

The Theory of Planned Behaviour in  
the Context of Electronic Cigarette  
Use

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## Abstract

Smoking is recognised as one of the world's leading causes of preventable deaths. It is common knowledge that combustible cigarettes and exposure to the second-hand smoke they produce causes significant and sometimes fatal harms. Governments and health-organisations from around the world have attempted to develop numerous strategies to help reduce these harms. One of these methods is to encourage cessation amongst those who already smoke. Unfortunately, quitting cigarettes has been proven to be a difficult task with very low success rates. Research has shown that these rates can be improved by incorporating cessation tools into quit attempts. While there are several options available, one of the most popular methods in recent years has been e-cigarettes. The relative safety of these devices, however, had led to them also being used by non-smokers.

To better understand the factors that influence people's intentions to use e-cigarettes, the aim of this thesis was to determine the predictive utility of the Theory of Planned Behaviour when applied to the behaviour of vaping. A mixture of qualitative and quantitative methods was used to achieve this goal. The first phase of the study incorporated a thematic analysis of qualitative content from a variety of sources. Newspaper articles, publications by government health-organisations, and online forum posts were used to help identify which elements may come into play when an individual is deciding whether to use e-cigarettes. The information from this analysis was then incorporated into the design and construction of the second phase of the project. This second step involved the distribution of an anonymous, online survey which was completed by a sample of 329 respondents. To test the Theory of Planned Behaviour, the questionnaire measured attitudes, subjective norms, perceived behavioural control, as well as intentions towards e-cigarettes. Additional variables – self-concept, social identification, attention to and the perceived credibility of vaping news, and nicotine dependence – were also assessed to determine if they could improve upon the original model.

The findings of this study demonstrated that the Theory of Planned Behaviour can be successfully applied to e-cigarette use and that this model is about to account for a considerable amount of variance within respondents' intentions to use e-cigarettes over the next six months. It was found that the factors which held the greatest influence over participants' intentions were – how certain they were regular vaping would result in undesirable consequences, how favourably they believed referents would respond to their decision to use e-cigarettes daily, and whether they believed certain obstacles would

prevent them from vaping. Incorporating respondents' general attitudes towards e-cigarettes and whether they believed that vaping could assist with smoking cessation resulted in small improvements to the model's predictive capabilities.

The results of this thesis have promising real-world applications. By understanding which particular elements influence the decision to use e-cigarettes, researchers can incorporate this knowledge into the construction of interventions whose goal is to affect vaping behaviour. This could be applied to programmes that encourage smokers to consider using e-cigarettes in their future cessation attempts, as well as educational programmes whose purpose is to dissuade non-smoking youth from vaping.

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## **Attestation of Authorship**

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person (except where explicitly defined in the acknowledgements), nor material which to a substantial extent has been submitted for the award of any other degree or diploma of a university or other institution of higher learning.

Louise Stone \_\_\_\_\_

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# Chapter One – Introduction

## 1.0 Background & Research Justification

The World Health Organisation [WHO] (2022) recognises tobacco as one of the largest threats to public health across the globe. The use of combustible cigarettes increases the likelihood of experiencing respiratory diseases, cardiovascular disease, and various types of cancer (U.S. Department of Health and Human Services [U.S. DHHS], 2022D). Those who are exposed to second-hand smoke also face a greater risk of lung cancer and cardiovascular disease. It is estimated that over 8 million people die each year from tobacco, with 7 million of those individuals being direct users and another 1 million being non-smokers who are exposed to second-hand smoke (WHO, 2022). Numbers such as these illustrate the significant impact that tobacco – namely, smoking – has. Due to its disastrous effects on health, it is important to encourage smoking cessation. Quitting combustible cigarettes, however, is a difficult task. An estimated 4% of those who attempt to quit smoking succeed (WHO, 2022). One of the ways these rates can be improved is by incorporating professional support and cessation tools into quit attempts. Currently, there are a range of aids that are supported by most governing bodies (U.S. DHHS, 2022H). Examples of these tools include patches, gum, lozenges, inhalators, and medications. Even with these methods, however, many people are still unable to quit smoking. These individuals may turn to alternative methods. One such approach that has risen in popularity in recent years is e-cigarettes (McNeill et al., 2019).

E-cigarettes, also known as ‘electronic cigarettes’ or ‘vapes’, are handheld devices that vaporize a liquid (e-liquid) for the user to inhale (McNeill et al., 2015). While Chapter Two will provide a more in-depth examination of the literature, it is important to establish here that people have been using e-cigarettes as cessation tools despite the research into their efficacy and safety being limited (McNeill et al., 2019). Of the evidence that is available, it can be said that e-cigarette use (or ‘vaping’) may assist some individuals with smoking cessation and short-term e-cigarette use is safer than short-term use of combustible cigarettes (McNeill et al., 2018). Despite being predominately marketed as a smoking cessation tool, it has been found that non-smoking youth and young adults are experimenting with e-cigarettes (U.S. DHHS, 2016A). Given that most e-liquids contain nicotine and the act of vaping bears physical similarities to smoking, there are concerns that e-cigarettes may act as a gateway to combustible cigarettes and potentially

renormalize smoking (U.S. DHHS, 2016A). Overall, vaping appears to be a behaviour that should be encouraged in certain populations (smokers) and discouraged in others (non-smokers). With this in mind, researchers need to examine which factors influence a person's decision to use e-cigarettes and whether a model can be used to predict intentions to vape. This thesis, for example, applies the Theory of Planned Behaviour to e-cigarette use. The next section explains why this model was chosen and provides a description of the theory.

## **1.1 Theoretical Background**

While theories in general attempt to explain how various factors interact with one another to influence events, health-behaviour models specifically focus on identifying the conditions under which people are more or less likely to engage in health-related behaviours (Conner & Sparks, 2005, Maio & Haddock, 2015; Sharma & Romas, 2012). Examples of such behaviour include exercise, diet, substance (ab)use, smoking (cessation), and condom use. By understanding which factors may promote or hinder people to partake in these activities, researchers can then design and implement programmes with the goal of encouraging/discouraging certain behaviours. Of the various health-behaviour models that have been proposed - for example, the Health Belief Model; Protection Motivation Theory; the Transtheoretical Model; and Social Cognitive Theory - this study focuses on the Theory of Planned Behaviour. The decision to use this particular theory was motivated by three key factors - adaptability, empirical support, and a lack of vaping-related research. One of the advantages of the Theory of Planned Behaviour is the models adaptability. This approach can be readily applied to a multitude of different behaviours and additional variables can easily be incorporated to better suit the activity being examined (Conner & Sparks, 2005, Maio & Haddock, 2015; Sharma & Romas, 2012). This meant that the model could easily be applied to e-cigarette use and I was able to include extra factors that I hypothesized may influence this behaviour (self-concept, social identification, news consumption, nicotine dependence). Another reason I selected this model was the decades of empirical testing confirming its validity (Conner & Sparks, 2005, Maio & Haddock, 2015; Sharma & Romas, 2012). In particular, the theory has been applied to both the initiation and cessation of combustible cigarette use (Lareyre et al., 2021; Topa & Moriano, 2010). While there are some similarities between smoking and vaping (the presence of nicotine and the behavioural component of in/exhalation), it cannot be assumed that a model which has been successfully applied to the former will also be relevant to the latter. Thus, it is important that research specifically examine the efficacy of this model within the context of e-cigarette use. At this point in time, very few studies have sought to determine whether the Theory of Planned Behaviour can be applied to the

activity of vaping (Alber et al., 2021; Aljaberi and Yao, 2021; Dobbs et al., 2020). Within the research that has been conducted, there are some limitations present. A more in-depth discussion of these studies and their limitations will be provided in Chapter Two. These three aspects support my decision to use the Theory of Planned Behaviour within my study. This is not to say that other health-behaviour models could not be applied to e-cigarette use and future research should endeavour to test these approaches. As with other health-related behaviours, it is possible that intentions to begin/cease using e-cigarettes could be explained by multiple different theories and this study seeks to establish the efficacy of one of those theories.

The core premise of the Theory of Planned Behaviour is the notion that intentions, the conscious decision to perform a specific action, are the most important predictor of actual behaviour (Ajzen, 1985, 1991, 2005, 2011). Behavioural intentions are thought to be the product of three core variables – attitudes, subjective norms, and perceived behavioural control (Ajzen, 1985, 1991, 2005, 2011). In this context, an attitude is an individual's belief about the consequences of performing a certain behaviour. These attitudes consist of two factors: (1) *behavioural beliefs* – the belief that performing the behaviour will result in certain consequences, and (2) *outcome evaluations* – the positive or negative assessments of these consequences (Ajzen, 1985, 1991, 2005, 2011; Bohner, et al., 2002; Fishbein & Ajzen, 1975; Montano & Kasprzyk, 2015). If an individual is certain that performing a specific action is likely to result in a positive outcome, they are more likely to possess intentions to engage in that behaviour (Ajzen, 1985, 1991, 2005, 2011; Fishbein & Ajzen, 1975; Montano & Kasprzyk, 2015). In comparison, if a person strongly believes that participating in a particular behaviour will certainly lead to negative outcomes, they are less likely to want to practice the behaviour. It should be noted that behavioural beliefs are a person's perceptions of outcome likelihood, and they may indicate the actual likelihood. It is important that **both** components of the attitude be taken into consideration. For example, a current smoker may perceive the outcome of smoking cessation as being highly desirable, but if they are uncertain that using e-cigarettes will help them to achieve this goal, they are likely to possess weak intentions to try vaping.

Subjective norms also consist of two aspects: (1) *injunctive norms* – whether respondents believe their referents would support them engaging in a behaviour, and (2) *motivations to comply* – the importance of referents' opinions regarding the behaviour (Ajzen, 1985, 1991, 2005, 2011; Fishbein & Ajzen, 1975). In this context, a referent can be defined as a person whose opinion the individual will refer to, for example, a family member, friend, or spouse. It is important to note that these are merely perceptions of what the referents

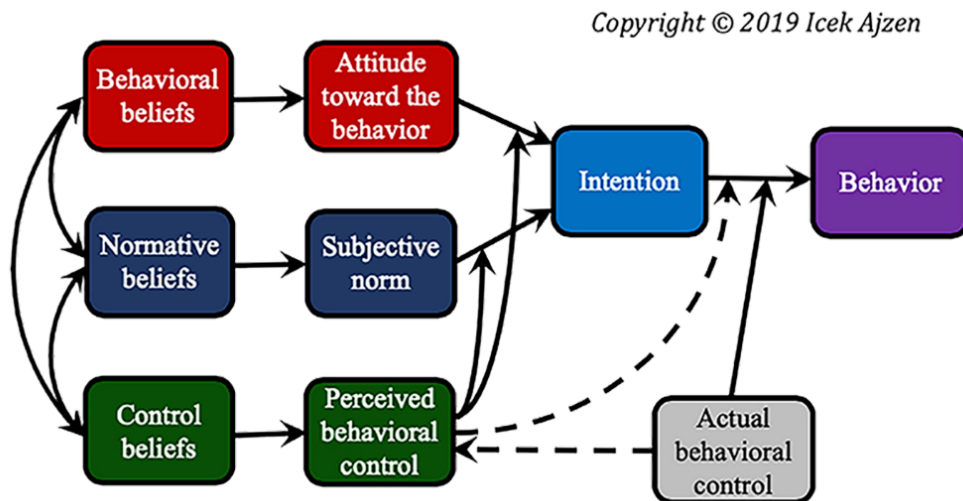
believe; and that they may not accurately represent their actual beliefs (Ajzen, 1991, 1985, 2005, 2011; Fishbein & Ajzen, 1975; Montano & Kasprzyk, 2015). A positive subjective norm occurs when it is believed that the referents view the behaviour of interest favourably and there is motivation to comply with these perspectives. Once again, **both** aspects of subjective norms should be reflected upon. For instance, a teenager may believe that their parents would disapprove of them smoking, however, they may still develop intentions to engage in this activity if they do not consider their parents' beliefs on the topic to be of importance.

Perceived behavioural control refers to the perceived ease or difficulty of performing the behaviour of interest (Ajzen, 2005, 2011; Bohner, et al., 2002; Montano & Kasprzyk, 2015). The two components of this variable are: (1) potential barriers – whether a person believes certain barriers/facilitators prevent/encourage a behaviour, and (2) barrier impact – how great of an impact people believe these barriers/facilitators will have on their ability to engage in the behaviour (Ajzen, 1985, 1991, 2005, 2011; Bohner, et al., 2002; Montano & Kasprzyk, 2015). Taking both factors of perceived behavioural control into account is important. For example, an individual may believe that cigarettes are very expensive, however, if they have the necessary income to pay for these, this cost may not be seen as effecting their ability to smoke. It should be noted that these are a persons' perceptions, and they may or may not accurately indicate the reality of the situation. A person may be physically able to perform a behaviour, for instance, but express weak intentions to do so if they perceive themselves as being unable to.

