

Heads Up: Real News About Drugs and Your Body

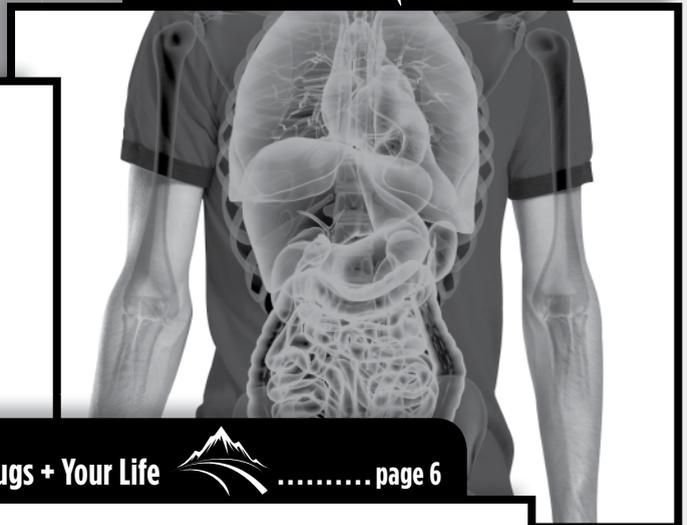
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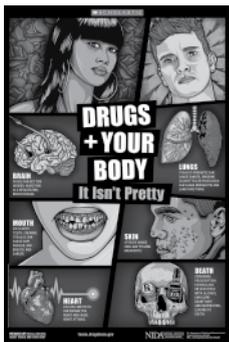


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Also available:
Drugs + Your Body: It Isn't Pretty

- Poster/Teaching Guide
 - Online Activity
- See back cover.



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- For this Heads Up **Teacher Edition Compilation** refer to **NIH Pub No. 13-7654**.
- For the accompanying Heads Up **Student Edition Compilation** refer to **NIH Pub No. 13-7653**.

Visit www.scholastic.com/headsup and <http://teens.drugabuse.gov> for more information.

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Dear Teacher:

Providing teens with scientific information about how abusing drugs interferes with the development and functioning of their brains and bodies can help them make better decisions.

The *Heads Up* student article “Drugs + Your Brain” and accompanying student work sheet “Mission Control” focus on the consequences of drug abuse as it affects a person’s brain. Future articles in the series will highlight the effects of drugs on the body’s major organs, as well as on a person’s behavior—affecting not just the individual, but also family, friends, and communities.

By sharing this article and working through these exercises with your students, you are providing them with important information on the brain-body connection and the many risks they expose themselves to if they abuse drugs.



Sincerely,

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

DRUGS + YOUR BRAIN

Lesson and Work Sheet

The lesson below and the reproducible work sheet on the reverse side reinforce student comprehension of key facts and concepts in the accompanying article “Drugs + Your Brain.”

Alignment With National Standards

- *Science (NSES):* Life Science: Structure and Function in Living Systems; Science in Personal and Social Perspectives: Personal and Community Health
- *Life Skills (McREL):* Self-Regulation; Thinking and Reasoning

Before-Reading Questions:

- What do you know about how different drugs affect the brain and body?
- What do you know about how the brain controls the body?
- What do you know about addiction and its causes?

After-Reading Questions (factual responses in *italics*):

- **How are drugs addictive?** (*Drugs act on a region of the brain that causes feelings of pleasure. Drugs alter the way the brain communicates and actually cause physical changes to brain wiring. These changes can cause cravings and other problems controlling behavior that make it hard to stop using drugs despite harmful consequences, which is addiction.*)
- **How does abusing prescription pain medications interfere with a person’s ability to breathe?** (*Prescription painkillers act on the brain stem, which controls the lungs and heart. Abuse of these drugs can decrease breathing and heart rate, leading to coma or even death.*)

- **Prescription stimulants can cause anxiety and hostility when abused. Which area of the brain do prescription stimulants affect?** (*Prescription stimulants affect the amygdala, which controls emotions.*)
- **How does marijuana affect a person’s ability to drive or play sports?** (*Marijuana affects the cerebellum, which controls coordination. It also affects attention and reaction time. A person needs all of these faculties to drive or play sports safely.*)
- **How do drugs affect a person’s ability to think?** (*Drugs, such as marijuana, can affect the prefrontal cortex and the hippocampus—areas of the brain involved in thinking, memory, and learning.*)

Work Sheet: Have each student use the work sheet and student article to answer the fill-in-the-blank questions under the illustration.

