

Your teen is underestimating the health risks of vaping

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A popular type of vaping device, called pod mods, look like USB drives and can even be charged via a laptop or USB port. Yale researchers in addiction medicine are concerned that teens may not know that they could be vaping with nicotine, a highly addictive drug. Credit: Yale University

Teens today are more reluctant to smoke cigarettes than their counterparts nearly three decades ago, according to a study released this summer. But parents should hold their collective sigh of relief. The

study, carried out by the Centers for Disease Control and Prevention (CDC), uncovered a new, troublesome trend: vaping.

Eleven percent of [high school seniors](#), 8 percent of tenth graders, and 3.5 percent of eighth graders reported vaping with nicotine in the past month, according to a national survey released from the University of Michigan late last year. The worrying part? Young people think vaping is mostly harmless.

To understand vaping, it's best to start on broad terms. To vape is to inhale vapor created from a liquid heated up inside a device. From there, things quickly get complicated. The devices have many names—vape pens, pod mods, tanks, electronic nicotine delivery devices (ENDS), e-hookahs and e-cigarettes. The liquid they contain also has many monikers—it might be called e-juice, e-liquid, cartridges, pods, or oil. Most vape liquids contain a combination of propylene glycol or glycerol—also called glycerin—as a base, and nicotine, marijuana, or flavoring chemicals to produce common or outlandish flavors, from mint to "unicorn puke." The devices rely on batteries to power heating elements made of various materials that aerosolize the liquid.

What's more, manufacturers of a specific type of vaping device, called a "pod mod," sell vape liquid made from nicotine salts found in loose-leaf tobacco instead of the traditional free-base nicotine found in most e-cigarette liquid. This may allow the user to experience a higher—and more addictive—concentration of nicotine, according to a recent article in *The New England Journal of Medicine*.

Since e-cigarettes arrived in the U.S. in 2007, they have been investigated by addiction researchers as possible cessation devices for adults trying to quit combustible, or regular, cigarettes. The Food and Drug Administration (FDA) lists 93 harmful or potentially harmful chemicals found in regular cigarettes, and the National Cancer Institute

(NCI) describes cigarettes as having more than 7,000 chemicals in them. E-cigarettes contain fewer chemicals and so the industry has presented them as a healthier alternative to regular cigarettes. But vape liquids can still contain nicotine, a highly addictive drug.

And on one point, Yale health researchers who study the health effects of vaping and e-cigs agree: Vape devices have not been proven to help adult smokers quit smoking. Moreover, vaping increases the risk a teen will smoke regular cigarettes later.

"We don't want youth to use devices and become addicted. That's my concern. The addiction to nicotine and conversion to cigarettes," says Roy S. Herbst, MD, Yale Medicine's chief of medical oncology at Yale Cancer Center. He points to two heavyweight organizations, the American Association for Cancer Research (AACR) and the American Society of Clinical Oncology (ASCO), that have issued statements that vaping could be harmful to youth.

One particular brand, called the Juul, a "pod mod" device, is worrying to addiction researchers. Juuls arrived late to the e-cigarette market in 2015, about eight years after vaping devices first began appearing in the United States. But the company, called Juul Labs, has surged ahead of competitors. In August, Juul accounted for 72 percent of the e-cig market, according to news reports. Sleek and slim, with an appearance that mirrors a flash drive, the Juul has been established among youth as the vaping tool of choice. Teens even morphed the brand into a verb—juuling—according widespread news coverage chronicling its rise. "When we ask teens about their vaping or e-cig habits, they don't even consider juuling to be part of that," says Suchitra Krishnan-Sarin, Ph.D., co-leader of the Yale Tobacco Center for Regulatory Science, one of 14 centers in the country funded by the National Institutes of Health (NIH) and the FDA to foster tobacco regulatory research.

The San Francisco-based company, and other vape manufacturers, including Vuse, MarkTen XL, blu e-cigs, and Logic, are under scrutiny by the FDA for marketing and sales practices that seem aimed at teens and young adults, according to an announcement the FDA released on September 12. "The agency is asking each company to submit to the FDA within 60 days plans describing how they will address the widespread youth access and use of their products," the news release states.