As it can be seen in Figure 1.1, perceived behavioural control does differ from attitudes and subjective norms. Ajzen (1985, 1991, 2005, 2011) hypothesized that perceived behavioural control could influence intentions and moderate the relationship between behavioural intentions and actual behaviour. Based upon positive attitudes and favourable subjective norms, an individual may possess strong intentions to perform an activity – but these intentions will not lead to a behaviour if the person believes themselves as being unable to complete the action. Fishbein and Ajzen (2010) differentiates between perceived behavioural control and actual behavioural control. The latter refers to whether a person actually possesses the necessary skills/abilities and resources to perform a behaviour and the presence of real-world barriers/facilitators. For many activities, however, measures of actual control are unavailable – so measures of perceived behavioural control are used as a proxy (Fishbein & Ajzen, 2010). To the extent that these perceptions accurately reflect genuine control, they can be used to predict intentions and behaviour.

**Figure 1.1**

*An illustration of the variables within the Theory of Planned Behaviour and their relationships.*



As Figure 1.1 illustrates, it is assumed that attitudes, subjective norms, and perceived behavioural control have the potential to influence each other as well as intentions. As an example, those who have friends/peers that encourage them to smoke (favourable subjective norms) may be motivated to believe that smoking could lead to positive outcomes, such as improved social standing (positive attitudes). Similarly, individuals who strongly believe that smoking will lead to negative consequences (negative attitudes) may prefer to associate with peers who view smoking the same way (negative subjective norms). With regards to individual contributions, Fishbein and Ajzen (2010) state that the relative importance of attitudes, subjective norms, and perceived behavioural control will vary according to the specific behaviour that is being examined, as well as the population being studied. When reviewing a range of meta-analyses, Fishbein and Ajzen (2010) found that the mean correlations of attitudes with intentions ranged from .45 to .60, while the mean correlations between subjective norms and intentions varied between .34 to .42, and the mean correlations between perceived behavioural control and intentions were between .35 to .46. The relevance of these variables is, in part, determined by belief salience. Individuals can possess a wide variety of attitudes, subjective norms, and perceived behavioural controls towards a single behaviour, however, they are unable to attend to all this information simultaneously (Ajzen, 2005, 2011; Fishbein & Ajzen, 2010). In these situations, the most prominent beliefs are thought to be the most significant determinants of intentions and actions (Ajzen, 2005, 2011; Fishbein & Ajzen, 2010). Belief

salience also helps to explain why the same individual may act differently when placed in similar situations – their most salient beliefs may change across these scenarios.

Past research confirms the validity of the Theory of Planned Behaviour with numerous studies presenting empirical support (Armitage & Conner, 2001; Conner & Sparks, 2005; Montano & Kasprzyk, 2015; Sharma & Romas, 2012). For example, in a review of nine meta-analyses, Conner and Sparks (2005) found that attitudes, subjective norms, and perceived behavioural control accounted for one third of behavioural intentions. Furthermore, over a quarter of actual behaviour was explained by behavioural intentions and perceived behavioural control (Conner & Sparks, 2005). Narrowing our focus to a behaviour similar to vaping, there is evidence which demonstrates that this model can be used to predict intentions to initiate and quit combustible cigarette use (Lareye et al., 2021; Topa & Moriano, 2010). Topa and Moriano's (2010) meta-analysis of 27 studies confirmed that participants' intentions to smoke were influenced by attitudes, subjective norms, and perceived behavioural control. Actual smoking behaviour was related to both perceived behavioural control and intentions. The authors found that perceived behavioural control was the best predictor of intentions, followed by subjective norms and then attitudes. Overall, it was concluded that the analysis had proven the predictive validity of the Theory of Planned Behaviour (Topa & Moriano, 2010). Although the findings of smoking-related research cannot be treated as a proxy for vaping, they do demonstrate that the chosen model can be successfully applied to a behaviour similar to e-cigarette use.

## **1.2 Research Questions & Design**

While previous literature has examined specific elements of the Theory of Planned Behaviour within the realm of vaping, very few studies have attempted to test the model in its entirety. As Chapter Two will demonstrate, the current research concerning perceptions of e-cigarettes is limited in several ways. The goal of this thesis is to begin the process of addressing these gaps and provide a more thorough assessment to determine how successfully the Theory of Planned Behaviour predicts intentions to use e-cigarettes. In addition, this study goes beyond the base model and seeks to establish whether additional variables could enhance the predictive utility. With this objective in mind, three research questions were established:

1. *To what extent does the Theory of Planned Behaviour predict intentions to use e-cigarettes?*

2. *Can the predictive capabilities of the model be improved by including additional variables?*
3. *What are the current attitudes, subjective norms, perceived behavioural controls towards e-cigarettes?*

To answer these proposed questions, the current study adopted a mixed methods approach. The project began with a qualitative phase that both preceded and succeeded the quantitative method. The qualitative portion incorporated a thematic analysis of four types of content – 1) reports and other resources published by government health organisations from the United Kingdom and United States, 2) articles published by newspapers based within the United States and United Kingdom, 3) posts made in two vaping-related online forums, and 4) participants' responses to open-ended questions within the survey. The preliminary analyses of the first three sources were used to aid to design and construction of the questionnaire that was employed for the quantitative approach. Using the information obtained via the literature review and thematic analysis, I was able to construct a survey that measured the core variables of the Theory of Planned Behaviour as well as additional ones in an attempt to improve upon the original model. The questionnaire allowed me to determine the predictive utility of the model and quantify the individual contributions made by each component. The preliminary qualitative analysis, along with an examination of responses to open-ended survey questions, then helped to provide explanations for many of the quantitative findings.

### **1.3 Organization of the Thesis**

This thesis contains a total of six chapters. The current section, Chapter One, has focused on providing contextual and theoretical background and establishing the aims of the study. Chapter Two reviews prior, relevant literature and summarizes what is currently known about e-cigarettes in relation to the Theory of Planned Behaviour. In Chapter Three, I describe the methods used to answer my research question – including a description of the instruments used, participants, and data collection and analysis procedures. The results from my qualitative methods are presented in Chapter Four, while Chapter Five outlines my quantitative findings. Chapter Six provides an interpretation and triangulation of these results, highlights the theoretical and practical implications of the study, and identifies areas of interest for future research.

# **Chapter Two – Literature Review**

## **2.0 Chapter Introduction**

This chapter reviews prior academic literature that has focused on the topic of e-cigarettes. The review begins with a brief description of what e-cigarettes are, who uses them and why. My focus then shifts to explaining the physiological side-effects of vaping and then the efficacy of these devices as a tool for smoking cessation. I then describe what the literature has found in terms of attitudes, social norms, and perceived behavioural controls towards e-cigarettes; this is done to establish what we currently know about vaping and the Theory of Planned Behaviour. There is a brief overview of what is known regarding vaping and social identification before the review covers media representations of e-cigarettes and how these may influence perceptions of and intentions to use these products.

The initial phase of the literature review took place during late 2017 and early 2018. I continued to check databases for relevant articles once every six months throughout the remainder of my thesis to allow for newer information to be incorporated. A variety of key phrases were used, including: 'e-cigarettes', 'electronic AND cigarettes', 'vape', 'vaping', 'electronic AND nicotine AND delivery AND systems', and 'ENDS'. In terms of databases, my initial search focused on journal articles published withing 'PsycARTICLES' and 'PsycINFO' before expanding my search to include the entirety of AUT's library database and Google Scholar. Additional searches were conducted using government publication databases for New Zealand, the United Kingdom, and the United States.

## **2.1 E-Cigarettes – What Are They, Who Uses Them, & How Are They Regulated?**

The modern e-cigarette can trace its origins back to a patent submitted in 2003 by a pharmacist and former deputy director of the Institute of Chinese Medicine in Liaoning Province Hon Lik (Britton & Bogdanovica, 2014; U.S. DHHS, 2016). E-cigarettes were introduced to Europe and the United States in 2005 and 2007, respectively (Britton & Bogdanovica, 2014; U.S. DHHS, 2016). These devices have proven to very popular within both markets.

### 2.1.1 Evolution of E-Cigarettes

While there is considerable heterogeneity amongst e-cigarettes, a number of common elements are present within most products (McNeill et al., 2015; U.S. DHHS, 2016). A vaping device will typically contain a re-chargeable lithium-ion battery and an atomiser (heating element) that aerosolises a solution for the user to inhale. These solutions – often called ‘e-liquids’ – typically consist of propylene glycol and/or glycerine, water, flavourings, and nicotine (freebase or nicotine salts) (Britton & Bogdanovica, 2014; McNeil et al., 2015; U.S. DHHS, 2016). The e-liquid is often held in a tank built into the device or in replaceable pods/cartridges. To help frame previous research and to allow for comparisons, the National Academies of Sciences, Engineering, and Medicine [NASEM] (2018) identified four categories of e-cigarettes:

- Single use, disposable products
- Reusable, rechargeable kits that require the replacement of cartridges or pods
- Reusable, rechargeable kits that contain a tank that is designed to be refilled with e-liquid by the user
- Reusable, rechargeable kits that enable users to customise their device – for example, changing the coil of the vape to allow the user to engage in ‘low-resistance vaping’

The order in which these classifications are listed somewhat mimic the chronological changes that e-cigarettes have undergone since their invention. First generation vapes physically resembled combustible cigarettes – which is why they are often called ‘cig-a-likes’ (NASEM, 2018). This design choice was most likely made to attract the interest of smokers who were the intended consumers. Second generation devices increased in size and were typically shaped like pens (NASEM, 2018). Third and fourth generation vapes are arguably the largest yet and are typically square or rectangular in shape. These later generations are the most likely to allow user customization. The most recent e-cigarette designs are very easily distinguished from traditional cigarettes, and this is most likely a deliberate choice so that vapers can separate themselves from smokers. The change in design is why some no longer use the term ‘e-cigarette’ when referring to these devices (McNeill et al., 2020). My thesis will use the terms ‘e-cigarettes’ and ‘vapes’ interchangeably.

### 2.1.2 E-Cigarette Regulation

To provide some context, the paragraphs below briefly review the regulatory environments of e-cigarettes within New Zealand, the United Kingdom, and the United States. The former is relevant as this is where the majority of my sample resided, while the latter two countries are where the newspapers for my qualitative analysis were sourced from. In New Zealand, vaping products are the responsibility of the Ministry of Health's 'Vaping Regulatory Authority'. As of November 2020, vaping and smokeless tobacco products have been regulated under the 'Smokefree Environments and Regulated Products Act 1990' (Te Whatu Ora, 2022). According to the Ministry of Health (2023A), "the Act strikes a balance between ensuring vaping products are available for smokers who want to switch to a less harmful alternative and ensuring these products aren't marketed or sold to young people." Under the Act, several restrictions related to combustible cigarettes were extended to include e-cigarettes (Smokefree Environments and Regulated Products Act 1990). For example, both the sale and supply of vaping products is prohibited to anyone under the age of 18 years. Similarly, e-cigarette use is banned in all workplaces (including bars and restaurants), the buildings and grounds of schools, early childhood education and care centres, and in vehicles carrying children (Te Whatu Ora, 2022). The pre-existing ban on advertisements and sponsorships of tobacco products was also extended to including vaping products (Smokefree Environments and Regulated Products Act 1990). In terms of vaping-specific rules, as of May 2021, retailers and manufacturers could no longer supply or sell any e-liquids that contain a 'colouring substance' (Ministry of Health, 2023C). As of August 2021, retailers who were not Specialist Vape Retailers (those who have at least 60% of their sales from vaping products) were no longer allowed to sell products that contain a 'flavour' (noticeable taste or smell) that is not tobacco, menthol, or mint (Ministry of Health, 2023B, 2023C). Manufacturers and importers must let the Vaping Regulatory Authority know about all vaping, herbal smoking, and smokeless tobacco products they intend to sell within New Zealand. In terms of difference across regions, so long as they meet the minimum requirements of the law, local councils, individual businesses, and workplaces can make their own policies around vaping (Te Whatu Ora, 2022).

