



Hibbs Brief

Hibbs Institute for Business & Economic Research

The New Adolescent Epidemic: Vaping and the Electronic Cigarette

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In this issue of the [Hibbs Brief](#), we discuss some health issues regarding what is considered the new pandemic among adolescents – the electronic cigarette.

The Electronic Cigarette

Electronic cigarettes, or e-cigarettes, are battery-operated devices that produce an inhalable aerosol by heating a liquid, which is typically flavored and frequently contains nicotine. They come in many shapes and sizes. Some look like regular cigarettes, pipes or cigars. Some resemble USB sticks, pens or other common items, while others such as tanks or “mods” are larger (See [Figure 1](#)).¹ Originally, they were introduced into the market in 2007, as an adjunct method to quit smoking.² Similar to patches, gums and other options, e-cigarettes were intended to help smoking patients

by gradually reducing the amount of nicotine administered to the body, which would make it easier to quit completely.³

While the initial intention behind the creation of e-cigarettes was to assist in quitting tobacco smoking, there is currently no definitive evidence to substantiate this notion.³ In fact, there is evidence that many smokers are now dual users. Instead of using e-cigarettes to quit smoking, they are using both e-cigarettes and regular cigarettes.⁴ Vaping (a verb associated with e-cigarette use) was once marketed as a healthier choice than smoking, but, in practice, the nicotine amounts are often higher. For instance, the JUUL e-cigarette, one of the most common brands, has a pod with liquid containing 59mg of nicotine, which is equivalent to smoking close to 20 combustible cigarettes (an entire pack).⁵ One pod provides approximately 200 puffs.⁶

Figure 1. Examples of E-Cigarette Appearance



Source: Centers for Disease Control and Prevention (CDC).

The Usage

The consumption of standard cigarettes among adolescents has decreased in the past several years. This is perhaps a result of exhaustive work done by physicians, lawmakers and

advocacy groups who have promoted the development of new regulations and educative programs which discourage smoking. According to a national survey, 71.1% of teens in high school tried smoking in 1991 (at least one or two puffs). This number decreased to 63.9% in 2001, 44.7% in 2011, and

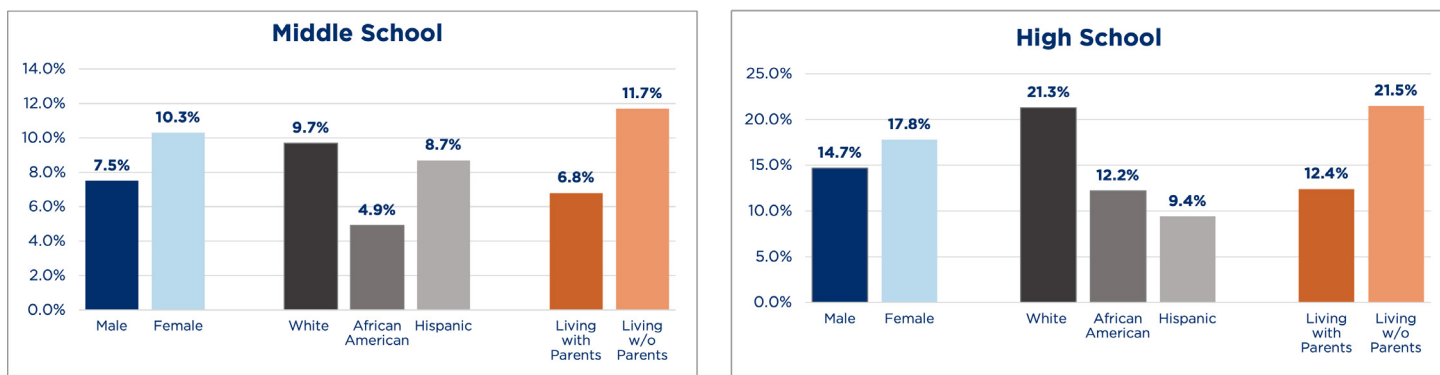
24.1% in 2019 (the latest date available).⁷ However, the use of e-cigarettes has shown a drastic increase among youth in recent years. Adolescents were the fastest-growing group of e-cigarette users in the past decade.⁸ Notably, the Centers for Disease Control and Prevention (CDC) has declared that the e-cigarette surge erased the progress made in tobacco use prevention among adolescents.⁹

