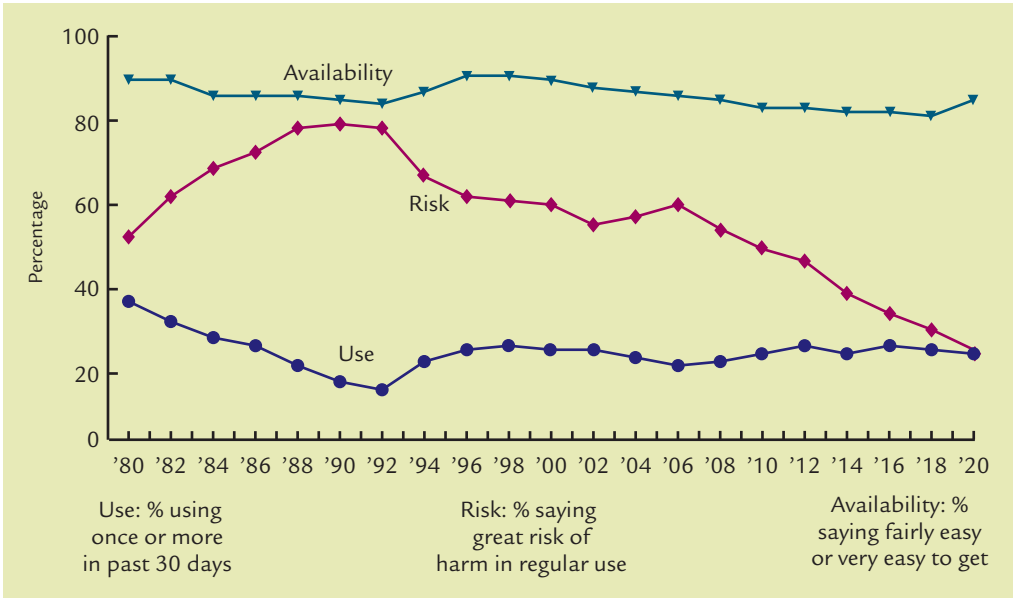
The decision to engage in a specific form of drug-taking behavior is intermeshed with individual perceptions about the drug in question. How risky would it be to use a specific drug? How dangerous would it be? How easy would it be to obtain? These questions have been asked of high school seniors in the MTF survey since 1975, and the relationship is clear. Figure 1.4 shows an almost exact "mirror image" in the trends over more than thirty-five years between the perceived risk of harm in regular marijuana smoking and the thirty-day prevalence rate. In other words, the change over the years in the perception of risk of harm is negatively correlated with the change in the prevalence rate of use in the past month.[31]

In the 1990s, there was a steady decline in the percentages of high school students, college students, and young adults who regarded regular drug use (regular marijuana use in particular) as potentially dangerous. These responses contrasted with reports beginning in 1978 that had shown a steady increase in such percentages. Survey researchers at the time considered this reversal to be a case of "generational forgetting," in that young people (in the 1990s) had less of an opportunity to learn from the mistakes of students of an equivalent age who had lived ten to fifteen years earlier.[32]

Also troubling during much of the 1990s were changes in the way our society dealt with the potential risks of drug use. Drug abuse prevention programs in schools were scaled back or eliminated because of a lack of federal funding, parents were communicating less with their children about drug use, anti-drug public service messages were less prominent in the media than they were in the 1980s, and media coverage in this area declined. At the same time, the cultural influences of the music and entertainment industry were, at best, ambivalent on the question of drug-taking behavior, particularly with respect to marijuana smoking (see Chapter 7). All these elements can be seen as having contributed to the upward trend in drug use during this period.

Another question asked in the Michigan survey is the following: Would you experience disapproval if you used a particular drug? Not surprisingly, the likelihood of using a drug is inversely related to how much disapproval might

Figure 1.4 Trends in perceived availability of marijuana, perceived risk of marijuana use, and prevalence of marijuana use in the past month for high school seniors, 1980–2020



SOURCE: Miech, R. A., Johnston, L. D., O'Malley, P. M., Bachman, J. G., Schulenberg, J. E., & Patrick, M. E. (2021). *Monitoring the Future national survey results on drug use, 1975–2020: Volume I,* Secondary school students. Ann Arbor: Institute for Social Research, The University of Michigan, Tables 4-1c, 8-3, and 9-9.

be experienced. This is particularly relevant in the everyday life of an adolescent, when peer approval is an important element in guiding their behavior.

The two types of drug perceptions, the perception of possible risk or danger and the perception of disapproval, are useful indices for predicting future trends in drug use, since shifts in perception often precede in time the observed changes in behavior. A lower level of disapproval of marijuana smoking, for example, may reflect a lower perception of riskiness, which might in turn be reflected later in an increased prevalence rate.[33]

1.7 Making the Decision to Use Drugs

1.7 Review the principal risk and protective factors that influence drug-taking behavior

Why do young people turn to drugs in the first place? What factors influence the initiation of drug-taking behaviors? One way of thinking about predicting drug use is to consider any given person as having a certain degree of vulnerability to drug-taking behavior that is shaped by two separate (and opposing) types of circumstances in a person's life.

We can identify a number of circumstances that are collectively referred to as ***risk factors***, in that any one of them increases the likelihood that a person might be involved with drugs. We can also identify a number of circumstances that are collectively referred to as ***protective factors***, in that any one of them decreases the likelihood that a person might be involved with drugs.

Together, risk factors and protective factors combine to give us some idea about an individual's overall vulnerability toward drug-taking behavior. The emphasis, however, should be on the phrase "some idea." We still would not know for certain whether a specific individual would use drugs, only a likelihood that the individual would do so. Despite the imprecision in predicting individual behavior, however, it is useful to have an understanding of risk factors and protective factors as well as the extent to which these factors might apply to a given individual when developing an effective drug abuse prevention program for a specific population or an effective treatment program for a specific individual (see Chapters 16 and 17).

