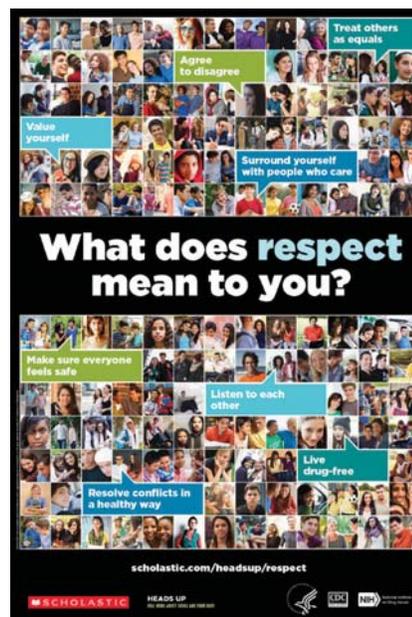


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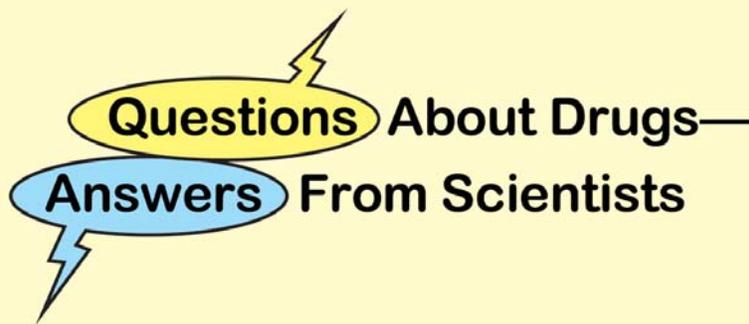
RESEARCH DISSEMINATION CENTER

Heads Up: Real News About Drugs and Your Body

Brought to you by Scholastic and the scientists at the National Institute on Drug Abuse, National Institutes of Health, U.S. Department of Health and Human Services

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- For this Heads Up **Student Edition Compilation** refer to **NIH Pub No. 16-DA-8022**.
- For the accompanying Heads Up **Teacher Edition Compilation** refer to **NIH Pub No. 16-DA-8023**.

Visit scholastic.com/headsup and teens.drugabuse.gov for more information.

QUESTIONS ABOUT DRUGS— ANSWERS FROM SCIENTISTS

Every year since 2007, scientists at the National Institute on Drug Abuse (NIDA) in Washington, D.C., dedicate a day to answering student questions about drugs. In this annual online chat—Drugs and Alcohol Chat Day*—teens across the country can ask the questions they most want answered, and scientists answer them. No judgment. Just the facts.

To read the actual questions and answers—more than 2,500—visit teens.drugabuse.gov/chatday2015. Here are a few Q&As inspired by Chat Day to give you some important facts now.

Q: SOME PEOPLE SAY MARIJUANA IS DANGEROUS AND OTHERS SAY IT'S NOT. WHAT'S THE TRUTH?

A: Scientific research has shown that marijuana can be dangerous for teens because their brains are still developing. Regular marijuana use may impact teens' ability to learn and even lower their IQs. It can also impair driving ability, especially when combined with alcohol. More recently, a lot of people have landed in the emergency room having psychotic episodes after eating food or candy containing marijuana. Not knowing that THC (the mind-altering chemical in marijuana) digests more slowly when eaten than when smoked, they mistakenly eat multiple servings looking to increase or speed up the mind-altering effects.

Q: WHY DO PEOPLE USE TOBACCO WHEN THEY KNOW IT'S SO BAD FOR THEM?

A: It is bad for them! More than 480,000 people die every year from smoking-related illnesses. But people smoke because the nicotine in cigarettes is highly addictive. Young people are especially sensitive to nicotine's addictive effects, which is why most smokers get addicted before age 18. Some people mistakenly think that using a hookah (water pipe) will let them use tobacco but avoid the dangers of it. Not true. Hookah smoke contains the same chemicals as cigarette smoke and is also linked to heart disease and lung cancer. In fact, a typical hookah session can equal as many as 100 cigarettes.

