National Institute on Drug Abuse
National Institutes of Health

WHAT IS K2/SPICE?

WHAT ARE THE EFFECTS OF MARIJUANA?

DOES MARIJUANA USE LEAD TO OTHER DRUGS?

CAN PEOPLE BECOME ADDICTED TO MARIJUANA?

WHAT HAPPENS IF YOU SMOKE MARIJUANA?

WHAT DOES MARIJUANA DO TO THE BRAIN?

WHY DO YOUNG PEOPLE USE MARIJUANA?

WHAT IS MARIJUANA?

HOW MANY TEENS SMOKE MARIJUANA?

Marijuana Facts for Teens

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
NIH Pub. No. 15-4037
Printed 1995, Revised November 1998
Reprinted April 2001, Revised March 2003,
September 2004, March 2008, March 2011, July 2013, May 2015

NIH National Institute on Drug Abuse

Letter to Teens

Did you know that teen marijuana use has dropped dramatically since the late 1990s? So, if you were thinking everyone smokes marijuana, they don't. Statistics show that about 7 percent, or roughly 1 in 14 teens, report using marijuana in the past month. However, many teens do not consider marijuana to be a harmful drug. Some believe marijuana cannot be harmful because it is "natural." But not all natural plants are good for you—take tobacco, for example.

One serious risk is addiction. In 2013, around 4.2 million people 12 and older had a marijuana abuse or addiction problem. Marijuana is not as harmless as you may think. Look inside this booklet to find out more.

Our goal is to give you the straight facts so you can make smart choices and be your best self—without drugs. And we hope you will continue the conversation and share this information with your friends, parents, teachers, and others.

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

Substance Abuse and Mental Health Services Administration (SAMHSA). *Results from the 2013 National Survey on Drug Use and Health: Summary of National Findings.* Rockville, MD: Substance Abuse and Mental Health Services Administration; 2014. HHS Publication No. (SMA) 14-4887. NSDUH Series H-49.

Need Treatment?

You can find treatment programs through the website **www.findtreatment.samhsa.gov** provided by the Substance Abuse and Mental Health Services Administration (SAMHSA). You can also call the SAMHSA Treatment Referral hotline at 1-800-662-HELP. Treatment can help you, a friend, or someone you love get back to the person you or they once were.

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People smoke marijuana for a lot of different reasons: to feel good, to feel better, to feel different, or to fit in. Whatever the reason, drug use has consequences.

To help you make an informed choice, the following are some brief summaries of what marijuana research is telling us. These topics represent the most popular questions and comments we get every day on our teen website and blog. Share them with your friends to help them separate fact from myth.

I. Some Things to **Think About**

Addiction

Marijuana can be addictive. Not everyone who smokes marijuana will become addicted—that depends on a whole bunch of factors, including your genes, the age you start using, whether you also use other drugs, your relationships with family and friends, success in school, and so on. Repeated marijuana use can lead to addiction, which means that people have trouble controlling their drug use and often cannot stop even though they want to. Research shows that about 9 percent, or about 1 in 11, of those who use marijuana will become addicted. This rate increases to 17 percent, or about 1 in 6, in people who start in their teens, and goes up to 25 to 50 percent among daily users.

Anthony J, Warner LA, Kessler RC. Comparative epidemiology of dependence on tobacco, alcohol, controlled substances, and inhalants: basic findings from the National Comorbidity Survey. *Exp Clin Psychopharmacol.* 1994;2:244-268.

Hall W, Degenhardt L. Adverse health effects of non-medical cannabis use. *Lancet.* 2009;374:1383-1391.

Hall W. The adverse health effects of cannabis use: what are they, and what are their implications for policy? *Int J of Drug Policy.* 2009;20:458-466.

Lopez-Quintero C, Pérez de los Cobos J, Hasin DS, et al. Probability and predictors of transition from first use to dependence on nicotine, alcohol, cannabis, and cocaine: results of the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC). *Drug Alcohol Depend.* 2011;115(1-2):120-130.

