

Introduction 2

Substance abuse and addiction are pervasive in our society, with their consequences felt by people in every economic, social, racial, and political boundary.

The United States has grappled with problems associated with substance abuse and addiction for over a century (see appendix A and table 2-1). In 1986, then-President Ronald Reagan launched what has become known as the war on drugs. Federal spending to combat drugs increased from \$1.5 billion in 1981 to more than \$12 billion in 1994, with spending in 1995 projected to pass the \$13 billion mark (see table 2-2). Nearly two-thirds of the federal antidrug budget goes toward efforts to curb the supply of drugs (e.g., border interdiction, law enforcement), with the remainder being spent on drug treatment and prevention programs. While the use of illegal drugs has declined in the United States in recent years, a vigorous debate continues as to whether the nation is indeed winning the war on drugs, and what the balance of federal effort should be in formulating programs to decrease the supply of drugs, treat drug abusers and addicts, and educate Americans about problems associated with drug abuse and addiction.

Congress has enacted a number of laws in an attempt to create a national policy to fight the scourge of drug abuse and addiction. As part of oversight responsibility for national drug policy, several committees of Congress have requested the Office of Technology Assessment (OTA) to undertake a study addressing the socioeconomic, psychological, physiological, and genetic underpinnings of substance abuse and addiction (see table 2-3).

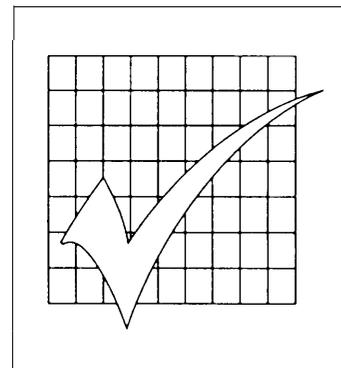


TABLE 2-1: Major Events in Combating Drugs

1900-20s *The first drug bans are enacted in the United States.*

- 1906:** The Pure Food and Drug Act requires labeling of over-the-counter medicines containing psychoactive ingredients such as alcohol, cocaine, opiates, and cannabis,
- 1909:** Congress bans opium imports.
- 1914:** Congress passes the Harrison Narcotics Act regulating the production and sale of opiates and cocaine,
- 1919:** The U.S. Supreme Court rules in *Webb et al. v. United States* that doctors may not prescribe maintenance supplies of narcotics to addicts. The decision effectively criminalizes the drug-consuming behavior of addicts.

1920s-30s *Prohibition of alcohol gives rise to a booming underground market in alcohol, while the Depression increases xenophobia against immigrants and pressure to ban the drugs associated with them.*

- 1920:** The 18th Amendment to the Constitution, prohibiting the production and sale of alcohol, takes effect
- 1933:** The 21st Amendment repealing Prohibition is ratified
- 1937:** Congress passes the Marijuana Tax Act, making registration and taxation of marijuana buyers and sellers mandatory, and imposing criminal penalties.

1960s-70s *The drug culture that flourished in the 1960s is followed by a crackdown on drug use.*

- 1970:** The Comprehensive Drug Abuse Prevention and Control Act consolidates drug laws and sets penalties for trafficking according to each illegal substance's perceived harmfulness.
- 1971:** President Richard M. Nixon declares the nation's first "war on drugs" and creates an executive branch office to coordinate drug policy.
- 1973:** The Federal Drug Enforcement Administration (DEA) is established.
- 1978:** Law enforcement agencies are authorized by Congress to seize the assets of drug dealers, including money, real estate, and vehicles.

1980s *Harsher antidrug policies are enacted.*

- 1984:** Congress enacts mandatory minimum prison sentences for certain drug offenses
- 1986:** President Ronald Reagan declares a "war on drugs" and announces he will seek stricter laws against the sale and use of illegal drugs. Congress enacts legislation linking the length of mandatory prison sentences to the types of illegal drugs involved.
- 1988:** Congress passes the Anti-Drug Abuse Act, which stiffens penalties for drug possession and requires the President to issue an annual drug control strategy,
- 1989:** Worldwide heroin production reaches an all-time record. Calling drugs "(the gravest threat facing our nation today," President George Bush appoints William J. Bennett as the first "drug czar," or director of the new Office of National Drug Control Policy. U.S. forces invade Panama and capture Gen. Manuel Antonio Noriega, a reputed key figure in the cocaine trade,

1990s *Statistics show a fall in consumption of most illegal drugs.*

- 1991:** The U.S. Supreme Court upholds a Michigan law imposing a mandatory life sentence without the possibility of parole to anyone convicted of possessing more than 650 grams of cocaine,
- 1993:** The U.S. Supreme Court rules that officials may not seize property acquired with the proceeds of illegal drug sales if the owner is unaware of the source of those funds. The ruling weakens one of the government's main weapons in the drug war

TABLE 2-2: Federal Drug Control Spending by Function, Fiscal Year 1993 to Fiscal Year 1995

	Fiscal year 1993 actual	Fiscal year 1994 enacted	Fiscal year 1995 President's request
	(Budget authority in millions)		
Drug treatment	2,339.1	2,514.1	2,874.4
Education, community action, and the workplace	1,556.5	1,602.4	2,050.7
Criminal justice system	5,685.1	5,700.4	5,926.9
International	523.4	351.4	427.8
Interdiction	1,511.1	1,299.9	1,205.6
Research	499.1	504.6	531.6
Intelligence	150.9	163.4	162.8
Total	12,265.2	12,136.2	13,179.8

SOURCE The White House Office of National Drug Control Policy, 1994

OTA has been asked to address a number of questions:

- What are the root causes of substance abuse and addiction?
- Why and how does addiction occur?
- Who are the substance abusers?
- What factors, scientific and social, lead to addiction?
- What are the implications for prevention?

