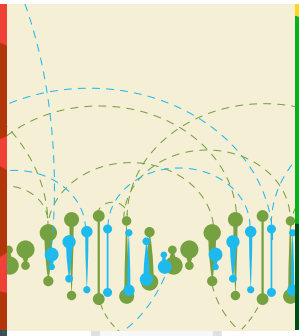
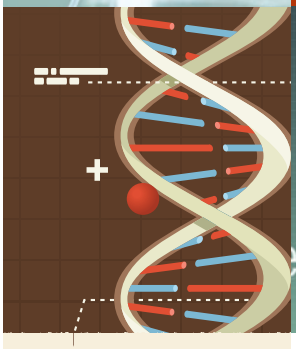
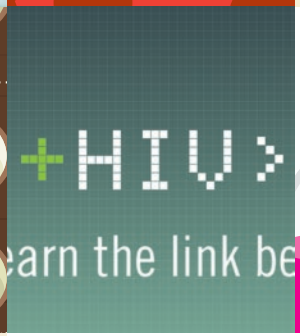
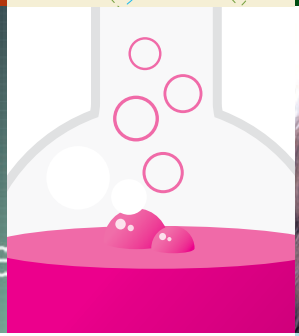
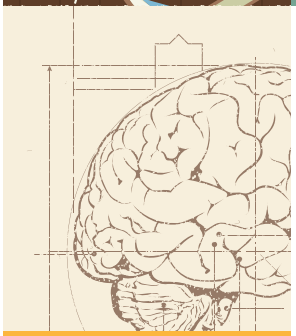




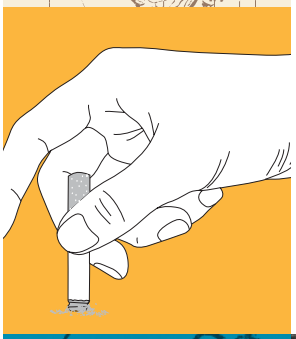


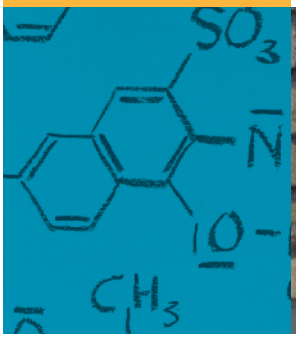
THE NATIONAL INSTITUTE ON DRUG ABUSE

MEDIA GUIDE

How to find what you need to know about drug use and addiction

www.drugabuse.gov





U.S. Department of Health and Human Services
National Institutes of Health

NIH
National Institute on Drug Abuse

quick reference/drugs & health

REPORTER'S QUICK REFERENCE GUIDE – WHO TO CALL FOR WHAT

WHAT	WHO
National Institutes of Health (NIH) (Within the U.S. Department of Health and Human Services [HHS])	
Science of drug use and addiction, including brain development, health consequences, prevention, and treatment; every December NIDA releases the annual Monitoring the Future Survey of teen drug use (8th, 10th, and 12th graders)	**National Institute on Drug Abuse (NIDA)** Press Office: 301-443-6245 E-mail: media@nida.nih.gov Web: drugabuse.gov/news-events
Science of alcohol use and addiction prevention, treatment, and recovery; NIAAA administers the National Epidemiologic Survey on Alcohol and Related Conditions-III	**National Institute on Alcohol Abuse and Alcoholism (NIAAA)** Press Office: 301-443-2857 E-mail: NIAAAPressOffice@mail.nih.gov Web: niaaa.nih.gov/news-events/press-room
Science of mental disorder prevention, treatment, and recovery	**National Institute of Mental Health (NIMH)** Press Office: 301-443-4536 E-mail: NIMHpress@nih.gov Web: nimh.nih.gov/news/index.shtml
To contact NIH Institutes not listed here	**NIH Media contacts:** Press Office: 301-496-5787 Web: www.nih.gov/news/media_contacts.htm
Other Relevant Agencies within HHS	
National Survey on Drug Use and Health (NSDUH), Behavioral Health Treatment Services Locator, and Prevention and Treatment Block Grants	**Substance Abuse and Mental Health Services Administration (SAMHSA)** Press Office: 240-276-2130 Email: media@samhsa.hhs.gov Web: samhsa.gov/newsroom
Safety and efficacy of medications	**U.S. Food and Drug Administration (FDA)** Press Office: 301-796-4540 E-mail: fdaoma@fda.hhs.gov Web: www.fda.gov/NewsEvents/
Wide-ranging Online Data for Epidemiologic Research (WONDER) database (includes overdose data), Youth Risk Behavior Survey (YRBS)	**Centers for Disease Control and Prevention (CDC)** Press Office: 404-639-3286 E-mail: media@cdc.gov Web: cdc.gov/media/index.html
HIV/AIDS	**HIV.gov** Web: hiv.gov
Relevant Offices Outside HHS	
Office of National Drug Control Policy (ONDCP) Executive Office of the President Press Office: 202-395-6618 E-mail: mediainquiry@ondcp.eop.gov Web: whitehouse.gov/ondcp	**Drug Enforcement Administration (DEA), within the U.S. Department of Justice** Press Office: 202-307-7977 Web: dea.gov

THE NATIONAL INSTITUTE ON DRUG ABUSE

MEDIA GUIDE

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DEAR JOURNALIST,

We thank you for your interest in the vitally important issues of drug use and addiction.

Today, thanks to science, our views and responses to addiction have changed dramatically. After more than four decades of research, as well as the development of exciting new imaging technologies, we know that drug addiction is a disorder of the brain that affects behavior — a disorder that can respond to treatment.

As the Director of the National Institute on Drug Abuse (NIDA), I am pleased to offer this guide to the important findings that are emerging as a result of research on addiction and its treatment. NIDA, one of 27 institutes within the National Institutes of Health (NIH) under the U.S. Department of Health and Human Services (HHS), supports most of the world's research on drug use and addiction. Findings from basic and behavioral science address fundamental and essential questions relevant to the entire spectrum of substance use disorders, ranging from causes and consequences to treatment and prevention.

FIGURES

RESEARCH

FACTS

The purpose of this guide is to give journalists fast and user-friendly access to the latest scientific information. In more than 35 years as a researcher, I have seen the impact that science and health journalists have in bringing scientific research to the public. It is through information that Americans gain hope and understanding.

I have come to know many of you over the years and remain committed to releasing scientific information as quickly as possible for rapid dissemination to the public. Please keep this guide nearby as a useful tool and let us know how NIDA's communication staff can provide you with information to meet your deadlines.

Nora D. Volkow, M.D.
Director
National Institute on Drug Abuse

NIDA's Public Information and Liaison Branch: NIDA's Link to the Media

We are committed to bringing timely, factual information on addiction and its treatment to the press and public. NIDA's Public Information and Liaison Branch (PILB) is part of NIDA's Office of Science Policy and Communications. Linking scientists, the scientific community, and the media, PILB supports the rapid dissemination of research information to inform policy and improve practice. NIDA's goal is to ensure that science — not ideology or anecdote — forms the foundation of public information on drug use and addiction.

Visit us online at **drugabuse.gov,** or contact the NIDA Press Office at **media@nida.nih.gov** or **301-443-6245** for information and access to experts, research, news, and information.

PILB developed this guide as part of NIDA's mission to close the gap between the public's impressions about drug addiction and the knowledge gained from scientific research on addiction and substance use.

the science of drug use and addiction: the basics

THE BASICS

THE SCIENCE OF DRUG USE AND ADDICTION: THE BASICS

What is drug addiction?

Addiction is defined as a chronic, relapsing disorder characterized by compulsive drug seeking, continued use despite harmful consequences, and long-lasting changes in the brain. It is considered both a complex brain disorder and a mental illness. Addiction is the most severe form of a full spectrum of substance use disorders, and is a medical illness caused by repeated misuse of a substance or substances.

Why study drug use and addiction?

Use of and addiction to alcohol, nicotine, and illicit drugs cost the Nation more than $740 billion a year related to healthcare, crime, and lost productivity.[1,2] In 2016, drug overdoses killed over 63,000 people in America, while 88,000 died from excessive alcohol use.[3,4] Tobacco is linked to an estimated 480,000 deaths per year.[5] (Hereafter, unless otherwise specified, *drugs* refers to all of these substances.)

How are substance use disorders categorized?

NIDA uses the term *addiction* to describe compulsive drug seeking despite negative consequences. However, *addiction* is not a specific diagnosis in the fifth edition of *The Diagnostic and Statistical Manual of Mental Disorders (DSM-5)* — a diagnostic manual for clinicians that contains descriptions and symptoms of all mental disorders classified by the American Psychiatric Association (APA).

In 2013, APA updated the DSM, replacing the categories of *substance abuse* and *substance dependence* with a single category: *substance use disorder,* with three subclassifications — mild, moderate, and severe. The symptoms associated with a substance use disorder fall into four major groupings: impaired control, social impairment, risky use, and pharmacological criteria (i.e., tolerance and withdrawal).