In the United Kingdom, e-cigarette products are regulated by the Medicines and Healthcare products Regulatory Agency (MHRA) (Medicines and Healthcare products Regulatory Agency [MHRA], 2022A). Vaping-related legislation is covered by 'The Tobacco and Related Products Regulations 2016'. Those who produce new e-cigarettes and refill containers for these devices are required to submit a notification to the MHRA (MHRA, 2022A). Information within these submissions includes: a list of all ingredients contained

within and emissions resulting from the use of the product, toxicological data regarding the product's ingredients and emissions, and information on the nicotine dose and uptake when consumed under normal or reasonably foreseeable conditions. Before these goods can be sold, the MHRA must publish basic information about the product (submitter name, product ID, brand name(s), brand sub-type name(s), and product type) online (MHRA, 2022A). There are also specific design requirements that vaping products must adhere to. For example, e-cigarette tanks cannot exceed a capacity of 2ml, refill containers for nicotine-containing e-liquids can only hold a maximum of 10ml, and e-liquids cannot exceed a nicotine strength of 20mg/ml (MHRA, 2022B). As with New Zealand, several regulations applicable to combustible cigarettes have also been extended to include e-cigarettes. This includes limiting e-cigarette use to those who are 18 years of age or older, and vaping-related products cannot be advertised via the press, television, or information society services (The Tobacco and Related Products Regulations 2016). It should be noted that the law prohibiting smoking in enclosed workplaces, public buildings or on public transport within the United Kingdom, does not apply to vaping (Health Act 2006). Many employers and business/companies, however, have implemented their own bans of these products.

Within the United States, the Food and Drug Administration (FDA) was granted regulatory authority over all electronic nicotine delivery systems (ENDS) in August 2016 when the 'Deeming Rule' went into effect (U.S. DHHS, 2021A). This rule allowed the FDA to regulate ENDS in the same way that they control cigarettes and smokeless tobacco. This includes authority over the manufacturing, importing, labelling, packaging, advertising, sale, promotion and distribution of ENDS and their components (U.S. DHHS, 2022B). Examples of these parts are cartridges, e-liquids, certain batteries, flavours, and software used in the devices. The United States classifies e-cigarettes as a tobacco product and, as of December 2019, federal law dictates that the minimum age for purchasing tobacco products is 21 (U.S. DHHS, 2022B). Vape manufacturers cannot market their products without FDA authorization. The FDA conducts a premarket review of the products to determine whether they meet the public health standards set by law and establish the risks their use may pose to youth (U.S. DHHS, 2022E). Additionally, to protect children, the FDA issued a policy "against certain unauthorized flavored e-cigarette products that appeal to kids, including fruit and mint flavors" (U.S. DHHS, 2020) It is important to note that while there are some federal laws concerning e-cigarettes, there are also differences in terms of state laws (U.S. DHHS, 2023). For example, 33 states have passed legislation requiring persons to obtain a license or permit prior to selling e-cigarettes over the counter and 30 states currently have legislation that requires e-cigarettes to be taxed. In contrast, only 17 states

have passed comprehensive smokefree indoor air laws that prohibit the use of e-cigarettes in indoor areas of private worksites, restaurants, and bars (U.S. DHHS, 2023).

### **2.1.3 User Demographics & Motivations**

Amongst Western populations, regular e-cigarette use is less prevalent than smoking and relatively uncommon overall (McNeill et al., 2018; McNeill et al., 2019;). Within the United States, for example, approximately 12.5% of the adult population smoke compared to 3.2% who currently use e-cigarettes (Villarroel et al., 2020). Similarly, in Great Britain, approximately 15% of adults smoke in comparison to 6% who vape (McNeill et al., 2021). In New Zealand, 3.2% of individuals used e-cigarettes daily, in contrast to 14.2% who currently smoked (Edwards et al., 2020). Those who do use e-cigarettes are more likely to be men and between the ages of 18 and 34 (McNeill et al., 2019; McNeill et al., 2021; Villarroel et al., 2020). Furthermore, the majority identify themselves as current or former smokers (McNeill et al., 2018; McNeill et al., 2019; Villarroel et al., 2020). While never-smokers may experiment with these devices, transitioning to regular vaping is rare. This pattern is true for adults and youth.

The 2017 'Action on Smoking and Health Smoke-free Great Britain-Adult survey' [ASH-A] found that while 17.5% of British adults had used an e-cigarette at least once, only 6.2% were classified as being current (regular) vapers. Amongst those who did currently vape, 51.6% were ex-smokers, 44.2% were current smokers, and 4.2% were never smokers (McNeill et al., 2018). A survey done with British youths reported a similar trend. While 11.7% of youths (aged 11-18) admitted to having used an e-cigarette once or twice, a much small proportion indicated that they vaped at least once a month (1.8%) or weekly (1.7%) (McNeill et al., 2019). The authors found that 15.8% of current smokers, 3.7% of former smokers, and 0.2% of never-smokers vaped at least one a week.

Within the United States, vaping appears to be less common amongst adults and more popular with youths – the influence of smoking status, however, remains the same. Villarroel et al., (2020) stated that 14.9% of adults had reported having ever used an e-cigarette but current vapers made up only 3.2% of the population. It was found that 9.7% of current smokers, 25.2% of former smokers (who had quit within the past year), and 1.1% of never-smokers were current e-cigarette users. In terms of youth, Tam and Brouwer (2021) stated that current vaping rates amongst high-school students within the United States were 85.8%, 53.6%, and 17.5% for current, former, and never-smokers, respective. The distribution was similar for middle schoolers, with 78.0% of current

smokers, 40.8% of former smokers, and 6.8% of never-smokers being identified as current e-cigarette users (Tam & Brouwer, 2021).

Research within New Zealand has found that while 13.1% of the adult population reports having ever used an e-cigarette, only .08% indicated that they were current users (Li et al., 2015). As with the United Kingdom and the United States, smoking status influences vaping behaviour (Li et al., 2015; Oakly et al., 2019; Walker et al., 2020). Li et al. (2015) found that 49.9% current smokers reported having ever tried an e-cigarette, compared to 8.4% of former smokers and 3.4% of never smokers. Similarly, 4.0% of current smokers indicated that they currently vaped, in contrast to 0.1% of ex-smokers and never smokers (Li et al., 2015). Studies examining youth have discovered comparable patterns (Lucas et al., 2020). Amongst 14- to 15-year-olds, 38% expressed that they had tried e-cigarettes at least once, compared to 1.9% who were daily users. Lucas et al. (2020) reported that 13% of current smokers vaped, in comparison to 5% of experimental or former smokers and 0.5% of never smokers.

While youth and adults appear to follow similar patterns regarding their relationship between smoking status and vaping behaviour, they seem to differ in terms of their motivations for e-cigarette use. Older adults who regularly vape most commonly cite smoking reduction and/or cessation as their primary reason for initiating e-cigarette use (Edwards et al., 2020; Farsalinos et al., 2015; Goniewicz et al., 2013; Khouja et al., 2020; McNeill et al., 2019, 2020, 2021; Schmidt et al., 2014; Vu et al., 2019; Yong et al., 2019). While not as prominent, other explanations that are often given are – reduction in harm (for both the self and others) compared to combustible cigarettes, cheaper alternative to smoking, and enjoyment/pleasure (Khouja et al., 2020; McNeill et al., 2019, 2020, 2021; Schmidt et al., 2014; Vu et al., 2019; Yong et al., 2019). Youths and younger adults (18-25 years old), in comparison, often explain that their use of e-cigarettes is typically motivated by curiosity, enjoyment of flavours, and peer pressure (Biener et al., 2015; Bold et al., 2016; Ickes et al., 2020; Kong et al., 2015; Lucas et al., 2020; Luzius et al., 2020; McNeill et al., 2020; Suris et al., 2015). There is also evidence to suggest that there is a relationship between motivations for initial use and whether individuals continue to vape in the future (Bold et al., 2016; Khouja et al., 2020). Bold et al. (2016) collected two waves of data that were just over a year apart. The authors found that participants who were reported vaping in the first wave were more likely to still be vaping at the follow-up if their reasons for initial use of e-cigarettes were low cost, the ability to use e-cigarettes, and to quit smoking combustible cigarettes. A 2020 study by Khouja et al. found that respondents who vaped at both points of data collection (one year apart) cited that their e-cigarette use was

motivated by smoking cessation, reduction in combustible cigarette consumption, and enjoyment/pleasure. In comparison, those who used e-cigarettes at the time of the first survey but not the second were more likely to state that their vaping had been motivated by curiosity.

Given that many people evidently try e-cigarettes but do not become or stay as regular vapers, researchers have also looked into reasons for discontinuing e-cigarette use. The explanation given seems to vary depending on smoking status. Yong et al. (2019) found that smokers were likely to no longer vape due lack of satisfaction, unhelpfulness with cravings, and unhelpfulness for quitting smoking. In comparison, ex-smokers who no longer used e-cigarettes justified their behaviour change by stating that they no longer needed to vape to stay abstinent from cigarettes, they were no longer satisfied, and safety concerns. When compared to smokers, non-smokers are more likely to discontinue e-cigarette use due to health concerns, parental/family disapproval, the perception that e-cigarettes were 'uncool', and the notion that they were merely experimenting with these devices (Kong et al., 2015; Pepper et al., 2014).

## **2.2 Health Effects of Vaping**

Since their introduction, e-cigarettes have been repeatedly marketed as a healthier alternative to conventional cigarettes (Collins et al., 2019; Payne et al., 2016). It is argued that e-cigarettes may pose fewer risks due to their comparatively smaller list of chemicals/ingredients and the lack of combustion present in the vaping process (Britton & Bogdanovica, 2014). As a result, a considerable portion of previous research has been dedicated to assessing the validity of these claims and establishing the health-related side-effects of vaping. Seeing as my thesis focuses on perceptions of e-cigarettes, an in-depth discussion of this topic is not necessary. Instead, I have focused my efforts on systematic reviews and meta-analyses that have been conducted by others. This allows for conclusions to be reached in a manner that is both efficient and well-supported by prior literature. In terms of scope, this summary centres on the three most prominent areas of research – cardiovascular, oral, and pulmonary/respiratory health. Health-related e-cigarette research assesses the harms of vaping in two different ways – absolute and relative harms. Absolute harms refer to the risks the vaping compared to those of being a non-smoker, whereas relative harms consider the dangers of e-cigarette use in comparison to those associated with smoking (Iles et al., 2021).

### **2.2.1 Cardiovascular Health**

A portion of the physiological research examines the effects of e-cigarette use on cardiovascular health. In terms of absolute harms, previous research repeatedly finds that short-term e-cigarette use can negatively impact cardiovascular health (Eltorai et al., 2019; Kuntic et al., 2020). Common side-effects of vaping are increased [diastolic] blood pressure and heart rate (NASEM, 2018; Byrne et al., 2018; Oh & Kacker, 2014). Furthermore, both observational and clinical trials of e-cigarette inhalation have found significant increases in biomarkers indicative of oxidative stress. Some have theorized that these cardiovascular changes are – at least in part - the result users consuming the nicotine that is typically present within e-liquids (NASEM, 2018; Oh & Kacker, 2014). Due to their inclusion of nicotine, those who use e-cigarettes will always be exposed to the same potential disease burdens that are associated with nicotine use (Oh & Kacker, 2014).

With regards to relative harms, the evidence seems to indicate that the cardiovascular dangers posed by e-cigarettes are less severe than those caused by traditional smoking (Eltorai et al., 2019; Kuntic et al., 2020; McNeill et al., 2018). Research has even suggested that completely transitioning from combustible cigarettes to e-cigarettes can lead to cardiovascular benefits, such as reductions in blood pressure and heart rate vital signs (Byrne et al., 2018; Kuntic et al., 2020). At this point in time, the literature examining the long-term cardiovascular consequences of vaping is sparse and reviews of previous studies repeatedly state that further research is needed in this area (Byrne et al., 2018; NASEM, 2018).

### **2.2.2 Oral Health**

Another area of research that has received considerable attention is oral health and vaping. Compared to **not** smoking, e-cigarette use has been found to adversely affect oral health. Common mouth-related side-effects are irritation, bad breath and taste, burns, black tongue, and oral (mucosal) lesions (Briggs et al., 2021). Frequently cited throat symptoms include tonsillitis, numbness, itching, difficulty swallowing, and tenderness (Briggs et al., 2021). When compared to non-smokers, vapers have higher plaque indexes, greater risk of adverse gingival outcomes, and an increased likelihood of experiencing periodontal disease (Briggs et al., 2021). In addition, exposing head, neck, and oral cells to e-cigarette vapour has been shown to reduce cell viability, abnormal cell morphology, DNA damage, and increased cell death (NASEM, 2018; Wilson et al., 2022).

When considering relative harms, the literature indicates that the oral side-effects of vaping are less frequent and less severe when compared to those associated with

combustible cigarette use (Briggs et al., 2018; NASEM, 2018; Wilson et al., 2022). For example, those who use e-cigarettes are less likely than smokers to develop periodontal disease, possess lower plaque indexes, and are at lower risk of gingival outcomes (Briggs et al., 2021). As with cardiovascular health, most of the research examining vaping and oral health is short-term and more long-term studies are required.

