Substance Misuse
INTRODUCTION AND OVERVIEW

Preview

The United States has a serious substance misuse problem. Substance misuse is the use of alcohol or drugs in a manner, situation, amount, or frequency that could cause harm to the user or to those around them. Alcohol and drug misuse and related substance use disorders affect millions of Americans and impose enormous costs on our society. In 2015, 66.7 million people in the United States reported binge drinking in the past month and 27.1 million people were current users of illicit drugs or misused prescription drugs.[3] The accumulated costs to the individual, the family, and the community are staggering and arise as a consequence of many direct and indirect effects, including compromised physical and mental health, increased spread of infectious disease, loss of productivity, reduced quality of life, increased crime and violence, increased motor vehicle crashes, abuse and neglect of children, and health care costs.

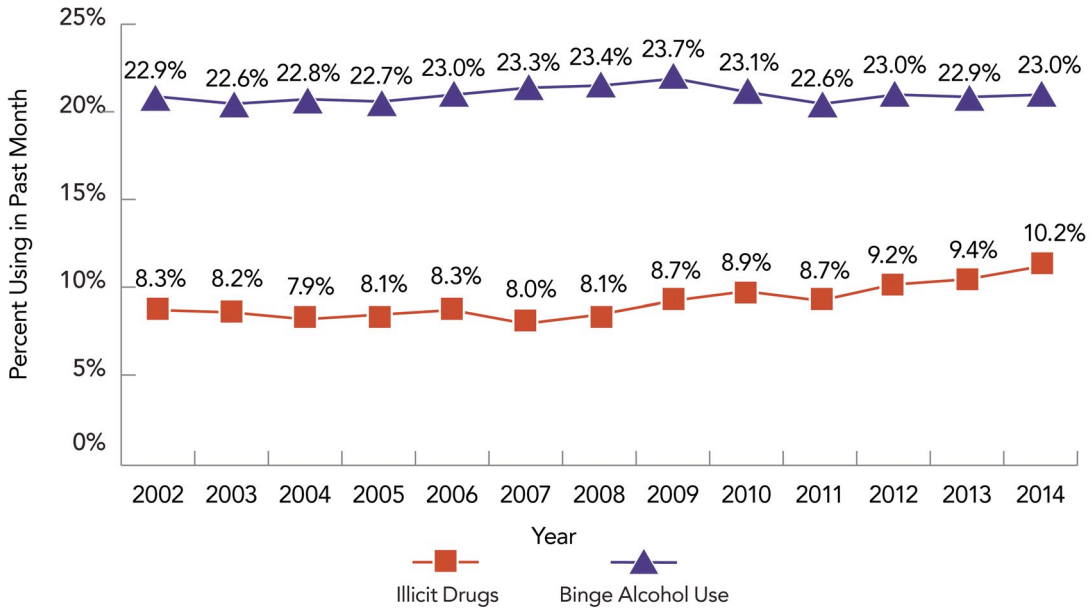
The most devastating consequences are seen in the tens of thousands of lives that are lost each year as a result of substance misuse. Alcohol misuse contributes to 88,000 deaths in the United States each year; 1 in 10 deaths among working adults are due to alcohol misuse.[6] In addition, in 2014 there were 47,055 drug overdose deaths including 28,647 people who died from a drug overdose involving some type of opioid, including prescription pain relievers and heroin—more than in any previous year on record.[7]

Even though the United States spends more than any other country on health care, it ranks 27th in life expectancy, which has plateaued or decreased for some segments of the population at a time when life expectancy continues to increase in other developed countries—and the difference is largely due to substance misuse and associated physical and mental health problems. For example, recent research has shown an unprecedented increase in mortality among middle-aged White Americans between 1999 and 2014 that was largely driven by alcohol and drug misuse and suicides, although this trend was not seen within other racial and ethnic populations such as Blacks and Hispanics.[8] An analysis from the Centers for Disease Control and Prevention (CDC) demonstrated that alcohol and drug misuse accounted for a roughly 4-month decline in life expectancy among White Americans; no other cause of death had a larger negative impact in this population.[9]

Substance misuse and substance use disorders also have serious economic consequences, costing more than $400 billion annually in crime, health, and lost productivity.[10,11] These costs are of a similar order of magnitude to those associated with other serious health problems such as diabetes, which is estimated to cost the United States $245 billion each year.[12] Alcohol misuse and alcohol use disorders alone costs the United States approximately $249 billion in lost productivity, health care expenses, law enforcement, and other criminal justice costs.[10] The costs associated with drug use disorders and use of illegal drugs and non-prescribed medications were estimated to be more than $193 billion in 2007.[11]

Despite decades of expense and effort focused on a criminal justice–based model for addressing substance use-related problems, substance misuse remains a national public health crisis that continues to rob the United States of its most valuable asset: its people. In fact, high annual rates of past-month illicit drug use and binge drinking among people aged 12 years and older from 2002 through 2014 (**Figure 1.1**) emphasize the importance of implementing evidence-based public-health-focused strategies to prevent and treat alcohol and drug problems in the United States.[13] A public health approach seeks to improve the health and safety of the population by addressing underlying social, environmental, and economic determinants of substance misuse and its consequences, to improve the health, safety, and well-being of the entire population.

Figure 1.1: Past Month Rates of Substance Use Among People Aged 12 or Older: Percentages, 2002-2014, 2014 National Survey on Drug Use and Health (NSDUH)



Notes: *The National Survey on Drug Use and Health* (NSDUH) obtains information on nine categories of illicit drugs: marijuana (including hashish), cocaine (including crack), heroin, hallucinogens, and inhalants, as well as the nonmedical use of prescription-type pain relievers, tranquilizers, stimulants, and sedatives; see the section on nonmedical use of psychotherapeutic drugs for the definition of nonmedical use. Estimates of "illicit drug use" reported from NSDUH reflect the use of these nine drug categories. Difference between the Illicit Drug Use estimate for 2002-2013 and the 2014 estimate is statistically significant at the .05 level for all years against 2014. Binge drinking for NSDUH data collected in 2014 is defined as five or more drinks on the same occasion on at least one day in the past 30 days. There was no significant difference between 2002-2013 against 2014. In 2015, changes were made to the NSDUH questionnaire and data collection procedures that do not allow comparisons between 2015 and previous years for a number of outcomes.

Source: Center for Behavioral Health Statistics and Quality, (2015).[13]

This *Surgeon General's Report* has been created because of the important health and social problems associated with alcohol and drug misuse in America. As described in this *Report*, a comprehensive approach is needed to address substance use problems in the United States that includes several key components:

- Enhanced public education to improve awareness about substance use problems and demand for more effective policies and practices to address them;
- Widespread implementation of evidence-based prevention policies and programs to prevent substance misuse and related harms;
- Improved access to evidence-based treatment services, integrated with mainstream health care, for those at risk for or affected by substance use disorders;
- Recovery support services (RSS) to assist individuals in maintaining remission and preventing relapse; and
- Research-informed public policies and financing strategies to ensure that substance misuse and use disorder services are accessible, compassionate, efficient, and sustainable.

KEY TERMS

The Public Health System. The Public Health System is defined as "all public, private, and voluntary entities that contribute to the delivery of essential public health services within a jurisdiction" and includes state and local public health agencies, public safety agencies, health care providers, human service and charity organizations, recreation and arts-related organizations, economic and philanthropic organizations, and education and youth development organizations.[2]

The Health Care System. The World Health Organization defines a health care system as (1) all the activities whose primary purpose is to promote, restore, and/or maintain health, and (2) the people, institutions, and resources, arranged together in accordance with established policies, to improve the health of the population they serve. The health care system is made up of diverse health care organizations ranging from primary care, specialty substance use disorder treatment (including residential and outpatient settings), mental health care, infectious disease clinics, school clinics, community health centers, hospitals, emergency departments, and others.[5]

Recognizing these needs, the *Report* explains the neurobiological basis for substance use disorders and provides the biological, psychological, and social frameworks for improving diagnosis, prevention, and treatment of alcohol and drug misuse. It also describes evidence-based prevention strategies, such as public policies that can reduce substance misuse problems (e.g., driving under the influence [DUI]); effective treatment strategies, including medications and behavioral therapies for treating substance use disorders; and RSS for people who have completed treatment. Additionally, the *Report* describes recent changes in health care financing, including changes in health insurance regulations, which support the integration of clinical prevention and treatment services for substance use disorders into mainstream health care practice, and defines a research agenda for addressing alcohol and drug misuse as medical conditions.

Thus, this first *Surgeon General's Report on Alcohol, Drugs, and Health* is not issued simply because of the prevalence of substance misuse or even the related devastating harms and costs, but also to help inform policymakers, health care professionals, and the general public about effective, practical, and sustainable strategies to address these problems. These strategies have the potential to substantially reduce substance misuse and related problems; promote early intervention for substance misuse and substance use disorders; and improve the availability of high-quality treatment and RSS for persons with substance use disorders.

A Public Health Model for Addressing Substance Misuse and Related Consequences

A public health systems approach to substance misuse and its consequences, including substance use disorders, aims to:

- Define the problem through the systematic collection of data on the scope, characteristics, and consequences of substance misuse;
- Identify the risk and protective factors that increase or decrease the risk for substance misuse and its consequences, and the factors that could be modified through interventions;
- Work across the public and private sector to develop and test interventions that address social, environmental, or economic determinants of substance misuse and related health consequences;
- Support broad implementation of effective prevention and treatment interventions and recovery supports in a wide range of settings; and
- Monitor the impact of these interventions on substance misuse and related problems as well as on risk and protective factors.

A healthy community is one with not just a strong health care system but also a strong public health educational system, safe streets, effective public transportation and affordable, high quality food and housing – where all individuals have opportunities to thrive. Thus, community leaders should work together to mobilize the capacities of health care organizations, social service organizations, educational systems, community-based organizations, government health agencies, religious institutions, law enforcement, local businesses, researchers, and other public, private, and voluntary entities that can contribute to the above aims. Everyone has a role to play in addressing substance misuse and its consequences and thereby improving the public health.

Substances Discussed in this Report

This *Report* defines a **substance** as a psychoactive compound with the potential to cause health and social problems, including substance use disorders (and their most severe manifestation, addiction). These substances can be divided into three major categories: Alcohol, Illicit Drugs (a category that includes prescription drugs used nonmedically), and Over-the-Counter Drugs. Some specific examples of the substances included in each of these categories are included in **Table 1.1**. Over-the-Counter Drugs are not discussed in this *Report,* but are included in **Appendix D – Important Facts about Alcohol and Drugs**.

Although different in many respects, the substances discussed in this *Report* share three features that make them important to public health and safety. *First, many people use and misuse these substances:* 66.7 million individuals in the United States aged 12 or older admitted to binge drinking in the past month and 27.1 million people aged 12 or older used an illicit drug in the past month.[3]

Table 1.1: Categories and Examples of Substances

Substance Category	Representative Examples
Alcohol	• Beer • Wine • Malt liquor • Distilled spirits
Illicit Drugs	• Cocaine, including crack • Heroin • Hallucinogens, including LSD, PCP, ecstasy, peyote, mescaline, psilocybin • Methamphetamines, including crystal meth • Marijuana, including hashish* • Synthetic drugs, including K2, Spice, and "bath salts"** • Prescription-type medications that are used for nonmedical purposes ○ Pain Relievers - Synthetic, semi-synthetic, and non-synthetic opioid medications, including fentanyl, codeine, oxycodone, hydrocodone, and tramadol products ○ Tranquilizers, including benzodiazepines, meprobamate products, and muscle relaxants ○ Stimulants and Methamphetamine, including amphetamine, dextroamphetamine, and phentermine products; mazindol products; and methylphenidate or dexmethylphenidate products ○ Sedatives, including temazepam, flurazepam, or triazolam and any barbiturates
Over-the-Counter Drugs and Other Substances	• Cough and cold medicines** • Inhalants, including amyl nitrite, cleaning fluids, gasoline and lighter gases, anesthetics, solvents, spray paint, nitrous oxide

Notes: The *Report* discusses the substances known to have a significant public health impact. These substances are also included in NSDUH. Additionally, NSDUH includes tobacco products (cigarettes, smokeless tobacco, cigars, and pipe tobacco); however, tobacco products are not discussed in this *Report* at length because they have been covered extensively in other Surgeon General's Reports.[14-17]

* As of June 2016, 25 states and the District of Columbia have legalized medical marijuana use, four states have legalized retail marijuana sales, and the District of Columbia has legalized personal use and home cultivation (both medical and recreational). It should be noted that none of the permitted uses under state laws alter the status of marijuana and its constituent compounds as illicit drugs under Schedule I of the federal Controlled Substances Act. See the section on Marijuana: A Changing Legal and Research Environment later in this chapter for more detail on this issue.

