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The Effects of Vaping

How could something so small and what looks like a USB drive cause any harm? It's a common misconception that vaping is a safer alternative to traditional cigarettes, but that couldn't be further from the truth. Numerous experts take issue with it and have voiced their dissent. Ongoing investigations, studies, and experiments have revealed that certain lung diseases and sometimes fatal outcomes have been linked to vaping. Regular vaping can pose serious risks and effects, even for those who live a healthy lifestyle. The younger generation is being targeted with fun flavors and enticing packaging. I have seen too many students, as young as 6th graders, pick up this bad habit. Coaches are worried about what the effects are doing to their athletes' bodies and performance. Before you inhale any substance, you should understand what is in it and what it does to your body. Teens and adults are unaware that the side effects of vaping are causing more harm than good and are not safer than traditional cigarettes.

Vaping has only been around for less than 20 years. Hon Lik, a Chinese pharmacist, secured the first patent for an electronic cigarette in the year 2003. An e-cigarette is designed to let users simulate the act of smoking a cigarette without actually inhaling carcinogenic smoke. The e-cigarette uses a liquid solution containing nicotine, which is converted to vapor and inhaled. Electronic cigarettes reached the United States after seeing success in China and Europe. In one year, the annual sale of e-cigarettes in the United States totaled about 20 million dollars. The first concern about vaping happened in 2014 when the World Health Organization (WHO)

issued a statement expressing concern about the rise of the vaping industry. The statement asserts that more information is needed about e-cigarettes before they can be deemed safe for public use. In that next year, two major U.S. cancer research organizations issued a joint statement arguing that the federal government should fund further research into vaping products and regulate them more strictly. That same year, Juul Labs began selling its Juul e-cigarette. This device with its catchy name, high nicotine content, and sleek flash drive-inspired design, was blamed by some for the rise of vaping among teenagers. In December 2016, a U.S. surgeon general, Vivek Murthy, issued the federal government's first comprehensive report evaluating the risks associated with e-cigarettes ("Chronology: Key Events in History of Vaping"). This report found that e-cigarettes pose a health threat to youth, with the potential for altered brain development, respiratory damage, and nicotine addiction that leads to the use of traditional cigarettes yet teens and young adults are still vaping.

In 2018, there was a growing concern among public health officials about reports of youth vaping skyrocketing. The FDA then began national enforcement against e-cigarette retailers to combat suspected sales to minors. That same year, a 38-year-old Florida man died after his e-cigarette exploded, sending projectiles into his head and causing a small fire in his home. San Francisco bans the sale of flavored tobacco products and vaping devices. They became the first city to outlaw the sale of e-cigarettes and other vaping products. Not until 2019 did the Illinois Department of Health report that an e-cigarette user died from a lung illness likely related to vaping. Health officials and the CDC investigated nearly 200 cases of lung disease with possible connections to vaping. Other states issued bans on the sale of flavored vaping products in response to vaping-related illnesses. Walmart, Walgreens, and Kroger remove e-cigarettes from their store shelves. In November 2019, the American Medical Association

called for a total, nationwide ban on vaping devices unless they receive special approval from the FDA as smoking cessation tools, akin to nicotine gum or patches. The FDA in 2020 moved to prevent sales of pod-based vaping devices, such as Juul, in all flavors except menthol and tobacco. The CDC announced that more than 2,600 people have been sickened, and at least 60 killed, since the epidemic of vaping-related lung illnesses began in June 2019 (“Chronology: Key Events in History of Vaping”). Today, there are numerous reports and investigations taking place regarding the safety of vaping products.

Since the introduction of vaping, e-cigarette usage among youth has become increasingly widespread. Adolescents are vulnerable to the risks of e-cigarettes. They are targeted as new consumers with advertisements and flavoring compounds and are not utilizing them as a means to smoking cessation (Leventhal et al., par. 1). According to an experiment, non-tobacco flavors may increase the appeal of e-cigarette products among young adult dual users. Additionally, these flavors may disproportionately suppress nicotine's appeal-reducing effects in those who use e-cigarettes for purposes other than smoking cessation. It started as a trend and skyrocketed.

Does our youth know the compounds of a vape or the risks associated? E-cigarettes and vapes heat a solution containing a psychoactive compound, most commonly nicotine or tetrahydrocannabinol (THC), along with flavorings and other additives to a vapor, which users inhale and what makes them so toxic. The pulmonary risks of vaping are rapidly emerging including vaping-associated lung injury. More recent studies are showing extrapulmonary effects including cardiovascular, immunologic neuro-developmental effects. These effects are likely to be dose-dependent (Overbeek et al.).