1.7.1 Evaluating Risk and Protective Factors through Odds Ratios

Specific risk and protective factors for a given form of drug-taking behavior are identified by the calculation of a statistic called an *odds ratio*, based on two pieces of information. The first is a specification of the drug-taking behavior that is under study (for example, marijuana smoking over the past year). The second is a condition or circumstance in a person's life that is being examined as a possible positive or negative influence. Typically, information about the condition or circumstance appears as an item in a questionnaire. One example might be "Do you often get into a serious fight at school or at work?" The frequency of individuals reporting marijuana smoking in the past year when the answer about fighting is "yes" is then divided by the frequency of individuals reporting similarly when the answer about fighting is "no." The result is the odds ratio.

If the odds ratio is one, with the numerator and denominator being equal, then it can be inferred that the answer to the question makes no difference in the likelihood of the behavior. If the numerator exceeds the denominator, then the ratio will be greater than one, and the extent of the difference will increase the size of the ratio itself. If, however, the denominator exceeds the numerator, the ratio will be less than one, with the extent of the difference approaching zero.

In other words, odds ratios significantly greater than one would denote a risk factor, odds ratios significantly less than one (approaching zero) would denote a protective factor. Finally, odds ratios equal to one will denote an irrelevant factor with respect to the drug-taking behavior. By the way, odds-ratio calculations are widely used in the analysis of factors underlying a range of health-related behaviors.

1.7.2 Risk and Protective Factors for Marijuana Use

Certain circumstances that may appear to be influential risk factors for drug-taking behavior in general (socioeconomic status, for example) turn out to have an association that is far from simple and may depend on the specific drug under discussion. The most reliable set of risk factors for drug-taking behavior in general involves psychosocial characteristics that reflect an individual's tendency toward nonconformity within society. Young people who take drugs are more inclined to attend school irregularly, have poor relationships with their parents, or get into trouble in general. Sociologists refer to such individuals as members of a *deviant subculture*.[34]

The importance of participation in a socially deviant subculture is highlighted by evidence showing a clear association with increased levels of drug-taking behavior. For example, the odds of youths aged twelve to seventeen using marijuana during the past year are more than six times (6.25 times, to be precise) greater among those who had at least a few close friends who tried or used marijuana than among those who did not have such friends (the second listed risk factor in Table 1.2). Note, however,

Table 1.2 Major risk factors and protective factors: Odds ratios for marijuana use over the past year among youths aged twelve to seventeen as related to specific questions about the social context of marijuana smoking

RISK FACTOR	REPRESENTATIVE QUESTION	ODDS RATIO
Antisocial behavior	*"How many times have you gotten into a serious fight at school or at work?"*	7.10
Friends' marijuana use	*"How many friends would you say use marijuana?"*	6.25
Perceived prevalence of marijuana use in school	*"How many of the students in your grade in school would you say use marijuana?"*	4.78
Individual attitudes toward marijuana use	*"How would you feel [positively] about someone your age trying marijuana?"*	4.47
Friends' attitudes toward marijuana use	*"How do you think your close friends would feel [positively] about your trying marijuana?"*	4.37

NOTE: By definition, risk factors have odds ratios greater than 1. Behavior is more likely to occur if a risk factor is present, through a multiplier designated by the odds ratio. The higher the odds ratio, the stronger the risk factor. By definition, protective factors have odds ratios less than 1. Behavior is less likely to occur if a protective factor is present, through a multiplier designated by the odds ratio. The lower the odds ratio, the stronger the protective factor.

PROTECTIVE FACTOR	REPRESENTATIVE QUESTION	ODDS RATIO
Sanctions against substance use in school	*"How much trouble do you think a student in your grade would be in if they got caught using an illegal drug?"*	0.28
Parents as sources of social support	*"Would you select a parent as a source of social support?"*	0.40
Commitment to school	*"Do you like going to school?"*	0.45
Religiosity	*"How many times did you attend religious services?"*	0.47
Extracurricular activities	*"Have you participated in at least two extracurricular activities in or out of school?"*	0.52

SOURCE: Wright, D., and Pemberton, M. (2004). *Risk and protective factors for adolescent drug use: Findings from the 1999 National Household Survey on Drug Use.* Rockville, MD: Substance Abuse and Mental Health Services Administration, Chapter 3 and Appendix A.

that in the case of marijuana use, we are speaking of an increased *probability* that it will occur, not necessarily a cause-and-effect relationship.

As shown in Table 1.2, leading risk factors for marijuana use include the perceived prevalence of marijuana use by friends in and out of school. One's own attitude toward marijuana smoking is an important risk factor, as is the attitude of friends toward marijuana smoking. By contrast, economic deprivation, as measured by a household income under $20,000, fails to be a risk factor for marijuana use.[35]

On the other hand, protective factors provide the basis for someone to have a stronger resistance against the temptations of drugs, to have a degree of resilience against engaging in a drug-taking lifestyle despite the presence of risk factors in that person's life.[36] It is important that we not see these protective factors as simply the inverted image, or the negation, of opposing risk factors. Rather, each group of factors operates independently of the other. One way of thinking about protective factors is to view them as a kind of insurance policy against the occurrence of some future event that you hope to avoid.[37] For example, the third protective factor listed in Table 1.2 shows an odds ratio of 0.45, indicating that youths aged twelve to seventeen who answer "yes" to the question "Do you like going to school?" are about half (0.45, to be precise) as likely to have tried or used marijuana during the past year as youths who answer "no."

Protective factors can serve as a buffering element among even high-risk adolescents, giving them a greater degree of resilience against drug-taking behavior and a higher resistance to drug use than they would have had otherwise. Leading protective factors include a commitment to conventionality in one form or another and a degree of social support from one's family.