Answer Key: 1. brain stem; 2. limbic system, prefrontal cortex, ventral striatum, cerebellum; 3. amygdala within the limbic system; 4. cerebellum; 5. brain stem; 6. prefrontal cortex and hippocampus.
Think It Through (Answers may vary but should include the conclusion that abusing drugs affects the brain while it is still developing. Conversations with students should highlight that the teen brain is still developing and that making a commitment not to use drugs before entering a high-pressure situation will help them make better decisions about avoiding drug use.)

More Information

- For more information on drugs, go to teens.drugabuse.gov or scholastic.com/headsup.
- For immediate help with a crisis, call 1-800-273-TALK.
- To locate a treatment center, call 1-800-662-HELP or visit <http://findtreatment.samhsa.gov>.

For printable past and current articles in the **HEADS UP** series, go to scholastic.com/headsup/teachers.
For other activities and teaching support, go to drugabuse.gov/parents-teachers.



Mission Control

Understanding the Brain's Central Control System

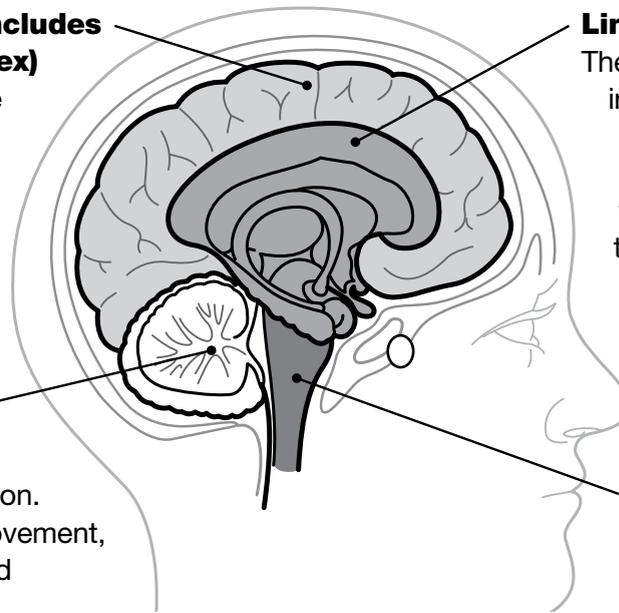
Study the information and diagram on this page, as well as the information from the article "Drugs + Your Brain." Then read the health effects caused by drug abuse (below the illustration), and write the name of the brain area involved in creating the health effect.

Cerebral Cortex (includes the prefrontal cortex)

Allows us to be aware of, pay attention to, and respond to our surroundings. Powers the ability to think, plan, solve problems, and make decisions.

Cerebellum

The center for motor control and coordination. Controls muscular movement, as well as balance and posture.



Limbic System

The collection of structures involved in emotion, motivation, memory, and other functions critical to survival. It includes the hippocampus (memory), the amygdala (fear and other emotions), the ventral striatum (reward), the hypothalamus (appetite, thirst, body temperature), and parts of the cortex.

Brain Stem

Controls basic functions critical to life: heart rate, breathing, sleeping.

1. Abusing prescription painkillers or sedatives can slow and stop breathing: _____
2. Many parts of the brain are affected over time with repeated drug use, leading to addiction.
Name two: _____
3. Steroids and methamphetamine can lead to aggressive behavior: _____
4. Marijuana and alcohol can affect coordination and movement: _____
5. Combining sedatives with alcohol can slow the heart rate: _____
6. Marijuana impairs the ability to think clearly: _____

Think It Through: The cerebral cortex does not fully develop until a person is about 25 years of age. Why is this important for teens to know when it comes to decisions involving drugs? Explain your reasoning.



DRUGS + YOUR BODY

Dear Teacher:

“Drugs + Your Body”—the latest installment in our series on the health effects of drugs—provides students with important factual information about the devastating effects drugs can have on their bodies.

