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## **ABSTRACT**

E-cigarette use among young adults has grown exponentially over the past decade around the world. The present study aims investigate the rising popularity and use of e-cigarettes among young adults (ages 18 to 25 years old) in Trinidad by exploring the factors that contribute to its increasing popularity and use. The study also aims to discover the health implications of e-cigarette use. Findings revealed that social influence, especially peer pressure, and curiosity were the two common motivational factors for initiating e-cigarette use. Findings also showed that its use is not without risks as e-cigarette use is associated with a range of physiological and psychological health issues.

**Keywords:** E-cigarettes, Young Adults, Trinidad, Factors, Popularity, Appeal, Health Risks.

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## INTRODUCTION

The latest trend in smoking is the use of electronic cigarettes, more popularly known as vapes, vape pens, JUUL, mods, tanks or smok sticks. Despite the many different names, they all refer to the same battery powered device that turns nicotine, flavourings and other chemicals into a vapour that is inhaled. Originally created to help cigarette smokers break their habit, e-cigarettes have gained widespread popularity and its users have increased exponentially within the last decade. This does not exclude Trinidad and Tobago. E-cigarettes were introduced in Trinidad and Tobago in 2010<sup>1</sup> creating this new vaping culture.

Interestingly, a majority of e-cigarettes users are those who have never even used a cigarette before and more alarming is that young adults are using e-cigarettes at a significantly higher rate than adults.<sup>1</sup> The policies and legislation needed for this new nicotine source cannot keep pace with its rampant popularity. The need for these policies and legislation is evident in new research findings coming into light about this device that is promoted as a much safer alternative to smoking regular cigarettes. Existing research has highlighted that there are health implications of e-cigarette use and second-hand exposures to e-cigarette emissions.<sup>2</sup> There is also the concern about its aggressive marketing techniques targeted towards the young population which makes it seem that rather than promoting these devices as a smoking cessation method, this industry is encouraging a vaping culture and nicotine addiction among youths. This current situation of e-cigarette reflects the struggle of the past efforts to regulate tobacco cigarettes in the 1960s as it faced widespread cigarette marketing and a lack of research on the effects of smoking.<sup>2</sup>

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<sup>1</sup> Dhandooolal et al, ““Electronic Cigarette Use.”

<sup>2</sup> National Center for Chronic Disease Prevention and Health Promotion, “The Health Consequences of Smoking—50 Years of Progress: A Report of the Surgeon General.”

This study intends to explore the prevalence, trends, popularity and impacts of e-cigarettes in Trinidad in hopes of developing a greater understanding on the current issue. This study intends to use these findings to influence change in practice, policies, regulations, and attitudes with regards to the use of e-cigarettes in Trinidad which can be used to inspire change in other societies. Due to time constraints, this study intends to solely focus on the young adult population of Trinidad and will be conducted within a span of six months.

### **Research Questions:**

1. What are the factors that contribute to the growth and popularity of e-cigarette use among young adults?
2. What are the motivational reasons underlying the use of e-cigarettes among young adults?
3. What are the health impacts and risks of e-cigarettes?
4. What is the correlation between the awareness of health impacts and risks associated with e-cigarettes and the prevalence of e-cigarettes use among young adults?

## **METHODOLOGY**

In line with the objectives of this study, a mixed method approach was employed. While this entailed gleaning data from both primary and secondary sources, data was mainly derived from secondary sources. This reliance on secondary sources is due to the study's need to obtain certain crucial and reliable information in order to develop a greater understanding on this issue. Such data included the history of e-cigarettes, relevant statistics on its use and research articles on the health impacts and factors that contribute to its popularity. In addition, this data obtained from the secondary sources was used to formulate the primary research.



For the primary research, an online survey was employed to collect information about general opinions, beliefs, and perceptions regarding e-cigarettes from young Trinidadian adults (18-25 years), the study population. The survey was circulated for 3 weeks with the employment of the snowball sampling technique. The data collected from this aided in contextualising this issue by providing valuable insights as it specifically relates to Trinidad.

#### **CHAPTER OUTLINE:**

This study consists of four chapters. Chapter one consists of the literature review that explores the historical background, evolution of electronic cigarettes as well as findings from prior research that relate to this study. Chapter two considers and examines the health impacts and risks of e-cigarettes. Chapter three explores the various factors that contribute to its growth and popularity. Lastly, chapter four includes the conclusion that comprises of summary as well as final comments and suggestions based on the findings of this study.

## CHAPTER ONE: Literature Review

### History and Evolution of E-cigarettes.

It can be assumed that versions of e-cigarettes have potentially existed since the late 1800s. This can be seen in advertisements in 1887 where products are described as cigars that have their harmful properties removed using thermoelectric treatment.<sup>3,4</sup> Throughout the mid-1900s to early 2000s there have been documented prototypes of e-cigarettes.<sup>4,5,6,7</sup> However, of these earlier versions, some were not intended for nicotine consumption<sup>4</sup>, others were not commercialised<sup>5</sup> or were commercially unsuccessful<sup>7</sup> and withdrawn from the market. It was in 2003 when the modern e-cigarette that is popular today was created in Beijing, China by Hon Lik, a 52-year-old pharmacist and inventor. Hon Lik's company, Golden Dragon Holdings, developed the device and, with support from Chinese investors, introduced it to the Chinese market as "Ruyan" meaning "like smoke."<sup>5</sup> Hon Lik's product was seen as a potential smoking cessation device or an alternative tobacco product and it achieved commercial success<sup>4,8</sup> not only in China but also in the United States and European markets when it was introduced in 2006. Electronic cigarettes were introduced in the Anglophone Caribbean between 2010 and 2011. In Trinidad and Tobago, e-cigarettes were introduced in 2010 where it was quickly adopted and became popular.<sup>1</sup>

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<sup>3</sup> "Coffin Nails: The Tobacco Controversy in the 19th Century," n.d

<sup>4</sup> Holt, Poklis, and Peace, "The History, Evolution, and Practice of Cannabis and E-Cigarette Industries Highlight Necessary Public Health and Public Safety Considerations," February 1, 2023

<sup>5</sup> CASAA, "History of Vaping - Historical Timeline of Events - CASAA," October 18, 2022

<sup>6</sup> Gilbert, Herbert A. (1965). "Smokeless Non-tobacco Cigarette"

<sup>7</sup> Bialous and Glantz, "Heated Tobacco Products: Another Tobacco Industry Global Strategy to Slow Progress in Tobacco Control," September 12, 2018.