Driving

After alcohol, marijuana is the drug most often linked to car accidents, including those involving deaths. A nationwide study of deadly crashes found that 36.9 percent of drivers who tested positive for drugs had used marijuana. Marijuana affects skills required for safe driving—alertness, concentration, coordination, and reaction time. Marijuana makes it hard to judge distances and react to signals and sounds on the road.

Wilson FA, Stimpson JP, Pagán, JA. Fatal crashes from drivers testing positive for drugs in the U.S., 1993-2010. *Public Health Rep.* 2014;129:342-350.

School

Marijuana is linked to school failure. Marijuana's negative effects on attention, memory, and learning can last for days and sometimes weeks—especially if you use it often. Someone who smokes marijuana daily may have a "dimmed-down" brain most or all of the time. Compared with teens who don't use, students who smoke marijuana tend to get lower grades and are more likely to drop out of high school. Research even shows that it can lower your IQ if you smoke it regularly in your teen years. Also, longtime marijuana users report lower life satisfaction, memory and relationship problems, poorer mental and physical health, lower salaries, and less career success.

Psychosis/Panic

High doses of marijuana can cause psychosis or panic when you're high. Some people experience an acute psychotic reaction (disturbed perceptions and thoughts, *paranoia*) or panic attacks while under the influence of marijuana. This reaction usually goes away as the drug's effects wear off. Scientists don't yet know if marijuana use causes lasting mental illness, although it can worsen psychotic symptoms in people who already have *schizophrenia*, a severe mental illness with symptoms such as hallucinations, paranoia, and disorganized thinking. It can increase the risk of long-lasting psychosis in some people.

McCaffrey DF, Pacula RL, Han B, Ellickson P. Marijuana use and high school dropout: the influence of unobservables. *Health Econ.* 2010;19(11):1281-1299.

Meier MH, Caspi A, Ambler A, et al. Persistent cannabis users show neuropsychological decline from childhood to midlife. *Proc Natl Acad Sci USA.* 2012;109:E2657-2664.

Zwerling C, Ryan J, Orav E. The efficacy of preemployment drug screening for marijuana and cocaine in predicting employment outcome. *JAMA.* 1990;264(20): 2639-2643.

Most teens do not use marijuana.

II. Want to Know More? **Some FAQs About Marijuana**

What is marijuana? Are there different kinds?

Marijuana is a green, brown, or gray mixture of dried, shredded leaves, stems, seeds, and flowers of the hemp, or *Cannabis sativa*, plant. It goes by many different names—pot, herb, weed, grass—and stronger forms include sinsemilla (sin-seh-me-yah), hashish (*hash* for short), and hash oil.

How does marijuana work?

All forms of marijuana are mind altering (*psychoactive*). In other words, they change how the brain works. Marijuana contains more than 400 chemicals, including THC (*delta-9-tetrahydrocannabinol*). Since THC is the main active chemical in marijuana, the amount of THC in marijuana determines its potency, or strength, and therefore its effects. The THC content of marijuana has been increasing over the past few decades.

Mehmedic Z, Chandra S, Slade D, et al. Potency trends of Δ9-THC and other cannabinoids in confiscated cannabis preparations from 1993 to 2008. *J Forensic Sci*. 2010;55(5):1209-1217.

"I used to smoke pot until I had an anxiety attack and thought I couldn't breathe. . . I was wheezing, and I got really paranoid."

"There are a million things to do that are more fun than smoking some unknown grass. Go to the beach, go to the movies, go to the gym—you are not missing anything."

–Comments submitted to NIDA's blog for teens

Marijuana can be addictive. About 1 in 6 people who start using as teens and 25 to 50 percent of those who use it every day become addicted.

How long does marijuana stay in your body?

Organs in the body have fatty tissues that quickly absorb the THC in marijuana. In general, standard urine tests can detect traces of THC several days after use. In heavy marijuana users, however, urine tests can sometimes detect THC traces for weeks after use stops.