As a complement to the poster/teaching guide “Drugs + Your Body: It Isn’t Pretty” (downloadable at scholastic.com/headsup/teachers), this new insert provides students with additional information about the effects of drugs on the body—inside and out. The accompanying reproducible work sheet further explains how alcohol magnifies the effects of some drugs, which can lead to deadly consequences.

By sharing this article with your students, you are providing them with not only important facts about the science of drug abuse but also valuable information to help them make smart decisions and choose healthy, drug-free lifestyles.



Sincerely,

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



In This Installment:

- **Student article:** Facts about the health effects of drugs on teens, with an emphasis on organs and major body systems.
- **Student work sheet:** Facts about how alcohol magnifies the effects of some drugs.

Alignment With National Standards

- *Science (NSES):* Life Science: Structure and Function in Living Systems; Science in Personal and Social Perspectives: Personal and Community Health
- *Life Skills (McREL):* Self-Regulation; Thinking and Reasoning

Before-Reading Questions:

- What do you know about how the brain, heart, and lungs work together in a healthy person?
- What do you know about the effects of different drugs on the heart and lungs?

After-Reading Questions (factual responses in *italics*):

1. What can drugs do to a person’s physical appearance? (*Male steroid abusers can experience shrunken testicles, baldness, and breast formation. Female steroid abusers can experience facial hair growth and male-pattern baldness. Meth abusers can have skin sores from excessive picking. Smokers often have discolored teeth, gum disease, and tooth loss.*)
2. Drugs can affect the body both directly and indirectly. A direct effect is one where one factor directly affects another. (For example, hitting a baseball with a bat has a direct effect—the bat directly affects the location of the ball.) When a drug acts indirectly, it produces some change in your body, and it is this change that directly causes harm.
 - **Provide one example where a drug can directly cause harm to an organ in your body.** (*Examples: Anabolic androgenic steroids act directly to cause breast*

development in males or facial hair growth in females. Cocaine chemically damages the tissues in the nasal septum, which eventually results in a hole in this tissue.)

- **Provide one example where a drug can indirectly harm an organ in your body.** (*Examples: Methamphetamine raises body temperature and causes dehydration. Dehydration, in turn, lowers blood volume, which reduces blood flow through the kidneys, damaging them. Methamphetamine can cause individuals to hallucinate that insects are crawling on their skin [a direct effect]. It is the hallucinations that cause people to pick at their skin causing sores [an indirect effect].*)

Student Work Sheet: Have each student use the information on the work sheet, as well as in the article, to answer the work sheet questions. As a class, discuss the dangers of using alcohol and how combining alcohol with drugs can make a dangerous practice even riskier.

Work Sheet Answer Key:

1. Prescription sedatives and opioids each slow breathing. Combining them with alcohol can further slow breathing to such low levels that a person could become comatose and/or die.
2. Doctors prescribe medications based on a person’s age, weight, and specific illness so that only the required dosage is used. Abusing prescription drugs exposes the body to unsafe doses that can cause harm.
3. Impaired driving, poor sports performance, poor academic performance, etc.
4. Alcohol can cause the heart to beat rapidly or irregularly, damaging the heart muscle. Combining alcohol with drugs that also increase heart rate, for example, magnifies the effects and the risks.

More Information

- For more information on drugs, go to teens.drugabuse.gov or scholastic.com/headsup.
- For immediate help with a crisis, call 1-800-273-TALK.
- To locate a treatment center, call 1-800-662-HELP or visit <http://findtreatment.samhsa.gov>.