1.7.3 The Power of Protective Factors

Obviously, the greater number of protective factors in our lives, the better the chances of resilience with respect to drug-related problems. In one study, protective factors were examined in one thousand high-risk male and female adolescents in the seventh and eighth grades, and information was collected on their drug use later in high school. As the number of protective factors increased, the resistance of these students to drug use increased as well. With six or more such factors in their lives, as many as 56 percent of the high-risk adolescents showed a resistance to drug use three years later. In contrast, only 20 percent of the youths with three or fewer protective factors were drug-free.[38]

1.8 DSM-5: Defining and Diagnosing Drug-Related Problems

1.8 Review the criteria listed in the DSM-5 that form the basis for a clinical diagnosis of problematic drug-taking behavior

For treatments of any disorder to be effective, there must be a standardized system for diagnosis based on symptoms. Only then can we establish an appropriate diagnosis and address the most effective treatment options. An effective treatment for ulcerative colitis, for example, first requires the presentation of specific bodily symptoms (among them, diarrhea, abdominal pain) for an appropriate diagnosis through a physical examination by a licensed health-care provider. Once a diagnosis of ulcerative colitis is made, treatment can begin. In the case of drug-related problems, health professionals in the United States have standardized a set of specific behavioral circumstances that serve as criteria for a diagnosis, just as physical symptoms serve as criteria for a physical disease.

From the perspective of a health professional, the goal is to reduce the incidence of drug-related problems in an individual's life through a therapeutic intervention (see Chapter 17). In these cases, the emphasis in making a diagnosis lies in the adverse impact of drug-taking behavior on their life *without regard to the possible legality or illegality of the drug being consumed.*

The *Diagnostic and Statistical Manual of Mental Disorders* (referred to as the "DSM"), issued under the auspices of the American Psychiatric Association, has been the official standard for defining and diagnosing a wide range of psychological disorders, including those related to drug-taking behavior. The fifth edition of the manual (referred to as DSM-5), issued in 2013, establishes a diagnosis of **substance use disorder**, on the basis of an individual meeting a minimum number of eleven possible behavioral circumstances (or criteria) as a consequence of using a particular substance. These criteria are

- Taking the substance in larger amounts and for longer than intended
- Wanting to cut down or quit substance use but not being able to do it
- Spending a lot of time obtaining the substance
- Craving or having a strong desire to engage in substance use
- Repeatedly being unable to carry out major obligations at work, school, or home due to substance use
- Continued use despite persistent or recurring social or interpersonal problems caused or made worse by substance use
- Stopping or reducing important social, occupational, or interpersonal activities due to substance use
- Recurrent substance use in physically hazardous situations
- Consistent substance use despite acknowledgment of persistent or recurrent physical or psychological difficulties from using the substance
- Tolerance, as defined by either a need for markedly increased amounts to achieve intoxication or desired effect or markedly diminished effect with continued use of the same amount. (This criterion does not apply for diminished effect when the substance is used appropriately under medical supervision.)
- Withdrawal manifesting as either characteristic syndrome or the substance is used to avoid withdrawal. (This criterion does not apply when used appropriately under medical supervision.)

The severity of the substance use disorder is determined by the number of criteria met. A minimum of two to three criteria is required for a diagnosis of *mild substance use disorder*, while four to five criteria are required for a diagnosis of *moderate substance use disorder*, and six to seven are required for a diagnosis of *severe substance use disorder.*[39]

It should be noted that when the need arises for a diagnosis of a specific form of substance use disorder, there will be a reference to the substance in question (as in opioid use disorder, stimulant use disorder, hallucinogen use disorder, cannabis use disorder, or alcohol use disorder). Nonetheless, the same behavioral criteria will be employed, no matter what substance is involved. Health Line 1.3 shows the DSM-5 diagnostic criteria for one specific form of substance use disorder involving opioid use. Additional sets of DSM-5 behavioral criteria are used for specific diagnosis of substance use disorders that relate to alcohol, cocaine, and methamphetamine.

Health Line 1.3

The DSM-5 Behavioral Criteria for Opioid Use Disorder

An illustration of the criteria used for a diagnosis of opioid use disorder is as follows:

1. Taking the opioid in larger amounts and for longer than intended
2. Wanting to cut down or quit but not being able to do so
3. Spending a lot of time obtaining the opioid
4. Craving or a strong desire to use opioids
5. Repeatedly unable to carry out major obligations at work, school, or home due to opioid use

6. Continued use despite persistent or recurring social or interpersonal problems caused or made worse by opioid use
7. Stopping or reducing important social, occupational, or recreational activities due to opioid use
8. Recurrent use of opioids in physically hazardous situations
9. Consistent use of opioids despite acknowledgment of persistent or recurrent physical or psychological difficulties from using opioids
10. Tolerance as defined by either a need for markedly increased amounts to achieve intoxication or desired effect or markedly diminished effect with continued use of the same amount
11. Withdrawal manifesting as either characteristic symptoms or the substance is used to avoid withdrawal

NOTE: Criteria 10 and 11 are not considered to be met for those individuals taking opioids solely under appropriate medical supervision.

SOURCE: American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Washington, DC: American Psychiatric Publishing, pp. 453–490.

A convenient way of remembering the eleven criteria in the DSM-5 is to view the criteria as belonging to four groups of problematic drug-related behavior:

- **Impaired control:** A substance may be taken in larger amounts or over a longer period of time than the individual originally intended (Criterion 1). There may be a persistent desire to cut down or regulate substance use or there may be multiple unsuccessful attempts to cut down or discontinue substance use (Criterion 2). A great deal of time may be spent obtaining the substance, using it, or recovering from its effects (Criterion 3). There may be intense urges or cravings to engage in substance use or times in which the individual cannot think of anything else (Criterion 4).
- **Social impairment:** There may be a failure to fulfill a major role or obligation at work, at school, or at home as a consequence of substance use (Criterion 5). Substance use may be continued despite the persistence or recurrence of social or interpersonal problems associated with use (Criterion 6). An individual may withdraw from, reduce, or give up on important social, occupational, or recreational activities because of substance use (Criterion 7).
- **Risky use:** There may be multiple times in which substance use has occurred in physically hazardous situations (Criterion 8). Substance use may continue despite the knowledge that it is likely to cause or exacerbate a physical or psychological problem. In other words, there is a failure to abstain from using the substance even though the individual recognizes the problems substance use is causing (Criterion 9).
- **Pharmacological effects:** Over time, there may be a development of tolerance to the effects of the substance being used (Criterion 10). For those substances for which significant withdrawal symptoms have been documented (e.g., alcohol, opioid-related drugs, sedative-hypnotics, and antianxiety medications), withdrawal symptoms may be observed (Criterion 11). However, in cases in which withdrawal symptoms have not been documented to occur, such as with hallucinogen use (see Chapter 6) or inhalant use (see Chapter 13), Criterion 11 is not used in arriving at a diagnosis.