### **2.2.3 Pulmonary Health**

Pulmonary, or respiratory health, can also be affected by e-cigarette use. The evidence regarding the types of risks and their severity is mixed. In a 2014 literature review by Hajek et al., it was argued that the available research did not suggest that short-term vaping was associated with clinically significant changes to airway resistance or lung function. NASEM's 2018 review concluded that there was insufficient evidence to determine whether e-cigarette use can lead to respiratory diseases in humans. In a more recent review, however, Wills et al. (2020) stated that e-cigarette use was associated with asthma and chronic obstructive pulmonary disease.

Eltorai et al. (2019) noted that research has found that exposure to e-cigarette vapour can result in cellular morphology, oxidative stress, and cytotoxicity. These effects are typically significant – but are generally smaller in size when compared to the consequences of smoking combustible cigarettes (Eltorai et al., 2019). There is also evidence to suggest that switching from combustible cigarettes to e-cigarettes may lead to small improvements in lung function, in the short term (Byrne et al., 2018; NASEM, 2018). Based on their 2020 review, Goniewicz et al. concluded that, compared to current smokers, former smokers who had transitioned to e-cigarettes experienced 40% lower odds of respiratory outcomes.

### **2.2.4 Summary**

Due to the relative recency of vaping, the majority of the literature to date has focused on the short-term effects of e-cigarette use. Of the research that has been conducted, the evidence seems to suggest that short-term vaping negatively affects an individual's cardiovascular, oral, and pulmonary health. The severity of these side-effects is debated, however, most of the data indicates that they are not as acute as those associated with smoking. Some studies have found that completely transitioning from combustible cigarettes to e-cigarettes may lead to improvements in these areas of health. Researchers agree that more long-term evidence is required before any solid conclusions can be reached. Several authors have also stressed that the heterogeneity of e-cigarettes and related paraphernalia weakens the generalizability of previous research and makes

meaningful comparisons between studies difficult (Eltorai et al., 2019; Holliday et al., 2021). Furthermore, it is important to recognise that the definition of 'use' can vary across research, which further hinders efforts to compare studies.

## **2.3 E-Cigarettes & Smoking Cessation**

Along with claims of being safer than combustible cigarettes, advertisements for e-cigarettes often assert that these products can be used as a tool for smoking reduction and/or cessation (Collins et al., 2019; Payne et al., 2016). Researchers have cited a number of factors which could help to explain why e-cigarettes may be not only an effective cessation tool but potentially even superior to other methods available. A core argument is the notion that, unlike most government approved nicotine replacement therapies, the process of vaping mimics the behavioural sequence of traditional smoking. That is, using an e-cigarette replicates the hand-to-mouth movement as well as the actions of inhalation and exhalation (Barbeau et al., 2013; Lam & West, 2015; Rahman et al., 2015). The customizability of e-liquids is also seen as a point in favour of e-cigarettes. While other cessation tools can be purchased in different nicotine strengths and flavours, customers have no control over what options are available and the choices are limited. When vapers mix their own e-liquids, however, they have access to a much greater variety of nicotine concentrations and flavours. This enhances their ability to select a flavour that they prefer and means that they wean themselves from nicotine at a pace that is best suited to them (Barbeau et al., 2013; Etter, 2016, 2018; Lam & West, 2015). Unlike other cessation approaches, there is also a strong social component present within vaping. Similar to how smoking is often seen as a group activity, many vapers express that they enjoy the social aspect of e-cigarette use and those within the vaping community offer support to one another with cessation attempts (Barbeau et al., 2013; Simmons et al., 2016).

The paragraphs below examine whether cessation claims hold merit. Similar to my description of health-related research, my thesis does not require an in-depth review of this topic. Consequently, I have once again kept my focus mostly on previous literature reviews and meta-analyses to help ensure that well-supported conclusions can be reached efficiently.

### **2.3.1 Evidence in Favour of E-Cigarettes**

The majority of the empirical evidence, to date, indicates that individuals can (and have) successfully use e-cigarettes as a way to achieve smoking cessation (Glasser et al., 2017; Grabovac et al., 2021; Hartmann-Boyce et al., 2021B; McNeill et al., 2021). In their review of 61 studies involving a total of 16,759 adult smokers, Hartmann-Boyce et al. (2021B)

estimated that “for every 100 people using nicotine e-cigarettes to stop smoking, 9 to 14 might successfully stop” (p.3). Similarly, when the Joanna Briggs Institute (2019) examined nine randomized controlled trials, they found smoking cessation rates via nicotine e-cigarettes ranged from 8.1% to 17.7%. The research shows that, under certain conditions, – vaping can be successfully employed as a smoking cessation tactic.

One of these conditions is the presence of nicotine. Studies have repeatedly demonstrated that e-cigarettes containing nicotine achieve better results than those without nicotine (sometimes called placebo e-cigarettes) (Grabovac et al., 2021; Hartmann-Boyce et al., 2021; Joanna Briggs Institute, 2019; Rahman et al., 2015; Zhang et al., 2021). The Joanna Briggs Institute (2019) reviewed four randomized controlled trials that compared placebo e-cigarettes to those with nicotine; and found that smoking cessation was achieved by 4.3% of participants in the nicotine-free conditions compared to 8.1% of those whose e-cigarettes contained nicotine. Similarly, Grabovac et al. (2021) examined 21 studies and concluded that, compared to those who received placebo e-cigarettes, the proportion of participants who achieved smoking abstinence was 1.71 times higher in the nicotine vaping conditions. The ability for nicotine to improve cessation rates is expected since most cessation tools are designed with the intention of displacing a person’s nicotine addiction from combustible cigarettes to another source.

Another component that seems to impact the efficacy of e-cigarettes as a smoking cessation tool is the frequency with which these devices are used. There is evidence to suggest that smokers who vape more frequently experience greater success with their cessation attempts (Biener & Hargraves, 2015). Biener and Hargraves (2015) found that participants who used e-cigarettes intensively (daily for at least one month) were six times more likely to report smoking cessation at a two-year follow up than respondents who had only experimented with vaping. A 2019 study by Brandon et al. reported that participants who preferred tobacco flavoured e-liquids possessed lower smoking cessation propensity, indicating that the flavour a person chooses may also impact their ability to quit smoking.

Whether e-cigarettes perform on par with approved nicotine replacement therapies is a question that some researchers have attempted to answer. While a small number have argued that the two approaches achieve similar results (Pound et al., 2021; Waghel et al., 2015), most literature reviews have concluded that vaping (for some) may be a more effective way of reaching smoking cessation (Grabovac et al., 2021; Hartmann-Boyce et al., 2021; Joanna Briggs Institute, 2019; Zhang et al., 2021). After assessing three randomized

controlled trials, the Joanna Briggs Institute (2019) reported that 8.1% of respondents who received nicotine replacement therapy had abstained from smoking compared to 13.8% of those who were provided with nicotine containing e-cigarettes. Grabovac et al. (2021) concluded that the proportion of abstinent smokers was 1.69 times higher in vapers compared to respondents who were given nicotine replacement therapies.

### **2.3.2 Evidence Against E-Cigarettes**

Although less frequent, some reviewers have argued that e-cigarettes are an ineffective cessation tool (Heydari et al., 2017). In a review of 69 articles dedicated to the topic of vaping and smoking cessation, Heydari et al. (2017) categorised the studies into 'support' and 'not support'. The authors determined that while 24 of the studies provided support for the use of e-cigarettes as a cessation tool, the remaining 45 did not. Beyond being ineffective, some researchers have suggested that the use of e-cigarettes may work against smoking cessation (El Dib et al., 2017; Kalkhoran & Glantz, 2016). El Dib et al. (2017) reviewed nine cohort studies and found that the evidence suggested that vaping may be associated with a reduction in quit rates. Similarly, Kalkhoran and Glantz (2016) examined 20 studies and reported that, compared to those who did not use e-cigarettes, the odds of quitting combustible cigarettes were 28% lower amongst those who vaped.

### **2.3.3 Summary**

The majority of previous literature reviews and meta-analyses have concluded that e-cigarettes can assist with smoking cessation. In terms of efficacy, e-cigarettes perform just as well – if not better – than government approved nicotine replacement therapies. This success, however, does appear to be contingent upon certain conditions. Authors of these reviews caution that further longitudinal research is needed to confirm whether e-cigarettes can achieve long-term smoking abstinence. Similar to research that examines the health effects of vaping, it can be difficult to compare smoking cessation studies as the definition of 'use' varies considerably. Furthermore, given the plethora of devices, it can be difficult to generalise these findings from specific products to e-cigarettes as a whole. Many of these studies are also limited by the fact that they rely upon self-reported smoking cessation. Given the stigma attached to combustible cigarettes, it is possible that some respondents may exaggerate or lie about their success when participating in these studies.

## **2.4 Attitudes Towards E-Cigarettes**

Amongst the three variables thought to predict behavioural intentions, attitudes are the component that has been most thoroughly assessed by past vaping-related research. This

section focuses on identifying what current attitudes towards e-cigarettes are and whether such perceptions are correlated to intentions or actual vaping.

#### **2.4.1 Perceptions of Vaping-Related Harms**

The most common method of measuring attitudes towards e-cigarettes is examining perceptions of harm. Studies typically refer to perceptions of 'absolute' and 'relative' harm. Absolute harms are gauged by asking participants to indicate, overall, how dangerous they perceive e-cigarettes to be (Iles et al., 2021). Relative harms, however, are investigated by asking respondents how dangerous they believe vaping to be in comparison to conventional cigarettes (Iles et al., 2021). Some researchers may measure the perceived absolute harms of smoking and vaping, and then compare to two during their analyses (Berg et al., 2015; Cooper et al., 2016).

There is reason to believe that perceptions of both absolute and relative harm could influence intentions to use e-cigarettes. It is theorized that non-smoking youth/young adults who perceive vaping to carry few risks will be more open to trying e-cigarettes (Chaffee et al., 2015; U.S. DHHS, 2016). If e-cigarettes are seen as safer alternative to smoking, this may encourage experimentation from those who may wish to engage in risk-taking behaviour but are unwilling to try combustible cigarettes. For smokers, if vaping is seen to be as harmful as -or more harmful than - conventional cigarettes, they may be less inclined to consider using these devices in future cessation attempts (McNeill et al., 2018).

For absolute harms, previous research demonstrates that most people believe that e-cigarette use is associated with some form of risk (Berg et al., 2015; Goniewicz et al., 2013; Jiang et al., 2019; Laurene et al., 2019; Naidoo et al., 2021; Vogel et al., 2021). For example, Goniewicz et al. (2013) presented participants with the question '*Do you think that e-cigarettes are safe for your health?*' and only 15.0% of the sample selected the option '*Yes, they are absolutely safe.*' Similarly, Berg et al. (2015) asked respondents to indicate on a 7-point scale (*not at all...extremely*) how harmful to their health they believed e-cigarettes to be. The overall sample scored an average of 4.26 which suggests a general understanding that vaping is associated with moderate risks.

In terms of relative harms, most of the literature indicates that e-cigarettes are perceived to be safer than combustible cigarettes (Abadi et al., 2017; Adkison et al., 2013; Allem et al., 2016; Amrock et al., 2016; Berg et al., 2014; Berg et al., 2015; Brose et al., 2015; Chaffee et al., 2015; Choi & Forster, 2013; Choi & Forster, 2014; Cooper et al., 2016; Goniewicz et al., 2013; Harrell et al., 2015; Lotrean, 2015; Manzione et al., 2020; McNeill et al., 2015;

Popova et al., 2018; Tan & Bigman, 2014). Choi and Forster (2013), for example, had participants express their agreement with the claim '*e-cigarettes are less harmful than cigarettes*' on a 5-point Likert scale (*strongly agree...strongly disagree*). Among the respondents who were aware of e-cigarettes, over half (52.9%) agreed that vaping is less harmful than smoking. A 2016 study by Amrock et al. reported that, of the respondents who had an opinion, nearly 73.0% viewed e-cigarettes to be less harmful than their combustible counterparts. Researchers often attribute these beliefs to marketing campaigns and advertisements which repeatedly claim that vaping is a safer alternative to combustible cigarettes (U.S. DHHS, 2016). As demonstrated by my earlier review, however, there appears to be empirical evidence to support these claims and beliefs – which is not always acknowledged by the studies assessing attitudes.

While the majority of respondents consistently express the belief that e-cigarettes pose fewer dangers than combustible cigarettes, there is research which indicates that this majority is shrinking in size (Huang et al., 2019; Majeed et al., 2015; McNeill et al., 2018). At the same time, it appears that the number of people who see vaping as being equally or more dangerous than smoking has risen. Between 2012 and 2015, the proportion of individuals who perceived e-cigarettes to be as equally harmful as combustible cigarettes rose from 11.5% to 35.7%, while those who thought vaping was more dangerous than smoking increased from 1.3% to 4.1% (Majeed et al., 2015). Likewise, McNeill et al. (2018) report that while 54.4% of respondents believed e-cigarettes to be less harmful than vaping in 2015, this number had dropped to 44.2% in 2017. At the same time, the proportion of those who perceived vaping to be as dangerous rose from 19.8% to 22.7%, and those who thought e-cigarettes carried greater risks increased from 2.3% to 3.1%.

