

Electronic Cigarettes' Health Effects on Young Adults: An Honors Thesis

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Abstract

Hon Lik introduced e-cigarette use in 2003 as a “safe alternative” to smoking cigarettes. Unfortunately, this message has been misinterpreted to mean that e-cigarette use is “harmless”. Recent studies have linked e-cigarette use to adverse health effects involving injury to the heart and lungs. Cigarette smokers using e-cigarettes to quit smoking and reduce second-hand smoke are being exposed to unregulated and potentially harmful chemicals. Teens who may never have considered cigarette smoking have been led to believe that e-cigarette use is safe and non-addictive. However, most e-cigarettes contain nicotine and unsuspecting teens are becoming addicted to this “fun” behavior. This thesis will review existing literature to compare the dangers of e-cigarette use also known as vaping with that of smoking cigarettes and discuss the specific dangers of this use to teens and young adults.

Electronic Cigarettes' Health Effects on Young Adults

Recently, many health improvements and pitfalls have occurred. During this time smoking tobacco was becoming obsolete. However, just as cigars and cigarettes were being rejected as a detrimental habit, the electronic cigarette (e-cigarette) was created. This invention has been praised for many years as a harmless alternative to smoking. However, rather than becoming a glorified cessation tool, it became one of the largest sources of addiction ever experienced by teens and young adults throughout the world with an estimated five million teens using e-cigarettes (Miech et al., 2019b).

The purpose of this paper is to expose the harm that e-cigarettes have caused the population of young people and reveal the hidden health problems and deceit that has lingered around its distribution (Miech et al., 2017). Further, the paper will explain how destructive e-cigarettes can be and why this product does not deserve the false title of a “harmless” solution. The World Health Organization has found no proof that electronic cigarettes are helpful cessation tools (World Health Organization, 2008).

Background: History of Smoking

To fully understand the issue of e-cigarette use, and the reason it was invented, one must first examine the history of smoking in general. Smoking is a habit created in America. Christopher Columbus' crew has been credited with being the first Europeans to smoke tobacco and when the crew returned home, the practice was introduced into European society and became very popular for years to come (West, 2017).

As smoking became increasingly popular, the production of tobacco became quite lucrative. Thus, vast amounts of land became devoted to its growth. By the early eighteenth

century, many individuals relied on tobacco as a medicine reputed to cure various ailments. At the end of the century, real attention was drawn to the potential side effects resulting from smoking tobacco. Another half century later smoking tobacco became associated with the deadly disease of lung cancer. In fact, during World War I and II, free cigarettes were distributed to Allied troops (West, 2017).

Because the tobacco industry generated so much money, those who operated it were very influential. Importantly, large amounts of wealth kept scientific evidence of the harm caused by cigarettes at bay. Even as more negative information surfaced, these companies fought to ensure that cigarette smoking would not be condemned and that scientists would cease releasing information on its “supposed” harmful qualities (Brandt, 2012).

Lies Told by Tobacco Companies

Tobacco companies have a long history of making smoking appear fun and popular. They use young gorgeous healthy-looking individuals in their commercials to promote smoking cigarettes. Fun colors and stories make their product attractive, and the entire scene always appears safe and blissful. When tobacco companies do admit the side effects of smoking, the effects are listed very briefly to keep the focus of advertising on the delight their product is supposed to provide. Thus, the goal of tobacco companies is to make smoking as desirable as possible to increase financial gain, and not to be concerned with consumer health (National Center for Chronic Disease Prevention and Health Promotion (US) Office on Smoking and Health, 2012).

This financial goal is reached by leading the target audience to associate smoking commercials with youth and beauty, and by enticing them to seek the lifestyles of the individuals

portrayed. The lie is that one can be successful and beautiful if they smoke tobacco. However, the reality is much darker. Tobacco companies hide the chronic health problems and side effects associated with smoking and use effective marketing research to catch consumer attention (National Center for Chronic Disease Prevention and Health Promotion (US) Office on Smoking and Health, 2012).

The surgeon general emphasizes the health risks of smoking. Beginning in 1964, it highlighted the health hazards the habit causes. By 2006, the surgeon general published information on the poisonous chemicals being transferred by secondhand smoke identifying 205 chemicals that could cause cancer. It warns of the large number of teens who have begun use of e-cigarettes as many in the generation will most likely suffer from the addiction throughout their life due to early use. The surgeon general recorded that in 2018 the number of youths using e-cigarettes was 3.6 million. It points out the decline in cigarettes at the same time. However, e-cigarettes are not necessarily any better and have gained the title of being the most used tobacco product in recent years (CDC, 2019).