"I was lazy a lot. I didn't want to do things. . . I was depressed. I felt like I was always in a rut. I was always feeling bad about myself, where I was standing in life."

–from Alby's story, on his experiences as a daily marijuana smoker

Does marijuana use lead to other drugs?

Long-term studies of drug use patterns show that most high school students who use other illegal drugs have tried marijuana first. However, many young people who use marijuana do not go on to use other drugs. To explain why some do, here are a few theories:

- Exposure to marijuana may affect the brain, particularly during development, which continues into the early 20s. Effects may include changes to the brain that make other drugs more appealing. For example, animal research suggests that early exposure to marijuana makes opioid drugs (like Vicodin® or heroin) more pleasurable.
- Someone who is using marijuana is likely to be in contact with other users and sellers of other drugs, increasing the risk of being encouraged or tempted to try them.
- People at high risk of using drugs may use marijuana first because it is easy to get (like cigarettes and alcohol).

What happens if you smoke marijuana?

Some people feel nothing at all when they smoke marijuana. Others may feel relaxed or "high." Some experience sudden feelings of anxiety and paranoid thoughts (even more likely with stronger varieties of marijuana). Regular use of marijuana has also been linked to depression, anxiety, and a loss of drive or motivation, which means a loss of interest even in previously enjoyable activities. Its effects can be unpredictable, especially when mixed with other drugs.

In the short-term, marijuana can cause:

- problems with learning and memory
- distorted perception (sights, sounds, time, touch)
- poor coordination
- increased heart rate

Marijuana affects each person differently according to:

- biology (e.g., his or her genes)
- marijuana's potency
- previous experience with the drug
- how the person uses it (smoked versus ingested)
- whether alcohol or other drugs are involved

How is marijuana likely to affect you?

Learning: Marijuana's effects on attention and memory make it difficult to learn something new or do complex tasks that require focus and concentration.

Sports: Marijuana affects timing, movement, and coordination, which can harm athletic performance.

Judgment: Marijuana, like most abused substances, can alter judgment. This can lead to risky behaviors that can expose the user to sexually transmitted diseases like HIV.

What does marijuana do to the brain?

We know a lot about where marijuana acts in the brain and how it affects specific sites called cannabinoid receptors. These receptors are found in brain regions that influence learning and memory, appetite, coordination, and pleasure. That's why marijuana produces the effects it does. Research suggests that the effects on memory, learning, and intelligence can be long term and even permanent in people who begin using marijuana regularly as teens. Lost mental abilities might not fully return even if a person quits using marijuana as an adult.

So, while we do know there are differences in the brains of marijuana users versus nonusers, we don't yet know what these differences mean or how long they last—especially if someone stops using the drug. One reason is that it's hard to find people who only smoke marijuana without using alcohol, which has its own negative effects on the brain.

Marijuana affects the brain — altering memory, judgment, and coordination.

Meier MH, Caspi A, Ambler A, et al. Persistent cannabis users show neuropsychological decline from childhood to midlife. *Proc Natl Acad Sci USA*. 2012;109:E2657-2664.

How does smoking marijuana affect the lungs?

Someone who smokes marijuana regularly may have many of the same breathing and lung problems that tobacco smokers do, such as a daily cough and a greater risk of lung infections like pneumonia. As with tobacco smoke, marijuana smoke has a toxic mixture of gases and tiny particles that can harm the lungs. Although we don't yet know if marijuana causes lung cancer, many people who smoke marijuana also smoke cigarettes, which do cause cancer—and smoking marijuana can make it harder to quit cigarette smoking.

What is K2/Spice and how does it affect the brain?