Many of the studies that examine perceptions of harm do not specify which types of harm they are interested in; they simply ask participants how harmful they perceive e-cigarettes to be (Adkison et al., 2013; Ambrose et al., 2014; Amrock et al., 2015; Cooper et al., 2016; Donaldson et al., 2021; Jongenelis et al., 2019; Malt et al., 2020; Pearson et al., 2012). Some researchers, however, have identified the particular harms they wish to assess. The two most common risks that have been examined are the perceived addictiveness of vaping and the perceived risks of exposure to second-hand aerosol. For the former, studies have found that participants generally believe vaping to be addictive – but less so than combustible cigarettes (Amrock et al., 2016; Berg et al., 2015; Goniewicz et al., 2013; Gorukanti et al., 2017; Harrell et al., 2015; Jiang et al., 2019; Naidoo et al., 2021). For instance, Goniewicz et al. (2013) found that over half (60.0%) of their sample perceived e-cigarettes to be addictive but not as addictive as smoking, while approximately a third

(33.0%) felt that vaping was just as addictive as traditional cigarettes (Goniewicz et al., 2013). Only 7% thought vaping was not at all addictive. In 2019, Jiang et al. asked participants to indicate on a 0-10 visual analogue scale (*not at all addictive ... extremely addictive*) how addictive they thought e-cigarettes were. Respondents were provided with the same scale and asked about the perceived addictiveness of combustible cigarettes. The findings showed that respondents viewed vaping to be rather addictive – but significantly less so than smoking. Like perceptions of harm, research suggests that beliefs regarding the addictiveness of vaping are also shifting. Between 2012 and 2015, the proportion of adults who perceived e-cigarettes as being addictive more than doubled in size (32.0% to 67.6%) (Majeed et al., 2015).

With regards to the risks of second-hand vapour, studies have shown that people believe e-cigarette aerosol is harmful, but not as dangerous as second-hand smoke (Jiang et al., 2019; Tan et al., 2016; Tan et al., 2017). In a 2016 study conducted by Tan et al., it was found that 38.9% of respondents agreed that breathing the vapours from other people's e-cigarette use would be harmful to their health, compared to the 19.0% who disagreed with this statement. At the same time, 39.3% agreed that second-hand vapour is less harmful than second-hand smoke, while 22.4% did not believe this to be the case. When asked to rate the dangers of e-cigarette aerosol on a 0-10 visual analog scale (*not harmful ... extremely harmful*), Jiang et al.'s participants averaged a rating of 6.93, which indicates that these individuals perceived second-hand vapour to be moderately harmful. In contrast, the same respondents averaged a score of 9.11 when asked to estimate the harms of second-hand smoke on the same scale.

#### **2.4.2 Perceptions of Vaping-Related Benefits**

Compared to perceived harms, opinions regarding the benefits of vaping have not been as extensively researched. While beliefs that vaping is dangerous may discourage e-cigarette use, perceptions that vaping will lead to favourable outcomes could (theoretically) encourage individuals to use e-cigarettes. From the limited literature, the most researched benefit is the potential for e-cigarettes to be used as an aid for smoking cessation (Berg et al., 2014; Choi & Forster, 2013; Gorukanti et al., 2017; Tan et al., 2016). If smokers believe that e-cigarettes are an effective cessation tool, they may be more likely to incorporate them into future quit attempts. Furthermore, if non-smokers see vaping to be a useful cessation aid, they may demonstrate more support for friends and family members who use them during quit attempts.

Prior studies suggest that perceptions regarding the efficacy of e-cigarettes are mixed (Berg et al., 2014; Choi & Forster, 2013; Gorukanti et al., 2017; Lotrean, 2015; Tan et al., 2016). In 2014, Berg et al. asked participants to express their agreement (*strongly agree...strongly disagree*) with two statements '*E-cigarettes have been shown to help smokers quit*' and '*E-cigarettes help people cut down on cigarettes or quit smoking.*' The study found that the vast majority agreed with both the former (80.6%) and latter (97.2%) claims. Nearly two thirds (66.4%) of participants in Lotrean's (2015) study (partially) agreed that e-cigarettes can assist smokers with cessation attempts. When Li et al. (2013) asked a group of current smokers and recent quitters whether they would use e-cigarettes to help them quit smoking, over half (58.1%) of the sample said they would. In comparison, when Tan et al. (2016) presented the statement '*Vaping or using e-cigarettes can help people quit smoking regular cigarettes completely*' 32.8% agreed, 26.9% disagreed, and 35.5% chose the response of 'no opinion.' A 2013 investigation by Choi and Forster found that less than half of the participants (44.5%) agreed that e-cigarettes can help people quit smoking.

As predicted by the Theory of Planned Behaviour, favourable attitudes towards vaping are associated with increased behavioural intentions to use e-cigarettes. If participants express strong beliefs that e-cigarette use is harmful, they are less likely to possess intentions to vape in the future (Alber et al., 2021; Aljaberi & Yao, 2021; Chaffee et al., 2015; Dobbs et al., 2020; Trumbo & Harper, 2013; Trumbo & Harper, 2015). In contrast, respondents who do not perceive vaping to be a dangerous behaviour are more likely to demonstrate intentions to use e-cigarettes in the future. Only one study was found that concluded perceptions of harm were **not** directly associated with intentions to use e-cigarettes (Jongenelis et al., 2019). Previous research also shows that there is a relationship between past behaviour and attitudes towards vaping. Specifically, individuals who have used e-cigarettes prior to or at the time of data collection are more likely to hold positive perceptions of vaping and/or are more likely to believe that e-cigarettes are less harmful than combustible cigarettes (Amrock et al., 2015; Barker et al., 2019; Chudech & Janmailmool, 2021; Czoli et al., 2014; Gaiha et al., 2022; Gorukanti et al., 2017; Kale et al., 2020; Laurene et al., 2019; Lotrean, 2015; Popova et al., 2018; Ruther et al., 2016; Vogel et al., 2021). Never-users, in comparison, are more likely to express strong beliefs that e-cigarette use is harmful. Those who previously or currently smoke combustible cigarettes are also more likely to view vaping as being safer than smoking (Ambrose et al., 2014; Brown et al., 2014; Pearson et al. 2012). There is some evidence to suggest that perceptions of harm can predict subsequent e-cigarette use (Brose et al., 2015; Choi & Forster, 2014). Both Brose et al. (2015) and Choi and Forster (2014) found

that participants who believed vaping to be less harmful than smoking were more likely to have used e-cigarettes at a later follow-up. Those who believe that vaping can assist with smoking are also more likely to experiment with e-cigarettes at a follow-up (Choi & Forster, 2014).

### **2.4.3. Summary**

Previous research has often focused on using perceptions of harm to gauge attitudes towards e-cigarettes. Studies have found that while participants believe vaping to be associated with some form of risk, this behaviour is seen as less dangerous than smoking combustible cigarettes (Berg et al., 2014; Berg et al., 2015; Brose et al., 2015; Chaffee et al., 2015; Choi & Forster, 2014; Goniewicz et al., 2013; McNeill et al., 2015; Tan & Bigman, 2014). A topic that has received less attention is the perceived benefits of e-cigarette use. Much of the research in this area focuses on whether people believe vaping to help with smoking cessation, and the results in this area are mixed (Berg et al., 2014; Choi & Forster, 2013; Gorukanti et al., 2017; Tan et al., 2016). When examining the link between attitudes and behavioural intentions, past literature confirms that participants possess stronger intentions to try vaping when they believe that potential risks are low and/or the potential benefits are high (Alber et al., 2021; Aljaberi & Yao, 2021; Chaffee et al., 2015; Dobbs et al., 2020; Trumbo & Harper, 2013; Trumbo & Harper, 2015). Research has also shown that individuals who have previously vaped, or currently vape, are more likely to hold favourable perceptions of e-cigarettes (Barker et al., 2019; Chudech & Janmailmool, 2021; Gaiha et al., 2022; Kale et al., 2020; Laurene et al., 2019; Popova et al., 2018; Ruther et al., 2016; Vogel et al., 2021).

While these studies provide some indication as to current attitudes towards e-cigarettes, there are limitations that should be addressed in future research. A main concern is the lack of depth within previous scales. Many studies have chosen to measure perceptions with a single item that fails to specify the type of harm and/or the recipient of the harm (Adkison et al., 2013; Ambrose et al., 2014; Brose et al., 2015; Brown & Allison, 2021; Donaldson et al., 2021; Jongenelis et al., 2019; Tan & Bigman, 2014). For example, Tan and Bigman (2014) presented the item '*Compared to smoking cigarettes, would you say that e-cigarette cigarettes are...much less harmful/less harmful/just as harmful/more harmful/much more harmful.*' It is unclear if respondents are meant to estimate the harms to themselves, others, or both. Another issue is the absence of context within items. It is uncommon for researchers to include components of time and/or frequency in their measurements (Chaffee et al., 2015; Laurene et al., 2019; Manzione et al., 2020; Popova et al., 2018). Most researchers have merely asked participants if they believe vaping is

dangerous – without specifying if they are referring to regular use or experimentation with these devices. Fishbein and Ajzen (2010) explain that behaviours should not be too narrowly defined to ensure that they are theoretically and practically significant, however, it is important to include information such as the target and context of the behaviour of interest. With regards to vaping, participants' harm beliefs may be influenced by how often an e-cigarette is used. Regular or daily use of a device is arguably more likely to be associated with greater perceptions of risk than experimentation. These are gaps that my study addresses by developing items that differentiate between different harms, specify the recipient of harm, as well as the hypothetical frequency of the behaviour in question.

## **2.5 E-Cigarettes & Subjective Norms**

After attitudes, subjective norms are the next most often researched component of the Theory of Planned Behaviour within e-cigarette literature. This section focuses on identifying what current subjective norms towards e-cigarettes are and whether such perceptions are correlated to intentions or actual vaping.

### **2.5.1 Injunctive Norms & Motivations to Comply**

In the context of vaping, injunctive norms refer to whether participants believe that others approve of e-cigarettes. Some studies asked participants about the perceptions of vaguely defined groups (e.g., society overall or 'people who mean a lot to me') (Brown & Allison, 2021; Dobbs et al., 2019; Phua, 2019A, 2019B), while others focus on the opinions of specific referents – with the most common ones being parents, friends, and/or peers (Abadi et al., 2017; Amin et al., 2021; Berg et al., 2015; Peters et al., 2013; Ruther et al., 2016). Respondents are questioned either about referents' perceptions of vaping in general (Berg et al., 2015; Jongenelis et al., 2019; Peters et al., 2013) or whether referents would approve of them specifically using e-cigarettes (Abadi et al., 2017; Dobbs et al., 2019; Trumbo & Harper, 2013, 2015). It is worth noting that, like attitudes, studies that assess social norms sometimes compare the perceived acceptance of vaping to that of smoking.

Perceptions regarding the social acceptance of vaping could theoretically influence peoples' intentions and behaviour. If non-smoking youth believe that their friends and family would prefer them to vape rather smoke, they may be more open to engaging in this activity in the future (Fite et al., 2018). Similarly, if smokers think that their referents would support their decision to use e-cigarettes rather than combustible cigarettes, this could motivate them to transition from the latter to the former.

Most of the available evidence indicates that participants believe both referents and society in general to be somewhat accepting of e-cigarettes (Abadi et al., 2017; Alber et al., 2021; Amin et al., 2021; Berg et al., 2015; Trumbo & Harper, 2013, 2015). For example, Amin et al. (2021) found that 62.7% and 65.9% of respondents agreed that the people they live with and those they work/study with would approve of e-cigarettes, respectively. Similarly, the majority (61%) of Abadi et al.'s (2017) sample (strongly) agreed that their friends would approve of them vaping. Peters et al. (2013) found that 49% of participants felt that their friends approve of e-cigarettes. On the other hand, Dobbs et al.'s (2019) respondents disagreed that their closest friends and most people important to them would approve and support their decision to use e-cigarettes. Likewise, Jongenelis et al. (2019) indicated that their participants believed that referents would disapprove of them using e-cigarettes. In terms of relative social acceptance, most studies find that participants believe their referents would prefer them to vape rather than smoke (Abadi et al., 2017; Berg et al., 2015; Fite et al., 2018; Jongenelis et al., 2019). Abadi et al. found that respondents were more likely to agree that their friends would support them vaping (61%) rather than smoking (30%). Likewise, participants within Jongenelis et al.'s (2019) study expressed that people important to them would disapprove of smoking more so than vaping. In contrast, Berg et al. (2015) found that respondents perceived e-cigarettes to be somewhat socially acceptable – but less so than combustible cigarettes.