Invention of E-Cigarettes

Despite efforts by the tobacco companies to retain their consumer base, smoking decreased as more extensive research showed the dangers of tobacco. Furthermore, when secondhand smoke was also found to be deadly, public facilities banned indoor smoking and those who continued to smoke were required to smoke in small outdoor areas. This ban prompted many users to quit smoking because of the inconvenience and smoking became less popular. However, at this time e-cigarettes made their debut and promised to make smoking “fun” again. These new e-cigarette devices were small enough to fit into a pocket and resembled USB ports,

making them much more convenient than previous tobacco products to use in public areas (Dinardo & Rome, 2019).

Inventor

The history of e-cigarette invention and evolution began in the year 2003. Hon Lik, a Chinese pharmacologist, developed a novel electronic delivery device, the e-cigarette, with very pure intentions to help his father who had lung cancer, quit smoking (Caruana, 2018). If successful, Hon Lik would have been able to lower the number of cases of lung cancer for centuries thereafter. His intentions were to create a device with a system that would circumvent the production of harmful secondhand smoke. It was also supposed to have a safer form of delivery to protect one's lungs from unnecessary harm (Nayir et al., 2016).

Purpose

E-cigarettes were introduced to the market in 2003 and were widely celebrated as a "safe" way to quit smoking or as an alternative to smoking. The safety, however, was not confirmable and the chemicals within each pod had not yet been fully reviewed to observe the physiologic effects on the body. Because the long-term health effects of new products require years to establish, limited data were available when e-cigarette use was initiated. Therefore, evidence as to the extent of harm that e-cigarette use causes is now reported. The following pages will review the chemicals found within e-cigarettes and identify the problems associated with the chemicals. The text presented will also compare the potential dangers of e-cigarettes with traditional tobacco cigarettes (West, 2017).

Design and Structure

How does an e-cigarette truly work? There are two categories of e-cigarettes: reusable and disposable. As suggested by the names one e-cigarette can be recharged and the other just discarded when the “juice” runs out. Specifically, the devices each have a sensor that is triggered when a person sucks in. This sucking action effects the airflow and allows the aerosol to be taken into the lungs via the mouth. The sensor also cues the device to heat the liquid, so the aerosol is created. The aerosol is then breathed in and fills the lungs and causes the user to experience a euphoric sensation that may last a few seconds or minutes (Christiani, 2020).

E-cigarettes come in an array of fascinating colors and intriguing flavors which make them attractive to both adults and teens. The devices are also widely marketed with an emphasis on their convenience as their use can be done anywhere without garnering much notice. For example, if an individual begins to crave nicotine even in a high school classroom, an e-cigarette can be hidden in their sleeve to be used to satisfy a craving without exiting the classroom. The design of an e-cigarette is intended to project an innocent appearance (Dinardo & Rome, 2019).

Harmful Ingredients: Chemicals and Metals

Much controversy surrounds e-cigarettes and although cigarettes are reported to have more toxins than e-cigarettes, both contain formaldehyde and acetaldehyde (Callahan-Lyon, 2014). More alarming and often unknown is that e-cigarettes have heavy metals in their liquids such as nickel and chrome. Heavy metals can have multiple effects on the body when ingested and can be unpredictable in these effects. Regular cigarettes do not contain heavy metals (Nayir et al., 2016).

The fact that vaping liquids (also known as e-cigarette liquid) do not have a standard formula is also concerning. Without FDA regulation the ingredients in e-cigarettes vary from company to company. Moreover, in those devices that have been studied, vaping liquids that claim not to contain nicotine often do in reduced quantities (Henry et al., 2019). The liquid generally contains substances such as nicotine, propylene glycol, formaldehyde, acetaldehyde, acrolein, diacetyl, diethylene glycol, nickel, tin, lead, cadmium, benzene, and assorted fine particles that might damage the lungs. These are all known chemicals that can be dangerous to the body when ingested (National Academies of Sciences, Engineering, and Medicine, 2018).