<sup>8</sup> National Center for Chronic Disease Prevention and Health Promotion, "E-Cigarette Use Among Youth and Young Adults: A Report of the Surgeon General."



Figure 1.

*Different shapes and sizes of e-cigarette devices.* (Sourced from Centres for Disease Control and Prevention, *Multiple Types of E-cigarettes*, November 2, 2023, CDC.

[https://www.cdc.gov/tobacco/basic\\_information/e-cigarettes/about-e-cigarettes.html](https://www.cdc.gov/tobacco/basic_information/e-cigarettes/about-e-cigarettes.html))

### The Growth and Popularity of E-cigarettes.

Global estimates show that there has been a 280.3% increase in e-cigarette use.<sup>9</sup> The 21.3 million e-cigarette users worldwide in 2012 increased to 81 million in 2022.<sup>9</sup> Additionally, as of 2019, there were over 460 brands on the market and thousands of e-cigarette flavours.<sup>10</sup> This industry has shown exponential growth with a global market size valued at about USD 18.32 billion in 2022 that is expected to increase to USD 46.98 billion by 2030.”<sup>11</sup> In the article ‘Vaping: the new wave of nicotine addiction,’<sup>12</sup> the authors reviewed the history and prevalence of e-cigarettes in the United States. It was found that in 2014, e-cigarette use became more popular among the youth than traditional cigarettes. What makes this more concerning is that the authors highlighted that

<sup>9</sup> Julia, “Vaping Statistics: How Many People Vape in 2023? - CFAH,” March 6, 2023.

<sup>10</sup> Nurmi, “Vaping.”

<sup>11</sup> Zion Market Research, “E-Cigarette Market Size, Demand, Trends, Share Analysis 2023-2030.”

<sup>12</sup> Dinardo and Rome, “Vaping: The New Wave of Nicotine Addiction.”

adolescents who use e-cigarettes are three times more likely to use traditional cigarettes than those who do not use e-cigarettes. This research also shed light on the marketing strategies employed by the e-cigarette industry. It highlighted the widespread advertising on television and in print publications for popular brands that often use celebrity endorsements. The authors stated that marketing campaigns are similar to those used by the tobacco industry as they use the same themes of freedom, rebellion, and glamour. These campaigns also make unsubstantiated claims about health benefits and its aid in smoking cessation. This article demonstrates the increasing prevalence of e-cigarettes among young adults in the United States, a country whose culture and trends significantly influence the culture in Trinidad.

#### Effects and Impacts of E-cigarettes.

Several ingredients and flavourings of e-cigarettes have been strongly associated with health implications.<sup>13,14</sup> One such ingredient is propylene glycol, the main ingredient in most e-cigarette liquids that has been shown to lead to lung inflammation.<sup>15</sup> In addition to the existing literature showcasing the health impacts of e-cigarettes on users, recent research also show that non-users may be at risk too. A research article, ‘Secondhand nicotine vaping at home and respiratory symptoms in young adults’<sup>16</sup> had the objective of investigating whether second-hand nicotine exposure from e-cigarette smoke affects respiratory health among young adults. The researchers viewed this as important because “unlike active smoking, second hand nicotine vape exposure is not a voluntary exposure.” This research is interesting because it is commonly believed that inhaling second-hand vapour is harmless to the body. However, the results showed that its second-exposure was associated with increased risk of bronchitis symptoms as well as shortness of breath

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<sup>13</sup> Marqués, Piqueras, and Sanz, “An Updated Overview of E-Cigarette Impact on Human Health.”

<sup>14</sup> Sassano et al., “Evaluation of E-Liquid Toxicity Using an Open-Source High-Throughput Screening Assay.”

<sup>15</sup> Song et al., “Effects of Electronic Cigarette Constituents on the Human Lung: A Pilot Clinical Trial.”

<sup>16</sup> Islam et al., “Secondhand Nicotine Vaping at Home and Respiratory Symptoms in Young Adults.”

among young adults even among those who are not e-cigarette users. This finding sparks more interest in exploring the health impacts and risks of e-cigarettes in this present study and makes this issue more alarming.

#### Perceptions, Opinions and Beliefs Surrounding the Use of E-cigarettes.

In the study, ‘Young Adults’ Electronic Cigarette Use and Perceptions of Risk,’<sup>17</sup> the researchers sent an online questionnaire to students at a Midwestern university in the United States where 3754 students participated to determine the prevalence of e-cigarette use as well as how perceptions of health risks are associated with its use. The findings revealed that over half of the participants, 55.2%, have used e-cigarettes where 23.2% were current users. The authors stated that these figures are concerning since “college-aged students are vulnerable to marketing and experimenting with substances to cope with stress.” Furthermore, it was discovered that among the current and past e-cigarettes users, 83.3% have never used traditional tobacco cigarettes. According to the authors, this indicates “a new generation of nicotine dependence that may possess unique implications.” With regards to the participants’ perceptions, the authors reported that although current e-cigarette users think that e-cigarettes may be harmful to one’s health, they believed that they are safer than tobacco products. They also noted that current e-cigarettes users are aware of its addictive powers and stated that this aligns “with the risk-taking behaviour that may be more common in this population.” The major limitation of the study is that all the participants were from the same university thus, the findings cannot be generalised to individuals from other geographical locations. However, this study provided insights into and highlighted how the perceptions of young adults can be associated with their use of e-cigarettes.