** These substances are not included in NSDUH and are not discussed in this *Report*. However, important facts about these drugs are included in Appendix D - Important Facts about Alcohol and Drugs.

Second, individuals can use these substances in a manner that causes harm to the user or those around them. This is called **substance misuse** and often results in health or social problems, referred to in this *Report* as **substance misuse problems.** Misuse can be of low severity and temporary, but it can also result in serious, enduring, and costly consequences due to motor vehicle crashes,[18,19] intimate partner and sexual violence,[20] child abuse and neglect,[21] suicide attempts and fatalities,[22] overdose deaths,[23] various forms of cancer[24] (e.g., breast cancer in women),[25] heart and liver diseases,[26] HIV/AIDS,[27] and problems related to drinking or using drugs during pregnancy, such as fetal alcohol spectrum disorders (FASDs) or neonatal abstinence syndrome (NAS).[28]

Third, prolonged, repeated misuse of any of these substances can produce changes to the brain that can lead to a ***substance use disorder****, an independent illness that significantly impairs health and function and may require specialty treatment.* Disorders can range from mild to severe. Severe and chronic substance use disorders are commonly referred to as **addictions**.

FOR MORE ON THIS TOPIC

See the section on *Diagnosing a Substance Use Disorder* later in this chapter.

Key Terms Used in the Report

Addiction: The most severe form of substance use disorder, associated with compulsive or uncontrolled use of one or more substances. Addiction is a chronic brain disease that has the potential for both recurrence (relapse) and recovery.

Substance: A psychoactive compound with the potential to cause health and social problems, including substance use disorders (and their most severe manifestation, addiction). For a list of substance categories included in this *Report* see Table 1.1. Note: Cigarettes and other tobacco products are only briefly discussed here due to extensive coverage in prior Surgeon General's Reports.[14-17]

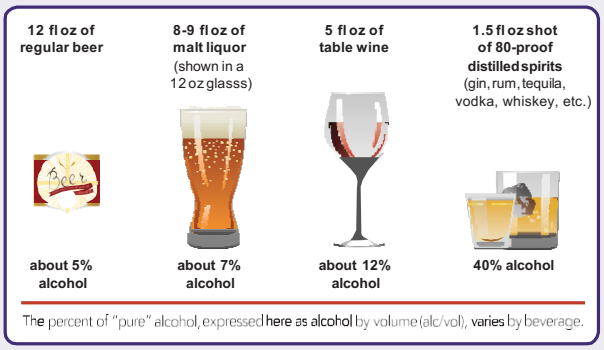
Substance Use: The use—even one time—of any of the substances in this *Report*.

Substance Misuse: The use of any substance in a manner, situation, amount, or frequency that can cause harm to users or to those around them. For some substances or individuals, any use would constitute misuse (e.g., underage drinking, injection drug use).

Binge Drinking: Binge drinking for men is drinking 5 or more standard alcoholic drinks, and for women, 4 or more standard alcoholic drinks on the same occasion on at least 1 day in the past 30 days.

Heavy Drinking: Defined by the CDC as consuming 8 or more drinks per week for women, and 15 or more drinks per week for men, and by the Substance Abuse and Mental Health Services Administration (SAMHSA), for research purposes, as binge drinking on 5 or more days in the past 30 days.

Standard Drink: Based on the *2015-2020 Dietary Guidelines for Americans*, a standard drink is defined as shown in the graphic below. All of these drinks contain 14 grams (0.6 ounces) of pure alcohol.



Source: U.S. Department of Health and Human Services and U.S. Department of Agriculture, (2015).[29]

Substance Misuse Problems or Consequences: Any health or social problem that results from substance misuse. Substance misuse problems or consequences may affect the substance user or those around them, and they may be acute (e.g., an argument or fight, a motor vehicle crash, an overdose) or chronic (e.g., a long-term substance-related medical, family, or employment problem, or chronic medical condition, such as various cancers, heart disease, and liver disease). These problems may occur at any age and are more likely to occur with greater frequency of substance misuse.

Substance Use Disorder: A medical illness caused by repeated misuse of a substance or substances. According to the Fifth Edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5),[30] substance use disorders are characterized by clinically significant impairments in health, social function, and impaired control over substance use and are diagnosed through assessing cognitive, behavioral, and psychological symptoms. Substance use disorders range from mild to severe and from temporary to chronic. They typically develop gradually over time with repeated misuse, leading to changes in brain circuits governing incentive salience (the

ability of substance-associated cues to trigger substance seeking), reward, stress, and executive functions like decision making and self-control. Multiple factors influence whether and how rapidly a person will develop a substance use disorder. These factors include the substance itself; the genetic vulnerability of the user; and the amount, frequency, and duration of the misuse. Note: A severe substance use disorder is commonly called an addiction.

Relapse: The return to drug use after a significant period of abstinence.

Recovery: A process of change through which individuals improve their health and wellness, live a self-directed life, and strive to reach their full potential. Even individuals with severe and chronic substance use disorders can, with help, overcome their substance use disorder and regain health and social function. This is called remission. When those positive changes and values become part of a voluntarily adopted lifestyle, that is called "being in recovery." Although abstinence from all substance misuse is a cardinal feature of a recovery lifestyle, it is not the only healthy, pro-social feature.

Prevalence of Substance Use, Misuse Problems, and Disorders

How widespread are substance use, misuse, and substance use disorders in the United States? The annual *National Survey on Drug Use and Health* (NSDUH) gathers data on the scope and prevalence of substance use, misuse, and related disorders, as well as utilization of substance use disorder treatment, among Americans aged 12 and older, representing more than 265 million people. Table 1.2 provides selected findings from the 2015 NSDUH. The table provides only general statistics for the United States as a whole; readers are urged to consult NSDUH's detailed tables[3] for subpopulation estimates.

KEY TERMS

Prevalence. The proportion of a population who have (or had) a specific characteristic—for example, an illness, condition, behavior, or risk factor— in a given time period.

Over 175 million persons aged 12 and older (65.7 percent of this population) reported alcohol use in the past year, with over 66 million (24.9 percent) reporting binge drinking in the past month (Table 1.2). More than 36 million (13.5 percent) reported using marijuana in the past year, 12.5 million reported misusing prescription pain relievers, and over 300,000 reported using heroin in the past year. Almost 8 percent of the population met diagnostic criteria for a substance use disorder for alcohol or illicit drugs, and another 1 percent met diagnostic criteria for both an alcohol and illicit drug use disorder. Although 20.8 million people (7.8 percent of the population) met the diagnostic criteria for a substance use disorder in 2015, only 2.2 million individuals (10.4 percent) received any type of treatment. Of those treated, 63.7 percent received treatment in specialty substance use disorder treatment programs.[3]

Several specific findings shown in Table 1.2 bear emphasis. Past year misuse of prescription psychotherapeutic drugs was reported by 18.9 million individuals in 2015 (7.1 percent of the population).[3] Within this category, prescribed opioid pain relievers (e.g., OxyContin®, Vicodin®, Lortab®) accounted for 12.5 million people, followed by tranquilizers, such as Xanax®, reported by 6.1 million people; stimulants, such as Adderall® or Ritalin®, reported by 5.3 million people; and sedatives, such as Valium®, reported by 1.5 million people.[3]

Substance Use Disorder Treatment Programs

Historically, treatment services were designed for people with severe substance use disorders (addictions), and programs were generally referred to as "specialty addiction treatment programs." Today, individuals with mild to severe substance use disorders may receive treatment. These treatments are delivered by specialty programs, as well as by more generalist providers (e.g., primary care and general mental health providers). Not everyone with a substance use disorder will need ongoing treatment; many will require only a brief intervention and monitoring. Because treatments vary substantially in level of specialization, content, duration, and setting, and because those receiving services may differ substantially in the severity, duration, and complexity of their substance use disorder, this *Report* uses the phrase "substance use disorder treatment" as the generic term to capture the broad spectrum of advice, therapies, services, and monitoring provided to the group of individuals with mild to severe substance use disorders. The programs and services that provide specialty treatment are referred to as "substance use disorder treatment programs or services."

The prevalence of past 30-day use of "any illicit drugs" (a broad category including marijuana/hashish, cocaine/crack, heroin, hallucinogens, inhalants, and prescription psychotherapeutic medications used nonmedically) rose from 9.4 percent in 2013 to 10.2 percent in 2014 among persons aged 12 and older (Figure 1.2). This 2014 prevalence rate for illicit drugs is significantly higher than it was in any year from 2002 to 2013. However, no significant changes were observed that year specifically in the use of prescription psychotherapeutic drugs, cocaine, or hallucinogens, suggesting that the observed increase was primarily related to increased use of marijuana. Marijuana was the most frequently used illicit drug (35.1 million past year users).[31] The rate for past month marijuana use in 2014 was significantly higher than it was in any year from 2002 to 2013, with the prevalence of past 30-day marijuana use rising from 7.5 percent in 2013 to 8.4 percent in 2014.[13] (Note: In 2015, changes were made to the NSDUH questionnaire and data collection procedures that do not allow for the presentation of trend data beyond 2014. For more information, see *Summary of the Effects of the 2015 NSDUH Questionnaire Redesign: Implications for Data Users.*[32])

Demographics of Substance Use

Table 1.3 and Table 1.4 show substance use by demographic characteristics. Prevalence of substance misuse and substance use disorders differs by race and ethnicity and gender, and these factors can also influence access to health care and substance use disorder treatment. Past year alcohol use for men was 68.6 percent and for women it was 62.9 percent. Past month binge alcohol use was 29.6 percent for men and 20.5 percent for women. The prevalence of past month binge alcohol use was 24.1 percent for American Indians or Alaska Natives, 25.7 percent for Hispanics or Latinos, and 26.0 for Whites. Prevalence of an alcohol use disorder was 7.8 percent for men and 4.1 percent for women. The prevalence of an illicit drug use disorder was 3.8 percent for men and 2.0 percent for women.