Importantly, some of the substances mentioned above may sound unfamiliar, thus their potential dangers will be elaborated on in this paragraph. To begin, acetaldehyde and formaldehyde are found in cigarettes as well and are known carcinogens linked with multiple cancers, including lung cancer. In contrast, propylene glycol, though not necessarily dangerous in small amounts, should not be inhaled directly into the lungs. Interestingly, it is added to many foods and used in fog machines (Nayir et al., 2016).

Diacetyl has been reported to be a direct contributor to lung cancer as well as to “popcorn lung” which has been observed in many users of e-cigarette. Another ingredient, acrolein is commonly used as a chemical to kill weeds and if ingested can cause irreversible lung damage. Diethylene glycol is yet another chemical linked to lung cancer, and benzene, a byproduct found in exhaust from vehicles, can cause complications in brain functioning. This can lead to comas or seizures if too much is consumed. Most individuals avoid breathing benzene and do not voluntarily ingest it (Nayir et al., 2016).

The heavy metals found in vaping liquid can also cause significant damage to the body including breathing difficulties and cancers. For example, nickel, in elevated quantities can cause severe burning and itching, not to mention that many individuals are allergic to this metal (Nayir et al., 2016). Some e-cigarettes contain lead which is known to be extremely toxic and causes severe brain damage (Nayir et al., 2016). The Environmental Protection Agency has made a concerted effort to remove lead paint from properties throughout the United States. It has also been removed from toy manufacturing plants. Even college laboratories have warnings above the sink not to pour lead down the drain and harm the water supply, yet it is included in e-cigarettes, waiting to be ingested by users. Another metal found in e-cigarettes, cadmium, can cause flu-like symptoms such as muscle pain and fever and is associated with kidney, lung, and bone diseases (West, 2017).

Some vaping liquids have been found to contain vitamin E (West, 2017). One might not suspect that vitamins could be harmful however, the liquid form of vitamin E is known to damage the lungs by hindering gas exchange which can lead to death (Marques et al., 2021). Importantly, little is known about the effects or damages that occur when vitamin E is ingested thus more research is needed. Collectively, this cocktail of chemicals reviewed here is composed of a variety of undesirable substances that unsuspecting users are breathing into their bodies (American Lung Association, n.d.). Regrettably, due to the lack of FDA regulation, e-cigarette companies are not likely to adjust the ingredients they put into these vaping liquids.

Nicotine

Not only do e-cigarettes contain heavy metals and chemicals, but many contain a high nicotine concentration. Nicotine is considered the main ingredient in tobacco products that

causes addiction. This can be particularly harmful in developing teens. Importantly, the nicotine consumed by smoking cigarettes is easily measured, while the concentration in a liquid state is more difficult to verify. This in combination with the convenience and desirable taste of the e-cigarettes can lead to even higher levels of nicotine consumption which can result in overdose (Dinardo & Rome, 2019).

Due to the concentration of nicotine in e-cigarettes, regular use can lead to more detrimental health effects later by consistently dosing the body with higher levels of daily nicotine than what occurs with cigarette use. For example, it is easy to count how many cigarettes are smoked a day and thus equate the amount of nicotine inhaled, but to determine how much vaping liquid is used per day and equate the amount of nicotine inhaled is more complicated and often unknown, especially for younger consumers. In a generation consumed by gluttony and overuse, obsessive vaping can occur and lead to consequences such as nausea, diarrhea, and stomach pain (Dinardo & Rome, 2019).

Interestingly, there is a difference between the liquid that is in the pods versus the compounds that are found within the aerosol that is inhaled (Maddock, 2019). In even very basic chemistry courses one is taught about chemical reactions and the effect of heat. Specifically, adding heat can change the chemical composition of the compounds completely. For example, even if the original liquid was safe for consumption, heating the substance could make it unsafe. Thus, an already harmful mixture of chemicals is made more harmful as it is heated up before being delivered to the lungs. Moreover, the heating of the device itself becomes dangerous as heavy metals and melted plastic are released into the lungs which can contribute to cancer as the lungs experience physical changes (Christiani, 2020).

E-cigarette content can affect many of the body organs including the lungs. The lungs are one of the most vital organs in the body. The use of e-cigarettes greatly hinders the function of the lungs due to the chemical ingredients that interfere with the tissue and cells within the lungs. As the gas exchange within the lungs becomes interrupted, it becomes more difficult to accomplish tasks. As the body becomes challenged for air, it experiences headaches and chest pains that can be associated with the habit. The damage to the lungs can be permanent even after cessation; however, quitting often gives the user some immediate relief. (Butt et al., 2019).