K2/Spice refers to a wide variety of chemical-coated herbal mixtures that have effects similar to marijuana and that sellers advertise as both a "safe" and "legal" alternative to that drug. Neither is true. Although the labels on K2/Spice products often claim that they contain "natural" mind-altering material taken from a variety of plants, chemical analyses show that their active ingredients are man-made compounds. Although we don't yet fully know Spice's effects on the human brain, these compounds act in the same brain areas as THC. However, some chemicals in Spice—often of unknown origin—may produce more powerful and unpredictable effects, like extreme anxiety, paranoia, and hallucinations.

The chemicals in many products sold as K2/Spice are unknown. Some varieties could cause dramatically different effects than the user might expect.

Can marijuana use by the mother affect a developing fetus or newborn baby?

Doctors advise pregnant women not to use any drugs because they could harm the growing fetus. Studies suggest that children of mothers who used marijuana while pregnant may have subtle brain changes that can cause difficulties with problem-solving skills, memory, and attention. Mothers are also advised not to use marijuana while breastfeeding. Some research suggests that moderate amounts of THC are excreted into breast milk. We don't yet know how this affects a baby's developing brain.

Does marijuana produce withdrawal symptoms when someone quits using it?

Yes. The symptoms are similar in type and severity to those of nicotine withdrawal—irritability, problems sleeping, anxiety, and cravings—peaking a few days after regular marijuana use has stopped. Withdrawal symptoms can make it hard for someone to stay off marijuana.

What if a person wants to quit using marijuana?

Researchers are testing different ways to help marijuana users stay off the drug, including some medications. Current treatment programs focus on counseling and group support systems. There are also a number of programs designed especially to help teenagers.

TJONES1—JUNCTION CITY HIGH SCHOOL, OREGON:

If you're dating someone who does marijuana, does that increase your chance of doing it?

NIDA: Great question! Research shows that people who have friends who use drugs are more likely to use drugs themselves. But we don't really know why this is the case. It could be that by hanging out with drug users, you have more chances to try drugs. Certainly, you can choose not to try drugs if offered—but this can be a challenge. Another approach would be to see if your friend will stop using marijuana—for your benefit and his/hers.

–from NIDA's Chat Day

Isn't marijuana sometimes used as a medicine?

A number of states have passed laws allowing marijuana for medical use, but the Food and Drug Administration (FDA) has not approved the marijuana plant to treat any diseases. Even so, the marijuana plant contains ingredients that could have important medical uses. Currently, the FDA has approved two pill versions of THC to treat nausea in cancer chemotherapy patients and to stimulate appetite in some patients with AIDS. Also, a new product that is a chemically controlled mixture of THC and *cannabidiol* (another chemical found in the marijuana plant) is available in several countries outside the United States as a mouth spray. However, it's important to remember that because marijuana is usually smoked into the lungs and has ingredients that can vary from plant to plant, its health risks may outweigh its value as a treatment. Scientists continue to investigate safe ways that patients can use THC and other marijuana ingredients as medicine.

Scientists continue to investigate safe ways that patients can use THC and other marijuana ingredients as medicine.

III. Other Useful Resources

Here are some helpful places to go for more information:

The National Institute on Drug Abuse (NIDA)

The NIDA website **www.drugabuse.gov** has information on a variety of drugs and related topics. NIDA's teen site **www.teens.drugabuse.gov** covers a lot of ground, with free downloads, entertaining and informative videos and games, and our blog for teens, where you can leave us a comment or two. Get the scoop on how different drugs affect the brain and body, and read real stories from teens who have struggled with drug abuse and addiction.

The National Institute on Alcohol Abuse and Alcoholism (NIAAA)

The NIAAA website **www.niaaa.nih.gov** contains the latest research, news, and other resources related to alcohol. NIAAA even has a site especially for young teens called "the cool spot," **www.thecoolspot.gov**, with quizzes and other interactive resources that give you information on alcohol and resisting peer pressure.

The National Institute of Mental Health (NIMH)

To learn more about mental health disorders like depression or schizophrenia, visit the NIMH website at **www.nimh.nih.gov** and read the Director's Blog on various topics that include suicide prevention, bipolar and borderline personality disorders, coping with traumatic events, and more.

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