Motivations to comply with the perceptions of referents is a topic that only a few studies have sought to examine within e-cigarette research (Alber et al., 2021; Trumbo & Harper, 2013, 2015). Alber et al. (2021) incorporated two items that could be interpreted as measuring motivations to comply with the perceptions of others – *'When it comes to things like e-cigarettes, it is important for me to follow the wishes of my [closest friends/doctor].'* The results indicated that participants saw the opinions of their closest friends as being neither important nor insignificant, whereas perceptions of respondents' doctors were perceived to be somewhat important. Research by Trumbo & Harper (2013; 2015) required participants to express their level of agreement (*5-point response scale, strongly agree...strongly disagree*) with the statement *'When it comes to things like e-cigarettes it is important for me to follow the wishes of my [closest friends/most people I know/my closest family members].'* The article did not provide descriptive statistics for the individual items nor for the specific factor of motivations to comply. Both injunctive norms and motivations to comply were combined into 'perceived norms'; and the results for that variable indicated that respondents felt that social norms somewhat discouraged them from vaping (Trumbo & Harper, 2013; 2015).

In terms of injunctive norms and motivations to comply predicting intentions to use e-cigarettes, the available literature has mixed results (Alber et al., 2021; Amin et al., 2021; Brown & Allison, 2021; Jongenelis et al., 2019; Trumbo & Harper, 2013; Trumbo & Harper, 2015). Alber et al. (2021) found that positive perceptions of vaping and higher social acceptance of e-cigarettes are positively associated with greater intentions to use e-cigarettes. Likewise, Amin et al. (2021) reported that vaping intentions were positively associated with the belief that study/work peers would approve of e-cigarette use. Brown and Allison (2021) stated that subjective norms were positively related to intentions to vape among former smokers. In contrast, Jongenelis et al. (2019) reported that perceived social pressure to vape did not influence respondents' intentions to use e-cigarettes in the future. Similarly, Trumbo and Harper's (2013, 2015) investigations indicated that perceived social norms (a combination of injunctive norms and motivations to comply) did not predict participants' intentions to try or use e-cigarettes. Most of the evidence seems to suggest there may be a relationship between subjective norms and actual e-cigarette use (Amin et al., 2021; Fite et al., 2018; Trumbo & Harper, 2013, 2015; Ruther et al., 2016). Amin et al. (2021) noted that past and current vaping were positively associated with the belief that study/work peers would approve of e-cigarettes. In comparison, participants who felt that their social contacts would disapprove of vaping had lower rates of ever using an e-cigarette (Amin et al., 2021). In both their 2013 and 2015 investigations, Trumbo and Harper concluded that perceived social norms were positively associated with having ever used an e-cigarette. Similarly, Fite et al. (2018) found that perceived parental attitudes towards vaping were positively associated with self-reported e-cigarette use. Agarwal et al. (2018), however, reported that the perceived social acceptability of vaping was not a predictor of e-cigarette initiation.

### **2.5.2 Descriptive Norms**

While subjective norms focus on participants' beliefs of how others view a particular behaviour, descriptive norms are referents' actual behaviour. Within the current context, this refers to whether participants' referents use e-cigarettes. Of the relevant studies that could be found, evidence was mixed regarding the prevalence of vaping amongst referents (Dobbs et al., 2019, 2020; Donaldson et al., 2021; Gorukanti et al., 2017; Jiang et al., 2019; Lotrean, 2015; Vogel et al., 2021). Gorukanti et al. (2017) reported that e-cigarette use by mothers (8.16%) and fathers (7.87%) was fairly uncommon, and siblings (15.43%) were more likely to have vaped in the past. Participants indicated that vaping was most common amongst their closest friends (32.28%). Similarly, Lotrean's (2015) sample was more likely to indicate that their friends had tried e-cigarettes (59.7%) compared to

parents (6.3%) and siblings (6.5). When Dobbs et al. (2020) assessed descriptive norms, nearly half of the respondents stated that four or five of their closest friends vaped or smoked, whereas only one in four respondents had a family member who vaped. In 2019, however, Dobbs et al. found that respondents disagreed that their closest friends and most people like themselves would buy and use e-cigarettes. Similarly, when Jiang et al. (2019) asked respondents to indicate on a 0-10 (*not at all popular...extremely popular*) visual analog scale how popular e-cigarettes were amongst their peers, the average response was 2.62 – this suggests that this sample perceived vaping to be rather unpopular. In terms of relative descriptive norms, Donaldson et al.'s (2021) participants indicated that vaping was more common amongst their friends than smoking, whereas respondents in Fite et al.'s (2018) study claimed that their siblings were more likely to smoke than vape.

The available evidence as to whether descriptive norms influence intentions to vape is mixed (Dobbs et al., 2020; Jiang et al., 2019). Both Dobbs et al. (2020) and Jiang et al. (2019) concluded that others' e-cigarette use does not predict participants' intentions to vape. In comparison, Dobbs et al. (2019) found that, when combined with injunctive norms, descriptive norms were positively associated with intentions to use e-cigarettes. Jongenelis et al. (2019) reported that having a larger number of friends who smoked combustible cigarettes was positively associated with intentions to vape. With regards to actual behaviour, the limited research suggests that descriptive norms are associated with past or current e-cigarette use. Respondents who have referents in their lives who vape or those who perceive e-cigarettes to be popular are more likely to have used e-cigarettes themselves (Gorukanti et al., 2017; Jiang et al., 2019; Ruther et al., 2016). Vogel et al. (2021) reported that participants had a greater likelihood of vaping nicotine in the past month if they had more friends themselves had vaped nicotine in the past month. Cardenas et al. (2015) and Gorukanti (2017) noted that participants are more likely to have tried vaping if they have referents in their lives who smoke combustible cigarettes. In terms of initiation, McDermott et al. (2020) found that seeing e-cigarette use in public 'at least some days' predicted initiation of e-cigarette use, but seeing close friends vape did not. Lotrean (2015) reported that participants were more likely to have experimented with e-cigarettes if they had friends who themselves had previously vaped; however, e-cigarette use by parents and siblings did not have the same influence.

### **2.5.3 Summary**

A number of studies have examined the social norms of vaping, typically focusing on injunctive and descriptive norms. The evidence suggests that participants believe vaping to be somewhat socially acceptable (Abadi et al., 2017; Alber et al., 2021; Amin et al., 2021;

Berg et al., 2015; Trumbo & Harper, 2013, 2015), and vaping is seen to be more common amongst friends rather than parental figures (Dobbs et al., 2020; Gorukanti et al., 2017; Lotrean, 2015). With regards to intentions, the literature is uncertain as to whether injunctive norms influence intentions, and studies indicate that descriptive norms do not predict intentions to use e-cigarettes. Descriptive norms are, however, related to actual behaviour; individuals who see others vaping (including friends and family, and society in general) are more likely to be past or current vapers themselves. Similarly, injunctive norms are associated with actual e-cigarette use – those who believe that others would approve of them vaping are more likely to have previously/currently vaped.

In addition to mostly ignoring motivations to comply, there are other limitations present within the available literature on social norms. As with those that examined attitudes, the items used to measure this construct would benefit from greater specificity. Participants' beliefs regarding the support of their friends and family may differ depending on how often frequently they use e-cigarettes. For example, it is possible that respondents would anticipate their parents reacting more negatively to them vaping on a regular basis as opposed to merely experimenting with these devices. Furthermore, there are some referents whose perceptions have been mostly ignored by prior research – doctors and dentists. Given that vaping is a health-related behaviour, this seems like an important gap to address. My thesis will contribute towards the literature by including the perceived beliefs of doctors and dentists, specifying the frequency of vaping within questions, and measuring motivations to comply with the opinions of referents.

## **2.6 E-Cigarettes & Perceived Behavioural Control**

Amongst the three variables thought to predict behavioural intentions, perceived behavioural control has received the least attention within vaping-related research. This section will describe what limited information is available regarding perceptions of behavioural control and whether they influence e-cigarette intentions and activity.

Despite the lack in research, it is plausible to theorize that perceptions of behavioural control could influence participants' intentions to vape. For example, non-smoking youth may demonstrate less interest in e-cigarettes if they believe that they will have trouble finding a place that would sell them a device despite their status as a minor, or if they think that underage vaping could result in them being punished. In comparison, it is desirable that smokers see e-cigarettes as an affordable and easily accessible tool to potentially increase their use as a cessation tool.

The available evidence suggests that individuals perceive themselves as having some control over their ability to use e-cigarettes (Alber et al., 2021; Dobbs et al., 2020). Alber et al. (2021) assessed perceived behavioural control by asking respondents to express the strength of their agreement with four different statements. These items examined whether participants saw themselves as being able to access e-cigarettes, in control of their use of e-cigarettes, and the effect of other peoples' opinions on their vaping behaviour. The results showed that respondents agreed that they could easily access an e-cigarette and had control of whether they vaped (Alber et al., 2021). Based upon the Reasoned Action Approach, Dobbs et al. (2019) sought to develop an instrument to measure recreational e-cigarette use. Perceived behavioural control was measured via 5 items with participants responding on a 7-point semantic differential scale. Descriptive statistics for this variable were not provided and all five items were removed from the final model due to poor factor loadings and cross-loading with other factors during the exploratory factor analysis. In 2020, Dobbs et al. did a more in-depth assessment of perceived control by measuring two components – autonomy and capacity – measured by six and three items, respectively. Examples of the autonomy items were: *'I have complete control over using e-cigarettes in the next three months to quit smoking'* and *'How much control do you have over using e-cigarettes in the next three months to quit smoking?'* One of the capacity items was: *'If you wanted to use e-cigarettes in the next three months to quit smoking, do you believe that you have the skills to use e-cigarettes?'* Respondents saw themselves as being in control over their use of e-cigarettes, believed that friends being supportive or vaping themselves would make it easier to vape, and saw themselves as being capable of using e-cigarettes as a smoking cessation tool (Dobbs et al., 2020). Aljaberi and Yao (2021) stated that they measured perceived behavioural control with scales that employed a 4-point Likert scale (*strongly disagree...strongly agree*) – but the article did not include any further details or examples of the items used nor did it outline any descriptive statistics.

Phua (2019A) measured perceived behavioural control in reference to quitting e-cigarettes. Three items examined whether participants felt it would be easy to quit vaping and if they believed themselves as having control over quitting. The researchers did not provide any results for the overall sample, but they did report that participants who were exposed to more forms of e-cigarette marketing expressed lower behavioural control over their ability to quit e-cigarettes. Similarly, Pulvers et al. (2021) asked a sample of JUUL (a specific brand of e-cigarettes) users how difficult they perceived cessation to be and their confidence in being able to quit JUUL. There were no descriptive statistics, but the study found that respondents who reported using their JUUL soon after waking up, as opposed

to later in the day, were less confident that they could quit and expressed stronger beliefs it would be difficult to quit JUUL.

With regards to the relationship between intentions and perceived behavioural control, the limited findings are mixed. Aljaber and Yao (2021) reported that respondents with greater perceptions of control over their ability to use e-cigarettes were more likely to possess intentions to vape in the future. In comparison, Dobbs et al. (2020) and Alber et al. (2021) concluded that perceived behavioural control did not predict intentions to vape or use e-cigarettes as a smoking cessation tool.

Past vaping-related research has predominately ignored the perceived behavioural control component of the Theory of Planned Behaviour. Furthermore, the literature so far has been inconclusive about its effects on intentions to vape and actual e-cigarette use. Based upon the information provided in previous studies, there has not yet been an attempt to break down this variable into its two components (as outlined by the theory) – whether certain barriers exist in the context of vaping and the perceived impact of these barriers. It also appears that certain barriers have not yet been explored. For example, none of the studies have examined perceptions regarding the cost of vaping. My thesis will begin the process of addressing these limitations by incorporating perceptions of behavioural control, examining the two components that make up this variable, and by considering barriers that other studies have not.

## **2.7 Social Identity & E-Cigarette Use**

The rise of vaping-related social media forums and in-person events (such as conventions) emphasize the social nature of this activity (similar to how smoking is a social behaviour) and such a factor may influence intentions to use e-cigarettes. For example, individuals may express strong intentions to continue using e-cigarettes if they develop strong connections to other vapers and associate positive emotions with their group membership. Social identity as a ‘vaper’, however, is a topic that has received relatively little attention from e-cigarette research (Donaldson et al., 2021; Phua, 2019A, 2019B; Phua et al. 2018).