The new DSM describes a problematic pattern of use of an intoxicating substance leading to clinically significant impairment or distress with 10 or 11 diagnostic criteria (depending on the substance) occurring within a 12-month period. Those who have two or three criteria are considered to have a "mild" disorder, four or five is considered "moderate," and six or more symptoms, "severe." The diagnostic criteria are as follows:

1. The substance is often taken in larger amounts or over a longer period than was intended.
2. There is a persistent desire or unsuccessful effort to cut down or control use of the substance.
3. A great deal of time is spent in activities necessary to obtain the substance, use the substance, or recover from its effects.

1. *National Drug Threat Assessment.* U.S. Department of Justice, National Drug Intelligence Center; 2011. www.justice.gov/archive/ndic/pubs44/44849/44849p.pdf.
2. Birnbaum HG, White AG, Schiller M, Waldman T, Cleveland JM, Roland CL. Societal costs of prescription opioid abuse, dependence, and misuse in the United States. *Pain Med Malden Mass.* 2011;12(4):657-667. doi:10.1111/j.1526-4637.2011.01075.x
3. Centers for Disease Control and Prevention. *Excessive Drinking Is Draining the U.S. Economy.;* 2016. https://www.cdc.gov/features/costsofdrinking/. Accessed April 21, 2017.
4. Centers for Disease Control and Prevention. U.S. drug overdose deaths continue to rise; increase fueled by synthetic opioids. https://www.cdc.gov/media/releases/2018/p0329-drug-overdose-deaths.html. Published March 29, 2018. Accessed May 15, 2018.
5. National Center for Chronic Disease Prevention and Health Promotion (US) Office on Smoking and Health. *The Health Consequences of Smoking – 50 Years of Progress: A Report of the Surgeon General.* Atlanta (GA): Centers for Disease Control and Prevention (US); 2014. http://www.ncbi.nlm.nih.gov/books/NBK179276/.

4. Craving, or a strong desire or urge to use the substance, occurs.
5. Recurrent use of the substance results in a failure to fulfill major role obligations at work, school, or home.
6. Use of the substance continues despite having persistent or recurrent social or interpersonal problems caused or exacerbated by the effects of its use.
7. Important social, occupational, or recreational activities are given up or reduced because of use of the substance.
8. Use of the substance is recurrent in situations in which it is physically hazardous.
9. Use of the substance is continued despite knowledge of having a persistent or recurrent physical or psychological problem that is likely to have been caused or exacerbated by the substance.
10. Tolerance, as defined by either of the following:
    a. A need for markedly increased amounts of the substance to achieve intoxication or desired effect.
    b. A markedly diminished effect with continued use of the same amount of the substance.

11 Withdrawal, as manifested by either of the following:
    a. The characteristic withdrawal syndrome for that substance (as specified in the DSM-5 for each substance).
    b. The use of a substance (or a closely related substance) to relieve or avoid withdrawal symptoms.

Please note: *Some national surveys of drug use may not have been modified to reflect the new DSM-5 criteria of substance use disorders and therefore still report substance abuse and dependence separately.*

How does NIDA use the terms *drug use, misuse,* and *addiction?*

Drug use refers to any scope of use of illegal drugs: heroin use, cocaine use, tobacco use. *Drug misuse* is used to distinguish improper or unhealthy use from use of a medication as prescribed or alcohol in moderation. These include the repeated use of drugs to produce pleasure, alleviate stress, and/or alter or avoid reality. *It also includes using prescription drugs in ways other than prescribed or using someone else's prescription. Addiction* refers to substance use disorders at the severe end of the spectrum and is characterized by a person's inability to control the impulse to use drugs even when there are negative consequences. These behavioral changes are also accompanied by changes in brain function, especially in the brain's natural inhibition and reward centers. NIDA's use of the term *addiction* corresponds roughly to the DSM definition of substance use disorder. The DSM does not use the term *addiction.*

Why does NIDA use the term "*misuse*" instead of "*abuse*"?

NIDA uses the term *misuse,* as it is roughly equivalent to the term *abuse.* Substance abuse is a diagnostic term that is increasingly avoided by professionals because it can be shaming, and adds to the stigma that often keeps people from asking for help. Substance misuse suggests use that can cause harm to the user or their friends or family.

What is the difference between physical dependence, tolerance, and addiction?

Physical dependence can occur with the regular (daily or almost daily) use of any substance, legal or illegal, even when taken as prescribed. It occurs because the body naturally adapts to regular exposure to a substance (e.g., caffeine or a prescription drug). When that substance is taken away, (even if originally prescribed by a doctor) symptoms can emerge while the body re-adjusts to the loss of the substance. Physical dependence can lead to craving the drug to relieve the withdrawal symptoms. Tolerance is the need to take higher doses of a drug to get the same effect. It often accompanies dependence, and it can be difficult to distinguish the two. Addiction is a chronic disorder characterized by drug seeking and use that is compulsive, despite negative consequences.

How do drugs work in the brain to produce pleasure?

Nearly all addictive drugs directly or indirectly target the brain's reward system by flooding the circuit with dopamine. Dopamine is a neurotransmitter present in regions of the brain that regulate movement, emotion, cognition, motivation, and reinforcement of rewarding behaviors. When activated at normal levels, this system rewards our natural behaviors. Overstimulating the system with drugs, however, produces effects which strongly reinforce the behavior of drug use, teaching the person to repeat it.

Is drug use or misuse a voluntary behavior?

The initial decision to take drugs is generally voluntary. However, with continued use, a person's ability to exert self-control can become seriously impaired. Brain imaging studies from people addicted to drugs show physical changes in areas of the brain that are critical for judgment, decision-making, learning, memory, and behavior control. Scientists believe that these changes alter the way the brain works and may help explain the compulsive and destructive behaviors of a person who becomes addicted.

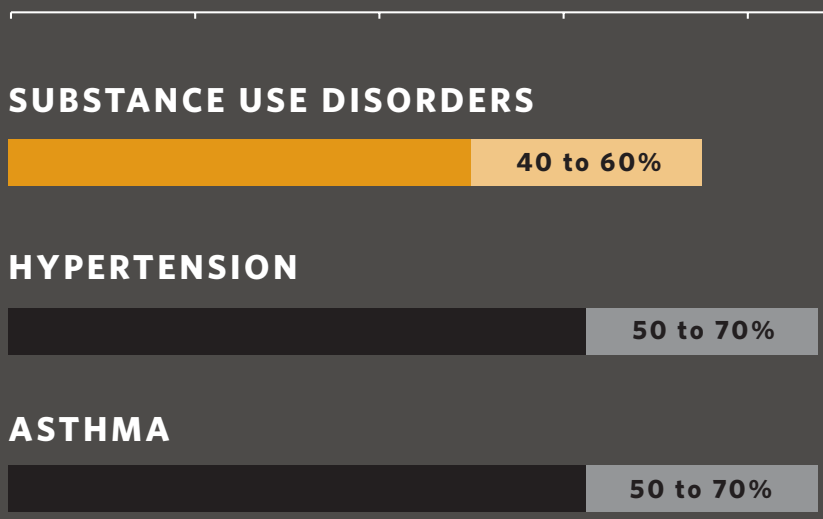
Can addiction be treated successfully?

Yes. Addiction is a treatable, chronic disorder that can be managed successfully. Research shows that combining behavioral therapy with medications, if available, is the best way to ensure success for most patients. The combination of behavioral interventions and medications to treat a substance use disorder is known as medication-assisted treatment (MAT). Treatment approaches must be tailored to address each patient's drug use patterns and drug-related medical, psychiatric, environmental, and social problems.

4

Comparison of Relapse Rates Between Substance Use Disorders and Other Chronic Illnesses

Percentage of Patients Who Relapse



Relapse rates for patients with substance use disorders are compared with those suffering from hypertension and asthma. Relapse is common and similar across these illnesses (as is adherence to medication). Thus, drug addiction should be treated like any other chronic illness, with relapse serving as a trigger for renewed intervention.

Source: McLellan et al., JAMA, 284:1689–1695, 2000.

Does relapse to drug use mean treatment has failed?

No. The chronic nature of addiction means that relapsing to drug use is not only possible but also likely. Relapse rates are similar to those for other well-characterized chronic medical illnesses such as hypertension and asthma, which also have both physiological and behavioral components. Relapse is the return to drug use after an attempt to stop. Treatment of chronic diseases involves changing deeply imbedded behaviors. Lapses back to drug use indicate that treatment needs to be reinstated or adjusted, or that alternate treatment is needed. No single treatment is right for everyone, and treatment providers must choose an optimal treatment plan in consultation with the individual patient and should consider the patient's unique history and circumstance.

How many people die from drug use?