The effects are caused by the components present in these vapes. The liquid added to e-cigarettes to be vaporized contains three major ingredients: psychoactive agents, solvents, and

flavoring compounds, which all have potential health risks, alone or in combination. The most common ingredient in e-liquids is nicotine. Nicotine is a naturally occurring alkaloid that is highly addictive and has been consumed by humans for hundreds of years. Nicotine freebase is the unprotonated form, often called “pure nicotine,” and can be easily vaporized by heat for absorption through the lungs. High concentrations of nicotine freebase are unpleasant to consume, leading to the development of an alternative formulation, nicotine salt. This nicotine is in its protonated state, complexed with an acid primarily benzoic acid. This crystal is then dissolved in the vaping fluid. The acid allows e-liquid formulation to contain far higher nicotine concentrations. Alternatively, e-liquids can contain THC, with a wide variety of THC concentrations and formulations (Overbeek et al.). Once you have developed this dependence, it is tough to quit.

One reason why students or adolescents may choose to vape is because the harmful effects on their bodies are not visible. People with lung disease often experience symptoms gradually, including breathing difficulty, shortness of breath, and chest pain before being hospitalized, according to the CDC. In an academic article, Olivia Belanger writes on an investigation Conant high schoolers performed on the potential health risks associated with vaping in response to thousands of vaping-associated lung injuries. For this investigation, the anatomy and physiology class exposed pig lungs and stomachs to common vaping ingredients approved by the U.S. Food and Drug Administration and compared the results to control organs. The vaping ingredients used in the experiment were vitamin E acetate, propylene glycol, vegetable glycerin, and benzoic acid dissolved in propylene glycol. The students used different ingredients at varied percentages to spray over each lung and stomach between three and five days, while water was sprayed over the controlled lung and stomach. The students reported that

the experimental lungs turned black and deteriorated, regardless of the FDA-approved ingredient they were exposed to. The students found that when benzoic acid was used, black patches and discoloration on the lung appeared within only five minutes, and for the propylene glycol group, nearly the entire lung turned black. Hannah Lambert, a student in the class, stated, I feel like our school has an issue with vaping. I know that people are caught in the bathroom vaping or out in the parking lot, so getting the message out, maybe they'll see the result and not do it anymore" (Belanger). These conclusions, which Belanger discusses in the article, add weight to the argument that vaping is a big problem and people are unaware of the serious health risks vaping produces.

Certain e-cigarettes allow you to vape without nicotine which some might perceive as a safer alternative. A study from the University of Pennsylvania finds that vaping without nicotine still harms blood vessels. Wehrli, a professor of radiologic science and biophysics at Penn's Perelman School of Medicine, states, "Yet just as e-cigarettes with nicotine are not a harmless alternative to cigarettes, e-cigarettes without nicotine seem to pose risks. Some nonsmokers, including youths, also have tried nicotine-free vaping – a bad idea" (par. 7). In other words, just because it doesn't have nicotine in it, doesn't make it automatically safe. Researchers found that the kind of damage associated with developing atherosclerosis is the hardening of the arteries.

The study consisted of 31 participants who had never smoked or vaped with an average age of 24. They each took 16 puffs from a vaping device, lasting three seconds at a time. Researchers measured the participants' blood-vessel function before and after vaping. They restricted blood flow by placing a cuff on each person's right thigh for five minutes, then used MRIs to gauge how well their blood vessels recovered. The scans revealed a 34 percent reduction in how much the participants' femoral arteries dilated when the cuff was removed

when compared to the same measurement before vaping. A 17.5 percent reduction was also measured in peak blood-flow velocity after vaping and a 20 percent drop in the oxygen levels of participants' leg veins. Alessandra Caporale, a post-doctoral researcher, explained, "Some of the damage may be due to the specific chemistry of the substances involved, whereas some harm may be due to the fact that the particles, regardless of type, are so small. "They can go deep into your lungs" (Avril par. 12-13). In other words, the damage may be from the size of the particle instead of the ingredients in the vape, and it's not natural for particles to go that deep into the lungs. Neal L. Benowitz noted that their study involved just one type of device and the findings should not be generalized to reflect all e-cigarettes. Devices that operate at higher temperatures may be riskier. Benowitz stated, the hotter it is, the more thermal degradation products you generate. Lower-temperature devices and none that contain the tar that is found in cigarettes, likewise, would presumably be safer (Avril par. 15-16). Students and others should be cautious and understand the risks associated with or without nicotine while vaping.

Although vaping comes with risks, problems have decreased since the rise of e-cigarettes. Binge drinking and the use of opioids have decreased since e-cigarettes have become so popular among teens. In an academic article Bennett Leckrone states, "Despite the rise in vaping, teen use of alcohol and opioids has dropped off, according to the report. Only 17.5 percent of high school seniors said they have been drunk within the last 30 days - down significantly from five years ago when it was at 26 percent" (par. 10). In other words, teens aren't binge drinking or using opioids because they are satisfied with the feeling a vape brings. This may seem like progress, but George F. Koob, director of the National Institute on Alcohol Abuse and Alcoholism, states, "The new data, however, underscore that far too many young people continue to drink at a time in their lives when their brains and bodies are quite vulnerable to

alcohol-related harms” (par. 12). What Koob is trying to say is that underage teens still drink at a time where their brains and bodies are vulnerable to alcohol-related injuries. Unlike alcohol, vapes are a path to addiction and FDA Commissioner Scott Gottlieb states that this must end (par. 18). James Jarvis, President of the Ohio Vapor Trade Association, explained that if Gottlieb eliminated the flavor part from the industry, it would kill every vape shop in the United States. The problem is youth access. Teenagers aren’t getting their vapes from the shops. This should be a concern not just for health officials, but for communities, teachers, coaches, or parents.