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<sup>17</sup> Kelsh et al., “Young Adults’ Electronic Cigarette Use and Perceptions of Risk.”

The study “Electronic Cigarette Use among Emerging and Young West Indian Adults”<sup>1</sup> had the purpose of examining the prevalence of e-cigarettes, the associated factors of its use as well as the knowledge and perceptions about e-cigarettes in young Trinidadian adults between the ages of 18 and 40 who were surveyed during May and June in 2016. The findings of this study aided in providing an understanding on the prevalence of e-cigarettes use among young adults in Trinidad in 2016. It also aided in understanding the characteristics of young adults who use e-cigarettes. The major findings of the study are interesting as the authors state that “the prevalence of e-cigarette use in young adults in Trinidad has risen rapidly, particularly among those aged 18–25 years, reaching almost 25%, 6 years after the introduction of the devices in 2010.” The researchers found that current traditional cigarette smokers and those who have quit are more likely to be e-cigarette users and that nearly 42% of the participants were dual users of e-cigarettes and tobacco cigarettes in Trinidad. This finding on dual use shows that e-cigarettes are not being used as a substitute for tobacco cigarettes. In fact, the researchers also found that 16.95% of the participants have never used traditional cigarettes. The researchers also stated that young adults have a low level of knowledge regarding e-cigarettes, highlighting the need for education on this. This research, however, was conducted seven years ago so it is very likely that these findings do not represent the present-day situation regarding e-cigarettes, hence this study aims to explore this. This research also did not explore the reasons for e-cigarette use therefore, this will also be taken into consideration in this study. Nevertheless, this study should be acknowledged and commended as it provided an early and valuable insight on the prevalence of e-cigarettes among young Trinidadian adults.

## CHAPTER TWO

### **Clouded Judgements: Exploring the Health Impacts and Risks of E-cigarettes.**

The use of e-cigarettes is widely referred to as a “safe” and “harmless” option or alternative to smoking traditional tobacco cigarettes. However, based on the findings from research conducted on the health implications of e-cigarettes, the use of these devices is not without health risks and should not be labelled “safe” and “harmless.” In this chapter these various health implications of e-cigarette will be discussed.

#### Respiratory effects associated with e-cigarette use.

The use of e-cigarettes has been linked to several respiratory health issues. Studies have shown that vaping is associated with lung irritation, inflammation, infection and injury.<sup>18,19,20,21</sup> This is due to the many ingredients and chemicals found in e-liquids. In fact, in one study, Australian researchers found that most e-liquids contain at least one or more potentially harmful chemicals and some that are known to cause respiratory issues and lung damage when inhaled.<sup>20</sup> The aerosols generated by e-cigarettes, that are composed of the same chemical composition of the e-liquid and usually contains nicotine, artificial flavourings and preservatives,<sup>22,23</sup> also have the potential to cause numerous, acute and chronic, pulmonary toxicities.<sup>18</sup> Diacetyl, a chemical found in e-cigarettes flavourings, can cause a type of lung inflammation commonly known as “popcorn lungs”<sup>24,25</sup> and the main ingredient in the majority of e-liquids, propylene glycol, has also been

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<sup>18</sup> Park, Alexander, and Christiani, “Vaping and Lung Inflammation and Injury.”

<sup>19</sup> Jonas, “Impact of Vaping on Respiratory Health.”

<sup>20</sup> Larcombe et al., “Chemical Analysis of Fresh and Aged Australian E-cigarette Liquids.”

<sup>21</sup> Alqahtani et al., “E-Cigarette Use and Respiratory Symptoms in Adults: A Systematic Review and Meta-Analysis.”

<sup>22</sup> Thornburg et al., “Exhaled Electronic Cigarette Emissions: What’s Your Secondhand Exposure?”

<sup>23</sup> Djones, “Electronic Smoking Devices and Secondhand Aerosol - American Nonsmokers’ Rights Foundation | No-Smoke.Org.”

<sup>24</sup> American Lung Association, “Popcorn Lung: A Dangerous Risk of Flavored E-Cigarettes.”

<sup>25</sup> Occupational Safety and Health Administration, “Flavorings-Related Lung Disease - Diacetyl and 2,3-Pentandione.”

shown to lead to lung inflammation.<sup>20</sup> Furthermore, the recently described respiratory health issue, due to its outbreak in 2019, ‘E-cigarette or vaping use-associated lung injury (or EVALI)<sup>18,19</sup> was strongly linked to vitamin E acetate, an ingredient in some vaping products.<sup>18</sup> EVALI is a condition characterised by an inflammatory response in the lungs triggered by inhaled substances found in e-cigarettes and vaping products.<sup>26,27</sup>

#### Effects of e-cigarette use on innate immunity.

In addition to the respiratory system, the lungs also play a crucial role in the immune system. The innate immune cells in the lungs act as the first line of defence against pulmonary infections by eliminating inhaled pathogens and toxins that impair the function of these immune cells and increase potential susceptibility to respiratory infections.<sup>28,29,30</sup> This finding suggests that due to the presence of toxic substances in e-cigarettes, its use can adversely impact the immune system and place e-cigarette users at a higher risk for dysregulated inflammatory responses and bacterial infections.<sup>31,32</sup> This is further supported by the research done on the link between vaping and higher risks of severe COVID-19 complications.<sup>33</sup> Studies reported that COVID-19 diagnosis was more likely among individuals who vape, suggesting that they are at a higher risk of COVID-19 infection.<sup>34,35,36</sup> In one of the studies<sup>35</sup> the researchers found that among young people (ages 13-24

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<sup>26</sup> Yale Medicine, “E-Cigarette, or Vaping Product, Use Associated Lung Injury (EVALI).”