ROOT CAUSES

At the outset, OTA was asked to address the root causes of substance abuse and addiction. The term *root causes* has been used in political discussions and debate (see box 2-1), and although many people have strongly held opinions as to what constitutes the root causes of drug abuse, no consensus exists as to what, if anything, is inherent in every case of substance abuse and addiction. OTA conducted a search of various bibliographic databases, which revealed only limited discussion about root causes of drug abuse (2).

Research into drug abuse looks not at root causes per se, but rather at risk and protective factors that increase or decrease the possibility that substance abuse and addiction will occur (see table 2-4), and how these risk and protective factors affect various subpopulations in different settings.

WHAT ARE SUBSTANCE ABUSE AND ADDICTION?

Drug consumption is divided into three levels or stages commonly distinguished by clinicians and researchers: use, abuse, and dependence (see figure 2-1). Each of these stages is, on average, more hazardous, more obtrusive, and more likely to provoke or induce social interventions (e.g., punitive sanctions, attention by prevention programs, admission to treatment) than the one before (4). A substance is abusable if it has the capacity to induce dependence in those who use it. Dependence, a term that is often used interchangeably with the term addiction, can include psychological dependence (a form of obsessive behavior whose objective is the attainment of pleasure or the avoidance of unpleasantness) and physical dependence (development of tolerance, causing the user to need increasing amounts of the drug for it to have its desired effect, and withdrawal symptoms if drug use is stopped) (5).

TABLE 2-3: Requesters of OTA Assessment, Technologies for Understanding the Root Causes of Substance Abuse and Addiction

House

Committee on Government Operations

Senate

Committee on Labor and Human Resources

Committee on Governmental Affairs

SOURCE Office of Technology Assessment, 1994

TABLE 2-4: Risk and Protective Factors

RISK FACTORS

Ecological environment

- Poverty
- Living in an economically depressed area with
 - high unemployment
 - inadequate housing
 - poor schools
 - inadequate health and social services
 - high prevalence of crime
 - high prevalence of illegal drug use
- Minority status involving.
 - racial discrimination
 - culture devalued in American society
 - differing generational levels of assimilation
 - cultural and language barriers to getting adequate health care and other social services
 - low educational levels
 - low achievement expectations from society

Family environment

- Alcohol and other drug dependency of parent(s)
- Parental abuse and neglect of children
- Antisocial, sexually deviant, or mentally ill parents
- High levels of family stress, including financial strain
- Large, overcrowded family
- Unemployed or underemployed parents
- Parents with little education
- Socially isolated parents
- Single female parent without family/other support
- Family instability
- High level of marital and family conflict and/or family violence
- Parental absenteeism due to separation, divorce, or death
- Lack of family rituals
- Inadequate parenting and low parent/child contact
- Frequent family moves

Constitutional vulnerability of the child

- Child of an alcohol or other drug abuser
- Less than two years between the child and its older/younger siblings
- Birth defects, including possible neurological and neurochemical dysfunctions
- Neuropsychological vulnerabilities
- Physically handicapped
- Physical or mental health problems
- Learning disability
- Early behavior problems
 - Aggressiveness combined with shyness
 - Aggressiveness
 - Decreased social inhibition
 - Emotional problems
 - Inability to express feelings appropriately
 - Hypersensitivity
 - Hyperactivity
 - Inability to cope with stress
 - Problems with relationships
 - Cognitive problems
 - Low self-esteem
 - Difficult temperament
 - Personality characteristics of ego under control, rapid tempo, inability to delay gratification, overacting, etc.

Nevertheless, there is considerable controversy about what constitutes substance abuse and addiction. A number of issues come into play, such as:

- What substance is being used? A wide range of psychoactive substances has the potential for abuse (see box 2-2). The possession and use of

several substances—such as marijuana, heroin, cocaine—are illegal in all 50 states. Other addictive substances—such as tobacco and alcohol—may be legally purchased, possessed, and consumed by a majority of Americans. Other abusable substances—such as inhalants—may

TABLE 2-4 (cont'd.): Risk and Protective Factors

Adolescent problems

School failure and dropout
 At risk of dropping out
 Delinquency
 Violent acts
 Gateway drug use
 Other drug use and abuse
 Early unprotected sexual activity
 Teenage pregnancy/teen parenthood
 Unemployed or underemployed
 At risk of being unemployed
 Mental health problems
 Suicidal

Negative adolescent behavior and experiences

Lack of bonding to society (family, school, and community)
 Rebelliousness and nonconformity
 Resistance to authority
 Strong need for Independence
 Cultural alienation
 Fragile ego
 Feelings of failure
 Present versus future orientation
 Hopelessness
 Lack of self-esteem
 Inability to form positive close relationships
 Vulnerability to negative peer pressure

PROTECTIVE FACTORS**Ecological environment**

Middle or upper class
 Low unemployment
 Adequate housing
 Pleasant neighborhood
 Low prevalence of neighborhood crime
 Good schools
 A school climate that promotes learning, participation, and responsibility
 High-quality health care
 Easy access to adequate social services
 Flexible social service providers who put client's needs first

Family environment

Adequate family income
 Structured and nurturing family
 Parents promote learning
 Fewer than four children in family
 Siblings 2 or more years apart in age
 Few chronic stressful life events
 Multigenerational kinship network
 Nonkin support network, e.g., supportive role models, dependable substitute childcare
 Warm, close personal relationship with parent(s) and/or other adult(s)
 Little marital conflict
 Family stability and cohesiveness
 Plenty of attention during first year of life
 Sibling as caretaker/confidante

Constitutional strengths

Adequate early sensorimotor and language development
 High intelligence
 Physically robust
 No emotional or temperamental impairments

Personality of the child

Affectionate/endearing
 Easy temperament
 Autonomous
 Adaptable and flexible
 Positive outlook
 Health expectations
 Self-esteem
 Self-discipline
 Internal locus of control
 Problem-solving skills
 Socially adept
 Tolerant

SOURCE U S Department of Health and Human Services, Office for Substance Abuse Prevention, *Breaking New Ground for Youth at Risk: Program Summaries*, OSAP Technical Report 1, DHHS Publication No. (ADM) 91-1658 (Washington, DC 1991)

be legally purchased, possessed, and consumed by anybody.