The CDC reports that in 2016, the rate of overdose deaths was more than three times the rate in 1999.[6] The pattern of drugs involved in drug overdose deaths has changed in recent years. The rate of drug overdose deaths involving synthetic opioids other than methadone doubled from 3.1 per 100,000 in 2015 to 6.2 in 2016, with about half of all overdose deaths being related to the synthetic opioid fentanyl, which is cheap to get and added to a variety of illicit drugs. For more information about drug overdose rates, please go to **cdc.gov/drugoverdose/data.**

MOST COMMONLY USED ADDICTIVE SUBSTANCES

Marijuana

Marijuana (cannabis) refers to the dried leaves, flowers, stems, and seeds from the *Cannabis sativa* or *Cannabis indica* plant and is the most commonly used illicit substance. It is now legal in some states for medical and recreational use. Some people use marijuana for its pleasurable high, but this drug also impairs short-term memory and learning, the ability to focus, and coordination. It also increases heart rate, can harm the lungs, and can increase the risk of psychosis in vulnerable people. Data suggest that 30 percent of those who use marijuana may have some degree of marijuana use disorder.[7] People who begin using marijuana before the age of 18 are four to seven times more likely than adults to develop a marijuana use disorder.[8] For more information, visit **drugabuse.gov/drugs-abuse/marijuana.**

6. *Data Brief 294. Drug Overdose Deaths in the United States, 1999–2016.* National Center for Health Statistics. Centers for Disease Control and Prevention. https://www.cdc.gov/nchs/data/databriefs/db294_table.pdf#page=4.
7. Hasin DS, Saha TD, Kerridge BT, et al. Prevalence of Marijuana Use Disorders in the United States Between 2001–2002 and 2012–2013. *JAMA Psychiatry.* 2015;72(12):1235-1242. doi:10.1001/jamapsychiatry.2015.1858
8. Winters KC, Lee C-YS. Likelihood of developing an alcohol and cannabis use disorder during youth: Association with recent use and age. *Drug Alcohol Depend.* 2008;92(1-3):239-247. doi:10.1016/j.drugalcdep.2007.08.005

Marijuana Research at NIDA and NIH

As part of its mandate to study drug use and addiction and other health effects of both legal and illegal drugs, NIDA funds a wide range of research on marijuana; its main mind-altering ingredient, THC; and other chemicals, such as cannabidiol (CBD). For more information about NIDA research on marijuana and cannabinoids, visit **drugabuse.gov/drugs-abuse/marijuana/marijuana-research-nida.** NIDA is one of 27 institutes and centers who could fund research on marijuana. For more information about NIH-funded research on marijuana, visit **https://www.drugabuse.gov/drugs-abuse/marijuana/nih-research-marijuana-cannabinoids.**

Medical Marijuana

Although many states have legalized marijuana for medical use, the scientific evidence to date is not sufficient for it to gain U.S. Food and Drug Administration (FDA) approval, for two main reasons.

First, there have not been enough clinical trials showing that marijuana's benefits outweigh its health risks. The FDA requires carefully conducted studies (clinical trials) in hundreds to thousands of patients to determine benefits and risks.

Second, to be considered a legitimate medicine, a substance must have well-defined and measurable ingredients that are consistent from one unit to the next (such as a pill or injection). This consistency allows doctors to determine the dose and frequency. As the marijuana plant contains hundreds of chemical compounds that may have different effects and that vary from plant to plant, evaluating the whole plant as a medicine is difficult.

However, synthetic THC-based drugs to treat nausea caused by chemotherapy and increase appetite in patients with extreme weight loss caused by AIDS are already FDA-approved and prescribed. In addition, the FDA recently approved Epidiolex®, the first medicine derived from the marijuana plant itself. Epidiolex® is made using CBD, a non-pscyhoactive ingredient in the plant, and has shown efficacy in treating two rare and severe forms of epilepsy in children. For more information, see our *Marijuana as Medicine DrugFacts* at **drugabuse.gov/publications/drugfacts/marijuana-medicine.**

Synthetic Cannabinoids (K2/Spice)

Synthetic cannabinoids are human-made, mind-altering chemicals that are either sprayed on dried, shredded plant material so they can be smoked (herbal incense) or sold as liquids to be vaporized and inhaled in e-cigarettes and other devices (liquid incense) to produce a high.

These chemicals are called *cannabinoids* because they are related to chemicals found in the marijuana plant. Because of this similarity, synthetic cannabinoids are sometimes misleadingly called "synthetic marijuana" (or "fake weed"), and they are often marketed as "safe," legal alternatives to that drug. In fact, they are not safe and may affect the brain more powerfully and differently than marijuana; their actual effects can be unpredictable and, in some cases, severe or even life-threatening.

Synthetic cannabinoids are part of a group of drugs called new psychoactive substances (NPS). These are unregulated mind-altering substances that have become recently available on the market and are intended to produce the same effects as illegal drugs. Some of these substances may have been around for years but have reentered the market in altered chemical forms, or due to renewed popularity.

People taken to the emergency room after using synthetic cannabinoids report rapid heart rate, vomiting, violent behavior, and suicidal thoughts.

These drugs can also raise blood pressure and reduce blood supply to the heart, as well as cause kidney damage and seizures. Synthetic cannabinoids have a high addictive potential and no medical benefit, so the U.S. Drug Enforcement Administration (DEA) has made it illegal to sell, buy, or possess them. However, manufacturers try to sidestep these laws by changing the chemical formulas in their mixtures. For more information, visit **drugabuse.gov/drugs-abuse/synthetic-cannabinoids-k2spice.**

Prescription and Over-the-Counter Medications

Some prescription and over-the-counter medications are increasingly being misused (used in ways other than intended or without a prescription). This practice can lead to addiction and, in some cases, overdose. Among the most disturbing aspects of this emerging trend is its prevalence among teenagers and young adults, as well as the common misperception that because these are used medically or prescribed by physicians, they are safe even when not used as intended. Commonly misused classes of prescription drugs include opioid pain relievers, stimulants, and central nervous system (CNS) depressants (sedatives and tranquilizers).

> ***Opioids*** are a class of drugs naturally found in the opium poppy plant. Some prescription opioids are made from the plant directly, and others are made by scientists in labs using the same chemical structure. Opioids are often used as medicines because they contain chemicals that relax the body and can relieve pain. Prescription opioids are used mostly to treat moderate to severe pain, though some opioids can be used to treat coughing and diarrhea. Opioids can also make people feel very relaxed and high — which is why they are sometimes used for non-medical reasons. This can be dangerous because opioids can be highly addictive, and overdoses and death are common. Heroin is one of the world's most dangerous opioids, and is never used as a medicine in the United States. Prescription opioids and heroin are chemically similar and can produce a similar high. In some places, heroin is cheaper and easier to get than prescription opioids, so some people switch to using heroin instead.
>
> In the short term, opioids can relieve pain and make people feel relaxed and happy. However, opioids can also cause drowsiness, confusion, nausea, constipation, euphoria, and slowed breathing. Slowed breathing can cause hypoxia, a condition that results when too little oxygen reaches the brain. Hypoxia can have short- and long-term psychological and neurological effects, including coma, permanent brain damage, or death, resulting in increasingly higher overdose deaths in the U.S. Researchers are also investigating the long-term effects of opioid addiction on the brain, including whether damage can be reversed.

Stimulants such as Methylphenidate (Ritalin®, Concerta®) and amphetamines (Adderall®, Dexedrine®) are commonly prescribed for attention-deficit hyperactivity disorder (ADHD) and narcolepsy — uncontrollable episodes of deep sleep. Prescription stimulants increase alertness, attention, and energy. Stimulants enhance the effects of certain neurotransmitters in the brain, such as norepinephrine and dopamine. Dopamine affects feelings of pleasure. Norepinephrine affects blood vessels, blood pressure and heart rate, blood sugar, and breathing.

People who use prescription stimulants report feeling a "rush" (euphoria) along with increased blood pressure and heart rate, increased breathing, decreased blood flow,

increased blood sugar, opened-up breathing passages. At high doses, prescription stimulants can lead to a dangerously high body temperature, an irregular heartbeat, heart failure, and seizures. Repeated misuse of prescription stimulants, even within a short period, can cause psychosis, anger, or paranoia.

CNS Depressants are medicines that include sedatives, tranquilizers, and hypnotics. They are usually prescribed to treat anxiety, panic, acute stress reactions, and sleep disorders. Sedatives primarily include barbiturates (e.g., phenobarbitol) but also include sleep medications such as Ambien® and Lunesta®. Tranquilizers primarily include benzodiazepines, such as Valium® and Xanax®, but also include muscle relaxants and other anti-anxiety medications. These medications slow brain activity, which can cause drowsiness, slurred speech, poor concentration, confusion, dizziness, problems with movement and memory, lowered blood pressure, and slowed breathing, especially when misused.

Over-the-counter medicines that are commonly misused include dextromethorphan (DXM), a cough suppressant, and loperamide, an antidiarrheal. Products containing DXM can be sold as cough syrups, gel capsules, and pills that can look like candies. They are often misused by young people, who refer to the practice as "robotripping" or "skittling." Loperamide is available in tablet, capsule, or liquid form. Both DXM and loperamide are opioids. DXM does not have effects on pain reduction or addiction and does not act on the opioid receptors. However, when taken in large doses, DXM can cause a depressant and hallucinogenic effect. Short-term effects of DXM misuse can range from mild stimulation to alcohol- or marijuana-like intoxication. Loperamide does not enter the brain; but when taken in large doses and combined with other substances, it may cause the drug to act in a similar way to other opioids. Loperamide misuse can cause euphoria, similar to other opioids, or lessen cravings and withdrawal symptoms, but other effects have not been well studied and reports are mixed.

