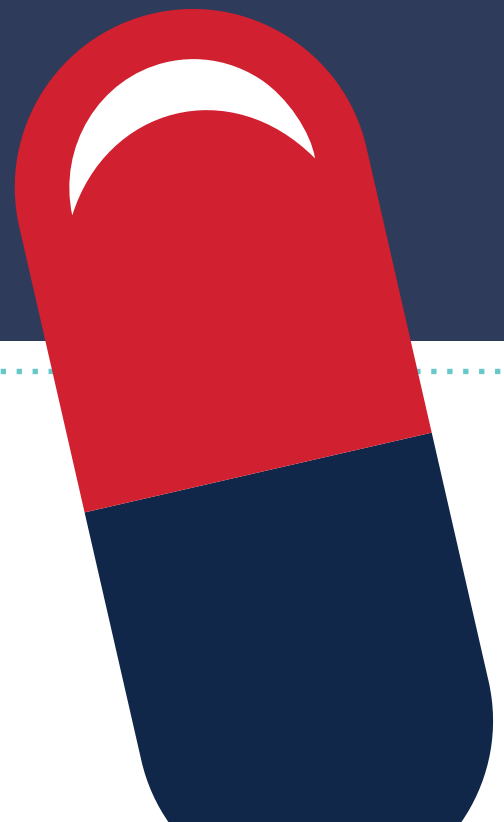


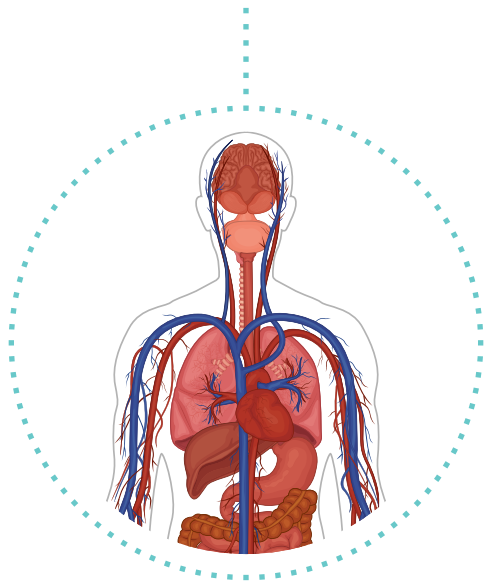
MIDDLE
SCHOOL

DIGITAL 1-DAY LESSON EDUCATOR GUIDE

Customized for [Prevention.org](https://www.Prevention.org)



LESSON OVERVIEW



In this lesson, students will investigate the science behind the impact of opioids on the mind and body, focusing on different body systems. Through a series of activities, students will investigate changes in the body due to prescription opioid misuse and heroin use. They will use this information to explain the science behind physical dependency and withdrawal.

The accompanying presentation was created with PowerPoint so that it can be used in a variety of classrooms. If you are using a laptop with an LCD projector, simply progress through the PowerPoint by clicking to advance. All of the interactive aspects of the presentation are set to occur on click. Links to the corresponding videos can be found in the notes section of the PowerPoint. Hover over the video window to reveal the “play arrow” at the bottom. If you are using an interactive whiteboard, tap on each slide with your finger or stylus to activate the interactive aspects of the presentation. It does not matter where you tap, but you can make it appear as if you are making certain things happen by tapping them. In the notes for each slide, there will be information on how to proceed.

Content Areas

Life Sciences, Health, and Physical Education

Activity Duration

1 class session (45 minutes)

Grade Level

Grades 6–8

Essential Questions

- Why do people misuse opioids?
- What are the short- and long-term effects of opioid misuse on the body?
- How do neurons transmit information throughout the body?
- What are the similarities and differences between endorphins and opioids?