Q: CAN COFFEE KILL YOU?

A: Caffeine is generally safe at levels found in beverages such as coffee, soda, or energy drinks—though drinking too much can make you feel sick. However, there have been overdoses from consuming caffeine powder. Just a teaspoon of it is equal to 25 cups of coffee—enough to kill you! Too much caffeine powder can cause fast and erratic heartbeat, seizures, vomiting, diarrhea, disorientation, and even death.



More Info: For additional facts about drugs, visit scholastic.com/headsup and teens.drugabuse.gov.



Q: HOW IS MARIJUANA ADDICTIVE?

A: Marijuana is addictive for some people, with the risk increasing for those who start using it as a teen. It affects certain receptors in the brain, called cannabinoid receptors, which influence many functions, including the brain's reward system. Over time, this can make it difficult for some people to stop using marijuana even when it's having negative effects on their lives—this means they have become addicted. Also, because marijuana withdrawal can cause irritability and restlessness and “looks” different from withdrawal symptoms from drugs such as heroin, some people might not realize they are experiencing withdrawal.

Q: WHAT ARE MOLLY AND SPICE AND WHY ARE THEY IN THE NEWS?

A: Both Molly and Spice have led to hospitalizations and death, which makes headlines. Molly is another name for a drug called MDMA (also known as Ecstasy or X). MDMA affects areas of your brain that help you control your body temperature. It can cause the body to overheat to such an extreme that serious heart and kidney problems can result. MDMA is sometimes passed out at concerts and parties, but more and more, what is being presented as MDMA actually contains additional dangerous chemicals or other drugs (and sometimes has no MDMA at all). Spice, sometimes called K2 or “fake marijuana,” is a drug that is made by spraying plant material with dangerous chemicals. These chemicals can cause extreme reactions like hallucinations, paranoia, and heart problems.

Q: HOW CAN I GET A FRIEND TO STOP TAKING DRUGS?

A: Talking about drug use can be uncomfortable, so we suggest you ask a trusted teacher or coach to help you figure out how best to help your friend. Without being judgmental, you can let your friend know that you care and are concerned, and that he or she can talk to a trusted adult or a medical professional in confidence. Also, the anonymous national call line at 1-800-273-TALK is not just for emergencies, but can also connect your friend with a nearby professional. There is also a helpful fact sheet at drugabuse.gov/helpforteens.

All Q&As:
www.teens.drugabuse.gov/chatday2015

From the Nation's Leading Expert on Drugs

→ “Any potentially addictive drug can be the ‘worst’ drug. We are all different, and some of us might be more sensitive to one drug versus another. You often won’t know until it’s too late what your reaction will be. No one ever chooses to be addicted.”

—Dr. Nora D. Volkow, Director, NIDA

Note: Original answers have been edited for space.

***New Name. Same Facts!** Drug Facts Chat Day is now Drugs and Alcohol Chat Day. Learn about it and National Drug and Alcohol Facts Week at teens.drugabuse.gov/national-drug-facts-week.

THE SCIENCE OF DECISION MAKING AND PEER PRESSURE

Imagine you're with classmates when a friend from another school approaches. Your classmates start making fun of her. You know it's hurtful, but you want to fit in. You laugh along . . . regretting it later.

Or suppose a friend wants you both to audition for a play, but you feel too shy. He pleads with you to do it, so you agree. Later, you're thrilled to see your name on the cast list.

Both of these scenarios are examples of how peers can influence a person's actions—both positively and negatively. As a teen, you can be especially sensitive to *peer influence*, better known as *peer pressure*. Science helps explain why.

THE BASICS OF DECISION MAKING

When a person makes a decision, different parts of the brain spring into action. The brain's *limbic system* generates an emotional response, and the *prefrontal cortex* produces rational thinking. In situations like the two above,

“what we are doing is very quickly, and often unconsciously, calculating the rewards and costs of different actions,” says psychologist Laurence Steinberg, a leading expert on adolescent peer influence. “When we do this calculation and come to the conclusion that the potential rewards of a particular action outweigh the potential costs, we act in that way.”