During a series of semi-structured interviews with 30 adult vapers, Tokle (2020) reported having identified different ‘vaper identities’, “ranging from ambivalent, pragmatic substitute users to dedicated vapers engaged in the hobby and of vaping as a sub-culture” (p.113). The author reported that participants who felt as though they were part of a vaping community described feeling more confident and prouder of their e-cigarette use;

whereas substitute users were more defensive and pragmatic and saw their vaping as a private activity. Simmons et al. (2016) interviewed 31 e-cigarette users and found that approximately a third of the sample strongly identified as 'vapers.' The researcher noted that both the explicit verbal responses and non-verbal behaviours of the participants indicated that they felt a sense of community and belongingness with other e-cigarette users.

In 2021, Donaldson et al. compared the attitudes, norms, and behaviours of e-cigarette users who self-identified as 'vapers' to those of 'non-vapers'. To determine a participants' vaper identity, they were asked the question 'Do you call yourself a vaper?' The study found that the descriptive norms and perceived harms of e-cigarettes were significantly related to vaper identity. Participants were more likely to self-identify as vapers if they had more friends who used e-cigarettes and perceive e-cigarettes to be less harmful. Vapers and 'non-vapers' also differentiated in how they used their devices. Respondents who were identified as vapers reported using their e-cigarettes more often and took a greater number of puffs/hits per use.

Phua et al. (2018) examined how the type of endorser used in a vaping advertisement may influence attitudes towards and intentions to use e-cigarettes. As a part of this study, the researchers measure participants' identification with the endorser featured in the advertisement. It was reported that social identification moderated the relationship between endorser trustworthiness and endorser type. Celebrity endorsers were found to be more trustworthy when identification was low, but non-celebrities were seen to be more trustworthy when identification was high. When Phua (2019A) considered how different types of marketing may influence intentions to quit e-cigarettes, they also included a measure of social identification. This measure, however, measured identification as an e-cigarette user. Social identification was found to moderate the relationship between marketing exposure and behavioural control. High exposure to advertising in combination with higher identification resulted in greater behavioural control. In comparison, a lack of marketing exposure combined with high identification led to lower behavioural control. Similarly, the relationship between advertisement exposure and intentions to quit vaping was also moderated by social identification. Greater identification resulted in lower intentions to quit when respondents were not exposed to marketing, and higher intentions to quit when they were exposed to advertisements. Phua (2019B) assessed the relationship between social identification as a vaper and intentions quit e-cigarettes. It was reported that stronger identification with other e-cigarette users

led to increased negative attitudes towards vaping cessation and reduced intentions to quit e-cigarettes.

There is evidence to suggest that e-cigarette use is a social activity and identification as a vaper and engagement with other vapers may influence perceptions and intentions towards e-cigarettes. The previous literature is limited, however, and additional research is required. This thesis provides another contribution to the available evidence.

## **2.8 Media Representations of E-Cigarettes**

Several studies have examined the effects of media consumption on intentions to use e-cigarettes and several more have assessed the correlation between media consumption and actual use. Most of the literature has focused on establishing whether advertisements and health warnings can influence attitudes towards and intentions to use e-cigarettes. There is concern that e-cigarette marketing, using the same tactics previously employed by the tobacco industry, may encourage non-smoking youth to try vaping and become addicted (U.S. DHHS. 2016). Studies that examine warning labels typically focus on their ability to discourage individuals from using e-cigarettes, similar to how health messages have been used on combustible cigarette packaging (Owusu et al., 2020). This section will review how e-cigarettes have been represented in media and whether these portrayals affect perceptions of and intentions to use e-cigarettes.

### **2.8.1 Marketing & Advertisements**

Research that has examined the topic of vaping-related marketing typically focuses on two areas of interest – the themes and tactics employed within e-cigarette advertisements and whether advertisements can influence intentions to use e-cigarettes. For my review, the focus will remain primarily on the latter as this is subject is more relevant to my own research.

Analyses of e-cigarette marketing generally focus on digital, print, and television advertisements. These studies repeatedly identify similarities between the strategies used to promote e-cigarettes and those that were previously employed to sell combustible cigarettes (Collins et al., 2019; Payne et al., 2016). Payne et al. (2016) identified 22 studies/publications that discussed the issue of e-cigarette advertising. This narrative review found that vaping advertising closely resembled market strategies used by the tobacco industry. For example, increasing product availability both stores near to colleges and retailers within more deprived areas, as well as incorporating celebrities into advertisements. Likewise, Collins et al.'s (2019) review of 80 marketing-related articles

identified parallels between the tactics used to sell combustible and e-cigarettes. This included incorporating themes that appeal to youth, price promotions, and the placement of advertisements across media and retail channels. There are, however, themes that appear to be unique to vaping advertisements. The two most prominent ones being – e-cigarettes are a safer/healthier alternative to conventional cigarettes and e-cigarettes can be used as a smoking cessation tool (Collins et al., 2019; Payne et al., 2016).

Research has demonstrated that exposure to vaping advertisements can influence attitudes towards and intentions to use e-cigarettes (Amin et al., 2020; Duke et al., 2016; Farrelly et al., 2015; Stroup & Branstetter, 2018; Villanti et al., 2016; Vogel et al., 2020). The evidence at this stage indicates that viewing promotional material can result in more favourable perceptions of e-cigarettes and increased intentions to vape. In a randomized controlled experiment, Farrelly et al. (2015) compared a control group, to participants who were shown four different e-cigarette television advertisements. Respondents who viewed the advertisements reported greater intentions to try vaping within the next year and were more likely to try an e-cigarette if offered one by a best friend. Respondents who saw the advertisements expressed stronger beliefs that e-cigarettes are less toxic, and a safer alternative compared to combustible cigarettes. In a similar experiment, Duke et al. (2016) investigated the relationship between perceptions of vaping advertisements and attitudes toward and intentions to use e-cigarettes amongst a sample of never vapers. Among the participants who viewed the advertisements, greater perceptions of the advertisements' effectiveness were associated with more favourable attitudes towards vaping and greater intentions to use e-cigarettes. Villanti et al. (2016) examined whether exposure to print advertisements influenced perceptions, intentions, and subsequent e-cigarette use in a sample of young adults. Compared to the control group, advertisement exposure was associated with greater curiosity to try vaping and greater likelihood of having tried an e-cigarette at follow-up among respondents who had previously never used e-cigarettes.

The strategy/tactic used within an advertisement is noted to have some effect on participant responses (Banerjee et al., 2016; Phua et al., 2018; Pokhrel et al., 2016). Pokhrel et al. (2016) assigned participants to one of three conditions – a control group or one of two possible e-cigarette advertisements (one that focused on harm-reduction and another that centred on social enhancement). When compared to those in the control condition, participants who viewed the social enhancement advertisement were 2.8 times more likely to be open to using an e-cigarette in the future. Respondents who received the harm-reduction advertisements expressed significantly stronger implicit attitudes

towards e-cigarettes as a safer alternative to combustible cigarettes than those from the control condition. In 2016, Banerjee et al. examined whether the persuasiveness of print advertisements was influenced by the type of framing used within the commercial. Two different framing approaches were used – comparative-framing highlighted the differences between the advertised product and combustible cigarettes while similarity-framing focused on the congruences between the product and conventional cigarettes. Former and current smokers indicated that comparative-framing advertisements were more persuasive than similarity-framing advertisements and expressed greater intentions to try e-cigarettes after being exposed to commercials that used comparative framing. Phua et al. (2018) investigated whether the type of endorser used in e-cigarette advertisements influenced attitudes towards and intentions to try vaping. Participants were assigned to one of three conditions – celebrity, non-celebrity, and product only. The study found that, compared to advertisements with non-celebrity endorsers or those showing only the product, advertisements with celebrities significantly increased positive attitudes towards vaping and intentions to try e-cigarettes.

There is evidence to suggest that the frequency/volume of exposure may impact the effects of advertisements (Giovenco et al., 2016; Wang et al., 2020). Amongst a sample of never-vapers, Wang et al. (2020) found that exposure to advertisements was associated with being tolerant towards e-cigarettes, uncertain about the harms of vaping, and susceptible to e-cigarette use. The magnitude of these associated increased as the number of types (broadcast media, online media, print media, etc.) of advertising rose (Wang et al., 2020). Phua (2019A) examined whether attitudes towards e-cigarettes and intentions to quit vaping were influenced by vape marketing via social media sites. Three forms of marketing were examined – sponsored advertisements, brand pages, and user-created groups. It was found that exposure to all three types of marketing had a significant additive effect, with respondents who saw all three holding the most negative attitudes towards vaping cessation as well as the lowest intentions to quit e-cigarettes (Phua, 2019A). Giovenco et al. (2016) examined the relationship between e-cigarette marketing near schools and vaping amongst youth. The researchers visited all stores within a half-mile of selected school and collected data regarding the number of vaping advertisements on each store’s interior and exterior, as well as the availability of e-cigarettes. It was found that “both e-cigarette retailer density and advertising volume significantly increased the probability of a student being a past-month user” (Giovenco et al., 2016, p.633).

## 2.8.2 Health Warnings

Health-related warning labels have been used to discourage individuals from smoking combustible cigarettes for decades (Owusu et al., 2020). Based upon this same premise, researchers have sought to determine if incorporating warning messages into e-cigarette advertisements or onto product packaging could deter people from using these devices. The majority of the literature has found that warning labels have the potential to increase perceptions of risk and reduce intentions to use e-cigarettes (Farrell & Hamby, 2019; Kimber et al., 2020; Mays et al., 2016; Owusu et al., 2020; Pepper et al., 2019; Sanders-Jackson et al., 2015).

Farrell and Hamby (2019) assessed whether different varieties of warning labels could influence perceptions of vaping. The researchers incorporated three different health warnings into e-cigarette advertisements – 1) a brief statement of harm, 2) a more in-depth description of harm, and 3) a more in-depth description which specified that harm would be caused to the user. Compared to respondents who viewed an advertisement that contained no health-related statement, exposure to any of the three warning labels increased participants' risk perceptions of vaping (Farrell & Hamby, 2019). A 2020 study by Owusu et al. found comparable results. For this study, the control condition was compared to four varying e-cigarette messages. These messages incorporated themes similar to those used in anti-smoking messages – 1) uncertainty regarding ingredients, 2) harmful effect of chemicals, 3) costs of vaping, and 4) distrust of the tobacco industry. Results demonstrated that all four harm messages increased respondents' perceived harms of vaping while simultaneously lowering intentions to use e-cigarettes (Owusu et al., 2020). The study by Sanders-Jackson et al. (2015) also used anti-smoking themes in their investigation into the impact of warning statements in e-cigarette television advertisements. Two types of warnings were examined – reference to the ingredients of e-cigarettes/e-liquids, and unscrupulous behaviour by the tobacco industry. It was found that the ingredient warning had **no** impact on participants' risk perceptions of e-cigarettes, but both types of messages were able to reduce intentions to purchase e-cigarettes. Compared to those in the control condition, respondents exposed to the industry warning rated e-cigarettes as significantly more harmful (Sanders-Jackson et al., 2015).

The content/framing of a warning message appears to influence its effect upon attitudes and intentions. Kimber et al. (2020) compared the effect of a nicotine addiction warning to that of a comparative harm message (a statement that vaping is less harmful than smoking). Both smokers and non-smokers perceived e-cigarettes to be more harmful and

addictive after being exposed to the nicotine addiction message, in contrast those who received no warning. When compared to the no message condition, smokers experienced reductions in harm perceptions after receiving the comparative harm message. Exposure to the comparative harm statement, rather than the nicotine addiction warning, increased smokers' intentions to purchase an e-cigarette during the next month (Kimber et al., 2020). Similarly, in 2019, Pepper et al. compared the effects of two health statements – 1) a control message which was a short factual statement about e-cigarettes, and 2) an uncertainty message that included the control message plus an explanation as to why vaping-related research is inconclusive or limited. The study found that, compared to those who viewed the control message, participants who read the uncertainty message rates e-cigarettes as being less risky. Exposure to either statement, however, did **not** influence intentions to try vaping in the near future or intentions to quit using e-cigarettes in the next six months (Pepper et al., 2019).

It also seems that warning labels are most effective when they are not accompanied by promotional/advertising material. Mays et al. (2016) assigned participants to one of three conditions – 1) advertisement only, 2) advertisement with a warning label, and 3) warning label only. Compared to those in the other two conditions, respondents who only received the warning reported significantly greater perceptions of harm and addictiveness, as well as more thoughts about not using e-cigarettes. The 'advertisement only' and 'advertisement with a warning' conditions did not differ on these outcomes. Liu et al (2021) and Mays et al. (2016) used eye tracking and heat-mapping task data to follow participants' focus when viewing advertisements that contain health warnings. Both studies confirmed that respondents were not drawn to the warning labels and instead paid more attention to promotional content. Liu et al (2021) also found that the amount of attention allocated to the health warnings did not influence attitudes towards or intentions to use the product. In comparison, the more attention ever-vapers allocated to the promotional material, the more favourably they perceived the product.