For more information about misuse of prescription and over-the-counter medicines, view the following NIDA resources:

- **Prescription Opioids DrugFacts**
- **Prescription Stimulants DrugFacts**
- **Prescription CNS Depressant DrugFacts**
- **Over-the-Counter Medicines DrugFacts**
- **Misuse of Prescription Drugs Research Report**

OTHER COMMONLY USED ADDICTIVE SUBSTANCES

Alcohol

Alcohol consumption can damage the brain and most body organs, including the heart, liver, and pancreas. It also increases the risk of some cancers, weakens the immune system, puts fetal development at risk, and causes deadly vehicle crashes. Areas of the brain that are especially vulnerable to alcohol-related damage include the following:

- cerebral cortex – largely responsible for higher brain functions, including problem-solving and decision-making
- hippocampus – important for memory and learning
- cerebellum – important for movement coordination

For more information, visit the National Institute on Alcohol Abuse and Alcoholism at **niaaa.nih.gov.**

Anabolic Steroids

Anabolic steroids are synthetic variations of the male sex hormone testosterone. The proper term for these compounds is *anabolic-androgenic steroids* (abbreviated as AAS.) "Anabolic" refers to muscle building and "androgenic" refers to increased male sexual characteristics. Steroids can be prescribed for delayed puberty and diseases that cause muscle loss; however, some athletes and body builders misuse these drugs in attempts to improve athletic performance or physical appearance.

Anabolic steroids work very differently from other addictive drugs, and they do not have the same short-term effects on the brain. However, long-term steroid use can affect some of the same brain pathways and chemicals — including dopamine, serotonin, and opioid systems — that are affected by other drugs. This may result in a significant impact on mood and behavior.

Anabolic steroid misuse can lead to mental problems like paranoid jealousy, extreme irritability, delusions, impaired judgment, and extreme mood swings. Other health effects include severe acne, body swelling, and changes in sex characteristics, such as shrinking of testicles in men and facial hair growth in women. Some serious consequences of steroid misuse can include heart disease, liver damage, and kidney problems or failure. For more information, visit **drugabuse.gov/drugs-abuse/steroids-anabolic.**

Cocaine

Cocaine is powerfully addictive stimulant drug made from the leaves of the coca plant. Cocaine increases levels of dopamine in brain circuits controlling pleasure and movement, leading to health effects like extreme happiness and energy, mental alertness, hypersensitivity to sight, sound, and touch, irritability, and paranoia. Some people find that cocaine helps them perform simple physical and mental tasks more quickly, although others experience the opposite effect. Large amounts of cocaine can lead to bizarre, unpredictable, and violent behavior. People who use cocaine often take it in binges — taking the drug repeatedly within a short time, at increasingly higher doses — to maintain their high. Cocaine use can lead to severe medical consequences related to the heart and the respiratory, nervous, and digestive systems. For more information, visit **drugabuse.gov/drugs-abuse/cocaine.**

Fentanyl

Fentanyl is a powerful synthetic opioid that is similar to morphine but is 50 to 100 times more potent. Like morphine, it is a prescription drug that is typically used to treat patients with severe pain or to manage pain after surgery. Synthetic opioids, including fentanyl, are now the most common drug involved in drug overdose deaths in the United States. Some drug dealers are mixing fentanyl with other drugs, such as heroin, cocaine, methamphetamine, and MDMA. This is because it takes very little to produce a high with fentanyl, making it a cheaper option. This is especially risky when people taking drugs don't realize they might contain fentanyl as a cheap but dangerous additive. They may be taking stronger opioids than their bodies are used to, and can be more likely to overdose. For more information, visit **drugabuse.gov/drugs-abuse/fentanyl.**

Hallucinogens

Hallucinogens are a class of drugs that cause hallucinations — sensations and images that seem real though they are not. People have used hallucinogens for centuries, mostly for religious rituals. Hallucinogens can be found in some plants and mushrooms or can be human-made. They are commonly divided into two broad categories: classic hallucinogens and dissociative drugs.

Research suggests that hallucinogens work at least partially by temporarily disrupting communication between brain chemical systems throughout the brain and spinal cord. The effects of hallucinogens are highly variable and unreliable, producing different effects in different people at different times. This is mainly due to differences in the amounts and chemistries of active compounds within the drugs. Because of their unpredictable nature, the use of hallucinogens can be particularly dangerous. Classic hallucinogens include the following:

- **Ayahuasca** is a tea made from one of several Amazonian plants containing *dimethyltryptamine* (DMT), the primary mind-altering ingredient.
- **DMT** is a powerful chemical found in some Amazonian plants. Manufacturers can also make DMT in a lab.
- ***D-lysergic acid diethylamide* (LSD)** is one of the most powerful mood-changing chemicals. It is made from lysergic acid, which is found in a fungus that grows on rye and other grains.
- **Peyote (mescaline)** is a small, spineless cactus with mescaline as its main ingredient. Peyote can also be synthetic.
- ***4-phosphoryloxy-N, N-dimethyltryptamine* (psilocybin)** comes from certain types of mushrooms found in tropical and subtropical regions of South America, Mexico, and the United States.

Dissociative drugs cause people to feel out of control or disconnected from their body and environment. Common examples include the following:

- **Ketamine** is used as a surgery anesthetic for humans and animals. Because ketamine is odorless and tasteless and has amnesia-inducing properties, it is sometimes added to drinks to facilitate sexual assault.
- ***Phencyclidine* (PCP)** was developed in the 1950s as a general anesthetic for surgery. It's no longer used for this purpose due to serious side effects, including out of control behaviors.
- ***Salvia divinorum* (salvia)** is a plant common to southern Mexico and Central and South America.

For more information, visit **drugabuse.gov/drugs-abuse/hallucinogens.**

Heroin

Heroin is an opioid drug made from morphine, a natural substance taken from the seed pod of various opium poppy plants. Heroin enters the brain rapidly and binds to opioid receptors on cells located in many areas, especially those involved in feelings of pain and pleasure and in controlling heart rate, sleeping, and breathing.

It produces euphoria and feelings of relaxation. It can also slow breathing and can increase the risk of serious infectious diseases, especially when injected with a needle. Regular heroin use changes brain functioning, causing tolerance and dependence. Prescription opioid pain medicines have effects similar to heroin. Research suggests that misuse of these drugs may open the door to heroin use. Nearly 80 percent of Americans using heroin (including those in treatment) reported misusing prescription opioids prior to using heroin.[9,10] However, while prescription opioid misuse is a risk factor for starting heroin use, only a small fraction of people who misuse opioid pain relievers switch to heroin. According to a national survey, fewer than 4 percent of people who had misused prescription pain medicines started using heroin within 5 years.[10] For more information, visit **drugabuse.gov/drugs-abuse/heroin.**

Inhalants

Inhalants are various products easily bought and found in the home and workplace — such as spray paints, markers, glues, and cleaning fluids — and include solvents, aerosol sprays, gases, and nitrites. Inhalants contain dangerous substances that have mind-altering properties when inhaled. People don't typically think of these products as drugs because they're not intended for getting high, but some people use them for that purpose. Although other substances that are misused can be inhaled, inhalants are substances that people typically take only by inhaling. Inhalants are extremely toxic and can damage the heart, kidneys, lungs, and brain. Even in a healthy person, sniffing these products can cause the heart to stop within minutes and lead to death.

People tend to abuse different inhalant products at different ages. New younger users (ages 12–15) most commonly abuse glue, shoe polish, spray paints, gasoline, and lighter fluid. First-time older users (ages 16–17) most commonly abuse nitrous oxide, or whippets. Adults most commonly abuse a class of inhalants known as nitrites (such as amyl nitrites, or poppers). For more information, visit **drugabuse.gov/drugs-abuse/inhalants.**

MDMA (Ecstasy, Molly)

***3,4-methylenedioxymethamphetamine* (MDMA)** is a synthetic drug that alters mood and perception. It is chemically similar to both stimulants and hallucinogens, producing feelings of increased energy, pleasure, emotional warmth, and distorted sensory and time perception. High doses of MDMA can affect the body's ability to regulate temperature. This can lead to a spike in body temperature that can occasionally result in liver, kidney, or heart failure or even death. In addition, because MDMA can promote trust and closeness, its use may encourage unsafe sexual behavior. This increases people's risk of contracting or transmitting HIV/AIDS or hepatitis. MDMA was initially popular in the nightclub scene and at all-night dance parties, with the elevated heat in the club environment contributing to reported deaths. The drug is now also used by a broader range of people who more commonly call the drug Ecstasy or Molly.

Molly — slang for "molecular" — refers to the "pure" crystalline powder form of Ecstasy. However, people who purchase powder or capsules sold as Molly often actually get other drugs instead of or in addition to MDMA. These drugs may include cocaine, ketamine, methamphetamine, over-the-counter cough medicine, or synthetic cathinones ("bath salts"). For more information, visit **drugabuse.gov/drugs-abuse/mdma-ecstasymolly.**

Methamphetamine

Methamphetamine is a stimulant that can produce feelings of euphoria and alertness. Methamphetamine's effects are particularly long-lasting and harmful to the brain. It can

9. Jones CM. Heroin use and heroin use risk behaviors among nonmedical users of prescription opioid pain relievers — United States, 2002–2004 and 2008–2010. *Drug Alcohol Depend.* 2013;132(1-2):95-100. doi:10.1016/j.drugalcdep.2013.01.007

10. Muhuri PK, Gfroerer JC, Davies MC. Associations of Nonmedical Pain Reliever Use and Initiation of Heroin Use in the United States. *CBHSQ Data Rev.* August 2013.

cause high body temperature and can lead to serious heart problems and seizures.