Three major points should be made with respect to the DSM-5 system in the context of the discussion about drug terminology earlier in the chapter.

- First, the term *substance use* is used throughout rather than *drug use* since it is acknowledged that confusion often exists in the public mind about what is defined as drug-taking behavior and what is not—particularly with regard to the consumption of alcohol or tobacco products.
- Second, the word *addiction* is not used in any diagnostic classification or criteria. Even though it is commonly used to describe a severe problem related to compulsive or habitual behavior, the word is considered to be difficult to define, and the negative connotation of the word might cause its use to be an obstacle to successful treatment.
- Third, separate diagnoses for *substance abuse* and *substance dependence*, distinct conditions that had been identified in earlier editions of the DSM (such as DSM-IV, published in 2000), are not differentiated in DSM-5. However, with minor exceptions, the four criteria previously listed for the diagnosis of substance abuse and the seven criteria previously listed for the diagnosis of substance dependence in DSM-IV have been combined into one set of eleven criteria in DSM-5. It has been felt that the clinical treatment of drug-related problems can be more easily carried out with a single diagnosis and a scale of severity of symptoms (mild to severe), even though the concepts of substance abuse and substance dependence can be helpful toward understanding the problems associated with drug-taking behavior. As a rough approximation, fulfilling six or more criteria for substance use disorder (in other words, meeting the threshold for a diagnosis of severe substance use disorder) can be considered equivalent to a diagnosis of substance dependence.
- Fourth, when a *single* drug is involved, the diagnosis of substance use disorder is identified in the context of that drug. With the exception of those cases in which Criterion 11 is not considered (see above), the same behavioral criteria are used, no matter what drug is involved.[40]

Portrait

stereoliar/Shutterstock

From Oxy to Heroin: The Life and Death of Erik

Erik lived in a suburban Long Island, New York, community, and heroin killed him in 2008 at the age of 19. Unfortunately, a decade or so afterward, the story of the life and death of Erik could be the story of thousands of young people who have been victims of opioids.

Erik's mother, Linda D., never imagined what she was up against. "You worry," she has said, "about them smoking pot. You worry about them driving recklessly. You worry about them not using their seat belt. You worry about that phone call in the middle of the night. You don't worry about heroin. Because it didn't exist in my mindset."

In the last few years, the reality of heroin in the suburbs and small towns of America, previously considered to be immune from its deadly reach, has hit home with a sudden and unexpected vengeance. As a director of a local drug counseling center has expressed it, "They're starting younger, they're starting with more substances, they have better access, everything is cheaper, and they have more money." You would call that a perfect storm. Heroin arrests have doubled; rehabilitation-facility admissions of those twenty-one and under for prescription pain reliever dependence have tripled or quadrupled in many cases.

In the case of Erik, it began after an emergency appendectomy with a prescription for Vicodin. Erik gradually entered into a shadowy world of drug-taking behavior. Finding new supplies of Vicodin, then shifting to OxyContin, was easy. "It sounded grimy and sleazy," a teenager would say in reference to her own dependence on prescription pain relievers, "but at the time it was just what I did. Everyone knows someone who can get them for you."

At some point in early 2008, according to Linda, "The oxy's dried up." Erik turned from pills to heroin. "It started at a party," she has said. "Someone said to him, 'Oh, try this.'" By May, Linda and her husband realized Erik was using heroin. In the weeks that followed, they tried to convince him to get help. The family's insurance covered Erik's first trip to a rehabilitation facility in upstate New York, but when Erik left after three days, the insurance company told the family that he had used up their "once in a lifetime" rehabilitation coverage. They tried to convince public hospitals to admit Erik, but he was denied. In the meantime, Erik's parents were finding injection needles around the house and discarded rubber tubing. They desperately tried to cobble together funds to pay for rehabilitation, but they didn't succeed in time. Erik died in July.

Erik's progression from Oxycontin to heroin, unfortunately, would be repeated in increasing numbers of people in the decade or so that followed. Chapter 4 will detail the circumstances of the rise of opioid abuse that led to the current opioid crisis of today.

SOURCES: Archibold, R. C. (2009, May 31). In heartland death, traces of heroin's spread. *The New York Times*, pp. 1, 24. Lefrowitz, M. (2009, June 14). Heartbreak of addiction hits home. *Newsday*, pp. A4–A6. Levin, D. (2019, December 3). "We could have been anything." Opioid addiction has taken a heavy toll on the Class of 2020 in a small Ohio community. *The New York Times,* pp. A11–A15.

Chapter 1: Summary

1.1 Understanding Drug-Taking Behavior and Society

- Psychoactive drugs are defined as those drugs that affect our feelings, perceptions, and behavior.
- We can examine the impact of our society on drug-taking behavior, through a series of societal influences, referred to as sociological risk factors. Arising from our present-day culture, these risk factors tend to increase the likelihood of certain undesirable forms of drug-taking behavior. Risk factors also can be biological and psychological in nature as well. The biopsychosocial model combines all three factors in understanding the full range of motivating circumstances for drug-taking behavior.
- We can examine the relationship between drugs and society in reverse by evaluating the impact of certain forms of drug-taking behavior on society itself, specifically the consequences of drug-related crime and other forms of antisocial behavior on a community.

1.2 Definitions and Distinctions

- The standard definition of a drug is a chemical substance that, when taken into the body, alters the structure or functioning of the body in some way, excluding those nutrients considered to be related to normal functioning.
- Based upon the intent of the individual, drug use can be categorized as either instrumental or recreational. Instrumental use refers to circumstances in which an individual is taking a drug with a specific socially approved goal in mind. Recreational use refers to circumstances in which an individual is taking a drug only for the purposes of acquiring the effects of the drug.
- Illicit drugs are illegal drugs, as officially defined in the United States. Criminal penalties are imposed on their possession, manufacture, or sale, according to statutes on a federal, state, and local level. Licit (legal) drugs include alcohol, nicotine in tobacco products, caffeine, and certain prescription medicines used to treat a wide range of mental disorders. However, restrictions may apply to access to some legal drugs.
- Drug misuse typically applies to cases in which a drug is used with an instrumental goal in mind but in an inappropriate manner. Drug abuse is typically applied to cases in which a licit or illicit drug is used in ways that produce some form of physical, mental, or social impairment. Drug dependence is typically applied to conditions that involve personal and social problems extending beyond the consequences of drug abuse.
- Because the general public often fails to recognize alcohol and nicotine as drugs, health care professionals and researchers have chosen to substitute the word *substance* instead of *drug* in their terminology.