Table 1.2: Past Year Substance Use, Past Year Initiation of Substance Use, and Met Diagnostic Criteria for a Substance Use Disorder in the Past Year Among Persons Aged 12 Years or Older for Specific Substances: Numbers in Millions and Percentages, 2015 National Survey on Drug Use and Health (NSDUH)

Substance	Past Year Use or Misuse[v]		Past Year Initiation Among Total Population[vi]		Met Diagnostic Criteria for a Substance Use Disorder[vi,vii]	
	#	%	#	%	#	%
Alcohol	175.8	65.7	4.8	1.8	15.7	5.9
Drinking Pattern						
Binge Drinking[i]	66.7	24.9	da	da	da	da
Heavy Drinking[i]	17.3	6.5	da	da	da	da
Any Illicit Drug[ii]	47.7	17.8	nr	nr	7.7	2.9
Cocaine/Crack	36.0	1.8	1.0	0.4	0.9	0.3
Heroin	0.8	0.3	0.1	0.1	0.6	0.2
Hallucinogens	4.7	1.8	1.2	0.4	0.3	0.1
Marijuana[iii]	36.0	13.5	2.6	1.0	4.0	1.5
Inhalants	1.8	0.7	0.6	0.2	0.1	0.0
Misuse of Psychotherapeutics[iv]	18.9	7.1	nr	nr	2.7	1.0
Pain Relievers	12.5	4.7	2.1	0.8	2.0	0.8
Tranquilizers	6.1	2.3	1.4	0.5	0.7	0.3
Stimulants	5.3	2.0	1.3	0.5	0.4	0.2
Sedatives	1.5	0.6	0.4	0.2	0.2	0.1
Alcohol or Any Illicit Drugs[ii]	182.3	68.1	nr	nr	20.8	7.8
Alcohol and Any Illicit Drugs[ii]	41.3	15.4	nr	nr	2.7	1.0

Notes: Past year initiates are defined as persons who used the substance(s) for the first time in the 12 months before the date of interview. The "nr = not reported due to measurement issues" notation indicates that the estimate could be calculated based on available data but is not calculated due to potential measurement issues. The "da" indication means does not apply.

i. Binge and heavy drinking, as defined by SAMHSA, are reported only for the period of 30 days before the interview date. SAMHSA defines binge use of alcohol for males and females as "drinking five (males)/four (females) or more drinks on the same occasion (i.e., at the same time or within a couple of hours of each other) on at least 1 day in the past 30 days" and heavy use of alcohol for both males and females as "binge drinking on each of 5 or more days in the past 30 days."

ii. Illicit drug use includes the misuse of prescription psychotherapeutics or the use of marijuana, cocaine (including crack), heroin, hallucinogens, inhalants, or methamphetamine.

iii. As of June 2016, 25 states and the District of Columbia have legalized medical marijuana use. Four states have legalized retail marijuana sales; the District of Columbia has legalized personal use and home cultivation (both medical and recreational). It should be noted that none of the permitted uses under state laws alter the status of marijuana and its constituent compounds as illicit drugs under Schedule I of the federal Controlled Substances Act.

iv. Misuse of prescription-type psychotherapeutics includes the nonmedical use of pain relievers, tranquilizers, stimulants, or sedatives and does not include over-the-counter drugs.

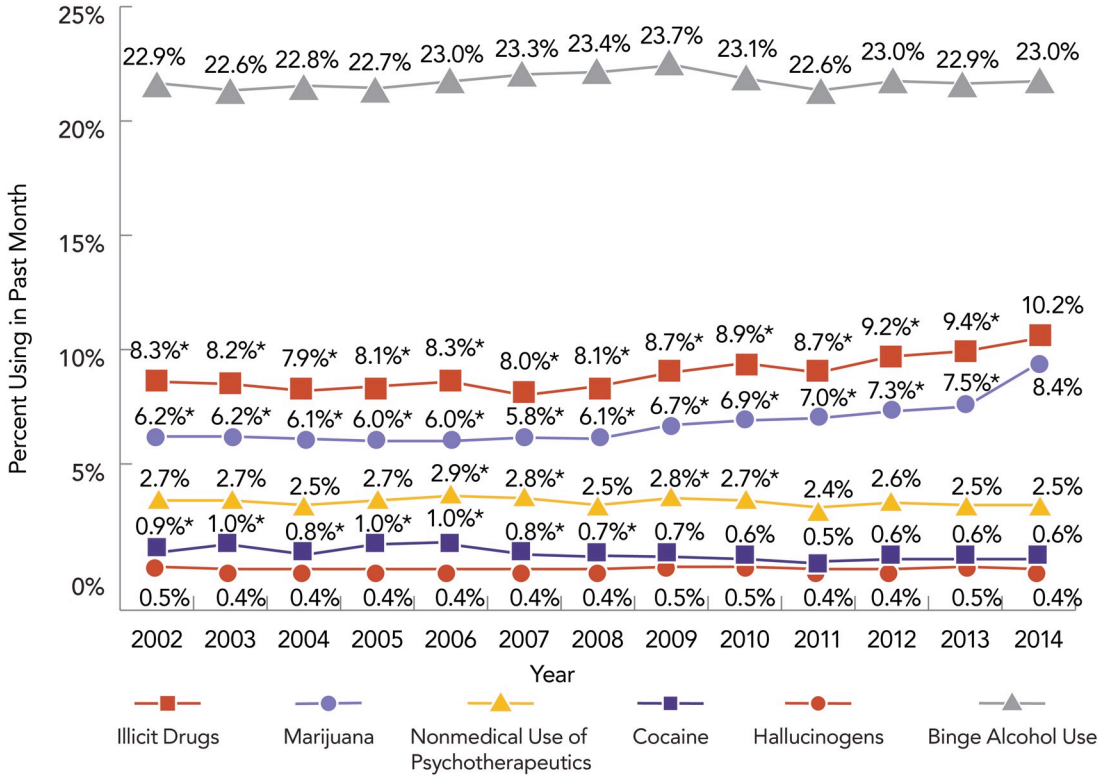
v. Estimates of misuse of psychotherapeutics and stimulants include data from new methamphetamine items added in 2005 and 2006 and are not comparable with estimates presented in NSDUH reports before 2007. See Section B.4.8 in Appendix B of the Results from the 2008 NSDUH.

vi. Estimates of misuse of psychotherapeutics and stimulants do not include data from new methamphetamine items added in 2005 and 2006.

vii. Diagnostic criteria for a substance use disorder is based on definitions found in the Fourth Edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV).

Source: Center for Behavioral Health Statistics and Quality, (2016).[3]

Figure 1.2: Trends in Binge Drinking and Past 30-Day Use of Illicit Drugs among Persons Aged 12 Years or Older, 2014 National Survey on Drug Use and Health (NSDUH)



Notes: *Difference between this estimate and the 2014 estimate is statistically significant at the .05 level. Illicit drugs include marijuana/hashish, cocaine (including crack), heroin, hallucinogens, inhalants, or prescription psychotherapeutics used non-medically. Nonmedical use of prescription psychotherapeutics includes the nonmedical use of pain relievers, tranquilizers, stimulants, or sedatives. In 2015, changes were made to the NSDUH questionnaire and data collection procedures that do not allow comparisons between 2015 and previous years for a number of outcomes.

Source: Center for Behavioral Health Statistics and Quality, (2015).[13]

Relevance of Substance Use and Misuse

It is sometimes thought that concern over substance use and misuse should be secondary to the *real* issue of substance use disorders and especially their severest manifestation, addiction, which has captured media headlines and has been linked to many health and social problems. This is an important misconception. Individuals with substance use disorders have elevated rates of substance misuse–related health and social problems and costs, but as shown in the last columns of **Table 1.2**, **Table 1.3**, and **Table 1.4**, many people who misuse substances do not meet the diagnostic criteria for a substance use disorder. For example, binge drinking at least once during the past month was self-reported by over 66 million individuals. By definition, those episodes have the potential for producing harm to the user and/or to those around them, through increases in motor vehicle crashes, violence, and alcohol-poisonings.[33] Similarly, in 2015, 12.5 million individuals misused a pain reliever in the past year—setting the stage for a potential overdose—but only 2.9 million met diagnostic criteria for a prescription medication disorder.[3]

Table 1.3: Past Year Alcohol Use, Past Month Binge Alcohol Use, and Met Diagnostic Criteria for a Substance Use Disorder in the Past Year Among Persons Aged 12 Years or Older: Numbers in Millions and Percentages, 2015 National Survey on Drug Use and Health (NSDUH)

Demographic Group	Past Year Alcohol Use		Past Month Binge Alcohol Use[ii]		Met Diagnostic Criteria for a Substance Use Disorder in Past Year[i]	
	#	%	#	%	#	%
Alcohol						
Male	89.0	68.6	38.4	29.6	10.1	7.8
Female	86.9	62.9	28.3	20.5	5.6	4.1
White	119.9	70.3	44.4	26.0	10.4	6.1
Black or African American	18.6	58.0	7.5	23.4	1.6	4.9
American Indian or Alaska Native	0.7	51.4	0.3	24.1	0.1	9.7
Native Hawaiian or Other Pacific Islander	0.4	51.1	0.1	17.8	0.04	5.4
Asian	7.8	53.1	2.1	14.0	0.5	3.2
Two or More Races	2.7	57.8	1.1	22.9	0.3	6.2
Hispanic or Latino	25.7	59.0	11.2	25.7	2.8	6.4

Table 1.4: Past Year Substance Use, Past 30-Day Illicit Drug Use, and Met Diagnostic Criteria for a Substance Use Disorder in the Past Year Among Persons Aged 12 Years or Older: Numbers in Millions and Percentages, 2015 National Survey on Drug Use and Health (NSDUH)

Demographic Group	Past Year Use		Past 30-Day Illicit Drug Use		Met Diagnostic Criteria for a Substance Use Disorder in Past Year[i]	
	#	%	#	%	#	%
Any Illicit Drug[iii]						
Male	26.6	20.5	16.2	12.5	5.0	3.8
Female	21.2	15.3	10.9	7.9	2.8	2.0
White	30.5	17.9	17.4	10.2	4.8	2.8
Black or African American	6.6	20.7	4.0	12.5	1.1	3.5
American Indian or Alaska Native	0.3	22.9	0.2	14.2	0.06	4.1
Native Hawaiian or Other Pacific Islander	0.1	20.5	0.07	9.8	0.03	4.5
Asian	1.4	9.2	0.6	4.0	0.2	1.2
Two or More Races	1.3	27.1	0.8	17.2	0.2	4.9
Hispanic or Latino	7.4	17.2	4.0	9.2	1.3	3.0

i. Diagnostic criteria for a substance use disorder is based on definitions found in the Fourth Edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV).

ii. Binge drinking, as defined by SAMHSA, are reported only for the period of 30 days before the interview date. SAMHSA defines binge use of alcohol for males and females as "drinking five (males)/four (females) or more drinks on the same occasion (i.e., at the same time or within a couple of hours of each other) on at least 1 day in the past 30 days.

iii. Illicit drugs include marijuana/hashish, cocaine (including crack), heroin, hallucinogens, inhalants, or misuse of prescription-type psychotherapeutics, including data from original methamphetamine questions but not including new methamphetamine items added in 2005 and 2006.

Source: Center for Behavioral Health Statistics and Quality, (2016).[3]

The clear implications of these data are that a comprehensive approach to reducing the misuse of alcohol and drugs—one that includes the implementation of effective prevention programs and policy strategies as well as high-quality treatment services—is needed to reduce the problems and costs of substance misuse in the United States. In fact, greater impact is likely to be achieved by reducing substance misuse in the general population—that is, among people who are *not* addicted—than among those with severe substance use problems. Of course, efforts to reduce general population rates of substance use and misuse are also likely to reduce rates of substance use disorders, because substance use disorders typically develop over time following repeated episodes of misuse (often at escalating rates) that result in the progressive changes to brain circuitry that underlie addiction.

FOR MORE ON THIS TOPIC

See Chapter 2 - *The Neurobiology of Substance Use, Misuse, and Addiction.*

Costs and Impact of Substance Use and Misuse

Alcohol misuse, illicit drug use, misuse of medications, and substance use disorders are estimated to cost the United States more than $400 billion in lost workplace productivity (in part, due to premature mortality), health care expenses, law enforcement and other criminal justice costs (e.g., drug-related crimes), and losses from motor vehicle crashes.[10,11] Furthermore, about three quarters of the costs associated with alcohol use were due to binge drinking, and about 40 percent of those costs were paid by government, emphasizing the huge cost of alcohol misuse to taxpayers.[34]

These costs are not unique to the United States. A 2010 study examined the global burden of disability attributable to substance misuse problems and disorders, focusing particularly on lost ability to work and years of life lost to premature mortality. Costs were calculated for 20 age groups and both sexes in 187 countries.[35] Mental and substance use disorders were the leading causes of years lived with disability worldwide, largely because these problems strike individuals early in their lives and can continue—especially if untreated—for long periods.