■ Does experimental use constitute abuse? Some maintain that any use of an abusable or addic-

BOX 2-1: Root Causes: Two Views From the Political Arena

"Many states and cities are on shoe-string budgets and must provide services and alternatives to substance abuse in local communities. The failure to address the fundamental causes of substance abuse and to provide immediate intervention strategies will impact city residents most. The committee recommends that the National Drug Control Strategy be framed by broader social and economic problems which require dramatic reforms in order to attack the root causes of substance abuse. We need to begin to build the infrastructure necessary to improve the quality of treatment services by requiring medical schools to provide comprehensive training to identify and treat substance abusers, provide adequate treatment services at the community level, including after care, vocational, educational, and psychiatric assessments, and develop alternate leisure activities for youth and adults to replace 'street life' and assist individuals to escape the drug culture."

House Committee on Government Operations committee report

"One of [the Democrats'] tactics was to talk about the root causes of drug use, the 'deeper and more profound problems,' as they put it, of hopelessness, poverty, helplessness, and the like. The elites liked this shift in emphasis, too. It took the discussion away from moral considerations to the (for them) more comfortable ground of social theory. They wanted to talk about 'hopelessness' as a condition caused by lack of government involvement. We talked about hopelessness, too, but talked about it as a condition caused by social decomposition and the breakdown of the family and a lack of law and order in these communities. I found it shocking and disappointing that when we argued for more police, jails, courts, and prisons because of the exploding crime epidemic in some of America's inner cities, some people responded by saying, 'But what are the root causes of this?' That's an interesting debate which should go on at an elite university. But if there are drug dealers going around shooting people in the affluent suburbs, the citizenry will not call for a seminar on root causes. They will raise hell and demand that the dealers be arrested. And they are right to do so."

William Bennett

Former director, U.S. Office of National Drug Control Policy

SOURCES: U.S. House of Representatives, Committee on Government Operations, H.Rept 101-992, "The Role of Demand Reduction in the National Drug Control Strategy", Bennett, W, *The De-Valuing of America: The Fight for Our Culture and Our Children* (New York, NY: Summit Books, 1992)

tive substance constitutes abuse. Others suggest that experimentation—particularly with such psychoactive substances as alcohol or tobacco that are available for purchase by adults of legal age—is part of normal development and does not necessarily have harmful consequences.

- In what context are substance abuse and addiction being addressed? Four broad arenas that encounter substance abuse related issues include: mass communications, criminal justice, medicine, and public health. These entities often operate independently of one another, and use substantially different terms when describ-

ing the use of illicit substances or the illegal use of licit substances (see appendix C).

■ **Public Health Model**

The traditional public health model incorporates the host-agent-environment relationship. Each of these factors has an individual, as well as an inter-related role in the potential use and/or harmful use of a substance. Host factors may include possible genetic, psychological, and biological susceptibility. Agent factors incorporate the substance's abuse liability capacity, as well as how the substance is marketed. Lastly, environmental factors

BOX 2-2: Overview of Alcohol and Some Other Psychoactive Substances

Class of psychoactive substance ^a	Description ^b	Examples
ALCOHOL (ethyl alcohol)	<p>Alcohol, one of the most widely used of all drugs, is a central nervous system depressant with effects similar to those of sedative-hypnotic compounds (see below). At low doses, alcohol may be associated with behavioral excitation thought to be due to the depression of inhibitory neurons in the brain. Alcohol differs from sedative-hypnotic compounds in that it is used primarily for recreation or social rather than medical purposes.</p>	<ol style="list-style-type: none"> 1 Beer. 2 Wine. 3 “Hard” liquor (e.g., whiskey, gin)
SEDATIVES, HYPNOTICS, OR ANXIOLYTICS	<p>Sedative-hypnotics are drugs of diverse chemical structure that exert a nonselective general depressant on the central nervous system. In addition, they reduce metabolism in a variety of tissues in the body, depressing any system that uses energy. Depending on the dose, any sedative hypnotic compound may be classified as a sedative (an agent that allays excitement), a tranquilizer (an antianxiety agent), a hypnotic (a sleep-inducing agent), or an anesthetic (an agent that eliminates pain). Sedative-hypnotics are used medically as sedatives, anxiolytics (antianxiety agents), hypnotics, antiepileptics, muscle relaxants, and general anesthetics.</p>	<ol style="list-style-type: none"> 1 Barbiturates (“downers” or “barbs”): pentobarbital sodium [Nembutal[®]], secobarbital sodium [Seconal[®]], amobarbital [Amytal[®]]^c—taken orally. 2 Nonbarbiturate hypnotics: methaqualone [Quaaludes[®]]^c—taken orally. 3. Tranquilizers: diazepam [Valium[®]], chlordiazepoxide hydrochloride [Librium[®]]^c—taken orally.
CANNABIS (THC)	<p>THC (tetrahydrocannabinol) the active agent in marijuana, alters perceptions, concentration, emotions, and behavior, though the mechanisms of action are not entirely clear. Researchers have found, however, that THC changes the way in which sensory information is processed by the brain. It can be used medically to relieve nausea and side effects of chemotherapy in cancer patients; it is very rarely used to treat glaucoma.</p>	<ol style="list-style-type: none"> 1. Marijuana (“pot” or “grass”)—smoked or eaten. 2. Hashish (“hash”)—smoked or eaten. 3. Hashish oil (“hash oil”)—smoked (mixed with tobacco). 4. Tetrahydrocannabinol (THC)—taken orally in capsules.
NICOTINE	<p>Nicotine, obtained naturally from tobacco, is a central nervous system stimulant.^c It exerts its action secondary to stimulation of certain cholinergic (excitatory) synapses both within the brain and in the peripheral nervous system.</p>	<ol style="list-style-type: none"> 1. Cigarettes. 2. Smokeless tobacco (e.g., snuff or chewing tobacco).

