

EDUCATIONAL ENHANCEMENT

Basic Knowledge: Physical and Pharmacological Effects



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Outline:

Module 1: What is Addiction

Module 2: The Brain and Addiction

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Module 1: WHAT IS ADDICTION?

How addiction is defined

Addiction is a primary, chronic, neurobiologic disease with genetic, psychosocial, and environmental factors influencing its development and manifestations.

Science tells us that addiction is not a choice. But substance use disorders can make our loved ones do hurtful things, which can feel a whole lot like personal choices.

Why?

Because addiction hijacks the brain.

It makes a person's brain believe that substances are essential for survival. More essential than food, shelter, or even relationships.

The video link below tackles this misunderstood aspect of addiction science. The video translates research from the National Institute on Drug Abuse (NIDA) into a brief, easy-to-follow story with the help of award-winning animator Patrick Smith.

Watch the videos: [ADDICTION: The Hijacker](#)

[ADDICTION: The Whirlpools of Risk](#)

[ADDICTION: Understanding Severity](#)

The American Psychiatric Association defines addiction:

Addiction is a complex condition, a brain disease that is manifested by compulsive substance use despite harmful consequence.

People with addiction (severe substance use disorder) have an intense focus on using a certain substance(s), such as alcohol or drugs, to the point that it takes over their life.

They keep using alcohol or a drug even when they know it will cause problems. Yet a number of effective treatments are available and people can recover from addiction and lead normal, productive lives.

People with a substance use disorder have distorted thinking, behavior and body functions.

Changes in the brain's wiring are what cause people to have intense cravings for the drug and make it hard to stop using the drug.

Brain imaging studies show changes in the areas of the brain that relate to judgment, decision making, learning, memory and behavior control.

These substances can cause harmful changes in how the brain functions. These changes can last long after the immediate effects of the drug — the intoxication.

Intoxication is the intense pleasure, calm, increased senses or a high caused by the drug. Intoxication symptoms are different for each substance.

Over time people with addiction build up a tolerance, meaning they need larger amounts to feel the effects.

Why do people take drugs?

In general, people begin taking drugs for a variety of reasons:

- To feel good.

Most abused drugs produce intense feelings of pleasure. This initial sensation of euphoria is followed by other effects, which differ with the type of drug used. For example, with stimulants such as cocaine, the “high” is followed by feelings of power, self-confidence, and increased energy. In contrast, the euphoria caused by opiates such as heroin is followed by feelings of relaxation and satisfaction.

- To feel better.

Some people who suffer from social anxiety, stress-related disorders, and depression begin abusing drugs in an attempt to lessen feelings of distress. Stress can play a major role in beginning drug use, continuing drug abuse, or relapse in patients recovering from addiction.

- To do better.

Some people feel pressure to chemically enhance or improve their cognitive or athletic performance, which can play a role in initial experimentation and continued abuse of drugs such as prescription stimulants or anabolic/androgenic steroids.

- Curiosity and “because others are doing it.”

In this respect adolescents are particularly vulnerable because of the strong influence of peer pressure. Teens are more likely than adults to engage in risky or daring behaviors to impress their friends and express their independence from parental and social rules.

If taking drugs makes people feel good or better, what’s the problem?

When they first use a drug, people may perceive what seem to be positive effects; they also may believe that they can control their use. However, drugs can quickly take over a person’s life.

Over time, if drug use continues, other pleasurable activities become less pleasurable, and taking the drug becomes necessary for the user just to feel “normal.”

They may then compulsively seek and take drugs even though it causes tremendous problems for themselves and their loved ones. Some people may start to feel the need to take higher or more frequent doses, even in the early stages of their drug use.

These are the telltale signs of an addiction. Even relatively moderate drug use poses dangers. Consider how a social drinker can become intoxicated, get behind the wheel of a car, and quickly turn a pleasurable activity into a tragedy that affects many lives.

Is continued drug abuse a voluntary behavior?

The initial decision to take drugs is typically voluntary. However, with continued use, a person’s ability to exert self-control can become seriously impaired; this impairment in self-control is the hallmark of addiction.