In addition to the costs to society, substance misuse can have many direct and indirect health and personal consequences for individuals. The direct effects on the user depend on the specific substances used, how much and how often they are used, how they are taken (e.g., orally vs. injected), and other factors. Acute effects can range from changes in mood and basic body functions, such as heart rate or blood pressure, to overdose and death. Alcohol misuse and drug use can also have long-term effects on physical and mental health and can lead to substance use disorders. For example, drug use is associated with chronic pain conditions and cardiovascular and cardiopulmonary diseases.[36,37] Alcohol misuse is associated with liver and pancreatic diseases, hypertension, reproductive system disorders, trauma, stroke, FASD, and cancers of the oral cavity, esophagus, larynx, pharynx, liver, colon, and rectum.[26,28] For breast cancer, studies have shown that even moderate drinking may increase the risk.[25] Although alcohol consumption is associated with adverse health effects as noted above, the *2015-2020 Dietary Guidelines for*

Americans indicate that moderate alcohol use can be part of a healthy diet, but only when used by adults of legal drinking age.[i]

In addition, alcohol and drug use by pregnant women can have profound effects on the developing fetus. Alcohol use during pregnancy can lead to a wide range of disabilities in children, the most severe of which is FASD, characterized by intellectual disabilities, speech and language delays, poor social skills, and sometimes facial deformities. Use of drugs, such as opioids during pregnancy, can result in NAS, a drug-withdrawal syndrome requiring medical intervention and extended hospital stay for newborns. Use of some drugs, such as cocaine, during pregnancy may also lead to premature birth or miscarriage. In addition, substance use during pregnancy may interfere with a child's brain development and result in later consequences for mental functioning and behavior.

Substance misuse also can affect a user's nutrition and sleep, as well as increase the risk for trauma, violence, injury, and contraction of communicable diseases, such as HIV/AIDS and Hepatitis C. These consequences can all contribute to the spectrum of public health consequences of substance misuse and need to be considered both independently and collectively when developing and implementing clinical and public health interventions.

Substance misuse problems can also result in other serious and sometimes fatal health problems and extraordinary costs; they may also lead to unexpected death from other causes. Three examples of these serious, sometimes lethal, problems related to substance misuse are highlighted below.

Driving Under the Influence

In 2014, 9,967 people were killed in motor vehicle crashes while driving under the influence of alcohol, representing nearly one third (31 percent) of all traffic-related fatalities in the United States.[38] DUI continues to be among the most frequent causes for arrests every year.[39] But at approximately 1.3 million per year, these arrests represent only about 1 percent of the actual alcohol-impaired driving incidents reported in national surveys, suggesting that there are many more people who drive while impaired that have not been arrested, putting themselves and others at high risk of being harmed.[18,40] In addition to the deaths that result from DUI, the National Highway Traffic Safety Administration (NHTSA) estimates that DUI costs the United States more than $44 billion each year in prosecution, higher insurance rates, higher taxes, medical claims, and property damage.[41]

As important as they are, these statistics account for only alcohol-related driving impairment and fail to measure other impairing substances. A study by NHTSA tested oral fluid and blood specimens from a random sample of drivers at the roadside (during daytime on Friday or nighttime Friday to Sunday) and

---

i Moderate alcohol use is defined by the *2015-2020 Dietary Guidelines for Americans* as up to 1 drink per day for women and up to 2 drinks per day for men—and only by adults of legal drinking age. Many individuals should not consume alcohol, including individuals who are taking certain over-the-counter or prescription medications or who have certain medical conditions, those who are recovering from an alcohol use disorder or are unable to control the amount they drink, and anyone younger than age 21 years. In addition, drinking during pregnancy may result in negative behavioral or neurological consequences in the offspring.

found 12 to 15 percent had used one or more illegal substances.[42] Drivers tested positive for drugs in approximately 16 percent of all motor vehicle crashes.[43]

Overdose Deaths

Overdose deaths are typically caused by consuming substances at high intensity and/or by consuming combinations of substances such as alcohol, sedatives, tranquilizers, and opioid pain relievers to the point where critical areas in the brain that control breathing, heart rate, and body temperature stop functioning.

Alcohol Overdose (Alcohol Poisoning)

The CDC reports more than 2,200 alcohol overdose deaths in the United States each year—an average of six deaths every day.[44] More than three quarters (76 percent) of alcohol overdose deaths occur among adults between ages 35 and 64, and 76 percent of those who die from alcohol overdose are men.

Drug Overdose (Illicit and Prescription Drugs)

KEY CONCEPT

The Opioid Crisis. Over-prescription of powerful opioid pain relievers beginning in the 1990s led to a rapid escalation of use and misuse of these substances by a broad demographic of men and women across the country.[1] This led to a resurgence of heroin use, as some users transitioned to using this cheaper street cousin of expensive prescription opioids. As a result, the number of people dying from opioid overdoses soared—increasing nearly four-fold between 1999 and 2014.[4]

Opioid analgesic pain relievers are now the most prescribed class of medications in the United States, with more than 289 million prescriptions written each year.[45,46] The increase in prescriptions of opioid pain relievers has been accompanied by dramatic increases in misuse (**Table 1.1**) and by a more than 200 percent increase in the number of emergency department visits from 2005 to 2011.[47] In 2014, 47,055 drug overdose deaths occurred in the United States, and 61 percent of these deaths were the result of opioid use, including prescription opioids and heroin.[7] Heroin overdoses have more than tripled from 2010 to 2014.[7] Heroin overdoses were more than five times higher in 2014 (10,574) then ten years before in 2004 (1,878). Additionally, rates of cocaine overdose were higher in 2014 than in the previous six years (5,415 deaths from cocaine overdose). In 2014, there were 17,465 overdoses from illicit drugs and 25,760 overdoses from prescription drugs.[48] Drug overdose deaths also occur as a result of the illicit manufacturing and distribution of synthetic opioids, such as fentanyl, and the illegal diversion of prescription opioids. Illicit fentanyl, for example, is often combined with heroin or counterfeit prescription drugs or sold as heroin, and may be contributing to recent increases in drug overdose deaths.[7,49]

Intimate Partner Violence, Sexual Assault, and Rape

Intimate partner violence, sexual assault, and rape are crimes with long-lasting effects on victims and great cost to society.[50,51] These crimes happen to both women and men and are often associated with substance use. A recent national survey found that 22 percent of women and 14 percent of men reported experiencing severe physical violence from an intimate partner in their lifetimes.[52] In this survey, 19.3 percent of women and 1.7 percent of men reported being raped in their lifetimes, while 43.9 percent of women and 23.4 percent of men reported some other form of sexual violence in their lifetimes.[52] Substance misuse is often related to these crimes.

Numerous studies have found a high correlation between substance use and intimate partner violence,[53-56] although this does not mean that substance use causes intimate partner violence. In addition to evidence from the criminal justice arena, recent systematic reviews have found that substance use is both a risk factor for and a consequence of intimate partner violence.[57-59]

A recent survey of sexual assault and sexual misconduct on college campuses found that use of alcohol and drugs are important risk factors for nonconsensual sexual contact among undergraduate, graduate, and professional students.[20] It is clear that substance use and intimate partner violence and sexual assault are closely linked; however, more research is needed on the nature of the relationship between substance use and these forms of violence to determine how substance use contributes to the perpetration of violence and victimization and how violence contributes to subsequent substance use among both perpetrators and victims.

Vulnerability to Substance Misuse Problems and Disorders

Risk and Protective Factors: Keys to Vulnerability

Substance misuse problems and substance use disorders are not inevitable. An individual's vulnerability may be partly predicted by assessing the nature and number of their community, caregiver/family, and individual-level risk and protective factors.

FOR MORE ON THIS TOPIC

See Chapter 3 - *Prevention Programs and Policies.*

Significant community-level risk factors for substance misuse and use disorders include easy access to inexpensive alcohol and other substances. Caregiver/family-level risk factors include low parental monitoring, a family history of substance use or mental disorders, and high levels of family conflict or violence. At the individual level, major risk factors include current mental disorders, low involvement in school, a history of abuse and neglect, and a history of substance use during adolescence, among others.[60]

Community-level protective factors include higher cost for alcohol and other drugs (often achieved by increasing taxes on these products); regulating the number and concentration of retailers selling various substances (e.g., density of alcohol outlets or marijuana dispensaries); preventing illegal alcohol and other drug sales by enforcing existing laws and holding retailers accountable for harms caused by illegal sales (e.g., commercial host [dram shop] liability); availability of healthy recreational and social activities; and other population-level policies and their enforcement.[61] Caregiver/family-level protective factors include support and regular monitoring by parents.[60] Some important individual-level protective factors include involvement in school, engagement in healthy recreational and social activities, and good coping skills.[60]

Three important points about vulnerability should be highlighted. First, no single individual or community-level factor determines whether an individual will develop a substance misuse problem or disorder. Second, most risk and protective factors can be modified through preventive programs and

policies to reduce vulnerability. Third, although substance misuse problems and disorders may occur at any age, adolescence and young adulthood are particularly critical at-risk periods. Research now indicates that the majority of those who meet criteria for a substance use disorder in their lifetime started using substances during adolescence and met the criteria by age 20 to 25.[62-64] One likely reason for this vulnerability in adolescence and young adulthood is that alcohol and other substances have particularly potent effects on developing brain circuits, and recent scientific findings indicate that brain development is not complete until approximately age 21 to 23 in women and 23 to 25 in men.[65-67] Among the last brain regions to reach maturity is the prefrontal cortex, the brain region primarily responsible for "adult" abilities, such as delay of reward, extended reasoning, and impulse control. This area of the brain is one of the most affected regions in a substance use disorder.

FOR MORE ON THIS TOPIC

See Chapter 2 - *The Neurobiology of Substance Use, Misuse, and Addiction.*

Substance misuse can begin at any age. Therefore, it is important to focus on prevention of substance misuse across the lifespan as well as the prevention of substance use disorders.

Diagnosing a Substance Use Disorder

Changes in Understanding and Diagnosis of Substance Use Disorders

Repeated, regular misuse of any of the substances listed in **Figure 1.2** may lead to the development of a substance use disorder. Severe substance use disorders are characterized by compulsive use of substance(s) and impaired control of substance use. Substance use disorder diagnoses are based on criteria specified in the American Psychiatric Association's *Diagnostic and Statistical Manual of Mental Disorders* (DSM). Much of the substance use disorder data included in this *Report* is based on definitions included in the DSM-IV, which described two distinct disorders: substance abuse and substance dependence, with specific diagnostic criteria for each. Anyone meeting one or more of the abuse criteria—which focused largely on the negative consequences associated with substance misuse, such as being unable to fulfill family or work obligations, experiencing legal trouble, or engaging in hazardous behavior as a result of drug use—would receive the "abuse" diagnosis. Anyone with three or more of the dependence criteria, which included symptoms of drug tolerance, withdrawal, escalating and uncontrolled substance use, and the use of the substance to the exclusion of other activities, would receive the "dependence" diagnosis. Notably, addiction is not listed as a formal diagnosis in the DSM. However, substance

KEY CONCEPT

Misuse versus Abuse. This *Report* uses the term substance misuse, a term that is roughly equivalent to substance *abuse*. Substance abuse, an older diagnostic term, was defined as use that is unsafe (e.g., drunk or drugged driving), use that leads a person to fail to fulfill responsibilities or gets them in legal trouble, or use that continues despite causing persistent interpersonal problems like fights with a spouse.

