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### The Deceptive Allure of Electronic Cigarettes

Vaping has had its reputation tarnished in front of the public eye in recent times. It recently spiked in usage as a healthier alternative to combustible cigarettes. As a whole, it should be noted that electronic cigarette companies should be allowed to market their products as safer than conventional cigarettes when used in a responsible and safe manner. There are thousands of chemicals and toxins present within combustible cigarettes (CCs) that can't be found within e-cigarettes (ECs) due to the mechanics behind how an EC works (Benowitz 2). "Tobacco is the leading cause of preventable cancers...Tobacco consumption alone accounts for nearly 5.4 million deaths per year and one billion people may die in this century if global tobacco consumption remained at the current levels" (Mishra). However, being deemed safer than CCs does not necessarily mean that a substance is "safe" to use. The recent scrutiny on vaping came in light of the epidemic of teens and youth using this product at an exponentially growing rate. The discrete nature of this product combined with previously gross un-regulation of its use caused a giant spike in its consumption by young people. All of these factors then beg the question: Is vaping a safe and effective path for smoking cessation? This question considers just how much safer ECs are than conventional cigarettes. The answer to this is much more nuanced,



because the exact health implications of electronic cigarettes are incredibly variable based on the exact EC used and also how it is being used. This factor is then coupled with how effective vaping is at allowing smokers to stop using combustible cigarettes.

#### Impact On Your Heart

The most prevalent health factor discussed with vaping and cigarettes is how it affects one's cardiovascular health. In a journal written by Professor Neal Benowitz and Joseph Fraiman, the specific health implications surrounding both CCs and ECs in regards to heart health were discussed in depth. An electronic cigarette essentially is composed of a cartridge filled with vegetable glycerin containing nicotine, a battery, and heating coils. When the user inhales from the mouth of the device, the battery is activated and heats up the coils, which begins to evaporate the glycerin into a smokeless vapor taken in by the user (Benowitz 2). This process is important to understand in order to begin discussing possible health effects of the EC.

The most glaring issue present within this process is the use of vegetable glycerin, because when evaporated it can generate acrolein and formaldehyde (Benowitz 2). These substances are well correlated to cardiovascular disease. However, e-cigarettes produce a generally produce a less amount of acrolein when compared to conventional cigarettes. Professor Benowitz writes "...at low battery voltages, aldehyde emissions are relatively low compared with those generated by cigarettes; however, at high battery voltages, emissions are closer to and could even exceed those generated by cigarettes"(Benowitz 3). As the same device is reused over and over, higher levels of acrolein and aldehyde will begin to find themselves within ECs. However, Benowitz's language should be considered in that he used the words "could even exceed" when talking about levels of aldehyde when related to cigarettes. This implies that cases where the harmful substance is found at comparable levels to CCs are few and far between. A

general theme will be found here though, in that what EC and how it is used is incredibly important to consider when thinking about its health effects.

#### Other Health Effects

Benowitz and Fraiman go into detail amongst other possible health effects found from electronic cigarettes. When compared to conventional cigarettes though, they make it relatively clear that ECs have clear health advantages. The journal states how no combustion in the process of vaping prevents the generation of thousands of toxic chemicals including carbon monoxide found in conventional cigarettes. Also, the presence of tobacco is almost non-existent when compared to conventional cigarettes. Tobacco is the parent plant that contains nicotine. It is a harmful substance that has been estimated to hold responsibility over 5.4 million deaths per year as written by the World Health Organization (Mishra et al). This carcinogen is not present within ECs because the nicotine is extracted from tobacco and instead dissolved in propylene glycol and vegetable glycerin. Such substances are thought to be easily passed through the digestive system (Benowitz 3).

When thinking about the possible toxicants found in electronic cigarettes, instead the authors profess more worry over possible trace amounts of metals that could be removed from the heating coils when the EC is activated (Benowitz 2). However, the authors also write “These contaminants are generally present in low amounts and most likely do not confer substantial toxicity to the user”(Benowitz 2). One could again assume though, that older devices would be more susceptible to the deterioration of the heating coils. Also, there may be some danger present in e-cigarettes purchased off of the black market. A recent lung disease outbreak has been linked to liquid in e-cigarettes, but more specifically THC derived from cannabis (Kary). In normal e-cigarettes, no THC would ever be present. As with all products, e-cigarettes

exponentially increase in danger when forced onto the black market. This again places the important caveat that ECs are significantly safer than combustible cigarettes when used responsibly, and policymakers should not ban *Juul* in any reactionary fashion, in concern of possibly negative unintended consequences.