TEEN DECISION MAKING

This decision-making process occurs naturally in humans throughout our lives. But during our teen years, our brains have unique characteristics that impact this calculation.

One reason for the difference in teen decision making involves

a chemical called *dopamine* in the brain's reward center. Dopamine helps transmit signals in the brain that make people feel happy. The number of brain receptors interacting with dopamine is higher in adolescence than at any other time of life. This means that when a teen is exposed to a reward—such as a compliment—the reward center reacts more strongly than it would for an adult or a child.

In addition, being with friends increases adolescents' sensitivity to rewards. Thus, the presence of peers makes the already sensitive reward system *even more* sensitive to potential rewards. At the same time, says Steinberg, “when adolescents are criticized or rejected by friends,



More Info: For additional facts about the brain and peer pressure, visit scholastic.com/headsup and teens.drugabuse.gov.

From Scholastic and the scientists of the National Institute on Drug Abuse, National Institutes of Health, U.S. Department of Health and Human Services



there is a bigger response in parts of the brain that control negative emotions.”

Feeling rewards more strongly and responding more intensely to what peers may think means that there are biological reasons for why teens sometimes decide to do things with their friends that they would never do on their own. This can be positive, by encouraging peers to take on new challenges. But it can also lead to dangerous decisions—such as using alcohol or drugs, or getting into other high-risk situations.

DRIVING UNDER PEER PRESSURE

One way to understand how peer influence can lead teens to make poor decisions is to look at teens

TEEN DRIVERS AND RISK TAKING ¹			
Number of Teen Passengers	0	1	2 or more
Driving Risk	Normal	2.5x more likely to take risks	3x more likely to take risks

and driving. In a study conducted by Steinberg, teens and adults played a driving video game in which they would make more money the faster they arrived at the end of a road. Driving through yellow lights could speed up their time, but could also cause an accident.

Alone, teens took no more risks than adults. But when their friends were with them, teens took more risks and ran more yellow lights. They did this even though their friends weren't allowed to talk. The presence of peers made the reward of earning more money by driving faster feel “more intense,” observed Steinberg.

Real life is not much different. Statistics show that teenage drivers are 2.5 times more likely to take risks while driving when another teen is in the car, and 3 times more likely with multiple teens in the car.¹

THE POWER OF PEER PRESSURE

So why do teens sometimes take more risks when their friends are with them? According to Steinberg, when the reward center “is activated by one kind of reward, it also makes us seek other kinds of rewards.”

For teens, friends are both a reward *and* the fuel that

encourages them to seek more rewards. “Being around peers makes people more sensitive to the potential rewards,” says Steinberg, “and less sensitive to the downsides.”

But not all risk taking is bad. As explained by Steinberg, “Risk taking is normal during adolescence.” For instance, trying a new activity when you don't know that you'll succeed is a type of risk that helps a person develop into an independent adult. “The solution is not to eliminate risk taking, rather it is to facilitate *good* risk taking.”



WHAT'S A TEEN TO DO? AN EXPERT'S ADVICE

To avoid letting peer pressure lead you to make risky choices that have negative consequences, Steinberg recommends preparing a plan before heading into peer pressure-packed situations. His advice: “Have a script in your head about what you are going to say and do. Be aware that your brain works differently in groups than when you are alone. Pause and exercise a little extra caution in those situations.”