Lack of FDA Regulation

Vaping liquid is encapsulated in “pods” which are inserted into the e-cigarettes. One of the main issues is that of regulating the ingredients in these pods. Not only are the ingredients in this liquid not regulated or standardized, but many fake pods have flooded the market which contain higher levels of formaldehyde and acetals. In fact, these fake pods are often the source of the harmful vitamin E discussed previously. Importantly, fake pods look just like a regular pod but are designed to increase profit by using cheaper materials. Moreover, the fake pods are nearly impossible to distinguish from a real pod by the normal user and can only be discovered as fake by a lab test. However, they are much more dangerous to the lungs (Ghosh et al., 2019).

Medical Hazards: Physical Side Effects and Diseases

The lungs were designed to take in and process oxygen. The introduction of any other material causes them harm. E-cigarettes are made so that the vaping liquid can be heated and then ingested to obtain the desired effect (Henry et al., 2019). Basic health problems such as pneumonia can result simply from having too much vapor delivered to one’s lungs (Maddock et al., 2019). Many e-cigarette users experience asthma, chronic obstructive pulmonary disease, and

lung inflammation. Such health problems are just a few of the many issues vaping can cause and importantly, these physical ailments are often the precursors of lung cancer.

Lung cancer is one of the most diagnosed cancers (Henry et al., 2019) in the world. Because lung cancer has become such a widespread problem the American Cancer Society as well as many other organizations have organized widespread campaigns to educate consumers on the dangers of smoking. As a result of these efforts, smoking cessation groups have been organized, and smokers have looked for tools to help them quit. The advent of e-cigarettes seemed to be the perfect solution, but the reported effects of these devices are now shown to be just as harmful if not more harmful to the lungs of users. Specifically, the reports of serious lung injury and pneumonia have begun to be published and between 2012 and 2018 more than seven studies have appeared in scientific journals. These data document the physiologic damage e-cigarettes have caused to the lungs of many users such as scarring, inflammation, and popcorn lung which can make breathing difficult (Maddock et al., 2019).

The diseases associated with e-cigarettes have been dubbed as “e-cigarette or vaping product use associated with lung injury” (EVALI) (Christiani, 2020). EVALI responses include the presence of lipid laden macrophages leading to pneumonias, and vitamin E has been identified as the trigger for this immune response. A few symptoms of EVALI are cough, shortness of breath/dyspnea, chest pain, nausea, vomiting/diarrhea, fatigue, fever, and/or weight loss. These are merely short-term symptoms, and no evidence exists regarding disease progression, or which chronic conditions might develop. It is essential that these potential dangers be addressed. The CDC has declared e-cigarettes to be an “outbreak” because use of these devices continues to increase (Maddock, 2019). E-cigarette related problems have been

added to the international classification of diseases and its ICD-10 code, U07.0, lists vaping related disorders as the cause (CDC, 2019).

As with any case of smoking or e-cigarette use, the lung recovery time, even after cessation, is quite long and can take months for lung function to improve. Moreover, the damaging effects to the lungs remain evident after quitting but show improvement every year after cessation (Butt et al., 2019).

Additional Health Problems

A study has also linked e-cigarette use with cardiovascular diseases. Although these diseases have garnered less attention than lung diseases, it is well known that nicotine increases blood pressure which can lead to heart attack or stroke (Nayir, et al., 2016). Many Americans are already at risk for cardiovascular disease because of the presence of obesity and type 2 diabetes, and e-cigarettes increases this risk exponentially. Smoking e-cigarettes also raises adrenal production and output putting additional strain on the heart causing permanent heart damage (Callahan-Lyon, 2014).

The effects of e-cigarettes can also be devastating to the neurologic system, especially the brain. For example, cognitive function is highly important to everyday tasks and problem solving. A study has shown that the use of e-cigarettes by teens and young adults stunts brain development, thus impairing cognitive function (Pesko, et al., 2018). Although neurologic changes may go unnoticed for years, the effects from e-cigarette use may lead to dementia or even personality disorders later in life. Importantly, the long-term health consequences resulting from e-cigarette use are unknown due to the insufficient passage of time for studies and their results (Chapman & Wu, 2014).