Brain imaging studies of people with addiction show physical changes in areas of the brain that are critical to judgment, decision making, learning and 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 addiction.

Why do some people become addicted to drugs, while others do not?

As with any other disease, vulnerability to addiction differs from person to person, and no single factor determines whether a person will become addicted to drugs.

In general, the more risk factors a person has, the greater the chance that taking drugs will lead to abuse and addiction.

Protective factors, on the other hand, reduce a person's risk of developing addiction.

Risk and protective factors may be either environmental (such as conditions at home, at school, and in the neighborhood) or biological (for instance, a person's genes, their stage of development, and even their gender or ethnicity).

While addiction to substances has often appeared clear-cut, there's some controversy about what substances are truly addictive.

Current Guidelines in the DSM—5

Current guidelines in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5), the diagnostic tool used to diagnose different types of mental health conditions, indicate that most psychoactive substances, including medications, have the potential to be addictive.

People with addictive disorders may be aware of their problem, but be unable to stop it even if they want to.

The addiction may cause health problems as well as problems at work and with family members and friends.

The misuse of drugs and alcohol is the leading cause of preventable illnesses and premature death.

Addiction Alters Their Brain's Reward System

Addiction affects their brain's reward, motivation, memory, and related circuitry to the extent that their motivations are altered so that their addictive behaviors replace healthy, self-care behaviors.

The brain's reward system is also altered in such a way that the memory of previous rewards—be it food, sex, or drugs—can trigger a biological and behavioral response to engage in the addictive behavior again, in spite of negative consequences, and sometimes even though they no longer even find pleasure in the activity.

Impulse Control Is Also Altered

Addiction also affects the frontal cortex of their brain in such a way as to alter their impulse control and judgment.

This results in the "pathological pursuit of rewards," ASAM says when persons with SUD return to patterns of addictive behavior in order to "feel normal."¹

The frontal cortex is involved in inhibiting impulsivity and delaying gratification.

Because this area of the brain continues to develop into young adulthood, the ASAM experts believe this is why early-onset exposure to substances is linked to the later development of addiction.

Characteristics of Addiction

According to the ASAM definition, addiction is characterized by:

- Inability to consistently abstain
- Impairment in behavioral control
- Craving or increased “hunger” for drugs or rewarding experiences¹

- Diminished recognition of problems with their behaviors and relationships
- A dysfunctional emotional response

Other Features of Addictive Behavior

These conditions are also commonly present in addiction:

- Cravings and addictive behaviors are triggered by external cues²
- A risk of relapse even after long periods of abstinence
- Resistance to change despite increasing problems

Relapse—Put simply, a relapse is the worsening of a medical condition that had previously improved.

A relapse to addiction is when the person with the past addiction starts doing his or her addictive behavior again after a period of not doing it, known as abstinence.

For example, someone who had completely stopped drinking for a period of time, say, six months would be experiencing a relapse if they had a single alcoholic drink, as much as if they went on a drinking binge.

Impaired Control and Judgment Problems

ASAM says that behavioral manifestations and complications of addiction, due to impaired control, can include:

- Engaging in more addictive behavior than they intended
- Increased time lost from work or school
- Continued substance use despite physical or psychological consequences
- Narrowing of their addictive behavior repertoire; for instance, they only drink one brand of a certain type of alcohol

- Lack of readiness to get help, despite admitting a problem

Addiction Can Cause Cognitive Changes

Cognitive changes in addiction can include:

- Preoccupation with the substance or addictive behavior
- An altered sense of the pros and cons of addictive behaviors
- A false belief that their problems are not predictable consequences of addiction

Addiction Can Cause Emotional Changes

ASAM believes emotional changes in addiction can include:

- Increased anxiety, dysphoria, and emotional pain
- Situations seeming more stressful than they really are¹
- Difficulty identifying and expressing feelings

Defining Features of Addiction

Two aspects that all addictions have in common:

- **The addictive behavior is maladaptive.** The behavior causes problems for the individual or those around them.

So instead of helping the person cope with situations or overcome problems, it tends to undermine these abilities.