(continued)

BOX 2-2 (cont'd.): Overview of Alcohol and Some Other Psychoactive Substances

Class of psychoactive substance ^a Description ^b	Examples
<p>COCAINE</p> <p>Cocaine, obtained naturally from coca leaves, is a potent central nervous system stimulant. It stimulates the sympathetic nervous system, which regulates the activity of cardiac muscle, smooth muscle, and glands. It also produces bronchodilation in the lungs. It is used medically as a topical anesthetic for surgical procedures.</p>	<ol style="list-style-type: none"> 1 Cocaine hydrochloride powder (“coke” or “street cocaine”)—usually snorted or injected intravenously. ^d 2. Cocaine alkaloid (“freebase” or “crack”)—smoked. ^e
<p>AMPHETAMINES AND RELATED STIMULANTS^f</p>	
<p>1 Amphetamines</p> <p>Amphetamines are a group of three closely related compounds, all of which are potent central nervous system and behavioral stimulants. Some amphetamines are used medically to treat attention deficit disorder or minimal brain dysfunction in children, narcolepsy (recurrent, uncontrollable, brief episodes of sleep), or (rarely) depression.</p>	<ol style="list-style-type: none"> 1 Amphetamine (“speed” or “uppers” [Benzedrine^R])—taken orally, injected, or snorted. ^g 2. Methamphetamine (“speed” or “crystal meth” or “ice”) [Methadrine^R]^h—taken orally, injected, or snorted. ^{g,h} 3. Dextroamphetamine [Dexedrine^R]ⁱ—taken orally, or rejected.
<p>2 Nonamphetamine stimulants</p> <p>Like amphetamines, nonamphetamine stimulants are central nervous and behavioral stimulants. Some non-amphetamine stimulants (e.g., Preludin^R) are used for weight control, and some (e.g., Ritalin^R and Cylert^R) are used medically to treat hyperactivity, minimal brain dysfunction, narcolepsy, or (rarely) depression.</p>	<ol style="list-style-type: none"> 1 Pheumetrazine hydrochloride [Preludin^R]^j—taken orally or injected. ^d 2 Methylphenidate hydrochloride injected. ^d 3 Pemoline [Cylert^R]^k—taken orally [Ritalin^R]^l—taken orally, or injected. ^d
<p>HALLUCINOGENS</p> <p>Hallucinogens, or psychedelics, are a heterogeneous group of compounds that affect a person’s perceptions, sensations, thinking, self-awareness, and emotions. ^l</p>	<ol style="list-style-type: none"> 1 LSD (lysergic acid diethylamide) or “acid”—taken orally or put in the eyes. 2. Mescaline (3,4,5-trimethoxyphenylethyl amide) or “mesc” and peyote-disks—chewed, swallowed, or smoked, tablets taken orally. 3. Psilocybin (“magic mushrooms”)—chewed and swallowed. 4 MDMA (methylene dioxymethamphetamine)—taken orally.

(continued)

BOX 2-2 (cont'd.): Overview of Alcohol and Some Other Psychoactive Substances

Class of psychoactive substance ^a Description ^b	Examples
<p>INHALANTS</p> <p>Inhalants are chemicals that produce psychoactive vapors. Although different in makeup, nearly all of the abused inhalants produce effects similar to those of anesthetics, which act to slow down the body's functions or produce feelings of dizziness. At low doses, users may feel slightly stimulated. Amyl nitrite is used for heart patients because it dilates the blood vessels and increases blood supply to the heart. There are no medical indications for most of the inhalants</p>	<ol style="list-style-type: none"> 1. Solvents (model airplane glue, nail polish remover, lighter and cleaning fluids, and gasoline) —vapors inhaled, 2. Aerosols (e.g., paints, hairsprays)—vapors inhaled 3. Some anesthetics (e.g., nitrous oxide) —vapors inhaled 4. Amyl nitrite (“snappers” or “poppers”) and butyl nitrite (“rush”)—vapors inhaled.
<p>OPIATES (NARCOTICS) AND RELATED ANALGESICS</p> <p>Opiates are natural or synthetic drugs that, like morphine, a substance derived from the opium poppy, have analgesic (pain-relieving) properties. Heroin is not approved for medical uses in the United States. The major medical use of other opiates is for the relief of pain (i.e., as analgesics); some narcotics are used to relieve coughing (i.e., as antitussives) or to treat diarrhea. Methadone is used in the treatment of narcotic abstinence syndromes and as an analgesic in terminal illness</p>	<ol style="list-style-type: none"> 1. Heroin (“smack” or “horse”)—injected, smoked, or inhaled^d. 2. Codeine (codeine sulfate) —taken orally or injected^d 3. Morphine (morphine hydrochloride)—injected, smoked, or inhaled. 4. Synthetic opiates (e.g., methadone [Dolophine[®]]; hydromorphone hydrochloride [Dilaudid[®]], meperidine hydrochloride [Demerol[®]], oxycodone and aspirin [Percodan[®]])—taken orally or injected,
<p>PCP (PHENCYCLIDINE) AND SIMILARLY ACTING SYMPHATHOMIMETICS</p> <p>Phencyclidine, commonly referred to as PCP, alters the functions of the neocortex and has been called a dissociative anesthetic. It was developed in the 1950s as an anesthetic but was subsequently taken off the market in 1967 when it was discovered that the drug caused hallucinations in some people.¹ PCP is now used legally only in veterinary medicine as an immobilizing agent.</p>	<p>PCP (“angel dust” or “lovely”)—taken orally, or smoked (sprayed on joints or cigarettes)^d</p>