Other physical symptoms related to e-cigarette use such as fever, chills, cough, difficulty breathing, shortness of breath, chest tightness, belly pain, and loss of appetite are very similar to the symptoms of COVID-19. This presents a particular risk of misdiagnosis. Because many teens will lie about their use of e-cigarettes the correct diagnosis can be difficult to evaluate. Evidence is being explored on whether e-cigarettes can lead to increased risk of contracting COVID-19 (Maddock et al., 2019).

As alluded, many young teens and adults began using e-cigarettes because these devices were promoted as safe and non-addicting; unfortunately, this has led some users to try more dangerous products including cigarette smoking and other illicit drugs. Prior to e-cigarette use, most of these new smokers or illicit drug users would not have adopted these risky behaviors. Because e-cigarette use was not recognized as harmful, further experimentation with addicting products was initiated by these users to enhance the bliss sensations incurred. (Dinardo & Rome, 2019). Thus, the contents of e-cigarette vapor have become a new gateway drug. One study found a strong correlation between e-cigarette use as a child and cigarette use as an adult later in life (Ghosh et al., 2019).

Cessation Tool

As mentioned earlier, the original intent of the e-cigarette was to enable smokers to taper off smoking by using this product. Importantly much debate remains as to whether e-cigarette use is an effective cessation tool for smoking. One report concludes that e-cigarettes may be less harmful but should not be labelled harmless (National Academies of Sciences, Engineering, and Medicine, 2018). As described earlier in the thesis, the e-cigarette contains the basic components of a regular cigarette that makes the product harmful, but the design of the e-cigarettes may make

delivery a little safer and have less of an environmental effect because instead of smoke a vapor is used. Also, an e-cigarette can be used for longer periods of time than a cigarette, therefore, less waste is created (Dinardo & Rome, 2019).

One major concern with cigarette smoking has been the harmful effects of secondhand smoke on non-smokers. Studies repeatedly show that lifelong non-smokers have developed severe lung problems, including lung cancer, caused by inhaling secondhand cigarette smoke (West, 2017; Marques et al., 2021; National Academies of Sciences, Engineering, and Medicine, 2018). Secondhand smoke is particularly harmful because non-smokers are exposed to the same chemicals as smokers, but without the benefits of the filter that smokers have when inhaling on the cigarette. One study reported that non-smokers standing in the same room as the smokers fully breath in the smoke which places them at increased risk for disease development similar that of the smokers (Palazzolo, 2013.)

Importantly, e-cigarettes promised to eliminate secondhand smoke. This was an appealing message to non-smokers as well as smokers who wished to protect those around them from the harmful effects of the secondhand smoke. Another message that was appealing about e-cigarette use was that the devices were environmentally friendly. Because pollution is an important topic, e-cigarette use was shown to reduce litter of cigarette butts on the ground, thus further promoting the marketing of e-cigarette devices as a less harmful and dirty product (National Academies of Sciences, Engineering, and Medicine, 2018).

Marketing Ploys

Unfortunately, marketing specialists are experts in selling their products and making e-cigarettes look fun. Specifically, these individuals are inventive with e-cigarette flavors such as

candy and fruit, which especially attract teens (Ford et al., 2016). Moreover, e-cigarettes have an array of electric colors, light up, glow, and contain fun pictures. Clearly, these marketing tactics are not targeting adults to purchase these devices, but are targeting young consumers (University of Bath, 2021). Whereas tobacco cigarettes look bland and uninteresting, e-cigarettes look fun and inviting (University of Bath, 2021). Of concern, teens have easy access to e-cigarettes with some adults even purchasing the devices for their teens because of the legal smoking age increasing, and adults finding the age increase unfair (Chapman & Wu, 2014).

Underage Consumers

Unfortunately, this new product designed to aid those battling smoking addiction created a new problem by inviting much younger consumers to begin smoking. The design of e-cigarettes today is not significantly different from the original design, but the variety of flavors and colors has greatly increased. One of the largest consumer bases for e-cigarettes is teens across the globe. Many countries have age restrictions on the purchase of e-cigarettes, but that does not prevent adults from purchasing and then reselling them to underage consumers (Blaha, 2020b).