<sup>27</sup> American Lung Association, “E-Cigarette or Vaping Use-Associated Lung Injury (EVALI).”

<sup>28</sup> Infante, “Beyond Respiration: Exploring the Lung’s Role as an Immune Organ.”

<sup>29</sup> Ardain, Marakalala, and Leslie, “Tissue-resident Innate Immunity in the Lung.”

<sup>30</sup> Clapp et al., “Flavored E-Cigarette Liquids and Cinnamaldehyde Impair Respiratory Innate Immune Cell Function.”

<sup>31</sup> Wu et al., “Electronic Cigarette Liquid Increases Inflammation and Virus Infection in Primary Human Airway Epithelial Cells.”

<sup>32</sup> Corriden et al., “E-Cigarette Use Increases Susceptibility to Bacterial Infection by Impairment of Human Neutrophil Chemotaxis, Phagocytosis, and NET Formation.”

<sup>33</sup> American Heart Association, “Smoking, Vaping Linked to Higher Risk of Severe COVID-19 Complications, Including Death.”

<sup>34</sup> Li et al., “Are Vapers More Susceptible to COVID-19 Infection?”

<sup>35</sup> Gaiha, Cheng, and Halpern-Felsher, “Association Between Youth Smoking, Electronic Cigarette Use, and COVID-19.”

<sup>36</sup> McFadden et al., “Symptoms COVID 19 Positive Vapers Compared to COVID 19 Positive Non-Vapers.”



years), a COVID-19 diagnosis was five times more likely among ever users of e-cigarette devices compared to those who have never used e-cigarettes before.

#### Cardiovascular effects and risks of e-cigarette use.

Cardiovascular effects such as changes in heart rate, blood pressure and the function of blood vessels have been noted in studies investigating the health effects of e-cigarettes on users.<sup>36,37,38,39</sup>

These changes in cardiovascular function are also noted in young adults. In one study,<sup>38</sup> that investigated the separate effects of e-cigarettes and tobacco cigarettes, the researchers expressed their concern on the negative impacts of e-cigarettes on cardiovascular function because it was very similar to the impacts experienced by traditional tobacco cigarette users, even though those who used e-cigarettes were younger and had vaped for nearly two decades less than those who smoked cigarettes. These cardiovascular changes are also associated with an increased risk for cardiovascular diseases, one of the leading causes of death globally.<sup>40</sup>

#### Effects and risks of chemical exposure and toxic ingredients found in e-cigarettes.

There exists an abundance of e-liquids on the market. One study found that nearly 20,000 e-liquids were marketed in the Netherlands alone.<sup>41</sup> These e-liquids contain a combination of numerous chemicals made to appeal to every person's taste. However, the chemicals and ingredients in e-liquids are found to be problematic for many reasons which emphasises the urgent need for regulation. Studies have shown that many of the chemicals found in these e-liquids are either potentially harmful, known to have adverse health effects, have unknown effects, have never been

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<sup>37</sup> Majid et al., "Abstract 15569: Association of Volatile Organic Compound Levels With Pod-Based Electronic Cigarette-Induced Changes in Vascular Function of Young Adults."

<sup>38</sup> American Heart Association, "People Who Vape Had Worrisome Changes in Cardiovascular Function, Even as Young Adults."

<sup>39</sup> National Institutes of Health, "NIH-Funded Studies Show Damaging Effects of Vaping, Smoking on Blood."

<sup>40</sup> World Health Organization: WHO, "Cardiovascular Diseases."

<sup>41</sup> Havermans et al., "Nearly 20 000 E-Liquids and 250 Unique Flavour Descriptions: An Overview of the Dutch Market Based on Information From Manufacturers."

approved for human consumption or are undisclosed by manufacturers.<sup>42,43,44</sup> One study<sup>42</sup> done by researchers of John Hopkins University found nearly 2,000 chemicals of which the vast majority are unidentified or unknown. Of the chemicals found, the stimulant caffeine was one as well as three industrial chemicals, a pesticide, and two flavourings linked with possible toxic effects and respiratory irritation. These findings suggest that e-cigarette users could be exposing themselves to completely uncharacterized chemicals that might have adverse health risks that are unknown or yet to be determined. Another thing that cannot be overlooked is that approval of chemical additives for ingestion, via the gastrointestinal tract, does not extend to inhalations of these chemicals. Unlike the gastrointestinal tract, which protects the body from absorbing toxins, the lungs allow passage of molecules entering the airways directly into the bloodstream. Therefore, the chemicals added to e-liquids for aerosolization and inhalation into the airways is delivering chemicals contained in e-cigarette aerosols into the bloodstream.<sup>18</sup>

#### Effects of nicotine in e-cigarettes.

Nicotine is a highly addictive psychoactive substance found in tobacco that is categorised as a stimulant drug.<sup>45</sup> Exposure to nicotine is mostly known to cause dependence and addiction but physiological as well as psychological impacts of nicotine are well established since research on nicotine started due to cigarette smoking.<sup>46</sup> Nicotine can have significant impacts on the brain.<sup>47,48,49</sup> This is most concerning for adolescent and young adult e-cigarette users whose brain

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<sup>42</sup> Tehrani et al., “Characterizing the Chemical Landscape in Commercial E-Cigarette Liquids and Aerosols by Liquid Chromatography–High-Resolution Mass Spectrometry.”

<sup>43</sup> Derewicz, “Some E-Cigarette Ingredients Are Surprisingly More Toxic Than Others | Newsroom.”

<sup>44</sup> Florko and Welle, “The FDA Stands by as the Vaping Industry Flouts Its Orders.”

<sup>45</sup> Alcohol and Drug Foundation, “Nicotine.”