PRESCRIPTION PAIN MEDICATIONS: WHAT YOU NEED TO KNOW

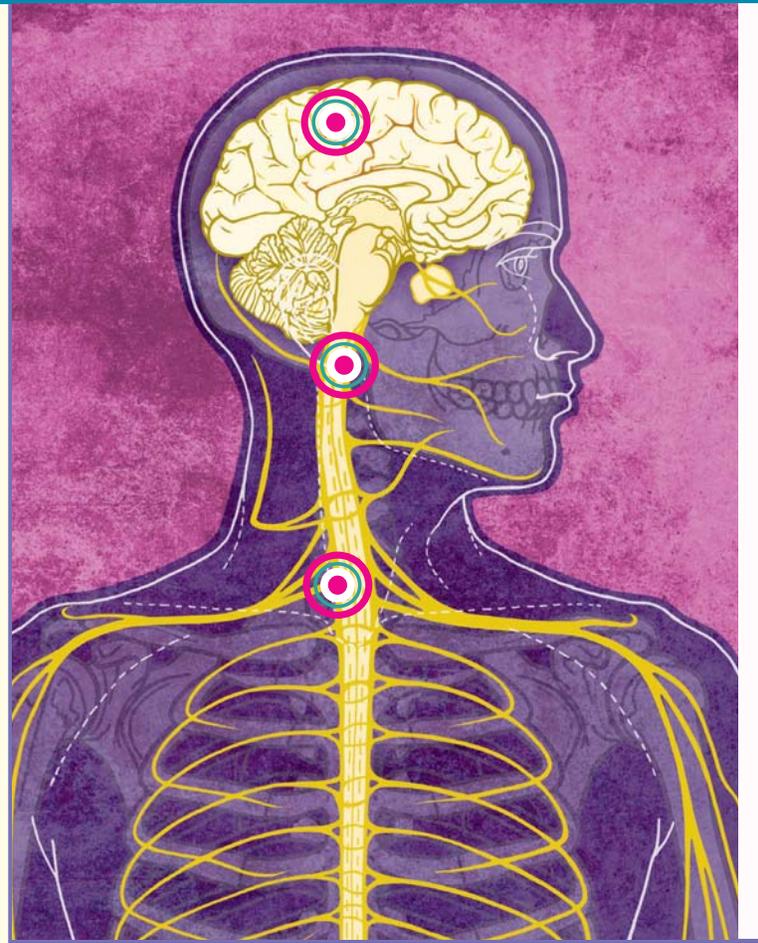
When used as directed by a doctor, powerful prescription pain medications called opioids (pronounced *OH-pee-oyds*) have helped millions of people cope with serious pain. But when used incorrectly, they can be addictive and deadly.

Some pain can be treated by over-the-counter medications such as Advil® and Tylenol®. But for pain from surgery, cancer, or serious injuries, doctors often prescribe the most powerful medications available—opioids. Opioid medications, such as Vicodin® and OxyContin®, are part of a class of drugs that resemble opioid chemicals our bodies make. In nature, opioids are found in the poppy plant, which is the source of some opioid medications as well as illegal opioids such as heroin.

Opioid medications are made to specific standards and regulated by the government for safety. But opioid medications can be powerfully addictive and can cause an overdose if not taken correctly. How is it that a medication that is so effective at relieving pain and helpful in healing can be so harmful when misused? The answer comes from how opioids work in the body.

Opioid Drugs: Master Impersonators

Opioid drugs, including medications and illegal drugs, are chemically very similar to endorphins, one of the body's natural opioids. When opioid drugs are taken, they use opioid receptors that are normally accessed by endorphins to tap into the body's systems. However, opioid drugs are more powerful than the opioids the body makes, so they trigger much stronger reactions.



Opioids and Pain

Endorphins naturally block pain by binding to opioid receptors in the spinal cord and other parts of the nervous system. Opioid drugs mimic endorphins but cause a much stronger pain-blocking signal. This is why opioid medications are prescribed for serious pain.

Opioids and Addiction

Opioid receptors are also found in the part of the brain that releases dopamine. Dopamine causes us to feel pleasure and to remember which behaviors produced this feeling. For example, endorphins released during physical activity can prompt a surge of dopamine, known as a “runner’s high.” Opioid drugs, however, cause a larger flood of dopamine to be released. The brain remembers the “high” and over time, with repeated abuse, develops an altered dopamine response. The brain begins to crave the extra intensity only an opioid drug can deliver, which can lead to addiction.