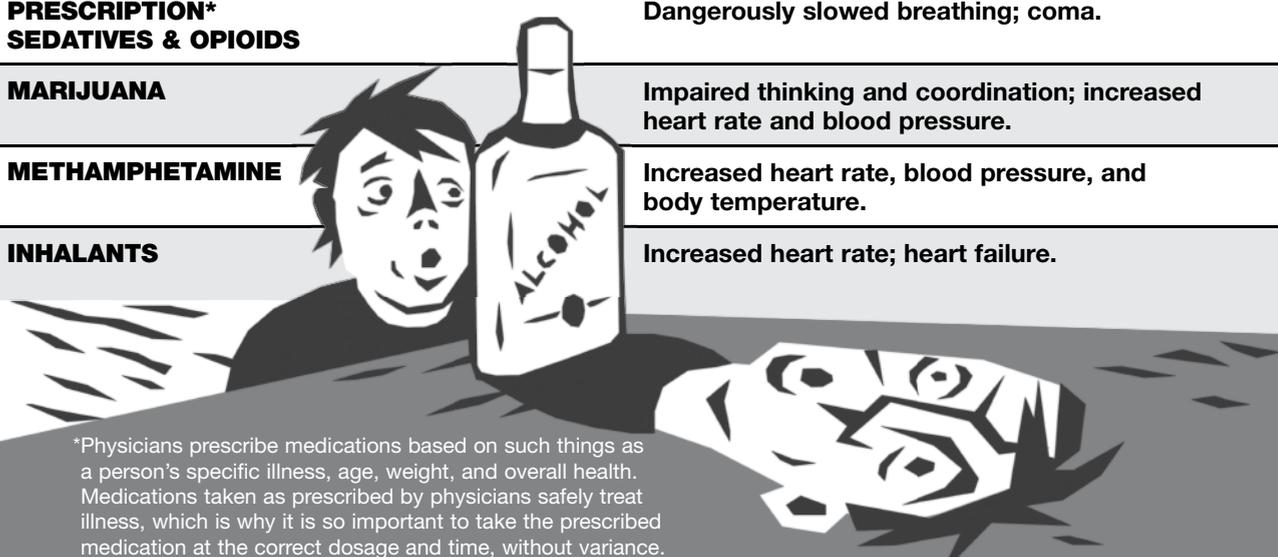
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Alcohol + Drugs = Magnified Effects

Study the information from the diagram below, and then answer the “Think It Through” questions that follow. Write in complete sentences on a separate sheet of paper.

Using alcohol with other drugs can magnify the effects of each drug and increase the harmful consequences. The results can be deadly. For example, alcohol combined with cocaine can increase blood pressure to dangerous levels. Combined with prescription sedatives and opioids, alcohol can drastically slow breathing.

Drug Name	MAGNIFIED Effects With Alcohol
COCAINE	Increased blood pressure and heart rate.
PRESCRIPTION* SEDATIVES & OPIOIDS	Dangerously slowed breathing; coma.
MARIJUANA	Impaired thinking and coordination; increased heart rate and blood pressure.
METHAMPHETAMINE	Increased heart rate, blood pressure, and body temperature.
INHALANTS	Increased heart rate; heart failure.



*Physicians prescribe medications based on such things as a person's specific illness, age, weight, and overall health. Medications taken as prescribed by physicians safely treat illness, which is why it is so important to take the prescribed medication at the correct dosage and time, without variance.

Think It Through

1. Prescription sedatives include sleeping pills and anti-anxiety medications such as Valium® and Xanax®. Prescription opioids include Vicodin®, Oxycontin®, and codeine. Why could combining any of these drugs with alcohol land a person in the emergency room (ER)?
2. Why is taking a prescription drug in a manner different from the way it was prescribed so dangerous?
3. Impaired thinking and coordination are dangerous side effects that result from mixing marijuana and alcohol. What are some harmful consequences that might result from this combination?
4. Heavy alcohol use does not have to be combined with other drugs to cause damage to your brain or body. Alcohol can damage the liver and heart while also impairing brain function. How does this make mixing drugs and alcohol so dangerous?



DRUGS + YOUR LIFE

Dear Teacher:

The first two articles of this year's Heads Up series highlighted the damaging health effects of drugs on a teen's brain and body. This third article, "Drugs + Your Life," focuses on other real-life consequences of teen drug and alcohol use such as academic problems, violence, accidental death, and blackouts. In addition, the lesson to the right includes further thought-provoking statistics for you to guide students in grade/age appropriate discussions about possible consequences of binge drinking. The accompanying work sheet helps students develop the skills to interpret and understand statistical data as well as apply information in decision making.

By sharing this article and working through these exercises with your students, you will provide them with critical information about the



many risks teens face with drugs, as well as valuable tools to help them make informed and healthy decisions.