However, "substance abuse" is increasingly avoided by professionals because it can be shaming. Instead, substance misuse is now the preferred term. Although misuse is not a diagnostic term, it generally suggests use in a manner that could cause harm to the user or those around them.

dependence was often used interchangeably with addiction, and tolerance and withdrawal were considered, by many, cardinal features of addiction.

The DSM-5, which is the fifth and current version of the DSM, integrates the two DSM-IV disorders, substance abuse and substance dependence, into a single disorder called *substance use disorder* with *mild*, *moderate*, and *severe* sub-classifications. Individuals are evaluated for a substance use disorder based on 10 or 11 (depending on the substance) equally weighted diagnostic criteria (Table 1.5). Most of these overlap with those used to diagnose DSM-IV dependence and abuse. Individuals exhibiting fewer than two of the symptoms are not considered to have a substance use disorder. Those exhibiting two or three symptoms are considered to have a "mild" disorder, four or five symptoms constitutes a "moderate" disorder, and six or more symptoms is considered a "severe" substance use disorder.[30] In this *Report*, addiction is used to refer to substance use disorders at the severe end of the spectrum and are characterized by compulsive substance use and impaired control over use.

KEY TERMS

Tolerance. Alteration of the body's responsiveness to alcohol or a drug such that higher doses are required to produce the same effect achieved during initial use.

Withdrawal. A set of symptoms that are experienced when discontinuing use of a substance to which a person has become dependent or addicted, which can include negative emotions such as stress, anxiety, or depression, as well as physical effects such as nausea, vomiting, muscle aches, and cramping, among others. Withdrawal symptoms often lead a person to use the substance again.

Table 1.5: Criteria for Diagnosing Substance Use Disorders

Diagnostic Criteria for Substance Use Disorders
Using in larger amounts or for longer than intended
Wanting to cut down or stop using, but not managing to
Spending a lot of time to get, use, or recover from use
Craving
Inability to manage commitments due to use
Continuing to use, even when it causes problems in relationships
Giving up important activities because of use
Continuing to use, even when it puts you in danger
Continuing to use, even when physical or psychological problems may be made worse by use
Increasing tolerance
Withdrawal symptoms

Notes: Fewer than 2 symptoms = no disorder; 2-3 = mild disorder; 4-5 = moderate disorder; 6 or more = severe disorder.

Source: American Psychiatric Association, (2013).[30]

Implications of the New Diagnostic Criteria

The new diagnostic criteria are likely to reduce the "all or nothing" thinking that has characterized the substance use field. Tolerance and withdrawal remain major clinical symptoms, but they are no longer the deciding factor in whether an individual "has an addiction." Substance use disorders, including addiction, can occur with *all* substances listed in Table 1.1, *not* just those that are able to produce

What is an Intervention?

Intervention here and throughout this *Report* means a professionally delivered program, service, or policy designed to prevent substance misuse or treat an individual's substance use disorder. It does not refer to an arranged meeting or confrontation intended to persuade a friend or loved one to quit their substance misuse or enter treatment—the type of "intervention" sometimes depicted on television. Planned surprise confrontations of the latter variety—a model developed in the 1960s, sometimes called the "Johnson Intervention"—have not been demonstrated to be an effective way to engage people in treatment.[68] Confrontational approaches in general, though once the norm even in many behavioral treatment settings, have not been found effective and may backfire by heightening resistance and diminishing self-esteem on the part of the targeted individual.[69]

tolerance and withdrawal. It is also important to understand that substance use disorders do not occur immediately but over time, with repeated misuse and development of more symptoms. This means that it is both possible and highly advisable to identify emerging substance use disorders, and to use evidence-based early interventions to stop the addiction process before the disorder becomes more chronic, complex, and difficult to treat.

This type of proactive clinical monitoring and management is already done within general health care settings to address other potentially progressive illnesses that are brought about by unhealthy behaviors.[70] For example, patients with high blood pressure may be told to adjust their activity and stress in order to reduce the progression of hypertension. Typically, these individuals are also clinically monitored for key symptoms to ensure that symptoms do not worsen.

FOR MORE ON THIS TOPIC

See Chapter 6 - *Health Care Systems and Substance Use Disorders.*

There are compelling reasons to apply similar procedures in emerging cases of substance misuse. Routine screening for alcohol and other substance use should be conducted in primary care settings to identify early symptoms of a substance use disorder (especially among those with known risk and few protective factors). This should be followed by informed clinical guidance on reducing the frequency and amount of substance use, family education to support lifestyle changes, and regular monitoring.

Research has shown that substance use disorders are similar in course, management, and outcome to other chronic illnesses, such as hypertension, diabetes, and asthma.[71] Unfortunately, substance use disorders have not been treated, monitored, or managed like other chronic illnesses, nor has care for these conditions been covered by insurance to the same degree. Nonetheless, it is possible to adopt the same type of chronic care management approach to the treatment of substance use disorders as is now used to manage most other chronic illnesses.[70-72] Evidence-based behavioral interventions, medications, social support services, clinical monitoring, and RSS make this type of chronic care management possible, often by the same health care teams that currently treat other chronic illnesses.

FOR MORE ON THIS TOPIC

See Chapter 4 - *Early Intervention, Treatment, and Management of Substance Use Disorders* and *Chapter 6 - Health Care Systems and Substance Use Disorders.*

Evidence also shows that such an approach will improve the effectiveness of treatments for substance use disorders. Remission of substance use and even full recovery can now be achieved if evidence-based care is provided for adequate periods of time, by properly trained health care professionals, and augmented by supportive monitoring, RSS, and social services. This fact is supported by a national survey showing that there are more than 25 million individuals who once had a problem with alcohol or drugs who no longer do.[73]

The Separation of Substance Use Treatment and General Health Care

Until quite recently, substance misuse problems and substance use disorders were viewed as social problems, best managed at the individual and family levels, and sometimes through the existing social infrastructure—such as schools and places of worship, and, when necessary, through civil and criminal justice interventions.[74] In the 1970s, when rates of substance misuse increased, including by college students and Vietnam War veterans, most families and traditional social services were not prepared to handle this problem.[75] Despite a compelling national need for treatment, the existing health care system was neither trained to care for nor especially eager to accept patients with substance use disorders.

For these reasons, a new system of substance use disorder treatment programs was created, but with administration, regulation, and financing placed outside mainstream health care.[74,75] This meant that with the exception of detoxification in hospital-based settings, virtually all treatment was delivered by programs that were geographically, financially, culturally, and organizationally separate from mainstream health care. Of equal historical importance was the decision to focus treatment only on addiction. This left few provisions for detecting or intervening clinically with the far more prevalent cases of early-onset, mild, or moderate substance use disorders.

Creating this system of substance use disorder treatment programs was a critical element in addressing the burgeoning substance use disorder problems in our nation. However, that separation also created unintended and enduring impediments to the quality and range of care options. For example, separate systems for substance use disorder treatment and other health care needs may have exacerbated the negative public attitudes toward people with substance use disorders. Additionally, the pharmaceutical industry was hesitant to invest in the development of new medications for individuals with substance use disorders, because they were not convinced that a market for these medications existed. Consequently, until the 1990s, few U.S. Food and Drug Administration (FDA) approved medications were available to treat addictions.[76,77]

Meanwhile, despite numerous research studies documenting high prevalence rates of substance use disorders among patients in emergency departments, hospitals, and general medical care settings, mainstream health care generally failed to recognize or address substance use disorders.[78] In fact, a recent study by the CDC found that in 2011, only 1 in 6 United States adults and 1 in 4 binge drinkers had *ever* been asked by a health professional about their drinking behavior.[79] Furthermore, the percent of adult binge drinkers who had been asked about their drinking had not changed since 1997, reflecting the challenges involved in fostering implementation of screening and counseling services for alcohol

misuse in clinical settings. This has been a costly mistake, with often deadly consequences. A recent study showed that the presence of a substance use disorder often doubles the odds for the subsequent development of chronic and expensive medical illnesses, such as arthritis, chronic pain, heart disease, stroke, hypertension, diabetes, and asthma.[80]

In this regard, fatal medication errors due to unforeseen interactions between a prescribed medication for a diagnosed medical condition and unscreened, unaddressed patient substance use increased ten-fold over the past 20 years.[81] To address this problem, researchers suggested "…(1) screening patients for use…of alcohol and/or street drugs; (2) taking extra precautions when prescribing medicines with known dangerous interactions with alcohol and/or street drugs; and (3) teaching the patient the risks of mixing medicines with alcohol and/or street drugs."[81] Similar recommendations focusing on prescribed opioids have been issued by the CDC to curb the rise in opioid overdose deaths.[82] Again, screening for substance use and substance use disorders before and during the course of opioid prescribing, combined with patient education, are recommended.[82]

Yet despite these and other indications of extreme threats to health care quality, safety, effectiveness, and cost containment, as of this writing, few general health care organizations screen for, or offer services for, the early identification and treatment of substance use disorders. Moreover, few medical, nursing, dental, or pharmacy schools teach their students about substance use disorders;[83-86] and, until recently, few insurers offered adequate reimbursement for treatment of substance use disorders.[87,88]

Recent Changes in Health Care Policy and Law

FOR MORE ON THIS TOPIC

See Chapter 6 - *Health Care Systems and Substance Use Disorders.*

The longstanding separation of substance use disorders from the rest of health care began to change with enactment of the Paul Wellstone and Pete Domenici Mental Health Parity and Addiction Equity Act of 2008 (MHPAEA) and the Affordable Care Act in 2010.[89,90] MHPAEA requires that the financial requirements and treatment limitations imposed by health plans and insurers for substance use disorders be no more restrictive than the financial requirements and treatment limitations they impose for medical and surgical conditions. The Affordable Care Act requires the majority of United States health plans and insurers to offer prevention, screening, brief interventions, and other forms of treatment for substance use disorders.[89]

It is difficult to overstate the importance of these two Acts for creating a public health-oriented approach to reducing substance misuse and related disorders. These laws and related changes in health care financing are creating incentives for health care organizations to integrate substance use disorder treatment with general health care. Many questions remain, but those questions are no longer *whether* but *how* this much-needed integration will occur. These changes combine to create a new, challenging but exceptionally promising era for the prevention and treatment of substance use disorders and set the context for this *Report.*

Marijuana: A Changing Legal and Research Environment

Although this *Report* does not examine the issue of marijuana legalization, its continually evolving legal status is worth mentioning because of implications for both research and policy. As mentioned elsewhere, marijuana is the most commonly used illicit drug in the United States, with 22.2 million people aged 12 or older using it in the past month.[3] In recent years marijuana use has become more socially acceptable among both adults and youth, while perceptions of risk among adolescents of the drug's harms have been declining over the past 13 years.[91]

As use of marijuana and its constituent components and derivatives becomes more widely accepted, it is critical to strengthen understanding of the effects and consequences for individual users and for public health and safety. Conducting such research can be complex as laws and policies vary significantly from state to state. For example, some states use a decriminalization model, which means production and sale of marijuana are still illegal and no legal marijuana farms, distributors, companies, stores, or advertising are permitted. Through ballot initiatives, other states have "legalized" marijuana use, which means they allow the production and sales of marijuana for personal use. Additionally, some states have legalized marijuana for medical purposes, and this group includes a wide variety of different models dictating how therapeutic marijuana is dispensed. The impacts of state laws regarding therapeutic and recreational marijuana are still being evaluated, although the differences make comparisons between states challenging.[92]