- **The behavior is persistent.** When people are addicted, they will continue to engage in the addictive behavior despite the trouble it causes.

So an occasional weekend of self-indulgence is not an addiction, although it may cause different kinds of problems.

Addiction is characterized by frequent engagement in the behavior.

Some people become addicted to drugs while others don't

No one factor can predict if a person will become addicted to drugs. A combination of factors influences risk for addiction.

The more risk factors a person has, the greater the chance that taking drugs can lead to addiction.

For example:

- **Biology.** The genes that people are born with account for about half of a person's risk for addiction. Gender, ethnicity, and the presence of other mental disorders may also influence risk for drug use and addiction.
- **Environment.** A person's environment includes many different influences, from family and friends to economic status and general quality of life.

Factors such as peer pressure, physical and sexual abuse, early exposure to drugs, stress, and parental guidance can greatly affect a person's likelihood of drug use and addiction.

- **Development.** Genetic and environmental factors interact with critical developmental stages in a person's life to affect addiction risk.

Although taking drugs at any age can lead to addiction, the earlier that drug use begins, the more likely it will progress to addiction. This is particularly problematic for teens.

Because areas in their brains that control decision-making, judgment, and self-control are still developing, teens may be especially prone to risky behaviors, including trying drugs.

Can drug addiction be cured or prevented?

As with most other chronic diseases, such as diabetes, asthma, or heart disease, treatment for drug addiction generally isn't a cure.

However, addiction is treatable and can be successfully managed.

People who are recovering from an addiction will be at risk for relapse for years and possibly for their whole lives.

Research shows that combining addiction treatment medicines with behavioral therapy ensures the best chance of success for most patients.

Treatment approaches tailored to each patient's drug use patterns and any co-occurring medical, mental, and social problems can lead to continued recovery.

More good news is that drug use and addiction are preventable. Results from NIDA-funded research have shown that prevention programs involving families, schools, communities, and the media are effective for preventing or reducing drug use and addiction.

Although personal events and cultural factors affect drug use trends, when young people view drug use as harmful, they tend to decrease their drug taking.

Therefore, education and outreach are key in helping people understand the possible risks of drug use.

Teachers, parents, and health care providers have crucial roles in educating young people and preventing drug use and addiction.

Points to Remember

- Drug addiction is a chronic disease characterized by drug seeking and use that is compulsive, or difficult to control, despite harmful consequences.
- Brain changes that occur over time with drug use challenge an addicted person's self-control and interfere with their ability to resist

intense urges to take drugs. This is why drug addiction is also a relapsing disease.

- Relapse is the return to drug use after an attempt to stop. Relapse indicates the need for more or different treatment.
- Most drugs affect the brain's reward circuit by flooding it with the chemical messenger dopamine. Surges of dopamine in the reward circuit cause the reinforcement of pleasurable but unhealthy activities, leading people to repeat the behavior again and again.
- Over time, the brain adjusts to the excess dopamine, which reduces the high that the person feels compared to the high they felt when first taking the drug—an effect known as tolerance. They might take more of the drug, trying to achieve the same dopamine high.
- No single factor can predict whether a person will become addicted to drugs. A combination of genetic, environmental, and developmental factors influences risk for addiction. The more risk factors a person has, the greater the chance that taking drugs can lead to addiction.
- Drug addiction is treatable and can be successfully managed.
- More good news is that drug use and addiction are preventable. Teachers, parents, and health care providers have crucial roles in educating young people and preventing drug use and addiction.

Addictions vs. Substance Use Disorders

The term addiction is used to describe compulsive drug-seeking behaviors that continue in spite of negative outcomes, but it is important to note that addiction is not considered an official diagnosis in the DSM-5.

Rather than using the term "addiction," the DSM-5 classifies substance use disorders.

While the diagnostic criteria vary for each type, the DSM-5 describes these disorders as a problematic pattern of use of intoxicating substances that leads to significant impairment and distress.

These symptoms can result in impaired control, social impairment, risky use, and tolerance/withdrawal.

While these conditions might be informally referred to as addictions, their doctor will officially diagnose them with some form of substance use disorder or one of the two behavioral addiction disorders that are officially recognized by the American Psychiatric Association (APA).

