



HOW **NICOTINE** AFFECTS THE TEEN BRAIN

Found in both conventional cigarettes and most vaping devices, nicotine is a highly addictive drug with many health risks for teens.

First, some good news: The number of teens who smoke cigarettes today is less than half of what it was 10 years ago. This decrease is a great win for the overall health of young people, but experts are still concerned. Why? While youth cigarette use is decreasing, the number of teens who use vaping devices, or e-cigarettes,

has been increasing. Just like regular cigarettes and smokeless tobacco, most vaping devices contain **nicotine**. In fact, one cartridge of the Juul brand and some disposables like Puff Bars have as much nicotine as a whole pack of cigarettes. No matter what product it comes in, nicotine is a highly addictive drug and a serious risk.

How Addiction Happens

Our brains come with a built-in reward system. When you do anything enjoyable—like laughing—your brain releases a natural chemical called **dopamine**. In essence, dopamine says to your brain, “Hey, I like this activity. It’s worth remembering and repeating.”

Nicotine takes advantage of that same reward system. When someone inhales nicotine, the drug enters the brain and triggers a surge of dopamine. But the amount of dopamine released is much greater than that from pleasurable everyday activities like eating a favorite food. Nicotine also causes the dopamine levels to remain elevated for longer than normal. The result: The brain receives a strong signal that it really wants to vape some more. Over time, this can lead to **addiction**, a disorder that causes a person to continue taking a drug, despite negative consequences.

Long-Term Effects

Once someone has a nicotine addiction, quitting can be very difficult. One reason is that they may have **withdrawal symptoms** (such as cravings, depression, anxiety, and problems focusing and sleeping) just a few hours after they stop using nicotine. The person has a strong urge to vape again to relieve these symptoms, which makes it even harder for them to stop.

Repeated exposure to surges of dopamine from nicotine can change how the brain reacts to natural levels of dopamine. When this happens, activities a person used to like may seem less enjoyable. Nicotine can also cause long-lasting changes to the brain circuits that control memory and self-control—leading to learning issues.

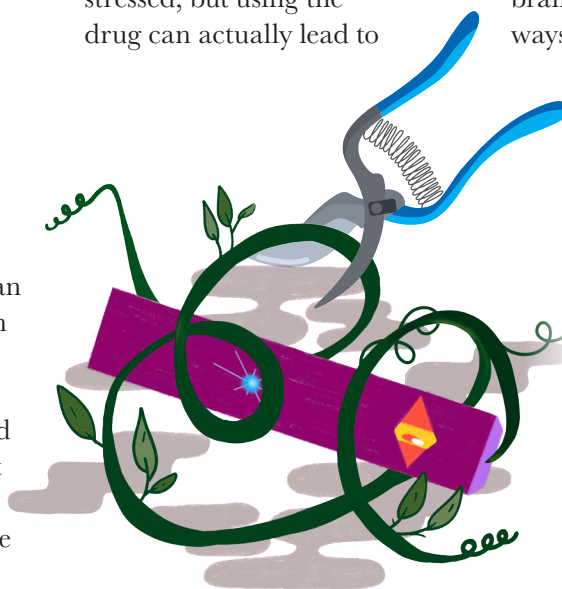
Sometimes people turn to nicotine because they’re stressed, but using the drug can actually lead to

anxiety. If a person becomes dependent on nicotine, they can experience irritability and anxiety when they are without it for too long.

Protecting Your Brain

Your young brain is still developing. In fact, it won’t fully mature until you reach your mid-twenties. That leaves teens especially vulnerable to the negative effects of nicotine, including addiction. Studies have shown that teens who use e-cigarettes are more likely to continue using nicotine as adults, and may be at greater risk of eventually smoking conventional cigarettes.

On the bright side, you have an opportunity during your teen years. If you avoid drugs like nicotine and instead take on healthy and stimulating challenges—learning to cook, playing an instrument, creating videos—you can affect your brain development in positive ways that can last a lifetime.



GETTING HELP

Visit teen.smokefree.gov/quit-vaping for teen-focused tools and tips, including:

- » More facts on nicotine risks
- » Ways to deal with stress and anxiety
- » How to quit vaping