E-cigarettes were promoted as a cleaner and safer substitute for combustible products such as cigars, cigarettes, and pipes. Their use was propagated massively among adolescents in the United States within a few years. The U.S. Food and Drug Administration (FDA) estimated total e-cigarette users increased by 10% between 2017 and 2018, which was equivalent to about 1.3 million teenagers. By December 2018, the U.S. Surgeon General officially declared the use of e-cigarettes among adolescents an epidemic.⁹ Furthermore, the FDA estimates that more than 2.5 million high and middle school students currently use e-cigarettes: 2.14 million high school students (14%), and 380,000 middle school students (3.3%).¹⁰

East Texas was not immune to this epidemic. The most recent numbers on e-cigarette use among adolescents indicate that 5.8% of middle school students surveyed have used e-cigarettes in the past month; 9.0% vaped during the past academic year. Correspondingly, 12.1% of high school students surveyed have used e-cigarettes in the past month; 16.3% of high schoolers vaped during the past academic year.¹¹

The results from the survey showed differences in the use of e-cigarettes by gender, race/ethnicity and whether the adolescent's parents live at home (Figure 2). Generally, female usage is higher than male for both middle and high school students. On average, White students are more prone to use e-cigarettes (in both middle and high school). Additionally, Hispanic students show higher numbers than African Americans in middle school, while African-American students depicted higher usage during high school. Students who live without their parents also show considerably higher usage levels for both surveyed groups (middle and high school students).¹¹

Figure 2. E-Cigarette Use in Middle and High School During the Past School Year (Gender, Race/Ethnic Group, and Living with Parents)



Source: Texas Health and Human Services Commission, Region 4; Texas School Survey of Drug and Alcohol Use, 2022.

The Damage

Although e-cigarettes were initially promoted as a healthier choice than smoking, they often contain higher amounts of nicotine. This higher amount of nicotine compounds can reduce prefrontal cortex activity and negatively impact memory and concentration among adolescents. E-cigarettes can also increase cardiac adrenaline levels and consequently develop into cardiac disease in later years.¹²

Perhaps the greatest danger associated with vaping is the toxicity of the inhaled vapor. The basic ingredients of e-liquids (about 7,700 different flavors in the market) are propylene glycol and vegetable glycerin, which are highly toxic when inhaled. Furthermore, some of the flavoring chemicals contain an agent called cinnamaldehyde, which can harm lung function in bronchial cells, as well as formaldehyde, a known carcinogen.

Harmful effects, such as a change in lung tissue, was found in biopsies conducted on chronic e-cigarette users due to small residual particles deposited deep in the lungs after several years of use.¹²

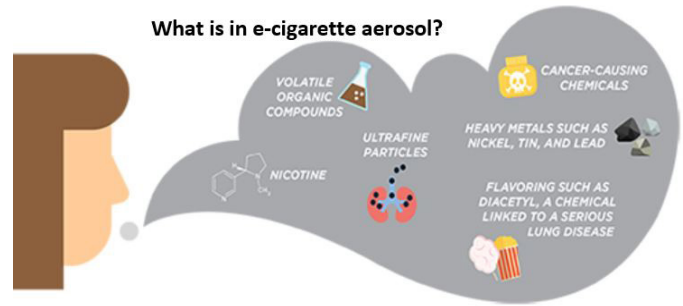
Another consequence of vaping is developing *bronchiolitis obliterans* (popcorn lung). In essence, this is a serious and irreversible scarring of the bronchioles that occurs after vaping diacetyl, a chemical found in flavors such as maple, vanilla and coconut.⁶ In addition to the liquid component, the heating coil can also cause severe damage to lung tissue via the release of toxic metal vapors (lead, manganese, nickel, and chromium).¹² While the health effects of e-cigarettes have harmful outcomes, the consequences are not just physical. Some research has found that electronic cigarettes can also be associated with increased impulsivity and hyperactivity. A study found that teen populations who vaped have higher