<sup>46</sup> Parascandola, “Tobacco Harm Reduction and the Evolution of Nicotine Dependence.”

<sup>47</sup> Mansvelder, “Short- and Long-Term Consequences of Nicotine Exposure During Adolescence for Prefrontal Cortex Neuronal Network Function.”

<sup>48</sup> Castro, Lotfipour, and Leslie, “Nicotine on the Developing Brain.”

<sup>49</sup> Yuan et al., “Nicotine and the Adolescent Brain.”

development continues until about the age of 25.<sup>50</sup> As their developing brain is vulnerable and susceptible to drug-induced alterations,<sup>47,48,49</sup> nicotine exposure can disrupt brain development resulting in long-term consequences on cognitive function in adulthood.<sup>47,51</sup> One study<sup>49</sup> also shows that in addition to also causing long-term and permanent effects, nicotine can induce epigenetic changes that sensitise the brain to other drugs and prime it for future substance abuse. This implies that the use of e-cigarettes, that contain nicotine, can be a gateway to both future tobacco use and other substance abuse.<sup>49,52,53</sup> Nicotine also impacts the cardiovascular system by stimulating the sympathetic nervous system leading to the release of norepinephrine and increases in heart rate, blood pressure, systemic vasoconstriction and impaired wound healing.<sup>54,55</sup> It cannot even be safe to say with certainty that e-cigarettes users who use “nicotine-free” e-liquids are free from the harmful effects of nicotine because “nicotine-free” e-liquids have been found to contain nicotine.<sup>56</sup> This raises questions on whether or not e-cigarette manufacturers intentionally mislabel their products as “nicotine-free.”<sup>57</sup> Additionally, some e-liquids contain ingredients and flavourings, such as menthol, that are known to boost the effects of nicotine and making it more addictive.<sup>20</sup> The presence of nicotine in these devices that are widely used by adolescents and young adults is concerning as they are in a developmental period of major brain plasticity and vulnerability of but also at the age of peak onset of nicotine use.<sup>58</sup>

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<sup>50</sup> Center for Disease Control and Prevention, “Surgeon General’s Advisory on E-Cigarette Use Among Youth | Smoking & Tobacco Use | CDC.”

<sup>51</sup> Counotte et al., “Development of the Motivational System During Adolescence, and Its Sensitivity to Disruption by Nicotine.”

<sup>52</sup> Shearston et al., “Effects of Electronic Cigarettes and Hookah (Waterpipe) Use on Home Air Quality.”

<sup>53</sup> Greenhalgh et al., “Tobacco in Australia: Facts and issues.”

<sup>54</sup> Rose et al., “Cardiopulmonary Impact of Electronic Cigarettes and Vaping Products: A Scientific Statement From the American Heart Association.”

<sup>55</sup> Price and Martínez, “Cardiovascular, Carcinogenic and Reproductive Effects of Nicotine Exposure: A Narrative Review of the Scientific Literature.”

<sup>56</sup> Chivers et al., “Nicotine and Other Potentially Harmful Compounds in ‘Nicotine-free’ E-cigarette Liquids in Australia.”

<sup>57</sup> Center for Disease Control and Prevention, “Quick Facts on the Risks of E-Cigarettes for Young People.”

<sup>58</sup> Leslie, “Unique, Long-Term Effects of Nicotine on Adolescent Brain.”

### Risks of second-hand exposure to vapours from e-cigarettes.

The second-hand effect of e-cigarette use is one type of effect that may be shocking for many as since its introduction in markets, e-cigarettes have been touted as “safer” and “harmless” alternatives to traditional tobacco cigarettes as it does not involve the combustion of tobacco. This may have impacted the assumption that unlike the smoke from tobacco cigarettes, the aerosol or vapour from e-cigarettes are harmless to bystanders. However, research has been emerging recently that shows that this vapour is quite the opposite from harmless because non-users are significantly exposed to e-cigarettes aerosols when standing close to e-cigarette users or within a confined space.<sup>21,59</sup> One study<sup>16</sup> confirms this by highlighting that the use of e-cigarettes or hookah increases air pollution in homes. Due to the findings of this study, the researchers expressed their opinion that smoke-free environment rules should be extended to inside homes to include e-cigarette and hookah products to protect household members and visitors from passive exposure to harmful aerosols. This second-hand exposure has also been associated with respiratory health symptoms among young adults, such as increased risk of bronchitis symptoms and shortness of breath among young adults,<sup>60</sup> as well as cardiovascular health symptoms due to the exposure of nicotine from second-hand e-cigarette aerosol.<sup>18</sup>

### Impacts of e-cigarettes as a smoking cessation tool.

Since its advent, e-cigarettes have been marketed as an effective and harmless tool for smoking cessation because tobacco combustion is replaced by e-liquid heating.<sup>61</sup> However, its effectiveness is uncertain due to mixed results from studies. While some studies provide evidence for the use of

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<sup>59</sup> Hefner et al., “E-Cigarettes, Alcohol Use, and Mental Health: Use and Perceptions of E-Cigarettes Among College Students, by Alcohol Use and Mental Health Status.”

<sup>60</sup> Soule et al., “Secondhand Electronic Cigarette Aerosol in Vehicles Impacts Indoor Air Quality.”

<sup>61</sup> Greenhalgh et al., “Tobacco in Australia: Facts and issues.”

e-cigarettes as smoking cessation tools,<sup>62,63,64</sup> others suggest that their efficacy for quitting is likely overstated and show that most individuals using e-cigarettes to quit cigarette smoking were unsuccessful and became dual users of both.<sup>65,66,67</sup> Additionally, one study highlighted that compared to those who use e-cigarettes for enjoyment, smokers who are motivated to use e-cigarettes for cessation purposes are more likely to have greater nicotine dependence, and increased cigarette and e-cigarette use.<sup>68</sup> Another worrying finding from two other studies,<sup>69,70</sup> focused on teens, found that e-cigarette use was associated with heightened risk of initiating tobacco smoking or persistent tobacco smoking. This suggests that the use of e-cigarettes is likely to induce cigarette smoking, having the opposite effect it was intended and marketed to have as a tool to quit smoking.