1.3 The History of Drugs

- Probably the earliest experiences with psychoactive drugs came from tasting naturally growing plants. Individuals with knowledge about such plants were able to attain great power within their cultures. The accumulation of knowledge about consciousness-altering substances would mark the beginning of shamanism, a practice among primitive societies in which an individual acted as a healer through a combination of trances and plant-based medicines.
- Ancient Egyptians and Babylonians in particular had extensive knowledge of both psychoactive and non-psychoactive drugs. An Egyptian scroll, known as the Ebers Papyrus, listed more than 800 "prescriptions" for a host of ailments. Whether the effectiveness on patients was genuine or due to a placebo effect cannot be determined.

1.4 Drugs in the Late Nineteenth Century

- By the end of the nineteenth century, medical advances had succeeded in the isolation of morphine as the major active ingredient in opium. Cocaine, having been extracted from coca leaves, began to be used as a stimulant and antidepressant. Sedative powers to calm the mind or induce sleep had been discovered in bromides and chloral hydrate. Important vaccines were now available for protection against rabies and smallpox.
- For much of the nineteenth century in America, psychoactive drugs were in widespread use, principally in the form of patent medicines. Only by the end of the nineteenth century were the risks of drug dependence beginning to be recognized.

1.5 Drugs and Behavior in the Twentieth Century

- Increased concern about the social effects of drug dependence in the early twentieth century led to restrictive legislation regarding the use of morphine, heroin, cocaine, and marijuana. Social pressure from the temperance movement mounted, eventually resulting in the national prohibition of alcohol consumption in the United States from 1920 to 1933.

- After 1945, important strides were made in the development of antibiotics and psychiatric drugs, but on a social level, illicit drugs such as heroin, cocaine, and marijuana were considered outside the mainstream of American life. In the 1960s and 1970s, the use of marijuana and hallucinogenic drugs spread across the nation, causing the use of many illicit drugs to move into the mainstream of America. One of the consequences was an increase in personal and social problems relating to heroin abuse.
- With a decline in heroin abuse in the 1980s came an increase in cocaine abuse and the emergence of crack as a cheap, smokable form of cocaine. A period of methamphetamine (meth) abuse in generally nonurban regions of the country followed the decline of crack cocaine abuse that had been centered in generally urban centers. As meth abuse itself declined in popularity, heroin abuse reemerged as a significant social problem.
- Heroin abuse and opioid abuse in general represent the dominant substance abuse issue today, exacerbated by the overprescription of opioid medications, the influx of inexpensive heroin from Mexico and other countries, and the availability of new synthetic opioids such as fentanyl that are far more powerful (and more lethal) than heroin.

1.6 Patterns of Drug-Taking Behavior in the United States

- In 2020, 139 million people drank alcohol, and 52 million people used a tobacco product. While these numbers are not mutually exclusive (since respondents included those who had used tobacco products and alcohol), nonetheless it is clear that alcohol use outnumbered tobacco product use by more than two to one.
- Approximately 50 million Americans aged twelve years or older (18 percent of the population) reported in 2020 using marijuana in the past year. By federal standards of drug legalization, marijuana use represented 84 percent of illicit drug-taking behavior. Since the statistics are reported nationwide; they do not reflect differences in the prevalence of marijuana use within those U.S. states where it is legally sanctioned and those U.S. states where it is not.
- In second place to marijuana was the misuse of prescription pain relievers, which were used by an estimated 9.3 million people in the past year. Considerably smaller numbers of people were past year users of the other illicit drugs.
- The prevalence-rate percentages for alcohol use are, in general, much higher than for illicit drugs. Whereas about 23 percent of high school seniors in 2020 reported use of illicit drugs in the past month, 29 percent drank an alcoholic beverage in the past month, and 14 percent reported an instance of binge drinking, defined as having five or more drinks in a row at least once in the past two weeks. Figures in 2020 were at historic lows, down substantially from those found in surveys conducted in 1980, when 72 percent of high school seniors reported that they had consumed alcohol in the past month, and 41 percent reported binge drinking.
- Roughly two percent of high school seniors in 2020 had established a regular habit of nicotine intake by smoking at least one cigarette every day, drastically reduced from a prevalence rate of 10 percent in 2011. There has been a steady decline in cigarette smoking rates in eighth and tenth graders as well as seniors, owing to national attention directed toward the issue of cigarette smoking among young people. However, the recent availability of nicotine consumption, through the practice of nicotine vaping, has dramatically changed the culture of drug-taking behavior among secondary school students.

1.7 Making the Decision to Use Drugs

- The vulnerability toward the use of drugs can be expressed in two components: Risk factors and protective factors.
- Risk factors for drug-taking behavior in adolescence include a tendency toward nonconformity within society and the influence of drug-using peers. Protective factors for drug-taking behavior include an intact home environment, a positive educational experience, and conventional peer relationships.
- The greater the number of protective factors in one's life, relative to the number of risk factors, increases resilience—that is, the tendency to resist opportunities in one's life to engage in drug-taking behavior.

1.8 DSM-5: Defining and Diagnosing Drug-Related Problems

- A clinical diagnosis involving problematic drug-taking behavior entails the evaluation of eleven behavioral circumstances, referred to as criteria in the fifth edition of the *Diagnostic and Statistical Manual of Mental Disorders* (the DSM-5). The behavioral criteria used in determining a diagnosis of "substance use disorder" cover areas of drug-related problems such as impaired control, social impairment, risky use, tolerance, and withdrawal.
- According to the DSM-5, the severity of a substance use disorder (mild, moderate, or severe) is determined by the number of behavioral criteria that are met.