Many teens that want their peers to see them as fun and interesting, tend to use e-cigarettes that “do not have the nicotine” content. However, e-cigarettes that do not contain nicotine can cause the same amount of harm as the ones that do including lung damage and cardiovascular issues (Marques et al., 2021). Moreover, some e-cigarettes still do contain nicotine contrary to their labels. However, delivering and introducing an aerosol into the lungs remains harmful to the body regardless of content. The lungs are not made to have liquids and chemicals smoked into them (Ghosh et al., 2019).

Currently, it is estimated that 10 million adults in the United States are using e-cigarettes and an overwhelming three million high school students are using this nicotine delivery method as well (including e-juices and pod-based systems). This totals 27.5% of high school students and 10.5% middle school student users. Between 2013 and 2014 the use of e-cigarettes among children in American schools greatly increased. The percent of students participating in underage smoking of e-cigarettes increased from 4.5% to 13.4%. This rise is equivalent to 660,000 students in 2013 which increased to nearly 2 million students in 2014. More recently, in a study assessing teen initiation of e-cigarette use, (Wills et al., 2016, as cited in Nayir et al., 2016) concluded that the rate of teens beginning use of e-cigarettes was drastically increasing and continuing to rise in number.

Therefore, it is essential to regulate age of use. Many gas station attendants and store owners continue to illegally sell e-cigarettes to underage customers. Sadly, these sites are some of the biggest markets for this product and managing these illegal sales, as it has historically been shown with alcohol and other tobacco products, is difficult. Thus, laws that increase the legal age of e-cigarette use have recently been implemented to discourage some of these sales to young teens, but many individuals have become angry and found ways to circumvent these new laws (Blaha, 2020b).

Electronic Cigarette Costs

As mentioned, the use of e-cigarette nicotine delivery systems is increasing both in the United States as well as the rest of the world. These delivery systems have attracted much criticism from many standpoints and pose a threat from a scientific as well as a financial standpoint (Polosa et al., 2017). Because the costs of purchasing e-cigarettes is high, it might

seem that the cost would prevent teens from purchasing the product; however, many teens use their parent's money to purchase the devices. The price factor becomes more of a problem when these individuals leave high school or enter college. Often, major financial turning points in an individual's life trigger a decision to quit using the devices. With tobacco cigarettes, if one quits, the unused cigarettes can be discarded or given away, however, because of the e-cigarette device prices, many users are hesitant to dispose of them. Therefore, many college students or high school students decide to sell their devices to younger people who have perhaps never engaged in the behavior before. Thus, another generation of e-cigarette users begins. Furthermore, since e-cigarettes are so addictive, often the individuals who sold the devices will later purchase new devices and their habits continue (Pesko et al., 2018).

Lack of Long-Term Data and Effects

It takes years to properly evaluate a product and its potential side effects. Because of this long-time frame for product safety evaluation, e-cigarette companies are left unmonitored, and the rumored safety of the product remains undenounced. Importantly, e-cigarettes have only been on the market for approximately eighteen years and the consumer base has only now been using the products long enough to generate study results. Little is known, therefore, on how ingredients such as heavy metals will affect the body over time (Chapman & Wu, 2014).

As more scientific evidence elucidates the harmful effects of e-cigarette use on the cardiovascular and neurologic systems, the potential exists for further damage to other body organs and systems as well. Moreover, as the rise in various lung injuries and cancers amass, and more damaging evidence to other body organs emerge, a negative case against this product will force changes or removal of e-cigarettes from the market (National Academies of Sciences,

Engineering, and Medicine, 2018). Unfortunately, there is no reversal of bodily damage for those people who have used e-cigarettes for a longer time, but these individuals will become examples for the chronic diseases that develop from product use (Callahan-Lyon, 2014).

Biblical Application

As discussed throughout the paper, the young population is one of the largest consumer groups for e-cigarette use. Many are underage which makes their use of e-cigarettes against the law (Kowitt et al., 2018). Christians are taught to respect the laws of the world unless they contradict God's word. This law increasing the age for e-cigarette use is a good law so as Christians, believers should obey it.

Scripture on Addiction

Addiction is powerful and can indeed drive one's life. For example, addiction can take over an individual's finances and time. This is not correct. Christians finances and time should be given to the Lord. As found in Deuteronomy 16:17, He has given to those who trust Him all they need. He has instructed believers to use what He has gifted them to serve and honor Him (Mark 12:17). A habit that destroys the body and squanders money is opposite of what God has instructed. If a believer is distracted by addiction, it could cause them to not be serving the Lord in a manner pleasing to Him.