While it is true that research on e-cigarette use is ongoing to discover the full extent of its health effects, there still exists ample evidence to suggest that a prudent recommendation is to abstain from e-cigarette use to reduce health risks. Furthermore, although there are mixed results regarding its effectiveness as a tool for smoking cessation, it is logical to say that it is not the best smoking cessation tool considering these health risks. Lastly, it must be noted that the health effects and risks discussed in this chapter are mainly short-term effects. Research on the long-term effects of

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<sup>62</sup> Hájek et al., “A Randomized Trial of E-Cigarettes Versus Nicotine-Replacement Therapy.”

<sup>63</sup> Auer et al., “Electronic Nicotine-Delivery Systems for Smoking Cessation.”

<sup>64</sup> Bond and Nunes, “Electronic Cigarettes for Smoking Cessation.”

<sup>65</sup> Sweet et al., “Quitting Behaviors Among Dual Cigarette and E-Cigarette Users and Cigarette Smokers Enrolled in the Tobacco User Adult Cohort.”

<sup>66</sup> Agaku, Egbe, and Ayo-Yusuf, “Associations Between Electronic Cigarette Use and Quitting Behaviours Among South African Adult Smokers.”

<sup>67</sup> Krishnan et al., “Trajectories of ENDS and Cigarette Use Among Dual Users: Analysis of Waves 1 to 5 of the PATH Study.”

<sup>68</sup> Temourian et al., “Why Do Smokers Use E-Cigarettes? A Study on Reasons Among Dual Users.”

<sup>69</sup> Martinelli et al., “Exploring the Gateway Hypothesis of E-Cigarettes and Tobacco: A Prospective Replication Study Among Adolescents in the Netherlands and Flanders.”

<sup>70</sup> Kelly et al., “E-Cigarette Use Among Early Adolescent Tobacco Cigarette Smokers: Testing the Disruption and Entrenchment Hypotheses in Two Longitudinal Cohorts.”

e-cigarettes use is extremely limited and lacking since they are relatively new. However, considering the unfavourable short-term effects of e-cigarette use, it can be assumed that long-term effects can be much worse.

## **CHAPTER THREE.**

### **The Vape Appeal: Factors Driving E-cigarette Popularity and Use.**

It is clear that the use of e-cigarettes has grown exponentially globally over the past decade.<sup>9</sup> Studies and reports<sup>1,71</sup> on e-cigarettes in Trinidad as well as the concerns raised by health professionals and politicians<sup>72,73,74</sup> indicate its growth and popularity within the country. This growth and increasing appeal have sparked interest and led to the examination of the possible contributing factors in this study. In doing this, a mixed method approach, where primary as well as secondary research, was conducted. The primary research involved a cross-sectional survey shared among young Trinidadian adults, using snowball sampling, to examine the perceptions and use of e-cigarettes among the study group. This chapter intends to discuss and compare the factors that contribute to the appeal and use of e-cigarettes gleaned from prior research and the findings of the cross-sectional survey.

#### Cross-sectional Survey

In a cross-sectional survey design, 111 young adults, between the ages of 18-25 years old, from Trinidad expressed their opinions and perspectives on e-cigarettes within their country. Of the 111 participants (57.7% male and 42.3% female), 56.8% (63) stated that they have tried or used e-cigarettes where 63.5% (40) of these are current users. Of the current e-cigarette users 47.5% (19) vape frequently and daily. There was no strong association found between any certain age and e-cigarette use however, an association between gender was noted where males represented 69.8% of those that have tried or used e-cigarettes and 70% of the current users. Curiosity along with friends or peer influence were the two common reasons for initiating e-cigarette use, where 83.8%

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<sup>71</sup> HCC, "Vaping Among Adolescents and Youth in the Caribbean."

<sup>72</sup> Wallace, "Sounding the Alarm on E-Cigarettes and Vaping."

<sup>73</sup> Perez-Sobers, "Vaping Expanding."

<sup>74</sup> Ghouralal, "Marijuana Smoking, Vaping Not 100% Harmless, Doctor Says."

(93) of all participants said that they have friends that use e-cigarettes. 94.6% (105) of the participants believe that vaping is more common within their age group (18-25), with 58.6% (65) saying that its social acceptance within this age group is moderate and 39.6% (44) saying that it is highly socially acceptable. When compared to tobacco cigarettes, 91.9% (102) participants believed that e-cigarettes are perceived as more appealing and socially acceptable among their age group for various reasons. Interestingly, one participant pointed out that “e-cigarettes were supposed to help tobacco smokers ease off cigarettes” and “with that being the selling point, it was more socially acceptable.” This may be because tobacco cigarettes are stigmatised because of its well-known health effects. Thus, as one participant expressed, “the sleek, harmless and attractive look of a vape is better (socially) accepted...”

No strong association was found between awareness of health risks and e-cigarette use. This finding could be due to the exposure of contradictory information about the health implications of e-cigarettes. However, a surprising majority, 91% (101) of all participants, believed that e-cigarettes can serve as a potential gateway to smoking tobacco cigarettes or using other substances. This number is inclusive of 92.5% (37) of current users, indicating that the increased risk of using cigarettes and other substances does not deter them from using e-cigarettes. This reflects research showing that risk-taking behaviour peaks during adolescence and young adulthood.<sup>75</sup> In addition, the awareness of health risks together with the belief that e-cigarettes are less harmful than tobacco cigarettes were noted in most current users. It appears as though current e-cigarettes users want to have the nicotine experience from e-cigarettes without the harmful effects associated with tobacco cigarettes since many cited the absence of tobacco and tar as the common reasons for why they

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<sup>75</sup> Kahn and Graham, “The Current Landscape of Adolescent Risk Behavior.”



believe e-cigarettes are safer. This study, however, did not determine the possible use of e-cigarettes as a smoking cessation tool amongst the participants.