Vaping was once considered trendy and cool, but it should not be viewed as such. Teens don’t see these risks or what they can do to them in the future. It is unfair that there wasn't enough information available about the effects of e-cigarettes at the time. Teenagers assumed vaping was safe because of how popular it was. An article in the Canadian Medical Association Journal written by six doctors highlights how dangerous vaping can be. The doctors treated a 17-year-old boy who went from being in perfect health to being on life support after just five months of regularly using e-cigarettes. His respiratory condition differed from the kinds typically seen in the growing number of confirmed vaping-related cases that were documented in the United States. The teen started receiving medical attention with his only symptom being a serious persistent cough which only got worse. He continued to deteriorate over time, eventually being placed on a ventilator. Dr. Teresa Martinu said the boy’s case also differed from past cases by having relatively high oxygen levels in his body. The inflammation in his small airways left him unable to clear carbon dioxide from his bloodstream, she said (McQuigge). His condition resembled “popcorn lung” due to its prevalence among factory workers producing microwave popcorn. Their conditions are believed to be caused by regular inhalation of diacetyl, a butter-flavored chemical deemed safe to ingest, not inhale. Diacetyl is present in several

flavoring agents used in vaping devices. The teen faced the prospect of a double-lung transplant which has a survival rate of five to six years after the surgery. Luckily the teen responded to extensive steroid treatment and was eventually discharged. The teen continued to recover at home but did not gain full breathing function even months after he was discharged from the hospital (McQuigge). Dr. Simon Landman states, “Avoid it if you can. We’re still trying to find the full long-term consequences, but it doesn’t appear to be safe at this time” (McQuigge, par. 29). Doctors see every day what we can’t, which is what vapes are doing to our bodies. You should be very cautious when deciding to vape. Just know that even if you are healthy, you could still end up in a hospital or worse.

Doctors and medical officials aren’t the only ones worried about what effects vapes are producing. Edwardsville ice hockey coach, Jason Walker, has a simple message for teens who are vaping or those who are thinking about trying it. Walker stated, “If you’re thinking about experimenting with vaping, don’t do it. If you’re already vaping, stop now (Marion para. 2-3).” EHS boys track and field coach Chad Lakatos expresses, “If you’re exerting your body in track and field or other sports like football and basketball where you do a lot of sprinting or running, you’re going to see the effects on the kids’ performance. It doesn’t take long to see if a kid is having trouble breathing (Marion para. 8).” Keeping your body healthy is important for any activity that requires any type of exercise, especially sports. If you want to pursue sports beyond high school, vaping can harm your body and prevent you from achieving your full potential. Marion argues that coaches are concerned that e-cigarettes remain too tempting and too readily available to teens, including athletes. Also, e-cigarettes are easier to conceal than conventional cigarettes. They can look like USB flash drives, pens, and other common items.

Students, athletes, and teens need to learn how to deal with peer pressure. Battas explains, “I don’t think they’re scared of the consequences of the health issues. Young people live day to day for the most part and they’re not thinking about their health like they will be when they’re 50 or 60. You just hope you build them up with self-esteem that they can say no to doing things they don’t believe in (Marion para. 29).” In other words, Battas knows we have all been in a similar situation before, but we should learn from our mistakes and teach the younger generation how to deal with these types of situations to help better their future.

I have seen kids as young as 6th graders vaping in the bathroom. This is a problem in the whole high school and junior high building with kids holding up stalls because they are vaping. If kids don’t have self-control and feel the need to vape in school, that should be a red flag. There are now studies, experiments, and reports that prove what e-cigarettes are doing to your lungs and body. Doctors, health departments, officials, coaches, teachers, and fellow students see the short-term effects and are urging people to stop. Long-term effects need to be further researched, but if people keep vaping regularly, we will find out.

Teens and adults need to understand that vaping is not a safer alternative to cigarettes because of the negative effects it has on your body. Vaping has caused numerous negative effects in the United States, such as EVALI, lung disease, weakened performance, addiction, dependence, respiratory distress, and even death. It also affects the cardiovascular, immunologic, and neuro-developmental systems, and can lead to hospitalization and pulmonary injury. Additionally, it is associated with "popcorn lung" and atherosclerosis. Teenagers need to be better informed of the effects and risks associated with vaping. We must find ways to connect with teens to help them understand. Preventing primary use in teens and young adults is the most important step that can be taken to reduce the long-term complications of nicotine exposure.

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