Materials

- Chart paper and markers
- Access to the Internet
- Copies of the article [“Opioids: Just the Facts”](#) (page 18, one per student)
- Paper for students to answer questions
- Copies of the [“Opioids: Just the Facts Capture Sheet”](#) (page 19, one per student)
- Copies of the printout [“Long-Term Effects of Opioid Use”](#) (page 20, one per student)

Objectives

- Describe the short- and long-term negative effects of opioid misuse on the body
- Explain how neurons (nerve cells) send and receive information. Differentiate between how endorphins and opioids affect the body

BACKGROUND INFO

The use and misuse of opioids such as heroin, morphine, and prescription medications is a serious national problem that affects the health of communities, including their social and economic welfare. There are approximately 144 drug overdose deaths per day in the United States, with 63% of those deaths related to pharmaceutical opioids or heroin.¹ About 15 million people indicated misusing prescription painkillers in 2014, while nearly one in five teens say they have misused prescription medicine at least once in their lifetime to get high.¹ To address this complex problem, federal agencies are working to inform patients, parents, teens, pharmacists, and educators about the dangers of opioid misuse.

This guide was created to give educators ideas and strategies for presenting the content in the digital lesson. It provides slide-by-slide details for educators to be prepared to engage with students as they explain, discuss, and effectively facilitate the content in the presentation. The presentation is designed to cover one 45-minute class session, but it is flexible, depending on the students' needs and time available.

During the lesson, students will learn about endorphins (“feel-good chemicals”). The human body produces natural endorphins in response to certain sensations—mainly stress, fear, or pain. These chemicals reduce pain and produce a sense of euphoria (feeling good).

Students will also be introduced to opioids, which are drugs that are either derived from the opium poppy plant or that are synthetically produced to have similar effects. Heroin is an example of the former type, but there are many other opioids, including legal drugs such as morphine, codeine, and fentanyl, which doctors prescribe to patients in extreme pain. Opioids have a chemical structure similar to endorphins, which enables them to

attach to the same places in the brain. As a result, the brain cannot tell the difference between the effects from activities that produce natural endorphins (e.g., exercising, laughing, and eating chocolate) and the effects caused by taking opioids.

Then, students will examine the structure of neurons and the process of neurotransmission to better understand how opioids affect the body, particularly the nervous system. Neurons are the tiny nerve cells that send messages along the human nervous system. Some of these messages control life-sustaining functions, such as circulation, respiration, and digestion. Opioids block pain signals from reaching the brain by attaching to certain parts of neurons called opioid receptors.

Finally, students will examine the short-term and long-term effects of opioid misuse on the systems of body. Opioids primarily affect the nervous system, but changes to this system impact a number of the body's other systems, including circulatory (slowed heart function), respiratory (slowed breathing), and skeletal (bone thinning). Repeated opioid use leads to physical dependency (changes in the body that cause systems to require the drug in order to function) and tolerance (the body's need to absorb more of a drug to achieve the same effects). When prolonged opioid use is stopped, the body experiences a shock called withdrawal, which has number of serious effects on the body's systems.

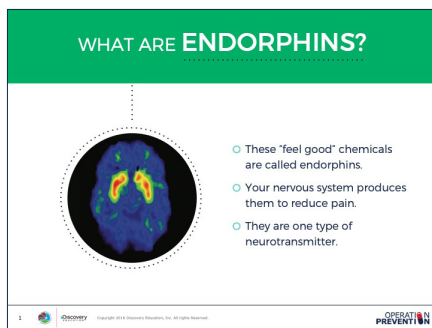
At different points in the lesson, students may be tempted to share personal information about opioid misuse by themselves or others. As always, be sure to follow school or district policies about the sharing of personal information about minors.

ENGAGE

SLIDES 1-6

ENGAGE

Overview: Students will be introduced to what endorphins and opioids are, why endorphins are released, why opioids are prescribed, and how the effects of opioids mimic the feeling of endorphins. Then, they will investigate what it means to misuse opioids.



SLIDE 1

Click to display the image of the brain. Ask students if they’ve ever seen an image of a brain “lighting up” like this. What do they think is happening here?

Once students have shared their thoughts, explain that messages in the brain are transmitted, or sent, across cells. This image shows messages being sent between cells in the brain—the colors (particularly red and yellow) represent brain activity that corresponds to messages being transmitted.

Then, click the slide to reveal the text definition of endorphins. The body’s nervous system produces endorphins in response to certain sensations—mainly stress, fear, or pain. In scientific terms, endorphins block messages of pain from reaching the brain and stimulate pleasure centers in the brain. Endorphins are only one type of neurotransmitter, or chemical that sends messages through the nervous system.