Another finding among the current users is that the majority, 75%, rated their confidence in identifying and understanding the ingredients in e-liquids as “average” or “not confident at all.” This also reflects risk-taking behaviour among young adults. Also, among current users, an association between e-cigarette use and perceived social acceptance was found where all current e-cigarette users (40) believe that its social acceptability is either high (22) or moderate (18).

### Social Influences.

Social influence refers to the phenomenon where an individual’s thoughts, behaviours, or beliefs change because of other people.<sup>76</sup> In influencing the use of e-cigarettes, it manifests as peer pressure which refers to the influence exerted by peer groups on its members to fit in with or conform to the group’s norms and expectations.<sup>77</sup> Studies have shown that young adults as well as adolescents are more likely to initiate use of e-cigarettes if they have friends who use e-cigarettes.<sup>78,79,80</sup> This coincides with the results from the cross-sectional study where 83.8% (93) of the participants shared that they have friends that use e-cigarettes. Of those who have friends that use e-cigarettes, 65 % (61) have either tried, used or are current e-cigarette users. Additionally, of the 56.8% (63) of the participants who have used or tried e-cigarettes at least once, 38% (24) participants said that it was the influence of their friends or seeing their friends use e-cigarettes

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<sup>76</sup> APA Dictionary of Psychology, “Social influence.”

<sup>77</sup> APA Dictionary of Psychology, “Peer pressure.”

<sup>78</sup> Valente et al., “Social Network Influences on Adolescent E-Cigarette Use,” March 16, 2023.

<sup>79</sup> Jha and Kraguljac, “Assessing the Social Influences, Self-Esteem, and Stress of High School Students Who Vape.”

<sup>80</sup> Cheng, Lizhnyak, and Richter, “Mutual Pathways Between Peer and Own E-Cigarette Use Among Youth in the United States: A Cross-Lagged Model.”

that encouraged them to try it. These findings highlight the profound influence of those within our social networks often called “social influence” in field of social psychology.<sup>81</sup>

### Perceptions

Perceptions refer to the thoughts, beliefs or opinions people hold that are shaped by or based on their way of thinking or perspective.<sup>82</sup> With regards to the use of e-cigarettes, the beliefs and opinions held by young adults can be a significant factor in their decision to use e-cigarettes. People have various perceptions, beliefs and opinions about its use but with respect to using e-cigarettes, it has been found that certain perceptions can be linked to its use. These include the belief that e-cigarettes are a safe or harmless alternative to smoking traditional cigarettes and that they are “cool.”<sup>83</sup> With regards to the perception that e-cigarettes are less harmful, a study that explored what drives this perception found that the most common reasons were that they produce no smoke and fewer toxins.<sup>84</sup> This corresponds with the results from the questionnaire where 41.4% (46) of the participants have expressed that they believe the use of e-cigarettes to be safer than smoking traditional cigarettes where 56.5% (26) of these justified their belief by stating that e-cigarettes does not contain tobacco or has less harmful chemicals and toxins. Furthermore, of the 111 participants, 51.4% (57) believed that e-cigarettes can be effective tools for smoking cessation. Moreover, the perception that e-cigarettes are “cool” may be a contributing factor to its popularity and has also been shown to be a reason why young adults decided to start using e-cigarettes because they were curious about its perceived popularity. Many participants from the

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<sup>81</sup> Branscombe and Baron, Social Psychology, 275-309.

<sup>82</sup> Cambridge Dictionary, “Perception.”

<sup>83</sup> Smith et al., “Youth’s Engagement and Perceptions of Disposable E-Cigarettes: A UK Focus Group Study.”

<sup>84</sup> Arshad et al., “What Drives Public Perceptions of E-Cigarettes? A Mixed-Methods Study Exploring Reasons Behind Adults’ Perceptions of E-Cigarettes in Northern England.”

cross-sectional also held the belief that e-cigarettes are perceived as “cool,” “trendy” and a “fun alternative” because of the various “intriguing” flavours and “styles” of the devices.

Prior studies investigating the motivational reasons for e-cigarette use show that despite the reasons for continuing to use e-cigarettes can vary, curiosity was the most frequently reported reason for initiating the use of e-cigarettes in young adults.<sup>85</sup> This is also noted in the cross-sectional study. Of the 56.8% (63) of the participants who have used or tried e-cigarettes at least once, 34.9% (22) said they tried it because they were curious. Furthermore, as observed from the cross-sectional study, perceived social acceptability is associated with current e-cigarette users. Interestingly, this correlates to findings that show that the perceived social acceptability of tobacco cigarettes is associated with increased smoking.<sup>86</sup>

### Marketing.

Marketing has evolved from simply promoting a business’ product to trying to persuade customers to buy what they produce through advertising.<sup>87</sup> The e-cigarette industry is often criticised for employing certain marketing tactics and strategies, some of which have been called “manipulative,” “irresponsible” and “unethical.”<sup>88,89</sup> The industry is mainly accused of targeting the youth<sup>90,91,92</sup> with the brightly coloured e-cigarette devices designed to look like popular characters such as SpongeBob and Mario as well as toys such as Nintendo Game Boy and digital cameras.<sup>93</sup> (see fig. 2) E-liquid flavourings are also criticised for being “youth-appealing” as

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<sup>85</sup> Kinouani et al., “Motivations for Using Electronic Cigarettes in Young Adults: A Systematic Review.”

<sup>86</sup> Long and Valente, “Perceived Social Acceptability and Longitudinal Trends in Adolescent Cigarette Smoking.”