Regular methamphetamine use significantly changes how the brain functions. Human brain imaging studies have shown alterations in the activity of the dopamine system that are associated with reduced motor skills and impaired verbal learning. It can also affect areas of the brain involved with emotion and memory. These changes may account for many of the emotional and cognitive problems seen in people who use methamphetamine regularly. For more information, visit **drugabuse.gov/drugs-abuse/methamphetamine.**

Nicotine

Nicotine is an addictive stimulant found in cigarettes, other forms of tobacco, and e-cigarettes or e-vaporizers. Nicotine causes an increase in blood pressure, breathing, and heart rate. Studies suggest that other chemicals in tobacco smoke may enhance nicotine's effects on the brain. Although nicotine itself does not cause cancer, many of the chemicals in tobacco are carcinogenic. Cigarette smoking accounts for at least 30 percent of all cancer deaths, especially lung cancer. Additionally, tobacco smoking can lead to other lung diseases such as chronic bronchitis and emphysema. It increases the risk of heart disease, which can lead to stroke or heart attack. Smoking has also been linked to other cancers, leukemia, cataracts, and pneumonia. All of these risks apply to use of any smoked product, including hookah tobacco. Smokeless tobacco increases the risk of cancer, especially mouth cancers. Scientists are still studying potential harm caused by the use of e-cigarettes, with some research suggesting that teens who start with vaporizers will soon switch to regular tobacco cigarettes. For more information, visit **drugabuse.gov/drugs-abuse/tobacco-nicotine** and read **NIDA's Electronic Cigarettes DrugFacts.**

Rohypnol® and GHB

Like ketamine, **Rohypnol®** and **GHB** have come to be known as "date rape" drugs because they can cause someone to lose their memory of an assault. Rohypnol® and GHB can easily be added to beverages and ingested unknowingly. These drugs can also cause someone to lose consciousness. GHB is predominantly a CNS depressant, whereas Rohypnol® is a benzodiazepine. For more information about these drugs, visit **drugabuse.gov/drugs-abuse/commonly-abused-drugs-charts.**

Synthetic Cathinones ("Bath Salts")

Synthetic cathinones, more commonly known as **"bath salts,"** are human-made stimulants chemically related to cathinone, a substance found in the khat plant. These chemicals can be much stronger than the natural product and, in some cases, very dangerous. Health effects include paranoia, hallucinations, increased sociability, increased sex drive, panic attacks, and excited delirium — extreme agitation and violent behavior. Some deaths have been reported.

These synthetic cathinone products — marketed as "bath salts" to evade detection by authorities — should not be confused with products such as Epsom salts for bathing. "Bath salts" typically take the form of a white or brown crystalline powder and are sold in small plastic or foil packages labeled "not for human consumption." For more information, visit **drugabuse.gov/drugs-abuse/synthetic-cathinones-bath-salts.**

resources

RESOURCES

WHERE TO FIND NATIONWIDE TRENDS AND STATISTICS

Major sources of data on the extent of drug use in the United States include the following:

Monitoring the Future (MTF)

The MTF survey measures drug and alcohol use and related attitudes among 8th, 10th, and 12th grade students nationwide. Survey participants generally report their drug use behaviors across three time periods: lifetime, past year, and past month, with regular or daily use being reported for some tobacco products and marijuana. Results from the survey are released each December. For the latest survey results, visit **drugabuse.gov/related-topics/trends-statistics/monitoring-future.**

National Survey on Drug Use and Health (NSDUH)

The Substance Abuse and Mental Health Services Administration's (SAMHSA's) NSDUH (formerly called the National Household Survey on Drug Abuse) is the primary source of information on the prevalence, patterns, and consequences of alcohol, tobacco, and illegal drug use and misuse and mental disorders in the U.S. civilian noninstitutionalized population, ages 12 and older. For more survey information, visit **https://www.samhsa.gov/data/data-we-collect/nsduh-national-survey-drug-use-and-health.**

Treatment Episode Data Set (TEDS)

The TEDS system, maintained by SAMHSA, is a national census data system that includes records for substance use treatment admissions and discharges annually for clients ages 12 or older. While TEDS does not represent all substance use treatment activities, it comprises a significant proportion of all admissions and discharges to substance use treatment programs. Data collected by states include: demographic information; primary, secondary, and tertiary substances and the usual route of administration, frequency of use, and age at first use; source of referral to treatment; number of prior treatment episodes; service type, including planned use of medication-assisted opioid therapy. For more information, visit **https://wwwdasis.samhsa.gov/webt/information.htm.**

National Drug Early Warning System (NDEWS)

NDEWS began in August 2014 and is supported through a Cooperative Agreement award to the University of Maryland. NDEWS builds on and expands beyond the former NIDA Community Epidemiology Work Group by creating a broader network, adding a national perspective, and incorporating innovative approaches for the identification and monitoring of emerging drug problems. NDEWS has established the NDEWS Network, a virtual community of scientists, government officials, public health experts, law enforcement representatives, and others for sharing information and assisting with local research. Innovative methods being developed for information collection include scanning social media and news media, developing a collaboration with the American Association of Poison Control Center, and conducting site visits to local communities experiencing emerging drug problems or changes in drug use trends. For more information, visit **drugabuse.gov/related-topics/trends-statistics/national-drug-early-warning-system-ndews.**

Youth Risk Behavior Survey (YRBS)

The YRBS, part of the Centers for Disease Control and Prevention's (CDC's) Youth Risk Behavior Surveillance System, consists of national, state, and large urban school district surveys that collect data from students in grades 9 through 12. The surveys are conducted every two years and include questions on a wide variety of health-related risk behaviors, including substance use. For more information, visit **cdc.gov/healthyyouth/data/yrbs/index.htm.**

CDC WONDER

CDC's Wide-ranging Online Data for Epidemiologic Research (WONDER) is a web application that makes many health-related data sets available to the worldwide public health community. Among many other things, it provides information on drug overdose deaths in the United States. For more information, visit **wonder.cdc.gov.**

NIDA RESOURCES

A wealth of material about drug use and addiction is available, free of charge, from NIDA.

NIDA Website

Through its online and mobile presence, NIDA strives to communicate its research findings to the wide-ranging audiences it serves, which include students, parents, teachers, researchers, scientists, prevention and treatment practitioners, healthcare professionals, policymakers, constituent groups, children and teens, underserved populations, and the general public.

Most resources are available on NIDA's website: **drugabuse.gov.** The site's responsive design allows people to access the information on handheld devices and to order a free hard copy of some resources.

For specific information on NIDA news releases, video, infographics and animations, podcasts, latest news, public education projects, and other additional resources for the media resources, visit the News & Events Page at **drugabuse.gov/news-events.**

Opioid State Summaries

NIDA summarized data from the Centers for Disease Control and Prevention (CDC) and IMS Health to create a database of opioid use and consequences of use in each of the fifty states and the District of Columbia. To learn more visit **drugabuse.gov/drugs-abuse/opioids/opioid-summaries-by-state.**

Other NIDA Sites:

- For audiences with low literacy skills: **easyread.drugabuse.gov**
- For teens and people who work with teens: **teens.drugabuse.gov**
- NIDA's intramural research program: **irp.drugabuse.gov**
- NIDA's website in Spanish: **drugabuse.gov/es/en-espanol**

NIDA's Social Media Accounts:

- Twitter: **@NIDAnews**
- Facebook: **facebook.com/NIDANIH**
- RSS feed: **drugabuse.gov/nidanews.xml**
- YouTube: **youtube.com/user/NIDANIH**
- Flickr: **flickr.com/photos/nida-nih/collections/**
- LinkedIn: **linkedin.com/company/the-national-institute-on-drug-abuse-nida**
- Google Plus: **plus.google.com/+NIDANIH**

OTHER GOVERNMENT WEBSITES FOR HEALTH AND SCIENCE INFORMATION

National Institutes of Health (NIH)

nih.gov

NIH is the steward of medical and behavioral research for the Nation. NIH.gov is a portal to sites representing 27 institutes and centers at NIH. NIH's mission is to seek fundamental knowledge about the nature and behavior of living systems and the application of that knowledge to enhance health, lengthen life, and reduce illness and disability. NIH is part of the U.S. Department of Health and Human Services (HHS).

Healthfinder

healthfinder.gov

Healthfinder, coordinated by the Office of Disease Prevention and Health Promotion, part of HHS, provides resources on a wide range of health topics, selected from approximately 1,400 government and nonprofit organizations.

RePORTER

https://projectreporter.nih.gov/reporter.cfm

RePORTER includes information on research projects funded by NIH as well as CDC, the Agency for Healthcare Research and Quality, the Health Resources and Services Administration, SAMHSA, and the U.S. Department of Veterans Affairs. RePORTER also includes links to publications and patents citing support from these projects.

Project results can be filtered according to specific parameters, such as research topic, principal investigator, fiscal year, keyword, etc.