Key Talking Points:

- We don’t typically all feel the same at the same time.
- Aerobic exercise can cause us to feel good.
- Exercise releases “feel-good” chemicals in our brains.
- People can be “addicted” to the good feeling they experience after exercising.

ENGAGE

KEY POINTS

- Everyone's body produces "feel-good" chemicals or endorphins.
- We can create endorphins by exercising, laughing, or eating comfort foods.
- Endorphins help block pain in our brains.
- Knowing how endorphins work in our bodies can help us make good decisions.

SLIDE 2

Key Points:

- Everyone's body produces "feel-good" chemicals or endorphins.
- We can create endorphins by exercising, laughing, or eating comfort foods.
- Endorphins help block pain in our brains.
- Knowing how endorphins work in our bodies can help us make good decisions.

ENGAGE



SLIDE 3

Remind students what they have learned about endorphins before moving on to the topic of opioids.

Ask students to identify a few examples of other words ending with “-oid.” Anticipated responses might include: factoid (a tiny fact), android (a machine that is like a human; “android is derived from the Greek root andros, which means “man”), thyroid (gland in your neck that secretes hormones), tabloid (newspaper ½ the size of a regular one), fibroid (benign tumor), etc.

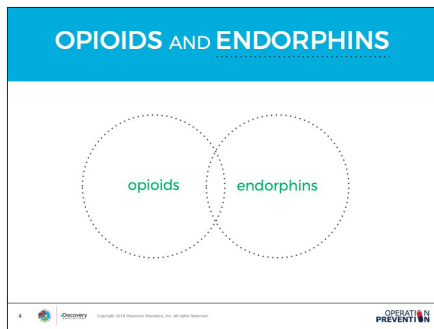
Click the slide to display the definition of opioids. Ask students if they know where opioids come from. Then, click to reveal that opioids can be synthesized, or made, from natural sources (like the poppy plant) and artificial sources (like chemicals in a laboratory). Break down the word “opioid” into two parts: “opium” (a drug derived from a plant called the opium poppy) and “-oid” (meaning “like” or “similar to”). Connect the two parts of the word so that students understand that the effects of opioids are like the effects of opium.

Click the slide to reveal the last bullet point. Explain that morphine, codeine, fentanyl, and heroin are in a class of drugs called opioids. Heroin is illegal, but doctors prescribe the other opioids to patients in extreme pain. These people might be recovering from surgery or a serious injury. In scientific terms, these drugs reduce the intensity of pain signals reaching the brain.

Key Talking Points:

- Opioids are drugs that work on the nervous system to reduce pain signals reaching the brain.
- Opioids can be natural or created in labs.
- Heroin is an illegal opioid
- Codeine and morphine are prescription opioids.
- Doctors prescribe opioids to people who are in extreme pain, for example someone recovering from surgery or a serious injury.
- Like endorphins, opioids reduce the intensity of pain signals reaching the brain.

ENGAGE

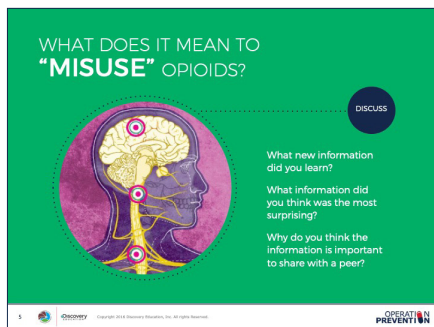


SLIDE 4

Display slide. Ask students to provide examples of the similarities and differences between opioids and endorphins.

Key talking points:

- Endorphins are neurotransmitters and transmit electrical signals within the nervous system to reduce the perception of pain (they are naturally produced in the body).
- Endorphins act similarly to opioids and block pain receptors.
- Endorphins increase the 'feel-good' sensations.
- Endorphins do not lead to addiction or dependence.
- Opioids also decrease pain reception in the brain and can lead to feelings of euphoria.



SLIDE 5

Now that students have learned what opioids are, they will learn what it means to misuse them.

Click the image on the slide to open the [article](#) (page 18).

Divide the class into small groups of three students. Make sure each group has access to the Opioids: Just the Facts article, either on a digital device or a printout. Give students time to read the article.