The Lord also instructs believers that they should remain joyful, because it brings them strength as Christians (Nehemiah 8:10). Importantly, many non-Christians are aware of what the Bible instructs and poor behavioral influences by Christians can often hinder nonbelievers from coming to Christ. Behaviors such as e-cigarette use, with its addicting properties, model worldly, not Christlike behaviors.

Temple of the Holy Spirit

The Lord has created humans with fully functioning bodies. He has given each one twelve systems that function in harmony. Our bodies were perfectly created to support themselves and keep mankind alive. After sin entered into the world, ailments have been allowed to plague our bodies. Deuteronomy 13:17 explains the consequences of mankind's sin and the consequences that would follow.

If one cares for their body, disregarding sickness, it should function well and enable Christians to carry out the Lord's work. God has told believers that they should not harm their bodies as they belong to Him. Because of this Christians should not want to take part in e-cigarette use. The Lord has told His people that they are His temple and here for His glory (I Corinthians 3:16). As tenants of the Lord's temple, Christians should not seek to defile themselves with such things.

God should be every Christian's delight. There should be no reason to be seeking pleasure in the things of this world (Matthew 6:19-20). Believers do not need a temporary euphoric feeling that harms their body. It is the lies of the devil through tobacco companies that sell this product. For all one's needs they can go to the Lord for help. Therefore, if e-cigarettes are being used as a coping method for stress, faith is being put in an inanimate object to provide comfort. This is unnecessary as God says in His word that He cares for all His creation and will comfort us (Philippians 4:19).

Recommendations

One must remember that smoking cigarettes did indeed take many centuries of study before finally convincing people that it was bad for one's health. It also took a significant

amount of time to begin reducing the number of smokers through the creation of interventions for the cessation of smoking (Miech et al., 2019a). The fact that the e-cigarette has so widely been marketed as safe will probably take years to scientifically disprove and create enough evidence on the dangers. Even more years will be required to create the interventions needed to successfully initiate a decline in the use of e-cigarettes (Polosa et al., 2017).

However, a decline in e-cigarette use is possible. The same steps that were implemented to put an end to smoking cigarettes can be modeled. First, research teams need to develop strong study designs and collect evidence that document the long-term physiologic effects of e-cigarette use. Data from these studies will become especially helpful as the current users age and have been using e-cigarettes for many years. By studying long-term e-cigarette users, the full effects of the products can be seen, and more conclusive papers can then be written (Polosa et al., 2017). Eventually, with enough scientific evidence, the false message of e-cigarettes being a harmless alternative to cigarette smoking will end.

After scientific evidence has overturned e-cigarettes supposed safety, education to users can begin. Specifically, health professionals can develop interventions to reduce e-cigarette use. Although these intervention efforts will take time to achieve, continued studies by researchers involving avid e-cigarette users will aid the national or worldwide cessation of e-cigarette use (CDC, 2020).

To Improve Consumer Awareness

To begin raising awareness regarding the harmful impact of e-cigarette use, education programs must be initiated across the nation. For example, current science textbooks that address substance use in youth need updated content that includes separate information on e-cigarette use.

Moreover, health professionals must visit schools and educate the children by having class discussions about the harmful effects of using e-cigarettes and parents must also take responsibility to reinforce this knowledge with their own children (Perikleous et al., 2018). As large-scale e-cigarette intervention programs are made accessible to the public, results from these programs can be published in peer-reviewed journals, and the information presented in user-friendly websites that provide current information on the harm and side effects of e-cigarettes.

Better Regulations

As scientific evidence regarding the dangers of e-cigarettes mount, the FDA must become more involved and at least ban fake e-cigarette pods, and develop more regulatory policies, especially ones that target underage e-cigarette users. Importantly, the FDA has implemented many federal policies to control cigarette smoking in the U.S., and it is not acceptable that the regulation of e-cigarettes use has been delayed for this long period of time (Henry et al., 2019). Specifically, government agencies must become more involved in regulating those individuals who are distributing e-cigarettes to underage consumers. Higher penalties must be enforced to gas station owners and parents who choose to supply these products to youth under the age of twenty-one years.