<sup>87</sup> Albrecht et al., “Principles of Marketing.”

<sup>88</sup> Victoria, “New Research Exposes the Manipulative Tricks the E-Cigarette Industry Uses to Normalise Vaping Among Teens on Social Media.”

<sup>89</sup> Scottish Greens, “Vape Promotions Must Be Stopped From Targeting Children.”

<sup>90</sup> Race, “JUUL Labs agrees \$462m deal to settle claims.”

<sup>91</sup> Pannett and Vinall, “Australia Cracks Down on Vaping, Accuses Big Tobacco of Targeting Youths.”

<sup>92</sup> News Service of Florida, “Florida AG Moody Targets Vaping Firms Accused of Marketing to Minors.”

<sup>93</sup> U.S. Food And Drug Administration, “Retailers Warned to Stop Selling Illegal E-Cigarettes Resembling Youth-Appealing Characters, School Supplies, Toys, and Drinks.”

flavours range from mint to popcorn to whipped cream, gummies and many more, as figure 4 and 5 shows, marketed to look like popular food and candy.<sup>94</sup> This is especially concerning because studies have shown that flavour is one of the most significant motivational factors in trying e-cigarettes. From the questionnaire results, “e-liquid flavours” was the second most agreed upon appealing factor of e-cigarettes among the participants. Moreover, one study<sup>95</sup> found that e-cigarette companies’ use of celebrity endorsement and social media influencer sponsorship is successful in fuelling the popularity of e-cigarettes which have resulted in more users and more intentions to use the e-cigarettes especially among young people. This finding is interesting as it was found in the cross-sectional study that social media was the most common source for information about e-cigarettes for 57.7% (64) of the participants. E-cigarettes companies have also been accused of misinformation and mislabelling as many marketing campaigns include baseless and unfounded health benefits.<sup>96</sup>

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<sup>94</sup> Truth Initiative, “E-Cigarettes: Facts, Stats and Regulations.”

<sup>95</sup> Chacón, Mitchell, and Golder, “The Commercial Promotion of Electronic Cigarettes on Social Media and Its Influence on Positive Perceptions of Vaping and Vaping Behaviours in Anglophone Countries: A Scoping Review.”

<sup>96</sup> Nottage et al., “Marketing Claims on the Websites of Leading E-Cigarette Brands in England.”



Figure 2.

*E-cigarette devices designed as cartoon characters and toys.* (Sourced from U.S Food and Drug Administration, August 23, 2023, FDA. <https://www.fda.gov/tobacco-products/ctp-newsroom/retailers-warned-stop-selling-illegal-e-cigarettes-resembling-youth-appealing-characters-school> )



Figure 3.

*E-cigarette devices designed to look like popular food products.* (Sourced from U.S Food and Drug Administration, August 23, 2023, FDA. <https://www.fda.gov/tobacco-products/ctp-newsroom/retailers-warned-stop-selling-illegal-e-cigarettes-resembling-youth-appealing-characters-school> )



Figure 4.

*E-liquid flavourings that are “youth-appealing.”* (Sourced from Truth Initiative, June 2023. <https://truthinitiative.org/research-resources/emerging-tobacco-products/e-cigarettes-facts-stats-and-regulations#E-cigarette-marketing> )



Figure 5.

*E-liquid flavourings that imitate popular food products.* (Sourced from U.S Food and Drug Administration, August 23, 2023, FDA. <https://www.fda.gov/tobacco-products/ctp-newsroom/misleadingly-labeled-e-liquids-appeal-youth> )

## Mental Health

Studies have shown associations between mental health issues and the use of e-cigarettes. These include psychological distress,<sup>97</sup> anxiety,<sup>98</sup> and depression.<sup>99,100,101</sup> One study<sup>99</sup> found that depressive symptoms predict e-cigarette use among college students between the ages of 18-29 years. Another study<sup>100</sup> noted that increased frequency of e-cigarette use was associated with higher odds of depression among current e-cigarette users when compared to non-users. These findings highlight the need for longitudinal studies to examine the association between e-cigarette use and depression, which may be bidirectional. Lastly, although this cross-sectional study did not explore the relation between mental health issues and e-cigarette use, it did discover that 91.9% (102) of the participants believe that stress or other mental health issues play a role in influencing young adults' decisions to use e-cigarettes.

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<sup>97</sup> Cabral, "E-Cigarette Use and Intentions Related to Psychological Distress Among Cigarette, E-Cigarette, and Cannabis Vape Users During the Start of the COVID-19 Pandemic."

<sup>98</sup> Teah and Conner, "Psychological and Demographic Predictors of Vaping and Vaping Susceptibility in Young Adults."

<sup>99</sup> Jones, Asare, and Lanning, "A Retrospective Cross-Sectional Study on the Prevalence of E-Cigarette Use Among College Students."

<sup>100</sup> Bandiera et al., "Depressive Symptoms Predict Current E-Cigarette Use Among College Students in Texas."

<sup>101</sup> Obisesan et al., "Association Between E-Cigarette Use and Depression in the Behavioral Risk Factor Surveillance System, 2016-2017."

## **CHAPTER FOUR: CONCLUSION**

This study aimed to contextualise the prevalence of e-cigarettes use within the Trinidadian young adult population by exploring the factors that contribute to its increasing popularity and use. It also aimed to obtain a greater understanding of the health implications of e-cigarettes use. Based on the research findings, from both primary and secondary sources, of this study, it can be concluded that factors such as social influence and curiosity were linked to initiating e-cigarette use and factors such as perceptions, marketing and social trends were associated with its appeal. Lastly, this study demonstrated that e-cigarette use is not without risk as it is linked to various health issues. These findings highlight the need for interventions to curtail the growth in popularity and use of e-cigarettes such as regulations, policies and educational public health programs.



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