Distribute an [Opioids: Just the Facts capture sheet](#) (page 19) to each group. Review the cooperative learning roles listed on the top, and give students one minute to assign roles. Then, read the directions and instruct students to complete the tasks.

When groups have completed their capture sheets, invite the Recorder from each group to share the group's thoughts with the class. Facilitate discussion about the different ideas that arise.

Key Talking Points:

Young people can misuse prescription opioids different ways:

- Taking medication that was prescribed for someone else.
- Taking a higher dose of your own medication than was prescribed.
- Taking an opioid with the intention of getting high.
- Sharing a prescription medication you have access to with someone else.

ENGAGE

KEY POINTS

- Opioid use affects us physically and can be harmful.
- In order to be healthy, we need to understand and protect ourselves from the risks of opioid misuse.
- Knowing how opioids work helps us to make better decisions for ourselves if we are prescribed them for pain or injury.

SLIDE 6

Key Points:

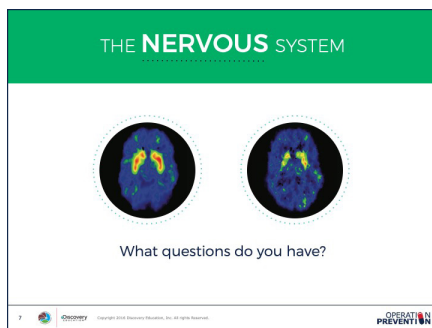
- Opioid use affects us physically and can be harmful.
- In order to be healthy, we need to understand and protect ourselves from the risks of opioid misuse.
- Knowing how opioids work helps us to make better decisions for ourselves if we are prescribed them for pain or injury.

EXPLORE

SLIDES 7-9

EXPLORE

Overview: In this section, students will compare an image of a healthy, functioning nervous system to one that has been impacted by opioid misuse. Students will study the parts of a neuron and the process of neurotransmission to understand how opioids affect the body and why this matters.



SLIDE 7

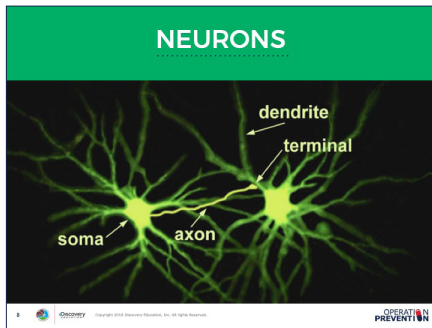
Now that students know what opioid misuse means, they will examine the effects of opioids on the human nervous system.

Display the two images of the brain, which is part of the body's nervous system. Ask students to identify which image shows a healthy brain (left) and which shows the brain of a person who misuses opioids (right).

Click the slide to reveal the question at the bottom. Explain that one of the most important practices that scientists do is ask questions. Scientific questions help identify relationships and clarify information. Direct students to generate a list of questions they have about opioid misuse. Examples may include:

- What's the relationship between endorphins and opioids?
- How does misusing opioids affect the human nervous system and other body systems?
- Why is quitting opioids so difficult?

EXPLORE



SLIDE 8

Now that students have modeled neurotransmission, they will learn the structure of a neuron to investigate how neurotransmission works.

Important background information includes:

- The body's nervous system is made up of a network of tiny nerve cells called neurons.
- The sense organs (e.g., eyes, ears, nose, skin) send messages to the brain about stimuli outside the body.
- The brain processes these messages and sends back its own messages that command the body to respond in appropriate ways.
- All this communication happens through extensive networks made up of neurons.

Click to display the image of the neuron, with four labeled parts. Point as you describe how neurons are composed of several parts: soma (cell body), dendrites (branches), and an axon (fibers) leading to a terminal (bulb). Trace the path on the image as you explain the purpose of each part of the neuron.

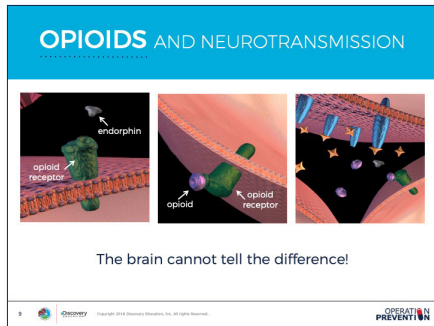
If there is time, guide students to do the neurotransmission activity again and this time talk through the different parts of the neuron while doing the activity.