Note: *when doing a "Text Search" to filter by certain keywords, you will have to read the description of each study to determine if that research is actually focusing on your keyword of interest. In some cases, the term may be merely mentioned in the grant application but is not the topic of the study.*

National Library of Medicine (NLM)

www.nlm.nih.gov

NLM is the world's largest biomedical library. It maintains and makes available a vast print collection and produces electronic information resources on a wide range of topics that are searched billions of times each year by millions of people around the globe. NLM sponsors MedlinePlus, a source of up-to-date, quality healthcare information from NIH.

ClinicalTrials.gov

clinicaltrials.gov

ClinicalTrials.gov, maintained by NLM, lists publicly and privately supported clinical studies of human participants conducted around the world. ClinicalTrials.gov does not contain all the clinical studies conducted in the United States because not all studies are required by law to be registered (for example, observational studies and trials that do not study a drug, biologic, or device).

Office on Women's Health (OWH)

womenshealth.gov

OWH provides up-to-date health information on women's health topics that range from reproductive health to healthy aging. The site provides easy-to-understand health information, daily announcements, links to thousands of free health publications and websites, and statistics on women's health.

Office of Adolescent Health (OAH)

hhs.gov/ash/oah/

OAH is dedicated to improving the health and healthy development of America's teens, especially those who are most vulnerable.

HIV.gov

hiv.gov

HIV.gov works to expand the visibility of timely and relevant federal HIV policies, programs, and resources to the American public by increasing the use of new media tools by government, minority-serving organizations, and other community partners to extend the reach of HIV programs to communities at greatest risk.

about NIDA

NIDA'S HISTORY AND BACKGROUND

For important events in NIDA's history, visit **www.nih.gov/about/almanac/organization/NIDA.htm.**

Research Accomplishments

Keeping an eye on drug use trends among teens to guide intervention strategies. Substance use among American youth is a continually changing phenomenon. Through its annual Montitoring the Future Survey of 8th, 10th, and 12th grade students nationwide, NIDA continues to monitor these changes and identify emerging substance use trends to better guide effective interventions.

Identifying the molecular sites and systems in the brain where every major addictive drug has its effect. Such discoveries have led to the development and approval of nicotine replacement therapies for cigarette smoking cessation; new medications such as buprenorphine, which physicians now prescribe in office settings for opioid addiction; and nasal formulations of naloxone, which reverses opioid overdose.

Studying the environmental, social, genetic, and biological factors that affect brain development. The NIDA-led Adolescent Brain Cognitive Development (ABCD) Study is the largest long-term study of brain development and child health in the United States. The study is following more than 11,000 healthy children from ages 9 to 10 into early adulthood to observe brain growth.

Discovering a new communications network that opens the way to novel medical therapies. NIDA-supported research was pivotal to the discovery of a cannabinoid system throughout the brain and body that is composed of natural compounds chemically related to marijuana's active ingredient. This network promises new and novel interventions for a range of diseases and conditions, including addiction, obesity, pain, and osteoporosis.

Demonstrating that addiction is a treatable disorder. NIDA-funded research has demonstrated that medications and behavioral treatments can provide long-lasting benefits for people trying to overcome addiction and should include counseling when possible. Addiction treatment promotes continued abstinence, which can reverse some of the detrimental brain changes caused by addiction, as shown in pioneering imaging studies. Successful substance use disorder treatment also reduces crime and other societal costs, including health costs, now in the billions.

Optimizing research findings to create individually tailored treatments. Researchers are taking advantage of ongoing discoveries from the Human Genome Project, identifying genetic markers of complex disorders such as addiction. Now, researchers are discovering gene variants that can predict who will respond to a medication and who will not. These breakthroughs herald a new era of individualized therapies that will optimize outcomes, promote cost efficiency, and relieve suffering.

Decreasing the spread of HIV. Through the development of interventions and treatments for injection drug use (IDU), NIDA has contributed to the decline in IDU-associated HIV infections. Innovative community-based research shows that substance use disorder treatment reduces risk behaviors leading to HIV transmission; thus, substance use disorder treatment is HIV/AIDS prevention.

Changing the course of substance use disorder treatment in this country. NIDA engages in myriad efforts to "translate" the results of basic and clinical research for real-world use. Our goal is to get research-based treatments into the hands of providers in community treatment centers, the criminal justice system, and physicians' offices. To that end, NIDA has established collaborative networks of researchers and practitioners, federal agencies, and state substance use directors to integrate research findings into substance use disorder treatment settings nationwide.

National Advisory Council on Drug Abuse. Congress, under 42 U.S.C. 284a of the Public Health Service Act, requires that each NIH institute (including NIDA) have an advisory council that assists the institute in its efforts to identify, review, and support the highest caliber of scientific research. As part of its responsibilities, each advisory council participates in the grant review process for its institute, providing recommendations on which research applications will best advance the institute's research goals and mission.

NIDA's advisory council, the National Advisory Council on Drug Abuse, was established on January 3, 1973. It consists of 18 members: 12 scientific experts and six people from the general public who are leaders in the fields of public policy, law, health policy, economics, or management. The council also consists of five nonvoting members or their designees — the HHS secretary, the NIH director, the NIDA director, the chief medical director of the Department of Veterans Affairs, and the assistant secretary of Defense for Health Affairs. For more information, visit **drugabuse.gov/about-nida/advisory-boards-groups/national-advisory-council-drug-abuse-nacda.**

NIDA OUTREACH AND EDUCATION ACTIVITIES

For the Professional Community

NIDA Notes

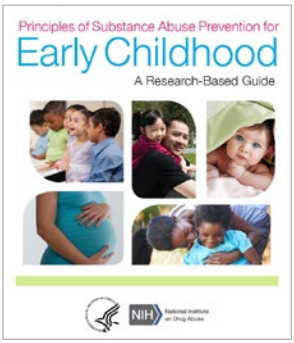
drugabuse.gov/news-events/nida-notes

An e-newsletter, provides in-depth coverage of research findings on drug misuse and addiction to professionals worldwide.

Principles of Substance Abuse Prevention for Early Childhood: A Research-Based Guide

drugabuse.gov/publications/principles-substance-abuse-prevention-early-childhood

Principles of Substance Abuse Prevention for Early Childhood: A Research-Based Guide provides evidence-based information on intervening very early in an individual's life, thereby preventing substance use disorders — and, along with them, a range of other related behavioral problems — long before they would normally manifest.



Preventing Drug Use among Children and Adolescents: A Research-Based Guide

drugabuse.gov/publications/preventing-drug-use-among-children-adolescents

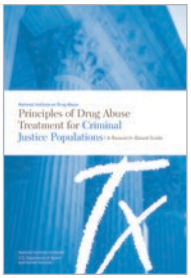
Preventing Drug Use among Children and Adolescents: A Research-Based Guide describes the most successful concepts for preventing drug use among young people.

Treatment Principles Series

Principles of Drug Abuse Treatment for Criminal Justice Populations: A Research-Based Guide

drugabuse.gov/publications/principles-drug-abuse-treatment-criminal-justice-populations

Principles of Drug Abuse Treatment for Criminal Justice Populations: A Research-Based Guide informs drug treatment programs in criminal justice settings.



Principles of Adolescent Substance Use Disorder Treatment: A Research-Based Guide

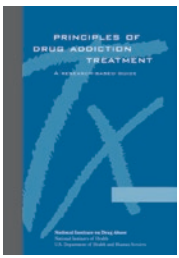
drugabuse.gov/publications/principles-adolescent-substance-use-disorder-treatment-research-based-guide

Principles of Adolescent Substance Use Disorder Treatment: A Research-Based Guide describes the many treatment approaches available to address the unique needs of teens with substance use disorders.

Principles of Drug Addiction Treatment: A Research-Based Guide

drugabuse.gov/publications/principles-drug-addiction-treatment-research-based-guide-third-edition/preface

Principles of Drug Addiction Treatment: A Research-Based Guide is intended for use in community and clinical settings.



For the General Public

DrugFacts

drugabuse.gov/publications/finder/t/160/DrugFacts

NIDA *DrugFacts* is a series of plain-language fact sheets highlighting specific drugs, trends in use, and prevention and treatment issues. Most are also available in Spanish.

Research Report Series

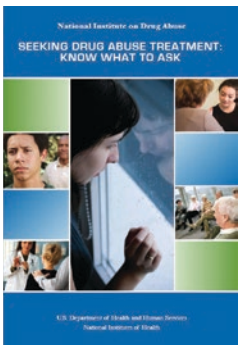
drugabuse.gov/publications/finder/t/162/research-reports

NIDA *Research Reports* are online reports summarizing and simplifying current research findings for the educated lay public, legislators, educational groups, and practitioners. Some reports are also available in Spanish.

Seeking Drug Abuse Treatment: Know What to Ask

drugabuse.gov/publications/seeking-drug-abuse-treatment-know-what-to-ask

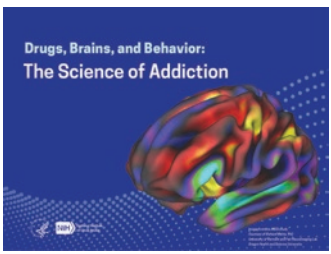
Seeking Drug Abuse Treatment: Know What to Ask distills NIDA's evidence-based treatment principles into easy-to-understand language. It offers families guidance while seeking substance use disorder treatment and lists five questions to ask when searching for a treatment program.