Sincerely,

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

Alignment With National Standards

- **Science (NSES):** Science in Personal and Social Perspectives: Personal and Community Health
- **Math (NCTM):** Evaluate inferences and predictions based on data; probability

Before-Reading Questions:

- In addition to damaging a teen's health, how else can drugs and alcohol affect his or her chances for a successful and happy life?
- What do you know about statistics? What makes statistical data reliable?
- What factors influence your choices and actions when making decisions?

After-Reading Questions (factual responses in *italics*):

- What are statistics, and what can we learn from them? (*Statistics can be used to indicate the probability, or likelihood, of something happening to a certain group of people.*)
- How can a person's age and behavior be used to determine the probability of risk? (*Scientists use a mathematical formula that examines the number of times a certain result occurs within a sample of similar people or behaviors. In drug studies, there are always at least two experimental [or study] groups—one that uses the drug and one that does NOT. By comparing how often a certain result occurs in each group, calculations can be made to determine if using a drug affects outcomes, i.e., has risk.*)
- How can statistics help you make smart decisions? (*Statistics can help you*

understand the likelihood of something happening, which can aid you in making smart and informed decisions.)

Additional Discussion: Binge Drinking¹

Below are several teen statistics relevant to binge drinking that might be sensitive to present in some classrooms, but are provided here for teachers to incorporate into student discussions as they deem appropriate.

- **Suicide:** Among high school teens, those who binge on alcohol are *three times more likely* to attempt suicide than those who do not drink.
- **Sexual Violence:** Teens who binge drink are about *three times more likely* to be forced to have sex than teens who do not drink.
- **Unwanted Pregnancy:** Compared with high school teens who do not drink, teen binge drinkers are about *four times more likely* to become pregnant or to get someone pregnant.

¹ American Academy of Pediatrics, 2007; <http://pediatrics.aappublications.org/content/119/1/76.full.html>

Extension:

Challenge students to research infograms and teen drug statistics. Then have them convey information they think is important in a graph, chart, or other visual illustration that displays the data in an accurate and effective way. Have students present their infograms in class.

Work Sheet Answer Key: 1. "Group Fight": $36.4 / 16.5 = 2.2$; "Sold Drugs": $29.8 / 2.8 = 10.6$; "Stole More Than \$50": $26.1 / 4.1 = 6.4$; "Attacked Someone": $24.4 / 7.3 = 3.3$; "Carried a Handgun": $8.6 / 3.1 = 2.8$. 2. Answers might include: *Teens who do drugs may become addicted and feel compelled to find money to buy more drugs, so they might turn to stealing or selling drugs to get the next high.* 3. Answers might include: *Statistical probability shows the likelihood of something happening, which can help a person determine risk.*

More Information

- For more information on drugs, go to teens.drugabuse.gov.
- For more teaching materials, go to scholastic.com/headsup and drugabuse.gov/parent-teachers.
- For immediate help with a crisis, call **1-800-273-TALK**.
- To locate a treatment center, call **1-800-662-HELP** or visit findtreatment.samhsa.gov.

In This Installment:

- **Student article:** Presents teens with statistics that illustrate other real risks of substance abuse in addition to health effects.
- **Student work sheet:** Helps to explain statistics in a relatable way, using real-life examples and mathematical context.

STUDENT WORK SHEET

Statistics: More Than Numbers

Eight seconds are left in the basketball game and your team is down by one. You have the ball. Who do you pass to?

Understanding statistical probability can help you determine the likelihood of something happening, and prepare you to make smart decisions. Back to the game:

- The freshmen have made 40 out of 100 shots this season (40%).
- The seniors have made 160 out of 200 shots this season (80%).

To understand this another way, a senior is two times more likely to make the shot than a freshman because the seniors' shooting percentage is twice as high. This is calculated by dividing the seniors' 80% by the freshmen's 40%, equaling 2. In a bar graph, this means the seniors' bar is two times

the size of the freshmen's (see *Figure 1*). Could a freshman make the shot and a senior miss? Of course! These are probabilities, not certainties, but the seniors' *chance* of scoring is still twice as high.

The same process can be applied to understanding drug statistics, which have more serious consequences

than a game outcome. To obtain statistics, scientists study reliable data to find patterns and probabilities. For example, statistics show that teens who use drugs are two times more likely to behave violently—a serious outcome (see *Figure 2*). This means that the act of using drugs multiplies the average teen's likelihood of violence not once, but *two whole times*.