#### Consuming Too Much

However, the direct health implications of nicotine itself are worthy of discussion. This is an important topic to consider because newer generations of e-cigarettes have similar levels of nicotine to that of a combustible cigarette (Benowitz 2). *The National Institute of Health* (NIH) wrote an in depth academic review of the negative health effects found from the fundamental addiction agent within cigarettes. While noting that nicotine itself is not deemed a carcinogen, there are a multitude of problems that can be linked to nicotine including gastrointestinal, reproductive, respiratory, cardiovascular, and others. Most notably, nicotine increases pulse rate and blood pressure. It also weakens the immune system (Mishra et al). These same concerns were echoed by Professors Benowitz and Fraiman, showing how increased blood pressure along with other factors could possibly lead to cardiovascular disease (Benowitz 5).

On top of this, nicotine is an addictive substance. The *Canadian Medical Association Journal* delves into the topic of children's latest craze for e-cigarettes, and the possible health effects this could have on growing brains. With the latest generation of Juul pods, nicotine concentration can get as high as 5% (Gregoire 1). Unfortunately, many kids who buy these products don't have the maturity to engage in responsible and controlled use. The newsletter details a phenomenon where children vape until they pass out, usually continually vaping for approximately 10 minutes straight. This can be accompanied with vomiting, abdominal pain, headaches, and other issues (Gregoire 1).

As such, it is shown that nicotine itself should be used moderately even though it can be considered less harmful than tobacco or other chemicals found in conventional cigarettes. It's important to mention that it is well-known that nicotine or any addictive substance is not good for the human body. Absolutely no one has argued that e-cigarettes are not harmful, but the question remains just how much less harmful they are as compared to conventional cigarettes. When thinking about levels of nicotine in comparing the two devices, it's very important to note that the two have similar nicotine levels. At least in this manner, e-cigarettes are just as dangerous as conventional cigarettes.

Can this be used for good?

With all of the danger that comes with e-cigarettes, the question remains if they can actually help smokers quit. The *New York Times* definitively answered this question in saying yes, *Juul* is effective in smoking cessation. Citing a study by the *New England Journal of Medicine*, they write how e-cigarettes were experimentally shown to be twice as effective as traditional nicotine patches and gums in smoking cessation (Hoffman). However, the definition of smoking cessation in this case is shown to mean only decreasing the use of conventional cigarettes. This is clear when the writer, Jan Hoffman, discussed the details of the study. "80 percent of the study participants who had quit by using e-cigarettes were still vaping at one year, while only nine percent of the nicotine replacement therapy group was still using nicotine products"(Hoffman). This information is seemingly contradictory to the conclusions of the study, but smoking was defined to be exclusive to combustible cigarettes while vaping was used in relation to ECs.

This article being written doesn't necessarily mean though, that e-cigarettes should be wholly embraced. When looking at the details within the study, it's increasingly clear that e-

cigarettes are effective in smoking cessation, but not nicotine addiction reduction. Even though traditional NRT (nicotine replacement therapy) was half as effective as e-cigarettes, these methods prove to allow the majority of smokers to quit entirely when successful. This is because patches and gum generally have lower nicotine concentrations as related to ECs. The immediate effect of embracing ECs would most likely involve switching a large swath of cigarette users over to electronic cigarettes. While this is a significant step in allowing smokers to quit, it is part of the longer journey in reducing any and all addiction to nicotine. Such ideas were strengthened by Tiffany Kary in her news article discussing a recent switch back to cigarettes. “Of 9,300 people who submitted sworn testimony to the Food and Drug Administration about their use of flavored vapes, 74% said a ban on flavors would cause them to make flavors themselves, 38% would turn to smoking, and 59% would turn to the black market”(Kary). This is amid a scare due to an ambiguous lung disease outbreak, linked to e-cigarettes sold on the black market. This is why it’s very important to be honest about ECs’ relative safety as compared to cigarettes. Also, e-cigarette companies have become more useful in recent years in regards to smoking cessation however. Newer generations of ECs have the ability of adjusting the voltage of the battery, allowing users to modify nicotine intake with each inhale. This feature can be used effectively in gradually decreasing nicotine levels that the user takes in.

