

**Do Vaping Products Have Adverse Effects on Youth?**

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## **Do Vaping Products Have Adverse Health Effects on Youth?**

The adverse side effects of vaping are proving themselves a danger to physical and developmental health in youth. In this article, the contents of electronic nicotine delivery systems will be explained. The harmful marketing of vaping products, reasons for high addiction rates, an analysis of pathological findings of EVALI (E-Cigarette or Vaping product Associated Lung Injury) and how it relates to adolescents will all be presented. Vaping products have adverse effects for youth and young adults such as high rates of addiction exacerbated by youth targeted advertising, impairments on cognitive development due to higher rates of nicotine in vaping products and fostering potentially fatal acute respiratory illnesses (Becker & Rice 2021).

“Electronic nicotine delivery systems which contain a battery, an atomizer (or heating element), and a reservoir for e-liquid in the form of cartridges, tanks, or pods, deliver an aerosol (usually containing nicotine) to the user through the lungs” (Wold et al., 2022). The aerosols that are inhaled by the user contain many harmful ingredients, some of which are considered carcinogens, dozens of which are not found in traditional cigarettes (Marques, Piqueras & Sanz, 2021). These chemicals include but are not limited to acetaldehyde, formaldehyde, acetamide, silicate particles, vitamin e acetate and metal particles including copper, nickel, and silver (Marques, Piqueras & Sanz, 2021). These ingredients inhaled on their own are harmful to a person’s physical health, which means that even nicotine free vaping products can still be detrimental (Marques, Piqueras & Sanz, 2021).

The tobacco industry funds research claiming that nicotine and non-nicotine vaping products are a less harmful alternative to traditional combustible cigarettes, that vaping can be utilized as a smoking cessation aid and that non-nicotine vaping products pose no threat of addiction (Tsai et al, 2020). These claims come with serious consequences: One study concluded

that 1 in 3 teenagers in the U.S believe that vaping is a safe alternative to combustible cigarettes (Tobore, 2019), another study found that 63% of its youth participants didn't realize that some vaping products have nicotine in them (Jones & Salzman, 2020) and in a third study 40% of adolescents who claimed that they only vaped non-nicotine products were found to have nicotine in their urinary samples (Becker & Rice, 2022). Dr. Kristen Jones & Dr. Gary Salzman, who are a Pediatric Physician and Professor of Medicine respectively (2020) say that this is exacerbated further by the fact that most marketing for vaping products is heavily targeted, especially through social media, at teens and young adults. Pods for vaping devices “come in fun packaging and the different pods are flavoured to be attractive to adolescents, with everything from mint to gummy bear to frosted sugar cookie” (Jones & Salzman, 2020). Flavouring has been cited by numerous studies as being a major deciding factor for a teenager trying a vape product (Jones & Salzman, 2020).

A major reason for teenage nicotine addiction by use of vaping products is that most teens are unaware that nicotine-based pods for vaping devices have a higher concentration of nicotine than traditional cigarettes (Jones & Salzman, 2020). For example, JUUL pods, which are the most widely used brand by teens in North America, “contain 5% or 59mg/ml of nicotine” which is comparable to 20 combustible cigarettes (Jones & Salzman, 2020). Another point of contention is the fact that vaping is sometimes marketed as harmless because of non-nicotine vaping products, therefore, teenagers who were previously not at risk for trying nicotine via cigarettes are now trying it via vape products (Jayakumar et al, 2020). The consequences of lack of awareness about vaping products and the marketing tactics used are as Dr. Timothy Becker and Dr. Timothy Rice, both of whom are psychiatrists specializing in pediatrics, stated in 2021; “a new generation is becoming addicted to nicotine.” In a cross-sectional survey that was

administered “in 2019 which included 19, 018 participants who were in grades 6 to 12 respectively, the prevalence of self-reported current e-cigarette use was 27.5% among high school students and 10.5% among middle school students” (Cullen et al, 2019).

What makes higher rates of nicotine addiction among youth a cause for concern is that nicotine has been proven to affect brain development in people ages 25 and younger (Jones & Salzman, 2020). Exposure to nicotine in developing brains “has been linked with cognitive deficits and impairment in memory and executive function” (Jones & Salzman, 2020). Another study on the effects of smoking and vaping on adolescents concluded that they were at higher risk for suicide attempts, physical confrontations, alcohol/marijuana/illicit drug use and reckless behaviour compared to non-vaping teens (Jones & Salzman, 2020).

Perhaps the most alarming consequence of vaping among youth is EVALI or “E-Cigarette, or Vaping Product Associated Lung Injury” (Belok et al, 2020). According to the Centre for Disease Control (2020) EVALI began as an outbreak in 2019 and by 2020, 2,688 hospitalized cases and 68 deaths were reported from 29 of the American states, however, more cases are suspected. 62% of these cases were people between the ages of 18 and 34, and 20% were under the age of 18. (CDC, 2020). Most of these cases also had no previous pulmonary issues or history of smoking (King et al, 2020). Most youth patients of EVALI admitted that they obtained their vaping products through online delivery systems that don’t require age verification and from non-regulated sources, such as friends, peers, family and illicit dealers that sometimes sell homemade e-liquids (King et al, 2020).

EVALI usually presents with the following symptoms: pneumonia like illness, progressive dyspnea (difficult breathing), tachypnea (rapid breathing) and/or worsening hypoxemia (poor oxygen saturation in the blood) (Belok et al, 2020). If the person presenting

with these symptoms has vaped in the last 90 days, Dr. Samuel Belok et al (2020) says that “EVALI should be suspected.” Some of the more serious conditions of EVALI include acute fibrinous pneumonitis, organizing pneumonia and diffuse alveolar damage, all of which are severe forms of pneumonia that usually require mechanical ventilation due to severe hypoxemia (Belok et al, 2020). Once a person with these conditions requires a ventilator, mortality rate becomes 43% - 50% (Belok et al, 2020). These injuries are mainly caused by Vitamin E Acetate which is used as a thickener in most e-liquids, experts believe there may be other chemicals and compounds also responsible, but evidence is limited (King et al, 2020). “When heated Vitamin E Acetate generates ketene, a highly reactive compound that acts as a lung irritant” (Belok et al, 2020). Hanjun Lee (2020), a computational biologist, says “Vitamin E Acetate can alter lung surfactant function” which is the lungs ability to not collapse at the end of respiration. Alteration of the surfactant function due to vaping has also resulted in pneumothorax (collapsed lung) in cases where there were no previous pulmonary diseases, the patient was relatively healthy and was 24 years of age or younger (Wieckowska, 2021).

Vaping among youth is a continuing public health concern (Becker & Rice, 2021), with 5.2 million American adolescents reporting current use as of 2020 (King et al, 2020). The advertising for vaping, which is mainly targeted at youth and young adults, is working (Jones & Salzman, 2020); more teens and young adults are addicted to nicotine than past decades thanks to vaping (Becker & Rice, 2021). Regular nicotine exposure before the age of 25 has been proven to cause impairments on cognitive development (Jones & Salzman, 2020), couple this with the fact that the most severe health effects of vaping, such as EVALI, are being seen among vaping’s youngest participants (King et al, 2020), and it’s easy to see why experts are calling vaping among youth a fast-growing epidemic (King et al, 2020).

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