As of June 2016, 25 states and the District of Columbia have legalized medical marijuana use. Four states have legalized retail sales; the District of Columbia has legalized personal use and home cultivation (both medical and recreational), with more states expecting to do so. None of the permitted uses under state laws alters the status of marijuana and its constituent compounds as illicit drugs under Schedule I of the federal Controlled Substances Act.[93] It should also be noted that use for recreational purposes has not been legalized by any jurisdiction for people under age 21, and few jurisdictions have legalized medical marijuana for young people. While laws are changing, so too is the drug itself with average potency more than doubling over the past decade (1998 to 2008).[94] The ways marijuana is used are also changing – in addition to smoking, consuming edible forms like baked goods and candies, using vaporizing devices, and using high-potency extracts and oils (e.g., "dabbing") are becoming increasingly common.[95] Because these products and methods are unregulated even in states that have legalized marijuana use, users may not have accurate information about dosage or potency, which can lead and has led to serious consequences such as hospitalizations for psychosis and other overdose-related symptoms.[95] Marijuana use can also impair driving skills and, while estimates vary, is linked to a roughly two-fold increase in accident risk.[96-98] The risk is compounded when marijuana is used with alcohol.[96,99]

There is a growing body of research suggesting the potential therapeutic value of marijuana's constituent cannabinoid chemicals in numerous health conditions including pain, nausea, epilepsy, obesity, wasting disease, addiction, autoimmune disorders, and other conditions. Given the possibilities around therapeutic use, it is necessary to continue to explore ways of easing existing barriers to research. Marijuana has more than 100 constituent cannabinoid compounds, with cannabidiol (CBD) and tetrahydrocannabinol (THC, the chemical responsible for most of marijuana's intoxicating effects) being the most well-studied. Evidence collected so far in clinical investigations of the marijuana plant is still insufficient to meet

FDA standards for a finding of safety and efficacy for any therapeutic indications. However, the FDA has approved three medications containing synthetically derived cannabinoids: Marinol capsules and Syndros oral solution (both containing dronabinol, which is identical in chemical structure to THC), and Cesamet capsules (containing nabilone, which is similar in structure to THC) for severe nausea and wasting in certain circumstances, for instance in AIDS patients. Recognizing the potential therapeutic importance of compounds found in marijuana, the FDA has granted Fast Track designation to four development programs of products that contain marijuana constituents or their synthetic equivalents. The therapeutic areas in which products are being developed granted Fast Track by FDA include the treatment of pain in patients with advanced cancer; treatment of Dravet syndrome (two programs), a rare and catastrophic treatment-resistant form of childhood epilepsy; and treatment of neonatal hypoxic ischemic encephalopathy, brain injury resulting from oxygen deprivation during birth.

Additionally, there are clinical investigations for the treatment of refractory seizure syndromes, including Lennox Gastaut Syndrome, and for treatment of post-traumatic stress disorder (PTSD). However, further exploration of these issues always requires consideration of the serious health and safety risks associated with marijuana use. Research shows that risks can include respiratory illnesses, dependence, mental health-related problems, and other issues affecting public health such as impaired driving. Within this context of changing marijuana policies at the state level, research is needed on the impact of different models of legalization and how to minimize harm based on what has been learned from legal substances subject to misuse, such as alcohol and tobacco. Continued assessment of barriers to research and surveillance will help build the best scientific foundation to support good public policy while also protecting the public health.

Purpose, Focus, and Format of the *Report*

The Audience

This *Report* is intended for individuals, families, community members, educators, health care professionals, public health practitioners, advocates, public policymakers, and researchers who are looking for effective, sustainable solutions to the problems created by alcohol and other substances. To meet those needs, the *Report* reviews and synthesizes the most important and reliable scientific findings in key topic areas and distills those findings into recommendations for:

- Improving public awareness of substance misuse and related problems;
- Reducing negative attitudes related to substance use disorders;
- Closing the gap between what is known to reduce substance misuse at the population level and within specific subgroups, and the implementation of these effective programs, policies, and environmental strategies at the federal, state, and community levels;
- Understanding the need for and effectiveness of programs for high-risk populations;
- Expanding the capacity of health care systems to deliver evidence-based substance use disorder treatment;
- Integrating financing and health care system models to facilitate access and affordability of care for substance use disorders;

- Continuing to build the science base of effective prevention, treatment, and recovery practices and policies; and
- Engaging stakeholders in reducing substance use and misuse problems and protecting the health of all individuals across the lifespan.

Because of the broad audience, the *Report* is purposely written in accessible language without excessive scientific jargon. The *Report* also focuses on current issues and practical questions that trouble so many people:

- What are the health and social impacts of alcohol and drug use and misuse in the United States? What key factors influence these behaviors?
- What are the major substance misuse problems facing the United States?
- What causes substance use disorders and why do they change people so dramatically?
- Can substance misuse problems and disorders be prevented? How?
- What constitutes effective treatment?
- Can addicted individuals recover? What will it take to manage their disorders and sustain recovery?

Topics Covered in the *Report*

Individual chapters in the *Report* review the science associated with the major substance use, misuse, and disorder issues for specific topics. Tobacco, also an addictive substance, is mentioned only briefly, because problems associated with tobacco use and nicotine addiction have been covered extensively in other Surgeon General's Reports.[14-16,100-103]

Because of the broad audience and the practical emphasis, the *Report* is intentionally selective rather than exhaustive, emphasizing findings that have the potential for the greatest public health impact and the greatest potential for action. For readers wanting greater scientific detail or more specific information, detailed research reports, as well as supplemental resource materials, are supplied in references, in the Appendices, and in special emphasis boxes throughout the *Report*.

Scientific Standards Used to Develop the *Report*

Findings cited in all of the chapters came from electronic database searches of research articles published in English. Within those searches, priority was given to systematic literature reviews and to findings that were replicated by multiple controlled trials. However, many important issues in prevention, treatment, recovery, and health care systems have not yet been examined in rigorous controlled trials, or are not appropriate for such research designs. In these cases, the best available evidence was cited and labeled according to the reporting conventions published by the CDC:[104]

- *Well-supported*: Evidence derived from multiple controlled trials or large-scale population studies.
- *Supported*: Evidence derived from rigorous but fewer or smaller trials or restricted samples.
- *Promising*: Findings that do not derive from rigorously controlled studies but that nonetheless make practical or clinical sense and are widely practiced.

In cases in which evidence was based on findings of neurobiological research, the CDC standards were adapted.

A summary of the key findings appears at the beginning of each chapter. The key findings highlight what is currently known from available research about the chapter topic, as well as the strength of the evidence. As with the rest of the *Report*, the key findings are not intended to be exhaustive, but are instead considered the important "take-aways" from each chapter. Readers interested in a fuller discussion of the topics are encouraged to read the chapters in their entirety.

Addressing Substance Use in Specific Populations

As indicated, the chapters are designed to prioritize best available research findings that apply most broadly across different substances and across various subgroups, while also identifying program and policy interventions that have strong evidence for particular substances (e.g., alcohol), when available. The rationale for this decision is that the available research suggests that the genetic, neurobiological, and environmental processes underlying substance use, misuse, and disorders are largely similar across most known substances and unrelated to the age, sex, race and ethnicity, gender identity, or culture of the individual. The available research also clearly indicates that many of the interventions, including population-level policies, focused programs, behavioral therapies, medications, and social services shown to be effective in one subgroup are *generally* effective for other subgroups. Put differently, it is reasonable to assume that the findings presented in this *Report* are relevant for many substance use types and patterns; for most age, gender, racial and ethnic, and cultural subgroups; and for many special needs subgroups (e.g., those with co-occurring mental or physical illnesses; those involved with the criminal justice system).

However, this general statement has some important caveats. First, the statement depends heavily on the phrase "available research." There is insufficient research examining subgroup differences in the neurobiology of substance use disorders and in interventions aimed at preventing, treating, and promoting recovery from substance use disorders. Additional research designed to examine these differences and to test interventions in specific populations is needed.

A second caveat is that individual variability in response to standard prevention, treatment, and recovery support interventions is common throughout health care. Individuals with the same disease often react quite differently to the same medicine or behavioral intervention. Accordingly, general health care has moved toward "personalized medicine," an individualized treatment regimen derived from specific information about the individual's genetics and stage of illness, as well as lifestyle, language, culture, and personal preferences. Personalized care is not common in the substance use disorder field because many prevention, treatment, and recovery regimens were created as standardized "programs" rather than individualized protocols.

The third caveat to the statement on general research findings is that even if research has shown that certain medications, therapies, or recovery support services are likely to be *effective*, this does not mean that they will be ***adequate*****,** especially for groups with specific needs. For example, a medication that is effective in blocking the rewarding effects of opioid use will not fully address the multiple, complex problems of those with opioid use disorders, nor address any co-occurring health conditions such as depression or HIV/AIDS.

Recognizing these limitations to the generalizability of research findings, each chapter has a dedicated section on Specific Populations that focuses particularly on age, racial and ethnic subgroups, and individuals with co-occurring mental and physical illnesses. Findings relevant to other important groups (e.g., military veterans; lesbian, gay, bisexual, and transgender [LGBT] populations; those with criminal justice involvement; those in rural areas) are referred to throughout the *Report* when available.

The Organization of the Report

This *Report* is divided into Chapters, highlighting the key issues and most important research findings in those topics. The final chapter concludes with recommendations for key stakeholders, including implications for practice and policy.

This **Chapter 1 - Introduction and Overview** describes the overall rationale for the *Report*, defines key terms used throughout the *Report*, introduces the major issues covered in the topical chapters, and describes the organization, format, and the scientific standards that dictated content and emphasis within the *Report*.

Chapter 2 - The Neurobiology of Substance Use, Misuse, and Addiction reviews brain research on the neurobiological processes that turn casual substance use into a compulsive disorder.

Chapter 3 - Prevention Program and Policies reviews the scientific evidence on preventing substance misuse, substance use-related problems, and substance use disorders.

Chapter 4 - Early Intervention, Treatment, and Management of Substance Use Disorders describes the goals, settings, and stages of treatment, and reviews the effectiveness of the major components of early intervention and treatment approaches, including behavioral therapies, medications, and social services.

Chapter 5 - Recovery: The Many Paths to Wellness discusses perspectives on remission and recovery from substance use disorders and reviews the types and effectiveness of RSS.

Chapter 6 - Health Care Systems and Substance Use Disorders reviews ongoing changes in organization, delivery, and financing of care for substance use disorders in both specialty treatment programs and in mainstream health care settings.

Chapter 7 - Vision for the Future: A Public Health Approach presents a realistic vision for a comprehensive, effective, and humane public health approach to addressing substance misuse and substance use disorders in our country, including actionable recommendations for parents, families, communities, health care organizations, educators, researchers, and policymakers.

The **Appendices** provide additional detail about the topics covered in this *Report*. **Appendix A - Review Process for Prevention Programs** details the review process for the prevention programs included in Chapter 3 and the evidence on these programs; **Appendix B - Evidence-Based Prevention Programs and Policies** provides detail on scientific evidence grounding the programs and policies discussed in Chapter 3; **Appendix C - Resource Guide** provides resources specific to those seeking information on preventing and treating substance misuse or substance use disorders; and **Appendix D - Important Facts about Alcohol and Drugs** contains facts about alcohol and specific drugs, including descriptions, uses and possible health effects, treatment options, and statistics as of 2015.

References

1. Kolodny, A., Courtwright, D. T., Hwang, C. S., Kreiner, P., Eadie, J. L., Clark, T. W., & Alexander, G. C. (2015). The prescription opioid and heroin crisis: A public health approach to an epidemic of addiction. *Annual Review of Public Health, 36*, 559-574.

2. Centers for Disease Control and Prevention. (2014). The public health system and the 10 essential public health services. Retrieved from http://www.cdc.gov/nphpsp/essentialservices.html. Accessed on August 16, 2016.

3. Center for Behavioral Health Statistics and Quality. (2016). *Results from the 2015 National Survey on Drug Use and Health: Detailed tables*. Rockville, MD: Substance Abuse and Mental Health Services Administration.