^aAccording to Julien, one could conceivably classify psychoactive drugs by at least three methods: 1) mechanism of action, 2) chemical structure, and 3) behavioral effects. Probably the most useful approach would be to classify them by mechanism of action, but knowledge of the brain's physiology is too limited for this approach to be comprehensive. A limitation of the second approach is that many drugs of apparently similar structure exert quite different effects, and many drugs of dissimilar structure exert quite similar effects. The classification in this table largely reflects the behavioral effects approach. The classification used here is based on the categories in the American Psychiatric Association's *Diagnostic and Statistical Manual of Mental Disorders*, 3rd ed., revised. According to the American Psychiatric Association, all of the classes of psychoactive substances listed in this box except nicotine are associated with both abuse and dependence. Nicotine is associated with dependence but not abuse.

(continued)

BOX 2-2 (cont'd.): Overview of Alcohol and Some Other Psychoactive Substances

^bThe potential physiological, psychological, and behavioral effects of using the psychoactive substance shown are discussed in the sources listed below. The consequences depend in part on the specific drug used, the dosage level and mode of administration.

^c*Central nervous system stimulants* are drugs that can elevate mood, increase alertness, reduce fatigue, provide a sense of increased energy, decrease appetite, and improve task performance. They can also produce anxiety, insomnia, and irritability. The drugs differ widely in their molecular structures and mechanisms of action.

^dAccording to the American Psychiatric Association, the route of administration of a psychoactive substance is an important variable in determining whether use will lead to dependence or abuse. In general, routes of administration that produce more efficient absorption of the substance in the blood stream (e.g., intravenous injection) tend to increase the likelihood of an escalating pattern of substance use that leads to dependence. Routes that quickly deliver psychoactive substances to the brain (e.g., smoking or intravenous injection) are associated with higher levels of consumption and with an increased likelihood of toxic effects. Use of contaminated needles for intravenous administration of amphetamines, cocaine, and opiates can cause hepatitis, HIV infection, and other illnesses.

^eFreebase *cocaine* is a form of cocaine made by converting "street cocaine" (cocaine hydrochloride) to a purified base that is smoked. The effect of smoking freebase is similar to that of intravenous injection but smoking provides a shorter, more intense high than sniffing or ingestion because of the rapid absorption of the drug through the lungs. "*Crack cocaine*" is the street name given to freebase cocaine that has been processed from cocaine hydrochloride to a chemical base by cooking it with baking soda and water. The term crack refers to the cracking sound that is heard when the mixture is smoked (heated), presumably due to the sodium bicarbonate.

^fDescribing a drug as a stimulant does not adequately describe its properties. Drug use surveys typically mean amphetamines when they use the word stimulants. Some surveys regard as stimulants both prescription (amphetamines) and nonprescription substances (e.g., caffeine-based compounds used in No-Doz, diet pills, and "fake pep pills"). Cocaine and nicotine (described above) are also central nervous system stimulants.

^gAccording to the National Institute on Drug Abuse, *designer drugs* are structural analogs of substances scheduled under the Controlled Substances Act that are prepared by underground chemists to mimic the psychoactive effects of controlled substances or produce other psychoactive effects. Because such analogs are not identical to their parent compound, their manufacture and distribution does not violate the law. As of June 1986, there were synthetic analogs of PCP, fentanyl and meperidine, and amphetamine and methamphetamine.

^hIn the past, abuse of methamphetamine had been in the form of tablets or intravenous injection. More recently, "ice" (one of the common street names for *d*-methamphetamine hydrochloride) has gained popularity in a form suitable for smoking.

Most of the agents in this class of drugs can induce hallucinations if the dose is high enough. But the term hallucinogen does not adequately describe the range of pharmacological actions of the diverse group of substances usually included in the class. The term psychedelic was proposed by Osmond in 1957 to imply that these agents all have the ability to alter the sensory perception and thus may be considered "mind expanding." The effects of hallucinogens are unpredictable and depend on the amount taken, the user's personality, mood and expectations, and the surroundings in which the drug is used.

ⁱPCP is considered a hallucinogen in some surveys of drug use.

SOURCES: Office of Technology Assessment, 1991, based on the following sources: American Psychiatric Association, *Diagnostic and Statistical Manual of Mental Disorders*, 3rd ed. revised (Washington, DC 1987); R. M. Julien, *A Primer of Drug Action*, 5th ed. (New York, NY: W. H. Freeman and Co., 1988); J. F. Kauffman, H. Shaffer, and M. Burglass, "The Biological Basics: Drugs and Their Effects," *Alcoholism and Substance Abuse Clinical Interventions* (New York, NY 1985); U.S. Department of Health and Human Services, Public Health Service, Alcohol, Drug Abuse and Mental Health Administration, National Institute on Drug Abuse, "Hallucinogens and PCP Inhalants, Marijuana, Opiates, Sedative-Hypnotics, Stimulants, and Cocaine," Rockville, MD, 1983; U.S. Department of Health and Human Services, Public Health Service, Alcohol, Drug Abuse, and Mental Health Administration, National Institute on Drug Abuse, "Designer Drugs," *NIDA Capsules*, Rockville, MD, June 1986; U.S. Department of Health and Human Services, Public Health Service, Alcohol, Drug Abuse, and Mental Health Administration, National Institute on Drug Abuse, "Marijuana Update," *NIDA Capsules*, Rockville, MD, May 1989; U.S. Department of Health and Human Services, Public Health Service, Alcohol, Drug Abuse, and Mental Health Administration, National Institute on Drug Abuse, "Methamphetamine Abuse," *NIDA Capsules*, Rockville, MD, January 1989; and U.S. Department of Education, *Growing Up Drug Free: A Parent's Guide to Prevention* (Washington, DC 1989).