Key Talking Points:

- The branches (dendrites) receive messages from neighboring neurons.
- The middle (soma) processes the information.
- It creates an electrical signal (a major impulse called the action potential) and sends it down the fiber (axon) toward the bulb at the tip (terminal); the signal can then be transferred to the dendrites of a neighboring neuron.

Encourage students to make connections between their body parts in the model activity and the neuron. (The body is the soma, the arm is the axon, and their fingertips are the terminal.) Then, ask students to predict what each part of a neuron does. (If time allows, have students repeat the neurotransmission activity and make the above connections while they do.)

EXPLORE



SLIDE 9

Now that students understand the role of neurotransmitters, they will learn how opioids simulate natural endorphins during neurotransmission. This everyday analogy may help students better understand this process: Neurotransmitters are like “keys” that fit certain “locks” in the brain. Different keys fit different locks. Because the shapes of opioids and endorphins are similar, opioids are able to fit into “locks” intended for endorphins.

Click to display the image and ask students a series of questions to guide their inquiry:

- What do you notice about the shape of each “key”—i.e., the natural endorphin and an opioid like morphine? (Circle the bottom section of each—i.e., the section that fits into the opioid receptors. They are similar.)
- The opioid receptor is the “lock” from the analogy. What type of “lock” does each key fit into? (Both natural endorphins and opioids such as morphine fit into opioid receptors.)
- What conclusion can you draw from this relationship? (The brain cannot tell the difference between natural endorphins and opioids.)

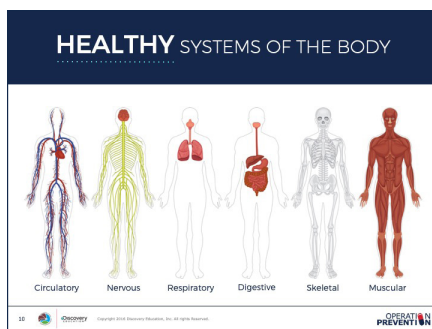
After students have drawn their own conclusions, explain that opioids mimic the action of endorphins by fitting in the same locks (binding to opioid receptor sites in the brain). This affects feelings of pain as well as a person’s overall emotional state. However, endorphins are not harmful or addictive like opioid drugs are. Endorphins come from positive activities such as exercising, laughing, and eating certain foods. Click the slide to display the text (“The brain cannot tell the difference!”).

EXPLAIN

SLIDES 10-14

EXPLAIN

Overview: In this section, students will examine how opioids impact body systems. Students will evaluate this information to describe which body systems are most impacted by opioid misuse. This will lead to a discussion around the science of physical dependency (what happens when you misuse the drug over time?) and withdrawal (what happens when you suddenly stop using opioids?).



SLIDE 10

Lead students through a quick review of the body systems by clicking on the slide to display the images of the bodies. Ask students to identify what each image represents.

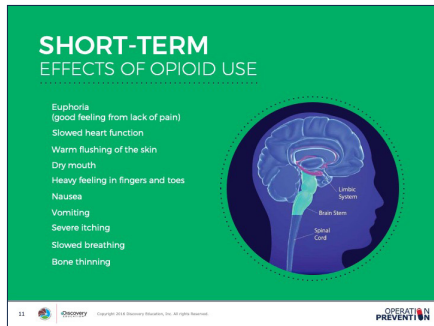
Click to display the text labels. From left to right, the images show the circulatory, nervous, respiratory, digestive, skeletal, and muscular systems.

Ask students to share how each body system should function in a healthy person. (If time allows, each student can record a brief description of each system) Anticipated responses include:

- Circulatory system- heart pumps blood back and forth
- Digestive system- mouth eats, stomach digests, intestines move
- Nervous system- transmit signals to and from different body parts
- Respiratory system- take in air, breath with lungs to get oxygen to body
- Skeletal system- bone support structure of the body
- Muscular system- gives body strength, balance, and movement

Remind students that as they continue to learn about opioids and how they can be misused, they should keep in mind how the different body systems operate to learn about how opioids can affect them.