Figure 1

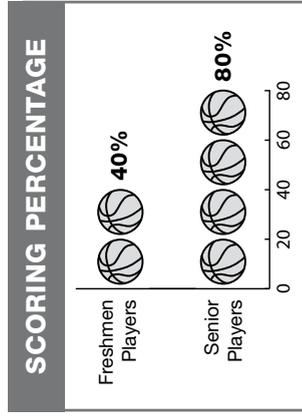
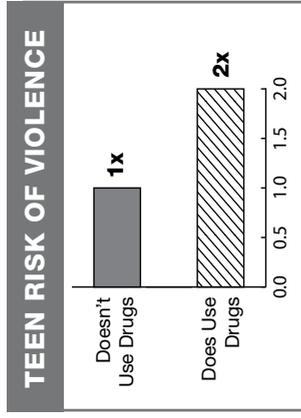


Figure 2

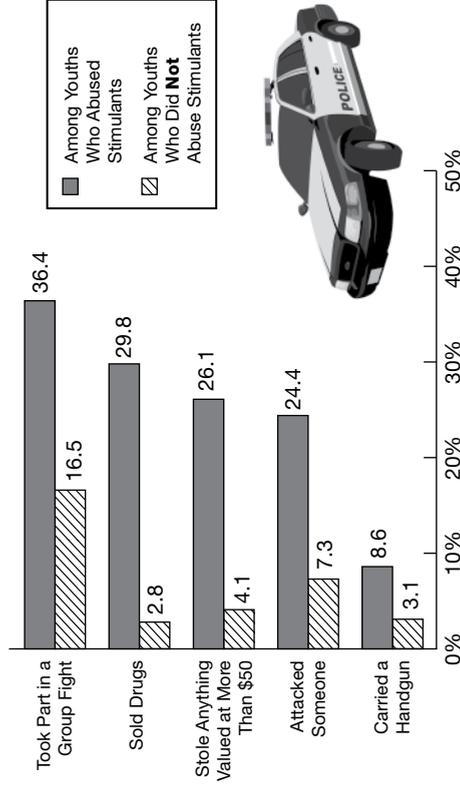


Violence graph: Substance Abuse and Mental Health Services Administration (SAMHSA), 2006; <http://oas.samhsa.gov/2k6/youthviolence/youthviolence.htm>. Stimulants graph: SAMHSA, 2008; <http://oas.samhsa.gov/2k8/stimulants/depression.htm>.

Think It Through

The graph below compares the probability of certain behaviors among stimulant abusers and non-abusers. Stimulants (cocaine, methamphetamine, and “ecstasy”) are a class of drugs that increase energy and feelings of well-being but they also cause increased blood pressure and irregular heartbeat. Study the graph, and then answer the questions on separate paper.

PERCENTAGES OF YOUTHS AGED 12–17 PARTICIPATING IN DELINQUENT BEHAVIORS, BY NONMEDICAL STIMULANT USE



1. How much more likely are stimulant abusers than non-abusers to participate in each of the behaviors on the graph? Round your results to the nearest tenth.

Example: Using stimulants makes a teen 2.8 times more likely to carry a handgun. Calculation: $8.6\% \text{ abusers} \div 3.1\% \text{ non-abusers} = 2.8$.

2. Why do you think drugs like stimulants increase a teen's likelihood of violent behavior and illegal activities?

3. How can examining probability help a person make decisions?

Photo: police car. © Mario Boutin/Shutterstock.

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Teacher Editions

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DRUG PUBS

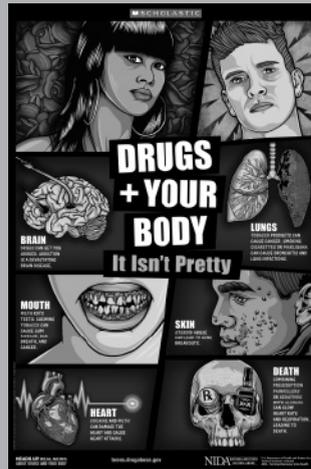
RESEARCH DISSEMINATION CENTER

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