Key Terms

biopsychosocial model, p. 4
chlorpromazine, p. 13
drug, p. 4
drug abuse, p. 7
drug dependence, p. 8
drug misuse, p. 7
Ebers Papyrus, p. 11
illicit (illegal) drugs, p. 6
instrumental use, p. 6
licit (legal) drugs, p. 6
neuroscience, p. 14
patent medicine, p. 12
placebo effect, p. 11
protective factors, p. 21
psychoactive drugs, p. 3
recreational use, p. 6
risk factors, p. 21
shaman, p. 10
shamanism, p. 10
substance use disorder, p. 23

Shared Writing

By what criteria do we say that a drug is being misused or abused? Provide a circumstance in which the distinction might be debated.

Chapter 2

Drug-Taking Behavior: Personal and Social Issues

Learning Objectives

2.1 Describe the use of two dose-response curves in measuring drug toxicity

2.2 Describe examples of cases arising from acute drug toxicity

2.3 Review the possible consequences of drug tolerance effects in drug abuse

2.4 Distinguish between concepts of physical dependence and psychological dependence as explanations for compulsive drug-taking behavior

2.5 Analyze the impact of drug abuse on pregnancy and the potential of HIV infection

2.6 Examine the relationship between drug abuse and violent crime

2.7 Review the challenges in holding back the continuing influx of illicit drugs into the United States

2.8 Discuss the challenges in controlling a vast global illicit drug-trafficking network

2.9 Discuss the use of money laundering as a form of nonviolent drug trafficking

As the driver of the car began crossing the U.S.–Mexico border at the busy DeConcini Port of Entry in Nogales, Arizona, his darting eyes and tight grip on the steering wheel were sufficient signs for the Customs and Border Protection (CBP) officer on duty to be suspicious. Here was someone who might have something to hide. Sure enough, the driver was a Mexican citizen with a border-crossing card, traveling with his wife and two small children—and a load of illicit drugs. Four pounds of methamphetamine were found in the passenger seat backrest as well as seven pounds of heroin between the engine and the dashboard. It was a small seizure operation, compared to more than 300 pounds of heroin that had been seized in a truck three weeks earlier.

The situation at the U.S.–Mexico border had gotten so bad, smuggling operations so brazen, that shipments would sometimes even display visible markings identifying the drug cartel of origin, like some sort of return address. On one occasion, the lettering "LEY" was spotted on a quantity of heroin bricks that had been intercepted and confiscated. "Probably the Sinaloa guys sending it through Chino Leya," explained one CBP agent, referring to the drug distributor within the Sinaloa cartel organization in charge of a distribution route through Arizona with destinations in Cleveland and major cities in New York and New Jersey. It appeared that the Sinaloa organization didn't want this particular shipment to get lost in transit.[1]

The abuse of both illicit and licit drugs seriously undermines America's family life, economy, public health, and public safety, but sometimes it is difficult to appreciate the immensity of the problem—in economic terms and in our personal lives.

It has been conservatively estimated that the abuse of tobacco, alcohol, and illicit drugs in the United States represents a cost of $760 billion a year, when considering costs related to crime, lost work productivity, and health care. As indicated in Table 2.1, these numbers need to be considered as conservative estimates, in that they are based on available analyses that were made several years ago. Current estimates for total overall costs are likely to be closer to $1 trillion or more. Yet it may surprise you in looking at these expenditure estimates that the costs that are related to *licit* drugs, specifically alcohol and tobacco (see Chapters 9 and 10), are considerably greater than the costs that are related to *illicit* drugs.

Table 2.1 Annual cost estimates in the United States for tobacco, alcohol, illicit drugs, and prescription opioids

	Health Care	Overall	Year of Estimate
Tobacco	$168 billion	$300 billion	2010
Alcohol	$27 billion	$249 billion	2010
Illicit Drugs	$11 billion	$193 billion	2007
Prescription Opioids	$26 billion	$78.5 billion	2013

*Overall expenditures refer to costs related to crime and lost workplace productivity as well as health care.

SOURCE: National Institute on Drug Abuse. (2020, February). *Trends and statistics: Costs of substance abuse.* Bethesda, MD: National Institute on Drug Abuse. Retrieved from https://www.drugabuse.gov/related-topics/trends-statistics/.

Agreeing that we have a problem, however, is only the first step. If we are to expend our energies, as well as public funds, on ways to reduce "the drug problem," it is important to know or at least reach some degree of consensus about the set of problematic areas that need to be dealt with and which ones are most deserving of our efforts. This chapter will concern itself with the specific aspects of drug-taking behavior that are known to present significant problems for individuals and for society in general as well as responses we have made to address them.

By the numbers . . .

75 percent	Proportion of the estimated 93,000 drug overdose deaths reported in 2020 in the United States that were due to an opioid drug.
812	Number of armed robberies of pharmacies in the United States in 2016 for purposes of obtaining prescription opioids. Robberies in 2016 were slightly down from 852 reported in 2015 but 13 percent higher than in 2012 and 125 percent higher than in 2006.
300,000	The estimated death toll in Colombia from 1948 to 1958, a period of civil war in Colombian history that is generally referred to as *La Violencia*.
60,000	The estimated number of killings and disappearances of Mexico citizens from 2007 to 2014 in the course of the domestic war against Mexican drug cartels.

SOURCES: Ahmad. F. B., Rossen, L. M., and Sutton P. (2021, May 12). Provisional drug overdose death counts. National Center for Health Statistics, Centers for Disease Control and Prevention, Atlanta, GA, Table 2. Retrieved from https://www.cdc.gov/nchs/nvss/vsrr/drug-overdose-data.htm#COD_classification_definition_drug_deaths/. Breslow, J. M. (2015, July 27). The staggering death toll of Mexico's drug war. Retrieved from https://www.pbs.org/wgbh/frontline/article/the-staggering-death-toll-of-mexicos-drug-war/. Centers for Disease Control and Prevention. (2019, January 4). Katz, J., Goodnough, A., and Sanger, M. (2020, July 15). In shadow of pandemic, U.S. drug overdose deaths resurge to record. *The New York Times.* Retrieved from https://www.nytimes.com/interactive/2020/07/15/upshot/drug-overdose-deaths.html/. National Institute on Drug Abuse. (2020, March 10). Overdose death rates. Retrieved from https://www.drugabuse.gov/related-topics/trends-statistics/overdose-death-rates/. Fagerman, K. (2017, April 17). Recent pharmacy robbery statistics. *Pharmacy Times,* Cranbury, NJ. Richani, N. (2002). *Systems of violence: The political economy of war and peace in Colombia.* Albany, NY: State University of New York Press, pp. 23–28.