■ Medical Model

Within the fields of medicine, the two most frequently cited texts for the definitions of substance abuse and dependence are the *Diagnostic and Statistical Manual of Mental Disorders (DSM)* issued by the American Psychiatric Association and used widely in American medical practice, and the *International Classification of Diseases (ICD)* published by the World Health Organization (WHO).

The current ICD and DSM definitions of substance dependence are nearly identical. However, the two manuals differ sharply on the concepts of abuse, which DSM classifies as a maladaptive pattern of substance use leading to impairment or distress, as manifested by one or more of several events occurring over the same 12-month period (e.g., failure to fulfill major role obligations at work, school, or home; recurrent substance-related legal problems, such as arrests for substance-related disorderly conduct. The current ICD-10 category of *harmful use*, while applicable cross-culturally, is limited to a pattern of psychoactive substance use that is causing damage to health. The damage may be physical, as in cases of hepatitis from the self-administration of injected drugs, or mental, such as episodes of depressive disorder secondary to heavy consumption of alcohol (see appendix C for a full discussion of DSM and ICD definitions).

■ Criminal Justice Model

While it is well-known that many crimes are committed by persons with substance use disorders and that these disorders can be major contributors to their crimes, the criminal justice system has no systematic policy for the evaluation of these disorders. In many jurisdictions, whether federal, state, or local, the prevailing sentiment is that *any use* of an illicit substance and/or use of a licit substance in an illegal manner is considered criminal abuse. A limited set of quantitative analyses including blood, urine, and breath tests can be performed to detect illegal levels of alcohol and/or the presence of illicit substances. Besides the limited amount

of testing and evaluation, psychological screening examinations or structured interviews are used infrequently to determine the level and severity of use, abuse, or dependence.

For purposes of this report, OTA does not adopt any single definition for the terms *substance abuse* or *substance addiction/dependence*. The focus of this report, the underlying causes of substance abuse and addiction, relates to each of the definitions discussed above.

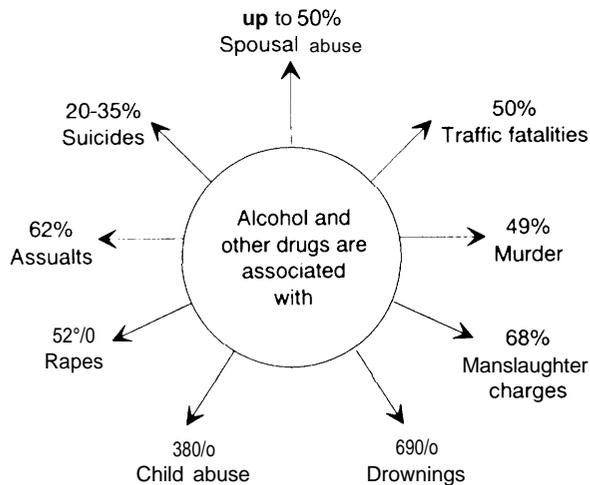
MAGNITUDE OF THE PROBLEM

The abuse of licit and illicit drugs represents a major public health problem in the United States. Abuse of alcohol and other drugs has been associated with many problems (see figure 2-2) costing Americans an estimated \$144.1 billion annually.

Federal survey data estimate that 11.4 million Americans aged 12 and older used illegal drugs in 1992, continuing a steady decline from a peak of 24 million in 1979. Findings from the 1992 National Household Survey found the following about specific drugs:

- **Illegal drugs.** Since 1979, overall rates of current use (defined as use within the last 30 days) have dropped in all age groups, except those aged 35 and older, whose use of drugs has remained level. This has resulted in a general shift in the age distribution of illegal drug users. In 1992, 23 percent of illegal drug users were aged 35 and older, compared with only 10 percent in 1979.
- **Cocaine.** The number of cocaine users decreased 31 percent from 1.9 million users in 1991 to 1.3 million in 1992. This is down from a peak of 5.8 million in 1985. The number of occasional users (defined as those who used the drug in 1992 but less often than monthly) also continued a sharp decline from 4.3 million in 1991 to 3.4 million in 1992. This is down from a peak of 8.6 million in 1985. Frequent use of cocaine (defined as use on a weekly basis) remained unchanged between 1991 and 1992. In fact, no significant change has occurred in this number since it was first estimated in 1985.

FIGURE 2–2: Association of Alcohol and Other Drugs With Problems



SOURCE Off Ice of Substance Abuse Prevention, 1991

- **Marijuana.** This is the most common illegal drug—used by 78 percent of all illegal drug users in 1992.
- **Other illegal drugs.** No major changes in the prevalence of the use of hallucinogens, such as lysergic acid diethylamide (LSD) and phencyclidine (PCP), between 1991 and 1992. The survey estimates that approximately 1.8 million Americans have used heroin at least once. However, the data on these categories are somewhat unreliable, as these users are less likely to be contacted and reported in a household survey.
- **Alcohol.** In 1992, approximately 98 million persons over the age of 12 had used alcohol in the last month, which is approximately 48 percent of the population aged 12 and older. This number is down from an estimated high of 106 million drinkers in 1988. The number of heavy drinkers (defined as having five or more drinks per occasion on five or more days in the past month) has remained steady at an estimated 9 million people.
- **Tobacco.** An estimated 54 million Americans were smokers in 1992, a rate of 26 percent of

the population aged 12 and older. Cigarette smoking has declined since 1988, when an estimated 57 million Americans smoked cigarettes.