OPIOIDS IN THE BODY

Opioid receptors are located in the brain, brain stem, spinal cord, intestines, and other organs. When endorphins, our body's naturally made opioids, are released or when opioid drugs, including medications, are taken, they bind to opioid receptors in the brain and body to regulate functions including pain, pleasure, breathing, and digestion.

 **BRAIN:** There are opioid receptors throughout the brain, including in the cerebral cortex, cerebellum, nucleus accumbens, ventral tegmental area, substantia nigra, and hypothalamus of the brain. These areas are involved in pain perception, emotion, and reward (pleasure). The activation of the reward center is the primary reason opioids can lead to addiction.

 **BRAIN STEM:** When opioids bind to receptors in the brain stem, breathing slows down, which creates a feeling of relaxation. This reaction to opioids is the reason an overdose can cause a person's breathing to stop.

 **SPINAL CORD:** The opioid receptors in the spinal cord reduce pain signals from an injury, sickness, or surgery. This interference in pain perception is the intended function of prescription opioids.

Opioids and Overdose

Opioid receptors in the brain and brain stem also regulate breathing. In proper doses, opioids slow breathing and create a feeling of relaxation. But if a person takes too much, he or she can stop breathing entirely. Taking opioids with other drugs that also slow breathing, such as alcohol, increases the risk that a person will stop breathing.

In 2014, there were 28,647 drug-poisoning deaths involving prescription opioids or heroin. This number has tripled since 2002. As a result of many more people now abusing prescription

Rise in Heroin Use and Overdoses

Approximately 80 percent of current heroin users got started by first misusing prescription opioids. However, only about 4 percent of people who misuse prescription opioids will start using heroin. Still, the United States is experiencing a spike in heroin use among men and women, of all income levels and most age groups. As heroin use goes up, so does the death rate from heroin overdose, which has quadrupled in the past 10 years.

Dependence vs. Addiction

Patients taking opioid medications for a long period of time often develop a tolerance, requiring more opioids to achieve the same effect. Long-term use may also lead the body to produce fewer endorphins and opioid receptors. These changes signal a *physical dependence*, which causes people to go through withdrawal, feeling sick or depressed without opioid drugs. Physical dependence can—but doesn't always—lead to *addiction*, a disease that involves additional changes to brain circuitry. Someone who is addicted takes drugs compulsively, even when he or she experiences negative consequences. While dependence involves a person's physical body, addiction takes over his or her entire life.

opioids, overdose deaths from opioids have also spiked. In fact, they now outnumber deaths from heroin and cocaine combined.¹

How to Stay Safe

Most people who take prescription opioids do not become addicted or overdose. The risk for serious problems goes up when opioids are misused. If you are ever prescribed an opioid, take these precautions:



- You and your parents should talk about the risks with your doctor and ask about any alternative treatments.
- Take your medications exactly as prescribed. If you are still in pain while following the directions, you should go back to the doctor—not take more of your medicine.
- If you have a history of a substance use disorder or mental illness, tell your doctor, as these increase your risk for addiction.
- If you start taking prescription opioids that have not been prescribed to you, or more than your doctor prescribed, or for their pleasurable effects, tell your doctor, a parent, or another trusted adult. These are signs that you may have a substance use disorder and need professional help. The sooner you get help, the better your chances are for recovery.
- Do not give your prescription drugs to anyone else. This is dangerous and illegal.
- If you have leftover pills, ask a pharmacist or look online for programs that take back unused medications.*
- Opioids should never be combined with alcohol. Combining them increases the risk of overdose and death.

¹CDC (2015). "National Vital Statistics System, Mortality Data"

 In Case of Opioid Overdose: Call 911. Naloxone is an emergency medication that can prevent opioid overdose death if given in time.

*One helpful resource: Visit fda.gov and search for the article "Disposal of Unused Medicines: What You Should Know."