"We cannot allow a whole new generation to become addicted to nicotine," FDA Commissioner Scott Gottlieb, MD, says in the release.

While it's possible to buy liquid without nicotine for some e-cigarettes, it's not possible to do so with popular pod mod devices. According to Juul's website—in a description that has since been taken down—a single Juulpod contains 40 mg of nicotine, which is similar to "the nicotine yield of a pack of cigarettes." (The company also sells Juulpods with approximately 23 mg of nicotine.) But researchers explain that it's difficult to describe a single pod as a "serving." A person might consume one pod in a week, while another may take only one day.

A stubborn trend

When potentially risky behaviors experience an uptick in popularity, health researchers are never far behind—gathering data. This year, Krishnan-Sarin and others found a direct link between students at public schools in Connecticut who said they'd used an e-cigarette in the past month and those who went on to smoke regular cigarettes.

Krishnan-Sarin points to progress that has been made—finally—in recent years to reduce regular cigarette smoking rates among young adults. In her opinion, the significant decline is due to the success of large-scale public health campaigns and a general awareness among

youth that cigarettes are harmful to health.

She is concerned that most teens who vape with nicotine don't know the drug can be damaging to their development. "We have a lot of evidence showing that the adolescent brain is extremely sensitive to the effects of nicotine," she says, adding that the brain doesn't stop growing until around age 25. "Studies have shown us that nicotine can interfere with memory and attention processing," Krishnan-Sarin says.

In his imaging studies of adults who use e-cigarettes, Stephen Baldassarri, MD, an internist at Yale Medicine, has begun to gather information on the factors that influence nicotine delivery from e-cigarettes and whether vaping promotes cessation from conventional cigarette smoking. Teens cannot participate in such studies, but "we all agree that e-cigs are not a good thing for youth and nonsmokers," Dr. Baldassarri says.

How to talk to your kids

Probably the worst thing a parent could do for their child would be to buy an e-cigarette under the misconception that this might prevent them from smoking regular cigarettes, Krishnan-Sarin says. She encourages parents to talk openly and freely about vaping—with the caveat that they provide accurate information. "I think the problem is that parents lose credibility if they say something to try and convince their child, who then finds out that it isn't true," she says.

Dr. Baldassarri suggests explaining the addictive nature of vaping, which would mess with the one thing teens crave the most: independence. "In some ways, when you get addicted to a drug, it's like losing your freedom of choice," he says. "The risk of losing that freedom might be a persuasive message for kids."

Deepa Camenga, MD, a pediatrician who is board-certified in addiction medicine, says it's never too early to begin talking about e-cigarettes in age-appropriate language. "When you are out and about with your children and see an advertisement, for example, take the opportunity to talk about it." As they grow older, parents can expand on their thoughts and expectations. "It's also important to give teens and [young adults](#) the space to ask questions," she says.

Patrick O'Connor, MD, Yale Medicine's chief of general internal medicine, who has dedicated his career to researching opioid and alcohol drug abuse, points to similarities between epidemic cigarette use in the 1940s and 50s, and e-cigarette use now.

Even as evidence accumulated on the link between lung cancer and cigarette use, doctors didn't always take time to talk to patients about those risks, he says. "I think it's a major responsibility of physicians, family medicine doctors, pediatricians, and adolescent medicine practitioners. One of the big deficits in medical education has been to prepare medical students to address these issues with their patients, ask them about their use of these substances, and advise them on the risks," Dr. O'Connor says. "This is as true for e-cigarette use and vaping as it is for alcohol and other drug use."

What may be the most important message of all is that e-[cigarettes](#) and vaping come with many health unknowns, Dr. O'Connor adds. "You see plumes of what looks like steam coming out of people's mouths on the street when they are vaping, and I think they assume it's mostly safe, mostly water. But these liquids used in [vaping](#) are filled with all kinds of stuff [like [nicotine](#), marijuana, flavoring agents, chemicals], and we don't always know what else is in there."

More information: Jessica L. Barrington-Trimis et al. Adolescents' Use of "Pod Mod" E-Cigarettes—Urgent Concerns, *New England*

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