Symptoms of substance use disorder are grouped into four categories:

- Impaired control: a craving or strong urge to use the substance; desire or failed attempts to cut down or control substance use
- Social problems: substance use causes failure to complete major tasks at work, school or home; social, work or leisure activities are given up or cut back because of substance use
- Risky use: substance is used in risky settings; continued use despite known problems
- Drug effects: tolerance (need for larger amounts to get the same effect); withdrawal symptoms (different for each substance)

Many people experience both mental illness and addiction. The mental illness may be present before the addiction.

Or the addiction may trigger or make a mental disorder worse.

Substance Use Overview

Substance abuse can simply be defined as a pattern of harmful use of any substance for mood-altering purposes. "Substances" can include alcohol and other drugs (illegal or not) as well as some substances that are not drugs at all.

"Abuse" can result because they are using a substance in a way that is not intended or recommended, or because they are using more than prescribed. To be clear, someone can use substances and not be addicted or even have a substance use disorder, as defined in the Diagnostic and Statistical Manual, Fifth Edition (DSM-5).

What Is Harmful Use?

Health officials consider substance use as crossing the line into substance abuse if that repeated use causes significant impairment, such as:

- Disabilities
- Failure to meet responsibilities
- Health issues
- Impaired control
- Risky use
- Social issues

In other words, if they drink enough to get frequent hangovers; use enough drugs that they miss work or school; smoke enough marijuana that they have lost friends; or often drink or use more than they intended to use, their substance use is probably at the abuse level.

However, the broad range of substance abuse in today's society is not that simple.

The Dangers of Illegal Drugs

Generally, when most people talk about substance abuse, they are referring to the use of illegal drugs. Drugs of abuse do more than alter their mood. They can cloud their judgment, distort their perceptions, and

alter their reaction times, all of which can put them in danger of accident and injury.

These drugs got to be illegal in the first place because they are potentially addictive or can cause severe negative health effects. Some believe the use of illegal substances is considered dangerous and, therefore, abusive.

Recreational Use: Is it Abuse?

Others argue that casual, recreational use of some drugs is not harmful and is merely use, not abuse. The most vocal of the proponents of recreational drug use are those who smoke marijuana. They argue that marijuana is not addictive and has many beneficial qualities, unlike the "harder" drugs.

But recent research has shown that even marijuana may have more harmful physical, mental, and psychomotor effects than first believed. Each year, new scientific studies find more ways that long-term marijuana use is harmful to their health.

In addition, the National Institute on Drug Abuse (NIDA) reports that marijuana users can become psychologically dependent, and therefore addicted. NIDA estimates that one in every seven users of marijuana becomes dependent.

When Does Drug Use Become an Addiction?

Drug addiction is a complex and chronic brain disease. People who have a drug addiction experience compulsive, sometimes uncontrollable, craving for their drug of choice. Typically, they will continue to seek and

use drugs in spite of experiencing extremely negative consequences as a result of using.

Characteristics of Addiction

According to the National Institute on Drug Abuse (NIDA), addiction is a chronic, relapsing disorder characterized by:

- Compulsive drug-seeking
- Continued use despite harmful consequences
- Long-lasting changes in the brain

NIDA also notes that addiction is both a mental illness and a complex brain disorder.

Behavioral Manifestations of Addiction

When friends and family members are dealing with a loved one who is addicted, it is usually the outward behaviors of the person that are the obvious symptoms of addiction.

Those behaviors are primarily centered around the addict's impaired control:

- The excessive frequency of drug use in spite of attempts to control
- Increased time using or recovering from drug effects
- Continued use in spite of persistent problems
- A narrowing of focus on rewards linked to addiction
- An inability to take steps to address the problems

The Inability to Abstain

Research has shown that prolonged drug use causes a chemical change in the brain of the addict that alters the brain's reward system that prompts compulsive drug seeking in the face of growing negative consequences.

This state of addiction, when the activity continues in spite of negative consequences and despite the fact it is no longer rewarding, is termed by addiction experts the "pathological pursuit of rewards."⁴ It is the result of chemical changes in the reward circuitry of the brain.