At the outset, it should be pointed out that, technically speaking, the real culprits are not actually the drugs themselves but rather certain forms of drug-taking behavior. If a particular drug, for example, was totally without any redeeming value (let us say it was extremely poisonous), most people would simply make every effort to avoid it. It would have no street value (other than perhaps to a terrorist or as an opportunity for suicide), and no one would object to measures that restricted access to it. It would clearly be a "bad drug." In terms of drug use, few people would care about it at all. There would be no controversy over its status.

When we characterize heroin and cocaine as "bad drugs" (that is, drugs for which we need some governmental restriction of access), we are essentially saying that society has calculated the perceived risks of heroin or cocaine use against any potential social benefits. Heroin and other drugs such as opium and morphine are excellent painkillers and have been used for medical purposes in many countries of the world for a long time. In the case of opium, we are speaking of thousands of years of medicinal use (see Chapter 4). Cocaine is an excellent local anesthetic and has been used in a select set of medical procedures in the United States (see Chapter 5). Nonetheless, society has made the decision that these positive applications in medicine are outweighed by the negative behavioral and social consequences when accessed by the general public.

The advantage of focusing on drug-taking behavior rather than simply on drugs themselves can be illustrated in terms of the bizarre but true story dating from the mid-1970s. At that time, a number of male patients were being treated for alcoholism on an in-patient basis in a Veterans Administration hospital in California. In one ward of the hospital, a patient was observed moving his bed into the bathroom. Shortly afterward, several of his fellow patients, one by one, did the same.

What was behind this curious behavior? Evidently these men, deprived of alcohol after years of alcohol abuse, had accidentally discovered that drinking huge amounts of water (more than seven gallons a day) produced a "high" by altering the acid-to-base balance of their blood. They had found a highly dangerous but psychologically effective way of getting drunk. The fact that they were also urinating approximately the same amount of water each day accounted for their decision to move into the bathroom.[2]

The point of the story is that, in this particular case, water had become a psychoactive substance without technically being a drug (recall the definition from Chapter 1). Once again, it is useful to focus on specific behaviors and their consequences rather than on the substance itself.

In this chapter, our examination of personal and social concerns associated with drug-taking behavior will focus on three main questions:

- What are the potential risks in drug-taking behavior to one's physical health and to the health of others?

- What are the potential risks to develop physical and psychological dependence?
- What is the connection between drug-taking behavior and violence and crime?

2.1 The Problem of Drug Toxicity

2.1 Describe the use of two dose-response curves in measuring drug toxicity

When we say that a drug is toxic, we are referring to the fact that it may be dangerous or poisonous or in some way has the capability of interfering with a person's normal functioning. Technically, any substance, no matter how benign, has the potential for **toxicity** if the **dose**—the amount in which the substance is taken—is high enough. The question of a drug's safety, or its relative safety when compared to other drugs, centers on the possibility that it may be toxic *at relatively low doses.* We certainly do not want people to harm themselves accidentally when taking a drug in the course of their daily lives. When there is a possibility that the *short-term* effects of a particular drug will trigger a toxic reaction, then this drug is identified as having some level of **acute toxicity**.

To understand the concept of toxicity in detail, we need to examine the graph of an S-shaped function called the **dose-response curve** (Figure 2.1a). Let us assume we have the results of data collected from laboratory tests of a hypothetical sleep-inducing drug on mice, indicating that increases in the dose level of the drug produce an increasing probability of inducing sleep. In other words, an increasing percentage of mice are affected (that is, they fall asleep) as the dose level goes up. In the example here, we find that at 10 milligrams (mg), 50 percent of the population have fallen asleep as a result, while at 50 mg, 100 percent have done so.

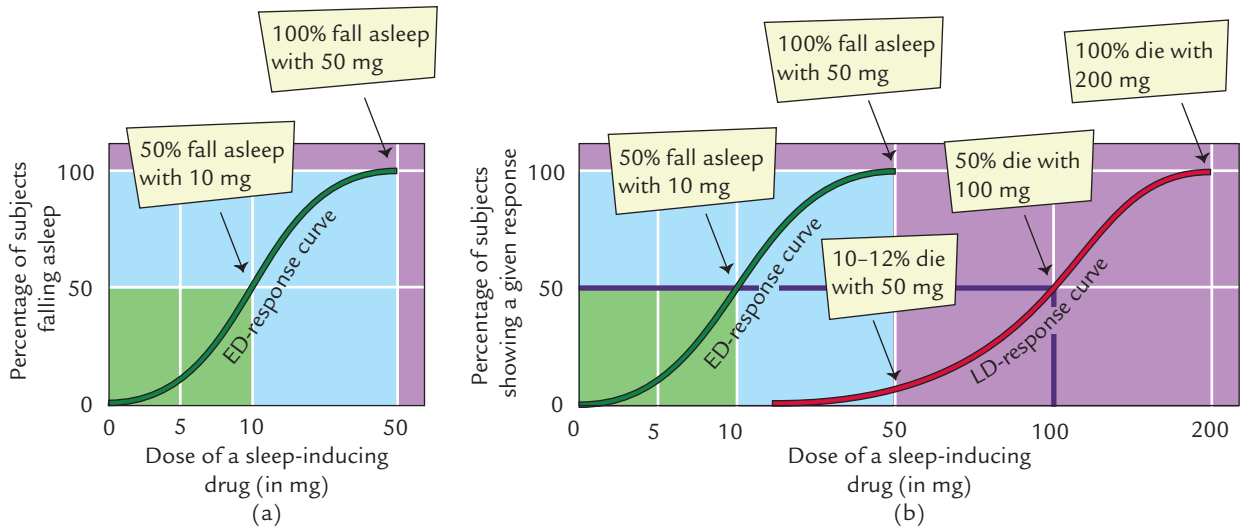
There will always be some variability in individual responses to a drug, so it is not unexpected that some mice will be internally resistant to this drug's effect (and stay awake) while others may be quite susceptible. We cannot predict *which specific animal* will fall asleep with 10 mg of the drug, only that the probability of a given animal doing so is 50 percent.