- **Smokeless tobacco.** An estimated 7.5 million Americans used smokeless tobacco in 1992, the vast majority of whom (7.1 million) were males.
- **Inhalants.** The use of inhalants (e.g., gasoline, glue, and nitrites) dropped slightly in 1992 as compared to 1991.
- **Prescription drugs.** The estimated current nonmedical use of psychotherapeutics (sedatives, tranquilizers, stimulants, or analgesics) dropped from 1991 to 1992.

The survey also provides demographic variables useful to understanding substance use and abuse in the United States (see box 2-3). However, these figures, as all data on drug use, are suspect. Most surveys have strengths and weaknesses, which have led stakeholders and policy makers to make widely divergent conclusions based on the same sets of data.

MEASURING SUBSTANCE USE AND ABUSE

Like the old fable about blind men describing an elephant, individual drug statistics usually tell us only part of the story (13). Each survey provides useful information, but at the same time, each survey is flawed. Currently, no single measurement can by itself describe drug use and abuse in all its complexity. Nonetheless, several useful indicators do provide information to policy makers.

Three major national drug monitoring systems are the primary data source for this review: The National Household Survey on Drug Abuse (the Household Survey), the National Survey of High School Seniors (the Seniors Survey), and the Drug Abuse Warning Network (DAWN). These continuing data series have been sponsored by the National Institute on Drug Abuse (NIDA) since the 1970s. Supplementary data sources include the few small area studies that compare drug use by poverty or income status and the Drug Use Forecasting System (DUF), sponsored by the National

**BOX 2-3: Household Survey
Demographic Portrait**

According to the 1992 National Household Survey on Drug Abuse

- Illegal drug use is most prevalent in the 18- to 25-year age group
- Most illegal drug users are in the white population (76 percent of all current users or 87 million people)
- Men have a higher rate of current illegal drug use than women
- Illegal drug use is highly correlated with educational status. Those who had not completed high school had the highest rate of use
- Unemployed people are twice as likely as employed people to be using illegal drugs.
- The prevalence of illegal drug use in large metropolitan cities is slightly higher than in nonmetropolitan areas

SOURCE: Office of Technology Assessment, 1994, based on U.S. Department of Health and Human Services data

Institute of Justice, which provides quarterly estimates of drug use among the criminal population in selected cities.

■ National Household Survey on Drug Abuse

Since 1974, NIDA has commissioned the Household Survey every one to three years. The survey is based on a multistage random sample of the household population in the 48 contiguous United States. The sample excludes persons living in group quarters, including institutions, prisons, military quarters, and college dormitories, and those with no permanent address, including the homeless.

Since 1985, a number of enhancements have been made to the Household Survey. In 1985, blacks and Hispanics were oversampled to provide additional cases for subgroup analyses, and new measures of drug use frequency were introduced to identify persons who used drugs monthly and weekly during the previous year. In

1991, special supplementary samples were added for six metropolitan areas with highly publicized drug problems. Similarly, reports published since the early 1980s provide greater detail on the demographic characteristics of users by frequency of use.

■ National Survey of High School Seniors

Every year since 1975 researchers at the University of Michigan have surveyed a nationally representative sample of approximately 16,000 high school seniors. Beginning in 1976, a followup survey of members from each graduating class, including an over-sampling of drug users, has been conducted by mail. In 1990, the followup sample included young adults aged 19 to 32.

■ Drug Abuse Warning Network

DAWN, established in 1972, is the federal government major data system for tracking patterns and trends in the serious health consequences of drug use. DAWN reports include statistics on the total number of hospital emergency room visits (episodes), separate counts of the number of drugs mentioned per episode (drug mentions), and drug-related deaths.

Throughout the 1970s and 1980s, the DAWN program focused primarily on data from emergency rooms and medical examiners in 27 metropolitan areas. The selection of reporting facilities, over 700 emergency rooms and 87 medical examiners by 1989, was not random, however, and the number of facilities reporting varied from year to year, with facilities in metropolitan areas being overrepresented. Beginning in 1990, DAWN implemented a national probability sample for the collection of drug-related emergency room visit data to allow reporting of national as well as metropolitan area information.

■ Drug Use Forecasting System

DUF, initiated in 1988 by the Department of Justice, provides estimates of drug use among booked arrestees in selected cities based on urinalysis tests. The tests, administered shortly after arrest, measure very recent drug use among

lawbreakers. Four times a year, samples of about 250 male adult arrestees in participating cities are tested; some areas also test female arrestees and juveniles. The proportion of persons arrested explicitly on drug charges is limited to 25 percent of the total sample.

■ Limitations of the Data

The national drug monitoring surveys have several limitations for studying drug use, abuse, and addiction:

- Most surveys rely on self-reporting. The results of such surveys rely on the veracity of the person responding to the survey. A major, and widely recognized, limitation in the national surveys is that respondents may be unwilling or unable to report their drug use accurately. Comparisons of self-report and urinalysis results based on DUF data indicate that, among arrestees, the tendency to underreport drug use is substantial (12). As one Member of Congress noted, “how in the hell can you expect people who live in households to share with anybody, let alone the government, how often they use drugs?” (3).
- Surveys miss populations at risk for drug abuse. The Household Survey, by definition, excludes certain groups who do not reside in households, such as the homeless and persons in jail or prison. Although the excluded groups represent only 2 percent of the total population, drug use may be higher, or different, among excluded groups such as the homeless and jail or prison inmates. The Household Survey may also fail to capture drug users within the target population. Although overall survey response rates are high (82 percent in 1990), drugs users may have been more difficult to locate and interview because their lifestyles may involve irregular hours, avoiding authority, and other behaviors that reduce the likelihood of survey response. In addition, response rates tend to be generally lower among young adults and residents of metropolitan and low-income areas, and those not interviewed may be more likely to use drugs than those who respond to the survey.
- **Poverty indicators per se are not available.** The national drug monitoring systems contain very limited data on poverty, and none that meet the official poverty definition (in 1991, the poverty thresholds varied from \$6,932 for a person living alone to \$27,942 for a family of nine or more members (6). The proxy variables relating to employment, education, place of residence, and race and ethnicity unsuccessfully separate the effects of income from the effects of other correlated factors. Information on drug use by income status is available only in the most recent Household Surveys, and then only by family income without regard to household size. More information is provided by the Household Survey on other variables related to poverty, including employment status, race and ethnicity, and neighborhood characteristics. The Seniors Survey provides no income data. For high school seniors, the only regularly reported indicators of socioeconomic status are college plans and parental education. No socioeconomic indicators are available for the followup sample of young adults except current enrollment in college. Race and ethnic status are not regularly reported for either sample, but for high school seniors racial and ethnic patterns of drug use are analyzed and published separately. DAWN has severe limitations for an analysis of poverty and drug use. The only indicators in DAWN related to poverty are race and ethnicity. No data are available on income status of patients or the economic status of areas served by the facility.
- Surveys may over- and underrepresent findings regarding populations at risk for drug abuse. Populations at risk for both poverty and drug abuse, for example, are excluded or underrepresented in the major surveys and overrepresented in reports from hospital emergency rooms. These problems mean that the findings from these surveys are suggestive rather than definitive (see box 2-4).
- Drug measures focus on use, rather than abuse or addiction. The common measures of drug use employed by the Household and Seniors Surveys—lifetime, past year, and past month

BOX 2-4: Two Contrasting Surveys Measuring Cocaine Use

Because of populations not represented in the Household Surveys (including homeless, run-away children, and institutionalized populations such as the incarcerated), the surveys may greatly underestimate the involvement of the poor in drug use. Two years ago, for example, Abt Associates conducted a study to determine the number of heavy cocaine users in the United States. Two measures of heavy cocaine use were employed, both of which measured use of cocaine in the very recent past. Estimates of the number of regular weekly cocaine users from the 1990 Household Survey were compared to estimates of the number of recent cocaine users based on urinalysis tests of arrestees from the Drug Use Forecasting (DUF) program. DUF urinalysis tests were conducted at the time of booking, and the results measured cocaine use during the day or two before arrest. DUF estimates therefore measured the prevalence of very recent drug use among those involved with the criminal justice system in selected major cities.

The two data systems generated significantly different estimates. From the Household Survey, Abt estimated that there were about 662,000 heavy cocaine users in this country in 1990. This is substantially lower than the Abt estimate of 1.709 million heavy cocaine users derived from DUF data. Reasons for the differences include both possible underreporting on the Household Survey and the fact that many heavy cocaine users may be excluded from the household population or may be exceedingly difficult to locate and interview. Overall, the study indicated that approximately two-thirds of the heavy cocaine users in this country are not counted by the Household Survey and that approximately 87 percent of all heavy cocaine users are involved with the criminal justice system.

SOURCE Office of Technology Assessment, 1994, based on Abt Associates, *Heavy Cocaine Use in the United States: The Number of Users* (Washington, DC: Abt Associates, 1991).

use—are **insufficiently** refined to distinguish between casual and dependent drug use. Definitions of alcohol, drug abuse, and dependency—such as those set forth in DSM (1)—link the quantity and frequency of use to indications of persistent, uncontrolled consumption, impaired social and psychological functioning as a result of use, and physical problems including withdrawal symptoms. No published estimates of the number of drug users meeting medical criteria for abuse or dependence by poverty indicators are available, with the single exception of the DAWN estimates of emergency room contacts for dependency, which are reported by race and **ethnicity**.

- The surveys include few **multivariate** analyses. Since the surveys do not examine variables while controlling for factors related to drug use, an accurate link of drug use with the role of income, race, education, and place of residence is impossible. The dearth of such analyses results in part from sample size limitations and in part

from the fact that secondary analyses of the national survey data have not been encouraged.

ORGANIZATION AND SCOPE OF THE REPORT

This report has four parts: necessary preconditions, individual factors, community contexts, and policy options.

The first part, *Necessary Preconditions* (chs. 3-5), focuses on several factors necessary for substance abuse to occur. The second part, *Individual Factors* (ch. 6), explores research conducted on risk and protective factors thought to be indicators in assessing an individual's substance use, abuse, and addiction. The third part, *Activity Settings* (chs. 7 and 8), looks at how risk and protective factors play out in various population subgroups and in various community settings (home, school, workplace, recreation, and neighborhood). The fourth section, *Policy Options* (ch. 9), addresses

the range of legislative issues and options for Congress arising from chapters 3 through 8.

This report focuses on factors that contribute to or protect against substance abuse and addiction, and the implications for prevention. It does not address in any depth drug treatment or law enforcement issues and interventions. Based on the literatures reviewed by OTA about causes and prevention, however, it is clear that comprehensive prevention strategies will generally need drug treatment and law enforcement components, if they are to be effective. While drawing on data from federal antidrug prevention programs, the effectiveness of such approaches needs to be studied

in greater depth than was possible in this report.

This report is the second and final publication of this assessment. The first publication, a background report on *Biological Components of Substance Abuse and Addiction*, described genetic, pharmacological, and abuse liability research issues (9). Readers are also referred to earlier OTA reports that address issues related to drug interdiction efforts (10); alcohol, tobacco, and drug abuse prevention and services issues in adolescent health (7); the effectiveness of drug abuse treatment in controlling AIDS/HIV infection (11); and alternative coca reduction strategies (8).