Drugs, Brains, and Behavior: The Science of Addiction

drugabuse.gov/publications/drugs-brains-behavior-science-addiction

Drugs, Brains, and Behavior: The Science of Addiction is a plain-language booklet that discusses the reasons why people take drugs, why some people become addicted while others do not, how drugs work in the brain, and how addiction can be prevented and treated.



Family Checkup

drugabuse.gov/family-checkup

Family Checkup is an evidence-based resource that equips parents with research-based skills to help keep their children drug-free.

Easy-to-Read Drug Facts

easyread.drugabuse.gov

Easy-to-Read Drug Facts website, developed with adult literacy educators, provides plain-language information about different drugs, addiction, prevention, treatment, and recovery. Most pages are available in Spanish.

NIDA TV

drugabuse.gov/nida-tv

NIDA TV is a central location for all NIDA videos and public service announcements.

For Young People, Their Parents, and Educators

NIDA for Teens: The Science Behind Drug Abuse

teens.drugabuse.gov

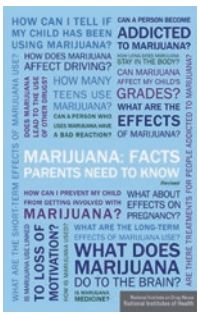
NIDA for Teens: The Science Behind Drug Abuse is an interactive website, focused on preteens and teens, that includes information about various addictive drugs and their consequences, as well as resources for parents and teachers.

Marijuana: Facts for Teens and Marijuana: Facts Parents Need to Know

drugabuse.gov/publications/marijuana-facts-teens/letter-to-teens

drugabuse.gov/publications/marijuana-facts-parents-need-to-know/letter-to-parents

Marijuana: Facts for Teens and *Marijuana: Facts Parents Need to Know* are two of NIDA's most popular publications, which provide information on the short- and long-term effects of marijuana.



Mind Matters

teens.drugabuse.gov/teachers/mind-matters

The *Mind Matters* series targets middle schoolers and highlights the effects of drugs on the brain and encourages the study of science.

Scholastic

headsup.scholastic.com

NIDA teams with *Scholastic,* a leading provider of educational materials for children and teachers, to create ongoing science-based information about drug use, seen in at least half of all U.S. classrooms.

NIDA DrugPubs

drugpubs.drugabuse.gov

To see what publications are available free, in hard copy, contact DrugPubs, NIDA's Research Dissemination Center, at the website above or by calling **1-877-NIDA-NIH (1-877-643-2644).**

Outreach Programs

National Drug & Alcohol Facts Week®

teens.drugabuse.gov/national-drug-facts-week

National Drug & Alcohol Facts Week® (NDAFW), a health observance week at the end of January, connects teens with experts to shatter the myths about drugs and alcohol, with more than 2000 local events every year. National Drugs & Alcohol Chat Day, held during NDAFW, provides an online opportunity for thousands of students from around the country to communicate directly with NIDA scientists in a Web Chat, asking questions about drugs and alcohol.

Addiction

Addiction is an Emmy Award–winning HBO documentary produced in collaboration with NIDA, the Robert Wood Johnson Foundation, and the National Institute on Alcohol Abuse and Alcoholism. The film explores drug and alcohol addiction through the eyes of those who suffer from this devastating disorder, with the added perspective of scientific and clinical experts working to better understand and treat it.

NIDAMED

NIDAMED: NIDA's Outreach to Clinicians

Resources for Clinicians: NIDAMED's Web portal offers science-based information for clinicians related to drug misuse and addiction, including videos and links to guidelines, continuing medical education resources, and other recommendations.

Screening Tools: NIDAMED provides tools and resources clinicians can use to screen patients for tobacco, alcohol, and illicit drug use.

Medical School Curricula: NIDA's Centers of Excellence for Physician Information program provides scientifically accurate information on substance use, addiction, and its consequences to help meet the educational needs of medical students, residents, and medical school faculty. For more information visit **drugabuse.gov/nidamed-medical-health-professionals/centers-excellence-coe-physician-information.**

All NIDAMED resources can be found at **drugabuse.gov/nidamed-medical-health-professionals.**

Addiction Science Awards

teens.drugabuse.gov/teachers/addiction-science-award

Addiction Science Awards — coordinated by NIDA — are given annually to three exemplary projects at the Intel International Science and Engineering Fair, the world's largest high school science competition.

CTN Dissemination Initiative

drugabuse.gov/nidamed-medical-health-professionals/ctn-dissemination-initiative

CTN Dissemination Initiative — coordinated by NIDA's Clinical Trials Network — disseminates user-friendly treatment tools and products into front-line clinical settings. The initiative is comprised of three components: products and materials, meetings and conferences, and collaborative partnerships.

glossary

GLOSSARY

GLOSSARY

Commonly Used Terms in Addiction Science

A

Abstinence: Not using drugs or alcohol.

Addiction: A chronic, relapsing disorder characterized by compulsive (or difficult to control) drug seeking and use despite harmful consequences, as well as long-lasting changes in the brain. In the past, people who used drugs were called "addicts." Current appropriate terms are people who use drugs and drug users.

Agonist: A chemical substance that binds to and activates certain receptors on cells, causing a biological response. Oxycodone, morphine, heroin, fentanyl, methadone, and endorphins are all examples of opioid receptor agonists.

Amphetamine: A stimulant drug that acts on the central nervous system (CNS). Amphetamines are medications prescribed to treat attention deficit hyperactivity disorder (such as Adderall®) and narcolepsy.

Anabolic-androgenic steroids: Synthetic substances similar to the male hormone testosterone. Often known as "anabolic steroids." They can promote muscle growth (anabolic effects) and produce changes in male sexual characteristics (androgenic effects) in both males and females.

Analgesics: A group of medications that reduce pain.

Anesthetic: A drug that causes insensitivity to pain and is used for surgeries and other medical procedures.

Antagonist: A chemical substance that binds to and blocks the activation of certain receptors on cells, preventing a biological response. Naloxone is an example of an opioid receptor antagonist.

B

Barbiturate: A type of CNS depressant sometimes prescribed to promote relaxation and sleep, but more commonly used in surgical procedures and to treat seizure disorders.

Basal ganglia: The area of the brain that plays an important role in positive forms of motivation, including the pleasurable effects of healthy activities like eating, socializing, and sex, and are also involved in the formation of habits and routines. These areas form a key node of what is sometimes called the brain's "reward circuit."

Benzodiazepine: A type of CNS depressant sometimes prescribed to relieve anxiety, panic, or acute stress reactions. Some benzodiazepines are prescribed short-term to promote sleep. Diazepam (Valium®) and alprazolam (Xanax®) are among the most widely prescribed benzodiazepine medications.

Brainstem: A group of brain structures that process sensory information and control basic functions needed for survival such as breathing, heart rate, blood pressure, and arousal.

Buprenorphine: An opioid partial agonist medication prescribed for the treatment of opioid addiction that relieves drug cravings without producing the high or dangerous side effects of other opioids.

C

Cannabidiol (CBD): A component of the marijuana plant without mind-altering effects that is being studied for possible medical uses.

Cannabinoid receptor: The receptor in the brain that recognizes and binds cannabinoids that are produced in the brain (anandamide) or outside the body (THC).

Cannabinoids: Chemicals that bind to cannabinoid receptors in the brain. They are found naturally in the brain (anandamide, 2-arachidonoylglycerol) and also in marijuana (THC and CBD). They are involved in a variety of mental and physical processes, including memory, thinking, concentration, movement, pain regulation, food intake, and reward.

Cannabis: Another name for the marijuana plant, *Cannabis sativa.*

Cardiovascular system: The system consisting of the heart and blood vessels. It delivers nutrients and oxygen to all cells in the body.

Central nervous system (CNS): The system consisting of the nerves in the brain and spinal cord.

Cerebellum: A part of the brain that helps regulate posture, balance, and coordination. It is also involved in the processes of emotion, motivation, memory, and thought.

Cerebral cortex: The gray matter that covers the surface of the cerebral hemispheres, whose functions include sensory processing and motor control along with language, reasoning, decision-making, and judgment.

Cerebral hemispheres: The right and left halves of the brain.

Cerebrum: The upper part of the brain consisting of the left and right hemispheres.

CNS depressants: A class of drugs that include sedatives, tranquilizers, and hypnotics. These drugs slow brain activity, making them useful for treating anxiety, panic, acute stress reactions, and sleep disorders.

Cognition (n): Of or relating to the act or process of thinking, understanding, learning, and remembering.

Cognitive-behavioral therapy (CBT): A form of psychotherapy that teaches people strategies to identify and correct problematic associations among thoughts, emotions, and behaviors in order to enhance self-control, stop drug use, and address a range of other problems that often co-occur with them.

Comorbidity: When two disorders or illnesses occur in the same person. Drug addiction and other mental illnesses or viral infections (HIV, hepatitis) are often comorbid. Also referred to as co-occurring disorders.

Contingency management: A treatment approach based on providing incentives to support positive behavior change.

Craving: A powerful, often overwhelming desire to use drugs.