How Addiction Gets Started

The reason that people engage in activity that can become addictive in the first place is to experiment, because of the social environment, or achieve a feeling of euphoria or to relieve an emotional state of dysphoria.

When people drink, take drugs, or participate in other reward-seeking behavior (such as gambling, eating, or having sex) they experience a "high" that gives them the reward or relief they are seeking.

Genetic Factors

Addiction also has a genetic component that may make some people more susceptible to becoming addicted to drugs. Some people have described feeling addicted from the first time they use a substance.

Researchers have found that the heritability of addictions is around 40—60% and that genetics "provide pre-existing vulnerabilities to addiction [and] increased susceptibility to environmental risk factors."

Changes in the Brain

A high is the result of increased dopamine and opioid peptide activity in the brain's reward circuits.

But after the high they experience, there is a neurochemical rebound which causes the reward function of the brain to drop below the original normal level. When the activity is repeated, the same level of euphoria or relief is not achieved. Simply put, the person never really gets as high as they did that first time.

Lower Highs and Lower Lows

Added to the fact that the addicted person develops a tolerance to the high—requiring more to try to achieve the same level of euphoria—is the fact that the person does not develop a tolerance to the emotional low they feel afterward. Rather than return to "normal," the person reverts to a deeper state of dysphoria.

When becoming addicted, the person increases the amount of drugs, alcohol, or the frequency of the addictive behaviors in an effort to get back to that initial euphoric state. But the person ends up experiencing a deeper and deeper low as the brain's reward circuitry reacts to the cycle of intoxication and withdrawal.

When Reward-Seeking Becomes Pathological

According to the American Society of Addiction Medicine (ASAM), this is the point at which the pursuit of rewards becomes pathological:

- Reward-seeking becomes compulsive or impulsive
- The behavior ceases to be pleasurable
- The behavior no longer provides relief

No Longer a Function of Choice

To put it another way, the addicted person finds himself compelled—despite his own intentions to stop—to repeat behaviors that are no longer rewarding to try to escape an overwhelming feeling of being ill at ease but find no relief.

According to ASAM, at this point addiction is no longer solely a function of choice. Consequently, the state of addiction is a miserable place to be, for the addict and for those around him.

Chronic Disease and Relapses

For many addicts, addiction can become a chronic illness, meaning that they can have relapses similar to relapses that can happen with other chronic diseases—such as diabetes, asthma, and hypertension—when patients fail to comply with their treatment. These relapses can occur even after long periods of abstinence. The addict can take action to enter remission again. But he remains at risk of another relapse. The ASAM notes "Without treatment or engagement in recovery activities, addiction is progressive and can result in disability or premature death."

Addiction vs. Dependence

It is important to distinguish between dependence and addiction.

When people become dependent on a substance, it means that they experience drug tolerance and drug withdrawal:

- **Tolerance** means that the body has adapted to the presence of the drug so that it takes more of the drug to produce the same effects.
- **Withdrawal** occurs when people experience certain physical and psychological symptoms if the use of the substance is suddenly decreased or halted.

A person can become dependent on a drug without being addicted, although the two often occur together.

Addiction occurs when people continue to compulsively use a drug despite harmful consequences.

Diagnosis

Addiction diagnosis usually requires recognizing that there is a problem and seeking help.

Substance use is not always an indication of addiction, although drug use carries numerous health and social risks in addition to the risk of addiction.

Once a person has decided that they have a problem and need help, the next step is an examination by a healthcare professional.

This involves questions about behaviors or substance use, an examination to assess overall health, and the development of a treatment plan that works best for the individual's specific addiction.

The exact diagnosis a person receives will depend on the nature of their addiction.

Commonly misused substances that can lead to addiction include:

- Alcohol
- Cocaine
- Hallucinogens
- Inhalants
- Marijuana
- MDMA and other club drugs
- Methamphetamine
- Opioids
- Prescription drugs
- Steroids
- Tobacco/nicotine

Because some substances have the potential to cause dangerous withdrawal symptoms, it is important to receive an appropriate diagnosis in order to get the best treatment.