Importantly, the law was recently changed to raise the age of smoking to twenty-one years, and unfortunately, since that time, the new law has been disrespected by both users and nonusers alike. The system to enforce new laws in this country needs to amend this problem. For example, harsher punishments need to be implemented for those who sell these smoking devices to teens and harsher punishments must be in place for those teens who are caught trying to illegally purchase the products. Otherwise, more young people will begin to smoke and use e-

cigarettes in years to come leading to a decline in health of our youth (National Center for Chronic Disease Prevention and Health Promotion (US) Office on Smoking and Health 2012).

Resources

There are many website resources being created to help individuals quit using e-cigarettes. One well-known site is TRUTH. As an online platform, TRUTH is very convenient to use and incorporates direct interactions with individuals to help influence people to quit using e-cigarettes. Importantly, the resources on this site have helped many individuals quit their addictions. As more information is gleaned on how addictive and health damaging electronic devices are, these online websites continue to raise awareness and are effective in their efforts. One effort that has shown effectiveness in reducing e-cigarette use incorporates a famous person to be the spokesperson and education lead in the cessation campaign. Thus, social media-driven educational campaigns are effective to reduce e-cigarette use (Kowitt et al., 2018).

An unexpected social media resource that has recently begun to spread the message of the harmful effects of e-cigarettes use in youth is Tik Tok. For example, ads for websites and information encouraging users to quit have begun to show up between the posted videos. Many popular Tik Tok influencers have used their identity and popularity to encourage their followers to quit the e-cigarette habit (TRUTH, 2020).

As knowledge increases about the harmfulness of e-cigarette use, it is encouraging to see individuals push for change. Many public platforms have been utilized to show various audiences how severe e-cigarette use is among young people. These messages have influenced many parents to pay more attention to behaviors in their children and have even helped many users to make the decision to quit on their own. It is always best to convince someone to quit an

addiction using scientific evidence depicting the harmfulness of a product as well as showing the benefits of quitting. Thus, these resources help to provide the motivation that users need to quit harmful behaviors easier (Chapman & Wu, 2014).

Unfortunately, information alone is not always enough for individuals to break addictions; many informed people still struggle to quit. Beyond the addictive properties of these products, one major reason people continue to abuse nicotine is to manage their stress. Therefore, it is encouraging that some of the cessation interventions mentioned above, provide replacement strategies for individuals to break their addictive habits and still manage other behavior issues. For example, replacement strategies to target and manage stress are helpful. When stress is managed through other outlets, the addiction is more easily broken and replaced by healthier habits that can be reinforced with rewards or prizes, thus a healthy exchange. Individuals need to understand that they do not need the nicotine to be okay and function properly (West, 2017).

Conclusion

In conclusion, as more scientific evidence emerges and shows the harmful effects of e-cigarette use on the body, it will be easier to convince users to quit. Unfortunately, the accumulation of such evidence takes time to accrue as habitual users of e-cigarettes must age, and more studies and autopsies must be done to document the full extent of organ damage. Fortunately, the harmful evidence is accumulating and the population in need of intervention is being identified.

The original idea for the development of e-cigarettes was not bad. Specifically, that Hon Lik developed an alternative to cigarette smoking so that his father and others struggling with

diseases related to smoking could quit, was a noble idea (Caruana, 2018). However, this noble idea was exploited by big industry to improve falling revenue from decreased tobacco cigarette use.

E-cigarettes are just one example of an item intended for good which was misused to create a billion-dollar market (Brandt, 2012). Perhaps as technology progresses, e-cigarettes can be modified to be a safe, smoking cessation tool. However, the conclusion currently remains that this device does not deserve the title of safe (World Health Organization, 2008) and in the next few years, additional policy changes will be implemented to regulate use. Most likely, changes will begin with better regulation of the content of the vaping liquids. This will be followed by further regulation of state and national laws regarding product use.

The ultimate turning point for the e-cigarette industry regarding the regulation of product use will be when more scientific evidence is collected that documents the harmful effects of e-cigarette use, and the research is peer-reviewed and published. Ultimately, this information will provide the impetus necessary to induce change (West, 2017). As for now, the lack of long-term research on e-cigarette use has prompted health professionals to use existing knowledge to promote policy change and to further amass study data for future interventions.

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