We can define the **effective dose (ED)** of a drug in terms of its effectiveness for a specific response on a test population along a scale of probabilities, from 0 percent to 100 percent. In a shorthand designation, the ED50 of a drug refers to the effective dose for 50 percent of the population; ED99 refers to the effective dose for 99 percent of the population. The ED numbers refer to the drug's effect of *producing sleep* on a specific proportion of the population being exposed to the drug.

It is important to acknowledge that the same drug could produce other reactions (muscular relaxation, for instance) at lower doses. In such cases, these drug effects would have their own separate dose-response curves. Remember that we are looking at the properties of a specific drug *effect* here, not at the overall properties of the drug itself.

Now we can look at Figure 2.1b, where the effective dose-response curve is represented next to another S-shaped dose-response function, also gathered from laboratory testing. In this case, however, the "response" is death. It makes sense that the second curve should be shifted to the right because the **lethal dose (LD)** would generally require a higher dosage of a drug than the dosage necessary to produce a nonlethal effect.

Figure 2.1 (a) An effective dose (ED)-response curve and (b) an ED-response curve (left) alongside a lethal dose (LD)-response curve (right)



In identifying a lethal dose of a drug, emphasis should be placed on the word *generally* because the lethal dose-response curve may overlap with the effective dose-response curve (as it does in this example). In the example shown, although a 100-mg dose needs to be taken to kill 50 percent of the test population, a dose of as little as 50 mg (or less) is lethal for at least a few of them. The LD50 of a drug refers to the lethal dose for 50 percent of the population; LD1 refers to a relatively smaller dose that is lethal for only 1 percent of the population.

In order to arrive at an idea of a drug's overall toxicity, it is necessary to calculate a ratio statistic based on the comparison of a specific effective dose to a specific lethal dose of the drug in question. The ratio of LD50/ED50 ("LD50 over ED50") is referred to as the **therapeutic index**. For example, if the LD50 for an analgesic (pain-killing) drug was 450 mg and the ED50 was 50 mg, then the therapeutic index for that drug would be 9. In other words, you would have to take a dose level that was nine times higher than the dose level that would be effective (that is, produce a pain-killing effect) for you to incur a 50 percent chance of dying.

It can be argued that a 50 percent probability of dying after taking a drug represents an unacceptably high risk even for a drug that has genuine benefits. To be more conservative in the direction of safety, another statistic called the **margin of safety** is calculated as the ratio, LD1/ED99. Here we have calculated the ratio between the dose that produces death in 1 percent of the population and the dose that would be effective in 99 percent. Naturally, this ratio should be as large as possible, since increases in the ratio indicate a greater difference between effectiveness and lethality. In other words, the wider the margin of safety, the safer (less toxic) the drug in question. Clearly, the margin of safety for the hypothetical drug shown in Figure 2.1 would present serious toxicity issues.

The therapeutic index and the margin of safety are helpful measures when considering the toxicity of drugs that are manufactured by recognized pharmaceutical companies and regulated by the U.S. Food and Drug Administration (FDA), keeping in mind the possibility that a person might intentionally or unintentionally take a higher-than-recommended dose of the drug. But what about the toxicity estimates in the consumption of illicit drugs? The unfortunate reality of street drugs is that the buyer has no way of knowing what they have bought until the drug has been used, and then it is frequently too late. It is an extreme case of *caveat emptor* ("Let the buyer beware").

Few if any illicit drug sellers make a pretense of being ethical business people; their only objective is to make money and avoid prosecution by the law. Frequently, the drugs they sell are diluted with either inert or highly dangerous ingredients. Adulterated heroin, for example, may contain a high proportion of milk sugar as inactive filler and a dash of quinine to simulate the bitter taste of real heroin, when the actual amount of heroin that is being sold is far less than the "standard" street dosage. At the other extreme, the toxicity of heroin may be unexpectedly high by virtue of contamination with extremely toxic synthetic opioids such as fentanyl or fentanyl analogs (see Chapter 4). The upsurge in heroin overdose deaths in recent years has been attributed to the increasing availability of contaminated street heroin.[3]

Cocaine, LSD, marijuana, and all the other illicit drugs that are available to the drug abuser, as well as look-alike drugs that are unauthorized copies of popular prescription medications, present additional hidden and unpredictable risks of toxicity. Even if drugs are procured from a friend or from someone you know, these risks remain. Neither of you is likely to know the exact ingredients. The potential for acute toxicity is always present.

Given the uncertainty that exists about the contents of many abused drugs, what measure or index can we use to evaluate the impact of acute toxicity on individuals in our society? The natural tendency is to look first to the news headlines that report all the well-known public figures who have died as a direct consequence of drug misuse or abuse (see Drugs… in Focus 2.1). Such examples of acute toxicity, however, can be misleading. Celebrities may not necessarily be representative of the drug-using population in general, and the drugs prevalent among celebrities, because of their expense or exclusivity, may not represent the drugs most frequently encountered by the rest of society. To have a more accurate picture of acute toxicity effects in the general population, it is necessary to turn to those institutions that contend with acute toxicity on a daily basis.

Drugs ... in Focus 2.1

Acute Toxicity in the News: Drug-Related Deaths

The following famous people have died either as a direct consequence or as an indirect consequence of drug misuse or abuse.

Name	Year of Death	Age	Reasons Given for Death
Marilyn Monroe, actress	1962	36	Overdose of Nembutal (a sedative-hypnotic medication); circumstances unknown
Lenny Bruce, comedian	1966	40	Accidental overdose of morphine
Judy Garland, singer and actress	1969	47	Accidental overdose of sleeping pills
Janis Joplin, singer	1970	27	Overdose of heroin and alcohol
Jimi Hendrix, singer and guitarist	1970	27	Overdose of sleeping pills