D

Dependence: A condition that can occur with the regular use of illicit or some prescription drugs, even if taken as prescribed. Dependence is characterized by withdrawal symptoms when drug use is stopped. A person can be dependent on a substance without being addicted, but dependence sometimes leads to addiction.

Detoxification: A process in which the body rids itself of a drug, or its metabolites. Medically-assisted detoxification may be needed to help manage a person's withdrawal symptoms. Detoxification alone is not a treatment for substance use disorders, but this is often the first step in a drug treatment program.

Dopamine: A brain chemical, classified as a neurotransmitter, found in regions of the brain that regulate movement, emotion, motivation, and reinforcement of rewarding behavior. Dopamine release in reward areas of the brain is caused by all drugs to which people can become addicted.

Drug abuse: An older diagnostic term that defined use that is unsafe, 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. This term is increasingly avoided by professionals because it can perpetuate stigma. Current appropriate terms include: drug use (in the case of illicit substances), drug misuse (in the case of problematic use of legal drugs or prescription medications) and addiction (in the case of substance use disorder).

Drugged driving: Driving a vehicle while impaired due to the intoxicating effects of recent drug use.

E

Electronic cigarette: A battery-operated device that people use to inhale an aerosol, which typically contains nicotine, flavorings, and other chemicals; also called e-cigarette, e-cigs, e-vaporizers, or electronic nicotine delivery system.

F

Flashback: A sudden but temporary recurrence of aspects of a drug experience (including sights, sounds, and feelings) that may occur days, weeks, or even more than a year after using drugs that cause hallucinations.

H

Hallucinations: Sensations, sounds and/or images that seem real though they are not.

Hippocampus: An area of the brain crucial for learning and memory.

Hypothalamus: A part of the brain that controls many bodily functions, including eating, drinking, body temperature regulation, and the release of many hormones.

I

Illicit: Illegal or forbidden by law.

Impulsivity: A tendency to act without foresight or regard for consequences and to prioritize immediate rewards over long-term goals.

Injection drug use (IDU): The act of administering drugs by injection. Blood-borne viruses, like HIV and hepatitis, can be transmitted via shared needles or other drug injection equipment.

Intranasal: Taken through the nose.

L

Limbic system: Interconnected brain structures that process feelings, emotions, and motivations. It is also important for learning and memory.

M

Mental disorder: A mental condition marked primarily by disorganization of personality, mind, and emotions that seriously impairs the psychological or behavioral functioning of the individual. This is sometimes referred to as a *mental health condition.* Addiction is a mental disorder.

Methadone: A long-acting opioid agonist medication used for the treatment of opioid addiction and pain. Methadone used for opioid addiction can only be dispensed by opioid treatment programs certified by SAMHSA and approved by the designated state authority.

Motivational Enhancement Therapy: A counseling approach that uses motivational interviewing techniques to help individuals resolve any uncertainties they have about stopping their substance use. The therapy helps the person strengthen their own plan for change and engagement in treatment.

N

Naloxone: An opioid antagonist medication approved by the FDA to reverse an opioid overdose. It displaces opioid drugs (such as morphine or heroin) from their receptor and prevents further opioid receptor activation.

Naltrexone: A long-acting opioid antagonist medication that prevents receptors from being activated by other opioids. Naltrexone is used to treat alcohol and opioid use disorders.

Neonatal abstinence syndrome (NAS): A condition of withdrawal that occurs when certain drugs pass from the mother through the placenta into the fetus' bloodstream during pregnancy causing the baby to become drug dependent and experience withdrawal after birth. The type and severity of a baby's withdrawal symptoms depend on the drug(s) used, how long and how often the mother used, how her body broke down the drug, and if the baby was born full term or prematurely. NAS can require hospitalization and treatment with medication to relieve symptoms.

Neurobiology: The study of the anatomy, function, and diseases of the brain and nervous system.

Neuron (nerve cell): A unique type of cell found in the brain and throughout the body that specializes in the transmission and processing of information.

Neurotransmitter: A chemical compound that acts as a messenger to carry signal s from one nerve cell to another.

Norepinephrine: A neurotransmitter that affects heart rate, blood pressure, stress, and attention.

Nucleus accumbens: A brain region in the ventral striatum involved in motivation and reward. Nearly all addictive drugs directly or indirectly increase dopamine in the nucleus accumbens, contributing to their addictive properties.

O

Opioid receptors: Proteins on the surface of neurons, or other cells, that are activated by endogenous opioids, such as endorphins, and opioid drugs, such as heroin. Opioid receptor subtypes include mu, kappa, and delta.

Overdose: An overdose occurs when a person uses enough of a drug to produce a life-threatening reaction or death.

P

Paranoia: Extreme and unreasonable distrust of others.

Partial agonist: A substance that binds to and activates a receptor to a lesser degree than a full agonist.

Pharmacodynamics: The way a drug acts on the body. This includes the drug's interaction with its biological target and the resulting changes (such as activation or blocking of receptors), as well as the relationship between drug dosing and drug effects.

Pharmacokinetics: What the body does to a drug after it has been taken, including how rapidly the drug is absorbed, broken down, and processed by the body.

Pharmacotherapy: Treatment using medications.

Prefrontal cortex: The front part of the brain responsible for reasoning, planning, problem-solving, and other higher cognitive functions. This area of the brain is not fully mature until adulthood, which confers greater vulnerability to drug use on the adolescent brain.

Prescription drug misuse: The use of a medication in ways or amounts other than intended by a doctor, by someone other than for whom the medication is prescribed, or for the experience or feeling the medication causes. This term is used interchangeably with "nonmedical" use, a term employed by many national drug use surveys.

Psychedelic drug: A drug that distorts perception, thought, and feeling. This term is typically used to refer to drugs with hallucinogenic effects.

Psychoactive: Having a specific effect on the brain.

Psychosis: Delusional or disordered thinking detached from reality; symptoms often include hallucinations.

Psychotherapeutics: Drugs that have an effect on the function of the brain and that are often used to treat psychiatric/neurologic disorders; includes pain relievers, tranquilizers, sedatives, and stimulants.

Psychotropic: Mind-altering.

R

Receptor: A molecule located on the surface of a cell that recognizes specific chemicals (normally neurotransmitters, hormones, and similar endogenous substances) and transmits the chemical message into the cell.

Recovery: A process of change through which people with substance use disorders improve their health and wellness, live self-directed lives, and strive to reach their full potential.

Relapse: In drug addiction, relapse is the return to drug use after an attempt to stop. Relapse is a common occurrence in many chronic health disorders, including addiction, that requires frequent behavioral and/or pharmacologic adjustments to be treated effectively.

Remission: A medical term meaning that major disease symptoms are eliminated or diminished below a pre-determined harmful level.

Reward: Pleasurable feelings that reinforce behavior and encourage repetition.

Reward system (or brain reward system): A brain circuit that includes the ventral tegmental area, the nucleus accumbens, and the prefrontal cortex.

Risk factors: Factors that increase the likelihood of beginning substance use, of regular and harmful use, and of other behavioral health problems associated with use.

Route of administration: The way a drug is taken into the body. Drugs are most commonly taken by eating, drinking, inhaling, injecting, snorting, or smoking.

S

Self-medication: The use of a substance to lessen the negative effects of stress, anxiety, or other mental disorders (or side effects of their pharmacotherapy) without the guidance of a health care provider. Self-medication may lead to addiction and other drug- or alcohol-related problems.

Serotonin: A neurotransmitter involved in a broad range of effects on perception, movement, and emotions. Serotonin and its receptors are the targets of most hallucinogens.

Stigma: A set of negative attitudes and beliefs that motivate people to fear and discriminate against other people. Many people do not understand that addiction is a disorder just like other chronic disorders. For these reasons, they frequently attach more stigma to it. Stigma, whether perceived or real, often fuels myths and misconceptions, and can influence choices. It can impact attitudes about seeking treatment, reactions from family and friends, behavioral health education and awareness, and the likelihood that someone will not seek or remain in treatment.

Substance use disorder (SUD): A medical illness caused by disordered use of a substance or substances. According to the Fifth Edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5), SUDs 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. An SUD can range from mild to severe.

GLOSSARY *(continued)*

T

THC: Delta-9-tetrahydrocannabinol; the main mind-altering ingredient in marijuana.

Tolerance: A condition in which higher doses of a drug are required to achieve the desired effect.

V

Vaping: Inhaling the aerosol or vapor from an electronic cigarette, e-vaporizer, or other device.

Ventral striatum: An area of the brain that is part of the basal ganglia and includes the nucleus accumbens; dopamine is released here in the presence of salient stimuli and in response to physically rewarding activities such as eating, sex, and taking drugs, and this process is a key factor behind the desire to repeat the behaviors associated with these rewarding activities.

Ventral tegmental area: An area in the brainstem that contains dopamine neurons that make up a key part of the brain reward system, which also includes the nucleus accumbens and prefrontal cortex.

W

Withdrawal: Symptoms that can occur after long-term use of a drug is reduced or stopped; these symptoms occur if tolerance to a substance has occurred, and vary according to substance. Withdrawal symptoms 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.

When your story
is the science of addiction,
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U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES

Printed October 2016, Revised July 2018

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Source: National Institute on Drug Abuse; National Institutes of Health; U.S. Department of Health and Human Services.