4. Volkow, N. D. (2014). *America's addiction to opioids: Heroin and prescription drug abuse*. Senate Caucus on International Narcotics Control: National Institute on Drug Abuse. Retrieved from https://www.drugabuse.gov/about-nida/legislative-activities/testimony-to-congress/2015/americas-addiction-to-opioids-heroin-prescription-drug-abuse. Accessed on February 16, 2016.

5. World Health Organization. (2015). Health systems strengthening glossary, G-H. *Health Systems*. Retrieved from http://www.who.int/healthsystems/hss_glossary/en/index5.html. Accessed on August 16, 2016.

6. Stahre, M., Roeber, J., Kanny, D., Brewer , R. D., & Zhang, X. (2014). Contribution of excessive alcohol consumption to deaths and years of potential life lost in the United States. *Preventing Chronic Disease, 11*(E109).

7. Rudd, R. A., Aleshire, N., Zibbel, J. E., & Gladden, R. M. (2016). Increases in drug and opioid overdose deaths — United States, 2000–2014. *MMWR, 64*(50), 1378-1382.

8. Case, A., & Deaton, A. (2015). Rising morbidity and mortality in midlife among white non-Hispanic Americans in the 21st century. *Proceedings of the National Academy of Sciences, 112*(49), 15078-15083.

9. Kochanek, K. D., Arias, E., & Bastian, B. A. (2016). *The effect of changes in selected age-specific causes of death on non-Hispanic white life expectancy between 2000 and 2014*. (NCHS Data Brief No. 250). Atlanta, GA: Centers for Disease Control and Prevention.

10. Sacks, J. J., Gonzales, K. R., Bouchery, E. E., Tomedi, L. E., & Brewer, R. D. (2015). 2010 national and state costs of excessive alcohol consumption. *American Journal of Preventive Medicine, 49*(5), e73-e79.

11. National Drug Intelligence Center. (2011). *National drug threat assessment*. Washington, DC: U.S. Department of Justice.

12. Centers for Disease Control and Prevention. (2014). *National Diabetes Statistics Report: Estimates of diabetes and its burden in the United States, 2014*. Atlanta, GA: U.S. Department of Health and Human Services.

13. Center for Behavioral Health Statistics and Quality. (2015). *Behavioral health trends in the United States: Results from the 2014 National Survey on Drug Use and Health*. (HHS Publication No. SMA 15-4927 NSDUH Series H-50). Rockville, MD: Substance Abuse and Mental Health Services Administration.

14. U.S. Department of Health and Human Services. (2000). *Reducing tobacco use: A report of the Surgeon General*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health.

15. U.S. Department of Health and Human Services. (2004). *The health consequences of smoking: A report of the Surgeon General*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health.

16. U.S. Department of Health and Human Services. (2014). *The health consequences of smoking: 50 years of progress. A Report of the Surgeon General*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health.

17. U.S. Department of Health and Human Services. (2012). *Preventing tobacco use among youth and young adults: A report of the Surgeon General*. Atlanta, GA: Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health.

18. Jewett, A., Shults, R. A., Banerjee, T., & Bergen, G. (2015). Alcohol-impaired driving among adults—United States, 2012. *MMWR, 64*(30), 814-817.

19. McMillan, G. P., & Lapham, S. (2006). Effectiveness of bans and laws in reducing traffic deaths: Legalized Sunday packaged alcohol sales and alcohol-related traffic crashes and crash fatalities in New Mexico. *American Journal of Public Health, 96*(11), 1944-1948.

20. Cantor, D., Fisher, B., Chibnall, S., Townsend, R., Lee, H., Bruce, C., & Thomas, C. (2015). *Report on the AAU campus climate survey on sexual assault and sexual misconduct assault and sexual misconduct.* Rockville, MD: The Association of American Universities.

21. Runyan, D., Wattam, C., Ikeda, R., Hassan, F., & Ramiro, L. (2002). Child abuse and neglect by parents and other caregivers. In E. Krug, L. L. Dahlberg, J. A. Mercy, A. B. Zwi, & R. Lozano (Eds.), *World report on violence and health.* (pp. 59-86). Geneva, Switzerland: World Health Organization.

22. U.S. Department of Health and Human Services, Office of the Surgeon General, & National Action Alliance for Suicide Prevention. (2012). *2012 National strategy for suicide prevention: Goals and objectives for action*. Washington, DC: U.S. Department of Health and Human Services.

23. Paulozzi, L. J., Kilbourne, E. M., & Desai, H. A. (2011). Prescription drug monitoring programs and death rates from drug overdose. *Pain Medicine, 12*(5), 747-754.

24. Bagnardi, V., Rota, M., Botteri, E., Tramacere, I., Islami, F., Fedirko, V., . . . Pasquali, E. (2015). Alcohol consumption and site-specific cancer risk: A comprehensive dose–response meta-analysis. *British Journal of Cancer, 112*(3), 580-593.

25. Jung, S., Wang, M., Anderson, K., Baglietto, L., Bergkvist, L., Bernstein, L., . . . Eliassen, A. H. (2015). Alcohol consumption and breast cancer risk by estrogen receptor status: In a pooled analysis of 20 studies. *International Journal of Epidemiology*.

26. Rehm, J., Mathers, C., Popova, S., Thavorncharoensap, M., Teerawattananon, Y., & Patra, J. (2009). Global burden of disease and injury and economic cost attributable to alcohol use and alcohol-use disorders. *The Lancet, 373*(9682), 2223-2233.

27. Baliunas, D., Rehm, J., Irving, H., & Shuper, P. (2010). Alcohol consumption and risk of incident human immunodeficiency virus infection: A meta-analysis. *International Journal of Public Health, 55*(3), 159-166.

28. Sokol, R. J., Delaney-Black, V., & Nordstrom, B. (2003). Fetal alcohol spectrum disorder. *JAMA, 290*(22), 2996-2999.

29. U.S. Department of Health and Human Services, & U.S. Department of Agriculture. (2015). 2015–2020 Dietary Guidelines for Americans: Appendix 9. Alcohol. *Dietary guidelines for Americans, 2015-2020.* (8th ed.).

30. American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders (DSM-5)* (5th ed.). Arlington, VA: American Psychiatric Publishing.

31. Center for Behavioral Health Statistics and Quality. (2015). *Results from the 2014 National Survey on Drug Use and Health: Detailed tables*. Rockville, MD: Substance Abuse and Mental Health Services Administration.

32. Center for Behavioral Health Statistics and Quality. (2016). *Summary of the effects of the 2015 NSDUH questionnaire redesign: Implications for data users*. Rockville, MD: Substance Abuse and Mental Health Services Administration.

33. Centers for Disease Control and Prevention. (n.d.). Alcohol and public health: Alcohol-related disease impact (ARDI). Retrieved from https://nccd.cdc.gov/DPH_ARDI/Default/Default.aspx. Accessed on July 9, 2016.

34. Centers for Disease Control and Prevention. (2016). Excessive drinking is draining the U.S. economy. Retrieved from http://www.cdc.gov/features/costsofdrinking/. Accessed on July 5, 2016.

35. Whiteford, H. A., Degenhardt, L., Rehm, J., Baxter, A. J., Ferrari, A. J., Erskine, H. E., . . . Vos, T. (2013). Global burden of disease attributable to mental and substance use disorders: Findings from the Global Burden of Disease Study 2010. *The Lancet, 382*(9904), 1575-1586.

36. Lange, R. A., & Hillis, L. D. (2001). Cardiovascular complications of cocaine use. *New England Journal of Medicine, 345*(5), 351-358.

37. Degenhardt, L., & Hall, W. (2012). Extent of illicit drug use and dependence, and their contribution to the global burden of disease. *The Lancet, 379*, 55-70.

38. National Highway Traffic Safety Administration. (2015). *Traffic safety facts 2014 data: Alcohol-impaired driving*. (DOT HS 812 231). Washington, DC: U.S. Department of Transportation.

39. National Highway Traffic Safety Administration (NHTSA). (2014). *Traffic safety facts 2013 data: Alcohol-impaired driving*. (DOT HS 812 102). Washington, DC: U.S. Department of Transportation.

40. Federal Bureau of Investigation (FBI). (2012). Estimated number of arrests: United States, 2012 *Crime in the United States 2012: Uniform crime reports*. Retrieved from https://www.fbi.gov/about-us/cjis/ucr/crime-in-the-u.s/2012/crime-in-the-u.s.-2012/tables/29tabledatadecpdf. Accessed on April 11, 2016.

41. Blincoe, L., Miller, T. R., Zaloshnja, E., & Lawrence, B. A. (2015). *The economic and societal impact of motor vehicle crashes, 2010 (Revised)*. (DOT HS 812 013). Washington, DC: National Highway Traffic Safety Administration.

42. Berning, A., Compton, R., & Wochinger, K. (2015). *Results of the 2013–2014 National Roadside Survey of Alcohol and Drug Use by drivers*. (DOT HS 812 118). Washington, DC: National Highway Traffic Safety Administration.

43. Compton, R. P., & Berning, A. (2015). *Drug and alcohol crash risk*. (DOT HS 812 117). Washington, DC: National Highway Traffic Safety Administration.

44. Centers for Disease Control and Prevention. (2015). Alcohol poisoning deaths. Vital signs: Alcohol poisoning kills six people each day. Retrieved from http://www.cdc.gov/media/dpk/2015/dpk-vs-alcohol-poisoning.html. Accessed on April 6, 2016.

45. Levy, B., Paulozzi, L., Mack, K. A., & Jones, C. M. (2015). Trends in opioid analgesic–prescribing rates by specialty, US, 2007–2012. *American Journal of Preventive Medicine, 49*(3), 409-413.

46. Volkow, N. D., McLellan, T. A., Cotto, J. H., Karithanom, M., & Weiss, S. R. B. (2011). Characteristics of opioid prescriptions in 2009. *JAMA, 305*(13), 1299-1301.

47. Crane, E. H. (2013). *The CBHSQ Report: Emergency department visits involving narcotic pain relievers.* Rockville, MD: Substance Abuse and Mental Health Services Administration, Center for Behavioral Health Statistics and Quality.

48. Centers for Disease Control and Prevention. (2016). CDC Wonder: Multiple cause of death 1999 - 2014. Retrieved from http://wonder.cdc.gov/wonder/help/mcd.html. Accessed on May 17, 2016.

49. Drug Enforcement Administration. (2016). DEA Report: Counterfeit pills fueling U.S. fentanyl and opioid crisis: Problems resulting from abuse of opioid drugs continue to grow. Retrieved from https://www.dea.gov/divisions/hq/2016/hq072216.shtml. Accessed on August 16, 2016.

50. McCollister, K. E., French, M. T., & Fang, H. (2010). The cost of crime to society: New crime-specific estimates for policy and program evaluation. *Drug and Alcohol Dependence, 108*(1-2), 98-109.

51. National Center for Injury Prevention and Control. (2003). *Costs of intimate partner violence against women in the United States.* Atlanta, GA: Centers for Disease Control and Prevention.

52. Breiding, M. J. (2014). Prevalence and characteristics of sexual violence, stalking, and intimate partner violence victimization—National Intimate Partner and Sexual Violence Survey, United States, 2011. *MMWR, 63*(8), 1-18.

53. Klein, A. R. (2009). *Practical implications of current domestic violence research: For law enforcement, prosecutors and judges*. (NCJ 225722). Washington, DC: U.S. Department of Justice, Office of Justice Programs.

54. Friday, P. C., Lord, V. B., Exum, M. L., & Hartman, J. L. (2006). *Evaluating the impact of a specialized domestic violence police unit. Final report for National Institute of Justice*. (215916). Washington, DC: U.S. Department of Justice, National Institute of Justice.