EXPLAIN



SLIDE 11

Now that students have considered healthy, functioning body systems, they will examine the short-term effects of opioid misuse on these systems.

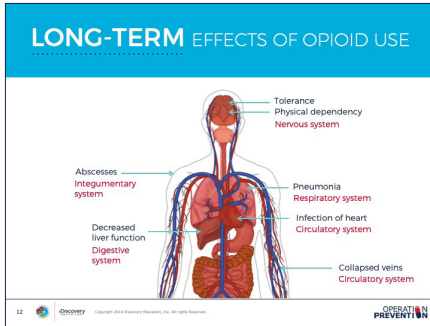
Ask students to consider ways that an endorphin rush from opioid misuse affects each system in the body. Ask: What effects appear during or immediately after? What effects might appear years later? Then, direct students to organize their effects into “short-term” (seconds, minutes, hours, days) and “long-term” (weeks, months, years).

Then, display the slide. Using a large sheet of chart paper, direct students to organize the effects listed on the slide into each system: nervous (euphoria), circulatory (slowed heart function), respiratory (slowed breathing), digestive (dry mouth, nausea and vomiting), muscular (warm flushing of the skin, heavy feeling in fingers and toes, itching), and skeletal (bone thinning).

Connect these short-term effects to the brain and nervous system by interacting with the image and saying the following:

- “Opioids can slow breathing by altering activity in the brain stem (point to this section), which controls automatic body functions such as breathing and heart rate.”
- “Opioids can increase feelings of pleasure by altering activity in the limbic system (circle these system), which controls emotions.”
- “Opioids can block pain messages transmitted through the spinal cord (draw an arrow up along this section) from the body.”

EXPLAIN



SLIDE 12

Now that students have examined the short-term effects, they will examine the long-term effects of opioid misuse on the body.

First, ask students to consider ways that opioid misuse affects other systems in the body. Ask: Which effects occur over the long term? Remind students that long-term refers to weeks, months, or years after use.

Then, display the image. [Using the Long-Term Effects of Opioid Misuse student activity sheet](#) (page 20), direct students to organize the effects listed on the slide into each system: circulatory (infection of heart, collapsed veins), respiratory (pneumonia), digestive (decreased liver function), and nervous (tolerance, physical dependency). Note that abscesses, or sores caused by the buildup of pus, can affect a variety of systems, most noticeably the integumentary (skin).

Key Talking Points

- The most important conclusion is that a long-term effect of opioid use is physical dependence.
- Once a person becomes physically dependent on opioids, they require increasing amounts of the drug (tolerance) and suffer withdrawal (defined in slide 13) if they cease using the drug.
- They also risk becoming addicted, which happens when seeking and using the drug becomes a compulsion, or the primary purpose in life. This greatly increases the risk of experiencing the other long-term effects.²

EXPLAIN

SLIDE 13

WITHDRAWAL

Withdrawal occurs if drug use is reduced abruptly after physical dependence.

Symptoms include: sweating, mydriasis (dilated pupils), vomiting, tachycardia (fast heart rate), goosebumps, abdominal cramps, muscle cramps, and involuntary leg movements.

OPERATION PREVENTION

Now that students have examined the short- and long-term effects of opioid use, they will examine what happens when a person who is physically dependent on opioids suddenly stops. Ask students if they have any routines (like brushing their teeth every morning) and how their bodies would feel if this routine were interrupted.

Click the slide to reveal the definition of withdrawal. Ask students to identify the causes of withdrawal (physical dependence and tolerance) and describe the possible effects.

Then, click to display the image. Ask students to describe what they see and identify the short- and long-term effects.

Recall that physical dependence causes the body to adapt to the presence of a drug. Explain that withdrawal symptoms occur if drug use is stopped or reduced suddenly. Withdrawal may occur within a few hours after the last time the drug is taken. Symptoms of withdrawal include restlessness, anxiety, muscle and bone pain, insomnia, diarrhea, vomiting, cold flashes with “goose bumps,” and involuntary leg movements. Major withdrawal symptoms peak between 24–48 hours after the last use and subside after about a week. However, some people have shown persistent withdrawal signs for many months.