Source: Centers for Disease Control and Prevention (CDC).

risks of physical fighting, attempting suicide, and using alcohol or marijuana.²

Many vaping devices can also be used to inhale cannabinoids (the chemical substance in marijuana). A study demonstrated that adolescents who use nicotine liquid in e-cigarettes were 3.6 to 4 times more likely to use marijuana in the next two years.² Marijuana oil is increasingly being used in electronic vaping devices. More than 12% of high school students and 4.5% of middle school students have vaped marijuana.⁶



Source: Centers for Disease Control and Prevention (CDC).

More than 2,600 cases of e-cigarette or vaping products were associated with lung injury in 2020. Sixty of those cases ended in deaths.⁸

The main reason for the increasing spread of this epidemic is the lack of information. If many adolescents and young adults who are vaping today were informed of the dangers of the e-cigarette, they would likely quit using e-cigarette. Please share this information with others so we can help prevent the spread of this continuing epidemic.

¹ Centers for Disease Control and Prevention (CDC), "About Electronic Cigarettes (E-Cigarettes)" https://www.cdc.gov/tobacco/basic_information/e-cigarettes/about-e-cigarettes.html

² Jones, K and Salzman, GA. (2020). The Vaping Epidemic in Adolescents. Missouri Medicine, 56-58.

³ Caraballo RS, Shafer PR, Patel D, Davis KC, and McAfee TA. (2017). Quit Methods Used by US Adult Cigarette Smokers, 2014–2016. Preventing Chronic Disease, 1-5.

⁴ Centers for Disease Control and Prevention (CDC), "Dual Use of Tobacco Products." <https://www.cdc.gov/tobacco/campaign/tips/diseases/dual-tobacco-use.html>

⁵ Morean ME, Bold KW, Kong G, Gueorguieva R, Camenga DR, Simon P, Jackson A, Cavallo DA, and Krishnan-Sarin S. (2019). Adolescents' awareness of the nicotine strength and e-cigarette status of JUUL e-cigarettes. Drug and Alcohol Dependence, 1-5.

⁶ Selekman J. (2019). Vaping: It's All a Smokescreen. Pediatric Nursing, 12-15,35.

⁷ Centers for Disease Control and Prevention (CDC). (2020). Youth Risk Behavior Survey: Data User's Guide. Youth Risk Behavior Surveillance System; editions 1991, 2001, 2011, and 2019.

⁸ Messina MD, Levin TL, Conrad, LA, and Bidiwala A. (2020). Vaping associated lung injury: A potentially life-threatening epidemic in U.S. youth. Pediatric Pulmonology, 1705-1711.

⁹ Farzal Z, Perry MF, Yarbrough WG, and Kimple AJ. (2019). The Adolescent Vaping Epidemic in the United States—How It Happened and Where We Go From Here. JAMA Otolaryngology–Head & Neck Surgery, 1-2.

¹⁰ U.S. Food and Drug Administration (FDA), "Results from Annual National Youth Tobacco Survey." <https://www.fda.gov/tobacco-products/youth-and-tobacco/results-annual-national-youth-tobacco-survey#2022%20Findings>

¹¹ The Department of Public Service and Administration at Texas A&M University. (2022). Texas School Survey of Drug and Alcohol Use, 2022. Texas Health and Human Services Commission, Region 4.

¹² Medscape Pulmonary Medicine; J. Watson (2018). "In a Haze About e-Cigarettes? 5 Things to Know." https://www.medscape.com/viewarticle/899866_5

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