



# NICOTINE AND THE ESCALATING RISK OF ADDICTION FOR YOUTH

Youth e-cigarette use has risen dramatically in South Carolina in the last three years, surpassing the use of cigarettes and other tobacco products for the first time.<sup>1</sup> This is a major public health concern. Youth use of nicotine increases their risk of addiction, and can make them more susceptible to addiction to tobacco products and other substances in the future. Fortunately, there are steps that can be taken by parents, educators, and health care providers to mitigate the growing risk.

## Nicotine primes the adolescent brain for addiction.

Addiction is a form of learning, where the brain learns to connect a stimulus (for example, smoking a cigarette or e-cigarette) with a response (feelings of pleasure and calming of cravings).<sup>2</sup> Each time a new skill or memory is learned, stronger connections – or synapses – are built between brain cells. Young people build synapses faster than adults. Nicotine changes the way these synapses are formed. Youth exposed to nicotine are at higher risk for addiction than are adults because youth brains are still forming and making permanent connections.<sup>2,3,4,5</sup> Studies show that symptoms of nicotine addiction can appear among youth within only a few days or weeks after smoking initiation.<sup>6,7</sup> The use of nicotine in e-cigarettes—nearly all of which contain nicotine<sup>8,9,10</sup>—and other tobacco products primes the adolescent brain for addiction. This could have significant public health consequences, including potentially increasing the risk for youth of future addiction.<sup>2</sup>

## Youth who are exposed to nicotine are more likely to use other substances.

Receptors in the brain are stimulated by exposure to nicotine, which triggers a rewarding effect on the brain. These receptors respond to and enhance the effects of nicotine and other drugs. The more adolescents are exposed to nicotine, the greater the sense of enjoyment because the effects of nicotine and other drugs are made stronger by repeated exposure. This effect increases the likelihood that youth will develop a dependence on those drugs.<sup>3,4,11</sup> For example, studies have found that young adults who smoke cigarettes or who use e-cigarettes are much more likely to binge drink than non-smokers.<sup>11,12</sup> More recent studies have identified similar patterns between use of nicotine and use of other drugs, including marijuana, cocaine, and methamphetamines.<sup>13,14,15,16,17,18,19,20</sup>

## New e-cigarette technologies pose greater risks for youth.

Popular e-cigarettes like JUUL have developed new technologies utilizing nicotine salts that are absorbed into the body more effectively and come in record-high levels of nicotine. According to the manufacturer, a single JUUL pod contains as much nicotine as a pack of 20 regular cigarettes.<sup>21</sup> E-cigarettes like JUUL come in a wide variety of fruit and other flavors that appeal to youth. They are also easily hidden, have limited odor, and emit aerosol that disappears quickly enabling youth to use them in public places where cigarette use is prohibited.

## Youth who use e-cigarette (vapes, JUUL) are more likely to smoke cigarettes.

Use of e-cigarette could lead to future cigarette smoking among youth who have never smoked cigarette. In fact, multiple research studies have demonstrated that e-cigarette users are twice as likely to smoke cigarette in the future.<sup>5</sup> In addition, the younger someone is when they start using e-cigarette, the more likely they are to smoke cigarettes later.<sup>5,14,22,23,24,25,26,27,28</sup> Youth hold many misconceptions around the danger of e-cigarettes. Many youth incorrectly perceive that e-cigarettes are not addictive and are easier to quit compared to cigarettes. These perceptions are more common among youth who use e-cigarettes. These misconceptions reinforce the need to increase awareness and education around the dangerous consequences of youth nicotine use.<sup>12,29,30,31</sup>

## Opportunities for Action

Given the danger of youth nicotine use, it is important for parents, educators, and health care providers to be aware and take action.

### Parents

- Talk to your kids about the risks of using e-cigarettes.
- Ask about e-cigarette use as it can indicate risk for use of cigarettes and other addictive substances (e.g., alcohol, marijuana, and other illicit drugs).
- Be aware of the risks of nicotine and the different products kids are using. Know that e-cigarettes almost always contain nicotine.

## Health Care Providers

- Talk to your young patients about the risks of e-cigarette use.
- Ask about use of e-cigarettes, as it can indicate risk for use of cigarettes and other substances (e.g., alcohol, marijuana, and other illicit drugs). Also ask about use of conventional cigarettes, alcohol, marijuana, and other substance use.
- If your patient reports using e-cigarettes, provide education about nicotine including harms to the brain from nicotine exposure, and that nicotine in any form (smoked or vaped) can be addictive.
- Screen parents for use of all tobacco products, encourage cessation, and refer patients to cessation services (e.g., in-person counseling and/or quitline).

## School Staff

- Partner with local public health for information on risks of nicotine addiction, and the use of e-cigarette and other tobacco products. Beware of outreach from e-cigarette manufacturers offering assistance with educating students about nicotine addiction.
- Educate students and staff that nicotine is highly addictive.
- Educate students, staff, and parents that e-cigarettes and vapes almost always contain nicotine.
- Educate teachers and parents on the harms of nicotine exposure, including impact to brain development and risks for engaging in other high-risk activities like use of cigarettes, alcohol, marijuana, and other illicit substances.
- Enforce existing tobacco-free school policies prohibiting the use of tobacco and alternative nicotine products such as e-cigarettes and vapes.

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