Give students a few minutes to revisit their questions from the beginning of **Explore**. They may add new questions, revise existing ones, or respond to questions answered by the videos in this section.

EXPLAIN



SLIDE 14

Avoid Opioid Misuse

Now that students have learned about opioid use and how it affects their bodies, discuss how they can make good decisions to avoid opioid misuse and deal with stress.

Ask students to turn to a shoulder partner and share ways in which they like to relax. Allow volunteers to demonstrate their ideas via charades in front of the class.

As a class, brainstorm healthy ways to release natural endorphins and reduce stress. Record ideas on the board. Anticipated responses might include:

- Identify stressors and brainstorm ways to alleviate stress (alternative activities to opioids or drug use)
- Learn stress relieving techniques to help your body become naturally calm
- Develop habits that include pro-healthy activities like exercise, listening to music, watching funny movies, etc.
- Use prescription medication (responsibly) only as directed and only under the direction of a physician/adult

Key talking Points:

- We all have different ways to release “feel-good endorphins.”
- Proactively planning for stressful times can help us make healthy choices for handling them.

WORKS CITED

¹ Miech, R. A., Johnston, L. D., O'Malley, P. M., Bachman, J. G., & Schulenberg, J. E. (2016). Monitoring the Future national survey results on drug use, 1975–2015: Volume I, Secondary school students. Ann Arbor: Institute for Social Research, The University of Michigan. Available at <http://monitoringthefuture.org/pubs.html#monographs>

² Principles of Drug Addiction Treatment: A Research-Based Guide, NIH Publication No. 12–4180 Printed 1999; Reprinted July 2000, February 2008; Revised April 2009; December 2018 at <https://www.drugabuse.gov/publications/principles-drug-addiction-treatment-research-based-guide-third-edition/preface>

OPIOIDS: JUST THE FACTS

THE NIDA BLOG TEAM

August 27, 2018

There's been a lot of talk about the opioid crisis lately. You might be wondering: What exactly are opioids? And why are they such a problem?

If you've had a sports injury or surgery, your doctor may have prescribed you an opioid for pain relief. When taken as prescribed by a medical professional, opioids are relatively safe and can be very good at treating pain. However, some people misuse opioids to get high—misuse means taking a medication that wasn't prescribed for you, or taking more of it than your doctor prescribed.

Here are some facts about opioids you should know:

What are opioids?

Opioids are naturally found in the opium poppy plant. Some prescription opioids are made from this plant, and others are synthetic (made in labs).

What are the most commonly used opioids?

The most commonly used prescription opioids are oxycodone (OxyContin®), hydrocodone (Vicodin®), codeine, and morphine. Some slang terms for misused opioid pills are "Oxy," "Percs," and "Vikes."

Another opioid, heroin, is not a medication and is often shot into the arm through a syringe to produce a high. Sometimes prescription opioids are misused by being crushed and injected.

What are the risks of misusing opioids?

Opioid misuse can cause harmful health effects like slowed breathing, which can lead to a fatal overdose.

When misused repeatedly, opioid use can also change the brain, leading to addiction.



Any other opioids I should know about?

Yes. Fentanyl is an opioid drug that's 50 to 100 times more powerful than heroin. Medically, it's used to treat extreme pain and for pain related to surgeries. But it's also made illegally and mixed with other drugs. Illegal fentanyl is responsible for many fatal overdoses in people who thought they were taking another drug.

For your own safety, use an opioid only under the care of a doctor and only as prescribed.

Adapted from: The National Institute on Drug Abuse Blog Team. Opioids: Just the Facts. Retrieved from <https://teens.drugabuse.gov/blog/post/opioids-just-facts>.

OPIOIDS: JUST THE FACTS

Review the learning roles below and assign a group member to each role:

- LEADER** Person who keeps track of time and leads the group to read the article and answer the questions.
- RECORDER** Person who writes down the answers to the questions.
- REPORTER** Person who will share out the group's answers with the larger group.

After reading the "Opioids: Just the Facts" article, discuss your thoughts as a group and answer the questions:

1. What new information did you learn?

2. What information did you think was the most surprising?

3. Why is the information you read about important to share with your peers?

LONG-TERM EFFECTS OF OPIOID USE