55. Brookoff, D. (1997). *Drugs, alcohol, and domestic violence in Memphis*. Washington, DC: U.S. Department of Justice, National Institute of Justice.

56. Smith, P. H., Homish, G. G., Leonard, K. E., & Cornelius, J. R. (2012). Intimate partner violence and specific substance use disorders: Findings from the National Epidemiologic Survey on Alcohol and Related Conditions. *Psychology of Addictive Behaviors, 26*(2), 236-245.

57. Vagi, K. J., Rothman, E. F., Latzman, N. E., Tharp, A. T., Hall, D. M., & Breiding, M. J. (2013). Beyond correlates: A review of risk and protective factors for adolescent dating violence perpetration. *Journal of Youth and Adolescence*, *42*(4), 633-649.

58. Stith, S. M., Smith, D. B., Penn, C. E., Ward, D. B., & Tritt, D. (2004). Intimate partner physical abuse perpetration and victimization risk factors: A meta-analytic review. *Aggression and Violent Behavior*, *10*(1), 65-98.

59. Exner-Cortens, D., Eckenrode, J., & Rothman, E. (2013). Longitudinal associations between teen dating violence victimization and adverse health outcomes. *Pediatrics*, *131*(1), 71-78.

60. Stone, A. L., Becker, L. G., Huber, A. M., & Catalano, R. F. (2012). Review of risk and protective factors of substance use and problem use in emerging adulthood. *Addictive Behaviors*, *37*(7), 747-775.

61. Elder, R. W., Lawrence, B., Ferguson, A., Naimi, T. S., Brewer, R. D., Chattopadhyay, S. K., . . . Task Force on Community Preventive Services. (2010). The effectiveness of tax policy interventions for reducing excessive alcohol consumption and related harms. *American Journal of Preventive Medicine*, *38*(2), 217-229.

62. Kessler, R. C., Berglund, P., Demler, O., Jin, R., Merikangas, K. R., & Walters, E. E. (2005). Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity Survey Replication. *Archives of General Psychiatry*, *62*(6), 593-602.

63. Compton, W. M., Thomas, Y. F., Stinson, F. S., & Grant, B. F. (2007). Prevalence, correlates, disability, and comorbidity of DSM-IV drug abuse and dependence in the United States: Results from the national epidemiologic survey on alcohol and related conditions. *Archives of General Psychiatry*, *64*(5), 566-576.

64. Hasin, D. S., Stinson, F. S., Ogburn, E., & Grant, B. F. (2007). Prevalence, correlates, disability, and comorbidity of DSM-IV alcohol abuse and dependence in the United States: Results from the National Epidemiologic Survey on Alcohol and Related Conditions. *Archives of General Psychiatry*, *64*(7), 830-842.

65. Hanson, K. L., Medina, K. L., Padula, C. B., Tapert, S. F., & Brown, S. A. (2011). Impact of adolescent alcohol and drug use on neuropsychological functioning in young adulthood: 10-year outcomes. *Journal of Child and Adolescent Substance Abuse*, *20*(2), 135-154.

66. Giedd, J. N., Blumenthal, J., Jeffries, N. O., Castellanos, F. X., Liu, H., Zijdenbos, A., . . . Rapoport, J. L. (1999). Brain development during childhood and adolescence: A longitudinal MRI study. *Nature Neuroscience*, *2*(10), 861-863.

67. Squeglia, L. M., Tapert, S. F., Sullivan, E. V., Jacobus, J., Meloy, M. J., Rolfing, T., & Pfefferbaum, A. (2015). Brain development in heavy-drinking adolescents. *American Journal of Psychiatry*, *172*(6), 532-542.

68. Miller, W. R., Meyers, R. J., & Tonigan, J. S. (1999). Engaging the unmotivated in treatment for alcohol problems: A comparison of three strategies for intervention through family members. *Journal of Consulting and Clinical Psychology*, *67*(5), 688-697.

69. White, W. L., & Miller, W. R. (2007). The use of confrontation in addiction treatment: History, science and time for change. *Counselor*, *8*(4), 12-30.

70. Bodenheimer, T., Wagner, E. H., & Grumbach, K. (2002). Improving primary care for patients with chronic illness: The chronic care model, Part 2. *JAMA, 288*(15), 1909-1914.

71. McLellan, A. T., Lewis, D. C., O'Brien, C. P., & Kleber, H. D. (2000). Drug dependence, a chronic medical illness: Implications for treatment, insurance, and outcomes evaluation. *JAMA, 284*(13), 1689-1695.

72. McLellan, A. T., Starrels, J. L., Tai, B., Gordon, A. J., Brown, R., Ghitza, U., . . . Horton, T. (2014). Can substance use disorders be managed using the chronic care model? Review and recommendations from a NIDA Consensus Group. *Public Health Reviews, 35*(2), 1-14.

73. Feliz, J. (2012). Survey: Ten percent of American adults report being in recovery from substance abuse or addiction. Retrieved from http://www.drugfree.org/newsroom/survey-ten-percent-of-american-adults-report-being-in-recovery-from-substance-abuse-or-addiction/. Accessed on April 12, 2016.

74. White, W. (2014). *Slaying the dragon: The history of addiction treatment and recovery in America* (2nd Ed.). Bloomington, IL: Chestnut Health Systems.

75. Musto, D. F. (1987). *The American disease: Origins of narcotic control* (Expanded ed.). New York, NY: Oxford University Press.

76. Rettig, R. A., Yarmolinsky, A., & Institute of Medicine (US) Committee on Federal Regulation of Methadone Treatment (Eds.). (1995). *Federal regulation of methadone treatment*. Washington, DC: National Academies Press.

77. Ries, R. K., Fielen, D. A., Miller, S. C., & Saltz, R. (Eds.). (2014). *The ASAM principles of addiction medicine* (5th ed.): Wolters Kluwer.

78. Institute of Medicine, & Committee on Crossing the Quality Chasm. (2006). *Improving the quality of health care for mental and substance-use conditions*. Washington, DC: National Academies Press.

79. McKnight-Eily, L. R., Liu, Y., Brewer, R. D., Kanny, D., Lu, H., Denny, C. H., . . . Centers for Disease Control and Prevention. (2014). Vital signs: Communication between health professionals and their patients about alcohol use - 44 states and the District of Columbia, 2011. *MMWR, 63*(1), 16-22.

80. Scott, K. M., Lim, C., Al-Hamzawi, A., Alonso, J., Bruffaerts, R., Caldas-de-Almeida, J. M., . . . de Jonge, P. (2016). Association of mental disorders with subsequent chronic physical conditions: World mental health surveys from 17 countries. *JAMA Psychiatry, 73*(2), 150-158.

81. Phillips, D. P., Barker, G. E., & Eguchi, M. M. (2008). A steep increase in domestic fatal medication errors with use of alcohol and/or street drugs. *Archives of Internal Medicine, 168*(14), 1561-1566.

82. Dowell, D., Haegerich, T. M., & R., C. (2016). CDC guideline for prescribing opioids for chronic pain - United States. *MMWR, 65*(1), 1-49.

83. Parish, C. L., Pereyra, M. R., Pollack, H. A., Cardenas, G., Castellon, P. C., Abel, S. N., . . . Metsch, L. R. (2015). Screening for substance misuse in the dental care setting: Findings from a nationally representative survey of dentists. *Addiction, 110*(9), 1516-1523.

84. Denisco, R. C., Kenna, G. A., O'Neil, M. G., Kulich, R. J., Moore, P. A., Kane, W. T., . . . Katz, N. P. (2011). Prevention of prescription opioid abuse: The role of the dentist. *The Journal of the American Dental Association, 142*(7), 800-810.

85. Krause, M., Vainio, L., Zwetchkenbaum, S., & Inglehart, M. R. (2010). Dental education about patients with special needs: A survey of US and Canadian dental schools. *Journal of Dental Education, 74*(11), 1179-1189.

86. Tommasello, A. C. (2004). Substance abuse and pharmacy practice: What the community pharmacist needs to know about drug abuse and dependence. *Harm Reduction Journal, 1*(3), 1-15.

87. Barry, C. L., & Huskamp, H. A. (2011). Moving beyond parity—mental health and addiction care under the ACA. *New England Journal of Medicine, 365*(11), 973-975.

88. McLellan, A. T., & Meyers, K. (2004). Contemporary addiction treatment: A review of systems problems for adults and adolescents. *Biological Psychiatry, 56*(10), 764-770.

89. Patient Protection and Affordable Care Act, 42 U.S.C. § 18001, H.R. 3590, Public Law No. 111–148, 124 Stat. 119 Stat. (2010).

90. Paul Wellstone and Pete Domenici Mental Health Parity and Addiction Equity Act of 2008, H.R. 6983 (2008).

91. Miech, R. A., Johnston, L. D., O'Malley, P. M., Bachman, J. G., & Schulenberg, J. E. (2016). *Monitoring the Future national survey results on drug use, 1975-2015: Volume I, secondary school students.* Ann Arbor, MI: Institute for Social Research, The University of Michigan.

92. Pacula, R. L., Powell, D., Heaton, P., & Sevigny, E. L. (2015). Assessing the effects of medical marijuana laws on marijuana use: The devil is in the details. *Journal of Policy Analysis and Management, 34*(1), 7-31.

93. Office of National Drug Control Policy. (n.d.). Answers to frequently asked questions about marijuana. Retrieved from https://www.whitehouse.gov/ondcp/frequently-asked-questions-and-facts-about-marijuana. Accessed on June 27, 2016.

94. Mehmedic, Z., Chandra, S., Slade, D., Denham, H., Foster, S., Patel, A. S., . . . ElSohly, M. A. (2010). Potency trends of 9-THC and other cannabinoids in confiscated cannabis preparations from 1993 to 2008. *Journal of Forensic Sciences, 55*(5), 1209-1217.

95. National Institute on Drug Abuse. (2016). DrugFacts: Marijuana. Retrieved from https://www.drugabuse.gov/publications/drugfacts/marijuana. Accessed on June 20, 2016.

96. Ramaekers, J. G., Berghaus, G., van Laar, M., & Drummer, O. H. (2004). Dose related risk of motor vehicle crashes after cannabis use. *Drug and Alcohol Dependence, 73*(2), 109-119.

97. Li, M.-C., Brady, J. E., DiMaggio, C. J., Lusardi, A. R., Tzong, K. Y., & Li, G. (2012). Marijuana use and motor vehicle crashes. *Epidemiologic Reviews, 34*(1), 65-72.

98. Asbridge, M., Hayden, J. A., & Cartwright, J. L. (2012). Acute cannabis consumption and motor vehicle collision risk: Systematic review of observational studies and meta-analysis. *BMJ, 344*, e536.

99. Hartman, R. L., & Huestis, M. A. (2013). Cannabis effects on driving skills. *Clinical Chemistry, 59*(3), 478-492.

100. U.S. Department of Health, Education, and Welfare. (1964). *Smoking and health: Report of the advisory committee to the Surgeon General of the Public Health Service.* Washington, DC: U.S. Public Health Service, Office of the Surgeon General.

101. U.S. Department of Health and Human Services. (1986). *The health consequences of using smokeless tobacco: A report of the Advisory Committee to the Surgeon General*. Washington, DC: U.S. Department of Health and Human Services.

102. U.S. Department of Health and Human Services. (1994). *Preventing tobacco use among young people: A report of the Surgeon General*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health.

103. U.S. Department of Health and Human Services. (2010). *How tobacco smoke causes disease: The biology and behavioral basis for smoking-attributable disease: A report of the Surgeon General*. Atlanta, GA:
U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health.

104. Puddy, R. W., & Wilkins, N. (2011). *Understanding evidence Part 1: Best available research evidence. A guide to the continuum of evidence of effectiveness*. Atlanta, GA: Centers for Disease Control and Prevention.