What about the children?

While it’s clear that e-cigarettes can be used in an effective manner for smoking cessation, there have been massive concerns in the recent rise of teens using ECs. *ABC News* interviewed Simah Herman, an 18 year old anti-vaping advocate who survived a lung illness linked to chronic vaping. In the interview, Herman detailed the peer pressure surrounding vaping as well as the lack of regulation. When talking of the first time she ever went to purchase *Juul*,

she painted the picture of a fifteen year old who walked into a smoke shop for the first time, lying and saying she was twenty two years of age. Unfortunately it was all too common for vendors to not ask for ID at this time, resulting in the teen vaping epidemic to remain unchecked. Even when directly facing worsening health conditions after starting, Sima didn't believe it was the e-cigarette because none of her friends were facing the same issues. A combination of all these sentiments can be extrapolated into understanding how e-cigarettes ran so rampant amongst the teen population. This substance was relatively un-regulated at the time, and also marketed as safer than conventional cigarettes. However, this marketing lacked the nuance of mentioning the remaining health dangers accompanied with the product. This combined with the discrete style of electronic cigarettes made it all too easy for kids to conceal. No smoke is released, and the actual device looks very similar to a USB. When internalizing all of this, it's very understandable why some have called for the ban of this product.

The former mayor of New York, Michael Bloomberg, wrote an op-ed calling for the ban of *Juul*. He expresses contempt for the marketing strategy employed by the e-cigarette company. "They are making huge investments in nicotine-loaded e-cigarettes and selling them in a rainbow of sweet and fruity flavors... They're turning millions of young people into addicted customers..."(Bloomberg). It is particularly egregious to intentionally market an addictive substance towards a group of people that is especially vulnerable to addiction. *Juul's* actions are indefensible in creating flavors that would appeal to the younger generation. However, it can easily be argued that the e-cigarette company was simply maximizing their profit margins in the opportunity of under regulation. Of course it isn't ethical to market these products towards kids, but the sole job of regulatory bodies is to prevent companies from committing these actions and punishing them when they do. It's very arguable that proper regulation of electronic cigarettes

along with education of their health effects could have easily controlled the health crisis of e-cigarettes ravaging teens and young adults.

Coral E. Gartner attempted to quell these alarms in an analytical review that involved the youth vaping epidemic. Gartner noted how smoking amongst teens has dramatically decreased during the rise of vaping (Gartner 1). Also, he cited a study done in Sweden that suggested over-regulation of electronic cigarettes may have unintended consequences. “Some research has suggested that banning sales to minors could have the perverse effect of increasing youth smoking. Evidence from Sweden also suggests youth uptake of snus helped reduce smoking among young men (Gartner 1).” This evidence does not mean to allow vaping to run free throughout the younger generation. It still is a fact as to the real health effects surrounding the product, and it should be treated with the caution that it deserves. Rather, *Juul* should be reserved for adults like all other substances that are addicting in nature. However, it may be possible to allow extremely restricted access to electronic cigarettes to youth who struggle with nicotine addiction. This is due to the fact that e-cigarettes have very clearly shown to play an effective role in smoking cessation.

Vaping’s reputation has been destroyed as a result of complacency on the part of our regulatory bodies. Its recently spiked usage amongst teens has caused a reactionary crackdown on a substance that is largely less harmful than cigarettes. As a whole, it is true that electronic cigarette companies should be allowed to market their products as safer than conventional cigarettes when used in a responsible and safe manner. The thousands of chemicals and toxins present within CCs are non-existent within ECs. This would play a pivotal role in preventing millions of tobacco related deaths. However, the regulation of this substance should still contain the nuance in understanding its very real health effects, and how it should be kept out of the



hands of teens. The discrete nature of this product combined with previously gross un-regulation left authorities sitting on their hands as the epidemic settled in. Regardless, it should be noted that ECs are significantly safer than conventional cigarettes, and are also effective in smoking cessation. However, e-cigarettes only play a part in the larger role of nicotine addiction reduction, and should not replace all nicotine replacement therapies.

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