### **2.8.3 Social Media**

There are a number of studies that have sought to examine how exposure to social media influences attitudes towards and intentions to use e-cigarettes, however, many of these have focused on vaping-related advertisements that are featured on social media platforms. Since the topic of marketing has already been discussed in a previous section, this portion will focus mostly on content that is not classified as 'advertisements.'

Previous research has identified a relationship between social media consumption and attitudes towards e-cigarettes (Choi et al., 2019, Pokhrel et al., 2018, 2021; Vogel et al., 2020). In 2019, Choi et al. asked a sample of adolescents how often they used four different social media platforms and how often they were exposed to e-cigarette messages (advertisements and pictures of people vaping) via these channels. The researchers reported that there were significant, positive associations between attitudes towards e-cigarette use and exposure to vaping-related messages via Instagram and Snapchat. In comparison, e-cigarette messages via Facebook and YouTube did not influence attitudes to vaping (Choi et al., 2019). Pokhrel et al. (2018) questioned participants how often they used six different social media platforms and how often they had seen vaping-related posts and advertisements via these platforms. Respondents were then asked how (un)likely to it was that e-cigarette use would lead to four different positive outcomes – social enhancement, positive ‘smoking’ experience, affect regulation experience, positive sensory experience. The study found that greater e-cigarette exposure via social media was associated with higher positive outcome expectancies. Using the same instruments in 2021, Pokhrel et al. found “that greater exposure to social media e-cigarette content at baseline was positively and significantly associated with increased positive e-cigarette use outcome expectancies at six-month follow up” (p.4). Vogel et al. (2020) reported that participants who indicated using social media (in general) more intensely in their daily lives expressed more favourable attitudes towards e-cigarettes, lower perceptions of harm, and stronger beliefs that vaping is a normative behaviour.

Prior studies have also found that use of e-cigarettes is associated with social media consumption (Hebert et al., 2017; Pokhrel et al., 2018, 2021; Sawdey et al., 2017). Hebert et al. (2017) asked youths if, during the past month, they had been exposed to posts about tobacco/e-cigarettes via social media sites and whether they had actively engaged in tobacco/e-cigarette social media. The study reported that e-cigarette users and dual users were significantly more likely to be exposed to vaping-related social media content. Participants who were susceptible to, had previously engaged in, or currently practiced dual use demonstrated greater odds of engaging in tobacco/e-cigarette social media (Hebert et al., 2017). Sawdey et al. (2017) asked participants how often, during the previous six months, they themselves had posted about e-cigarettes, their friends posted about e-cigarettes, and they had seen vaping advertisements. It was found that respondents who had greater exposure to peer posts about e-cigarettes were significantly more likely to have ever used or be a current user of e-cigarettes (Sawdey et al., 2017). Similarly, Pokhrel et al. (2018) reported that participants who experienced higher exposure to vaping-related social media content were also more likely to be current e-

cigarette users. The 2021 study by Pokhrel et al. found that greater exposure to social media content with associated with increased odds of having initiated e-cigarette use at a one-year follow up.

There is evidence to suggest that vaping-related social media content may influence intentions to use and quit e-cigarettes (Phua, 2019B; Vogel et al., 2020). In a 2020 experiment, Vogel et al. manipulated the amount of 'peer-generated' content a participant was exposed to. Respondents in the 'heavy' condition viewed 3 unrelated posts and 3 e-cigarette posts, and those in the 'light' condition viewed 5 unrelated posts and 1 e-cigarette post. It was found that participants exposed to the 'heavy' condition expressed more positive attitudes towards e-cigarettes and greater intentions to use these devices. The study also reported that greater intensity of social media use in daily life was associated with stronger intentions and willingness to use e-cigarettes (Vogel et al., 2020). Phua (2019B) sought to determine if attitudes and intentions towards quitting e-cigarettes were influenced by active participation in vaping-related social media communities. The majority (69.5%) of the sample were classified as being 'active members' of vaping-related social media communities, while the remaining respondents (30.5%) used social media but were not active members. Results demonstrated that, compared to those who didn't, participants who joined and participated in e-cigarette social media communities possessed negative attitudes towards quitting e-cigarettes and lower intentions to quit vaping (Phua, 2019B).

#### **2.8.4 Newspapers**

Of the different media facets, newspaper representations of vaping have received the least attention from researchers. From the limited studies, the focus has often remained on how e-cigarettes are portrayed in news stories or whether these representations influence audience members perceptions of and intentions to use e-cigarettes.

With regards to how e-cigarettes are represented by newspapers, most of the research has focused on news stories published within China, the United Kingdom, or the United States. Using a sample of 476 articles, Sun et al. (2018) investigated how Chinese newspapers covered the topic of e-cigarettes over a 12-year period. From the analysis, four topics featured most prominently – tobacco control/regulation, youth vaping, nicotine/constituents/features, and the tobacco market/industry (Sun et al., 2018). A later study done by Lyu et al. (2021) analysed a sample of 639 Chinese news stories that reported on the topic of e-cigarettes between 2014 and 2019. The most prominent themes

were the health effects of vaping, regulation, and usage of e-cigarettes. Less common were articles that discussed the issues of smoking cessation, youth, and industry development.

Research conducted by Rooke and Amos (2014) found similar themes within newspapers from the United Kingdom. Analyses of 119 articles published between 2007 and 2012 recognized five recurring themes – risk and uncertainty, healthier choice, getting around smokefree legislation, price, and celebrity use. It was noted that while most articles often presented a more ‘balanced’ approach – identifying both positives and negatives of these devices – the overall coverage leaned towards more positive themes, highlighting reasons to use e-cigarettes (Rooke & Amos, 2014). Patterson et al. (2016) examined content from 104 British newspaper articles to determine how often different stakeholders were cited and their stances towards vaping regulation. Results indicated that government and regulatory bodies were the most frequently cited stakeholders and uniformly support vaping-related regulation. Arguments against e-cigarette regulation were greatly outnumbered by those that supported it; and the most supported regulations were those regarding purchasing age, regulating e-cigarettes as medicine, and restricting marketing. Stakeholder disagreement was more likely when discussing whether to prohibit e-cigarette use in enclosed public spaces. Those who advocated for regulation typically referred to concerns about the safety of vaping products and child protection. Opponents of regulation were more likely to cite the potential for e-cigarettes to aid smoking cessation and would question the evidence regarding the health-related harms of vaping.

Algiers et al. (2021) examined newspaper coverage of the 2019 e-cigarette/vaping associated lung injury (EVALI) outbreak within the United States. Despite initial concerns that nicotine was the cause, lab testing eventually confirmed that EVALI cases were likely linked to vitamin E acetate being used in informal THC products – with the brand ‘Dank Vapes’ being named as a likely source of exposure. The analysis by Algiers et al. (2021) included 417 articles that were published from April to December 2019. It was found that over three quarters (77%) of the articles provided updates regarding the number of EVALI cases and deaths, however, only a fifth (20%) described EVALI symptoms. The brand ‘Dank Vape’ was rarely mentioned (4%). Once the CDC altered their stance and no longer recommended that the public avoid all vaping products, articles were significantly less likely to promote the idea that readers should quit vaping entirely or express that nicotine caused EVALI.

Of the limited research that is available, there is evidence to suggest that news content may influence perceptions of vaping. In 2019, Duong and Liu implemented a 2x2 between-subjective factorial design to assess how individuals’ descriptive norm perceptions of real-

world vaping were influenced by exposure to e-cigarette related news articles. The researchers found that participants who were exposed to articles that suggested vaping was popular were more likely to adopt this normative perspective; and the opposite was true for those who read articles which suggested e-cigarettes were uncommon (Duong & Liu, 2019). Kikut et al.'s (2020) study examined the association between youth perceptions of vaping and media references to e-cigarette flavours. A content analysis spanning three years of Twitter posts, newspaper articles, and news story transcripts was conducted, with a specific focus on content related to e-cigarette flavours. During the same period, researchers measured participants' perceptions of e-cigarette taste. The study found that "high level of recent e-cigarette flavour coverage on both Twitter and longform media was associated with the belief that e-cigarettes taste good" (Kikut et al., 2019, p.647). Morgan et al. (2021) sought to examine how former/current smokers' perceptions of vaping were influenced by the national news coverage of the EVALI outbreak in the United States. The results of two online surveys were compared, with the first study being conducted prior to extensive news coverage of EVALI and the second study taking place after cases and deaths featured prominently in the news. Compared to the first study, respondents in the second were more likely to agree that e-cigarettes were 'risky' and more likely to cause lung damage when compared to combustible cigarettes (Morgan et al., 2021).

A 2017 study by Tan et al. suggests that previous vaping behaviour may influence the how participants respond to e-cigarette news headlines. The authors exposed participants to one of four possible conditions - positive, negative, conflicting (both positive and negative), or no headlines. The study found that never vapers exposed to the negative condition expressed weaker beliefs about the benefits of e-cigarettes and stronger beliefs about the harms of vaping, when compared to the positive condition. Never vapers in the conflicting condition also reported weaker benefit beliefs about vaping than those in the positive condition. In contrast, the perceptions of both past and current vapers were not influenced by the valence of the headlines.

Wackowski et al. (2019) examined if intentions to continue vaping were influenced by how often participants were exposed to vaping-related news stories and whether these stories were perceived to be mostly positive, mostly negative, or an even mix of the two. Participants from England had lower odds of news exposure compared to those from the United States and Canada. Compared to English respondents, American participants were significantly more likely to report exposure to mostly negative news stories. The study found that participants were more likely to believe that vaping causes harm if they had

been exposed to mostly negative news, as opposed to mostly positive news stories. With regards to intentions, amongst participants who had used e-cigarettes in the past 30 days, there were greater intentions to quit vaping in the next month if they were exposed to mostly negative news content (Wackowski et al., 2019).

### **2.8.5 Summary**

The previous sections have demonstrated that vaping-related advertisements, health-warning labels, and social media content can influence perceptions of and intentions to use e-cigarettes. Exposure to advertisements and social media content can create more favourable perceptions of vaping and increase peoples' intentions to use e-cigarettes; whereas warning-labels are able to increase risk perceptions and dissuade individuals from wanting to vape. Information regarding the influence of news consumption is very limited. Despite knowing their potential influence, I was unable to locate a previous study that has attempted to incorporate media consumption into the Theory of Planned Behaviour in the context of vaping. This thesis addresses this gap by examining whether attention to and the perceived credibility of vaping-related news can improve upon the Theory of Planned Behaviour when applied to e-cigarette use. Furthermore, the thematic analysis conducted during the design phase of my project enables me to compare news representations of e-cigarettes within the United Kingdom and the United States – another area that has been ignored by previous research.

## **2.8 Chapter Conclusion & Research Hypotheses**

By summarizing previous research, this chapter has helped to frame the context in which the current study takes place. This review has established what we currently know about the attitudes, subjective norms, and perceived behavioural controls towards e-cigarettes. There has been evidence that all three of these components influence intentions to vape, however, very few studies have attempted to examine all three and fully apply the Theory of Planned Behaviour to e-cigarette use (Alber et al., 2021; Aljaberi & Yao, 2021; Dobbs et al., 2019; Dobbs et al., 2020). Most literature focuses on attitudes and/or social norms, with perceived behavioural control generally being ignored. Prior studies also possess a number of limitations – several of which my study addresses. Based upon the findings of the available literature, I was able to develop four hypotheses for my own study (see below). The next chapter describes the methods that were used to collect my data and establish whether my hypotheses were supported.

H1. Compared to non-users, participants who currently use e-cigarettes will express more favourable attitudes towards vaping.

H2. Compared to non-users, respondents who currently use e-cigarettes will perceive chosen referents as being more supportive of them vaping.

H3. Compared to non-users, participants who currently use e-cigarettes will believe that they have stronger control over their ability to access and use e-cigarettes.

H4. Compared to non-user, respondents who currently use e-cigarettes will express greater intentions to vape over the next six months.

# Chapter Three: Methods

## 3.0 Chapter Introduction

The chapters prior to this have summarized the previous research, identified gaps within the literature, and outlined the aims and questions of the current study. This chapter focuses on describing the methods used to achieve those aims and answer those questions. First, I describe and justify both the chosen paradigm and design of the study. After that, the chapter is split into two halves – one each to explain the qualitative and quantitative methods.

## 3.1 Research Paradigm

The concept of scientific paradigms was developed in Thomas Kuhn's 1962 text '*Structure of Scientific Revolutions*'. According to Epstein (2012), Kuhn "maintained that scientific observations are always embedded in some broad context consisting of the theoretical premises, methods and practices used by a particular community, or generation, of scientists" (p.22). Kuhn suggested that an individual's choice of paradigm is made based on both logical and sociological reasons (Epstein, 2012). This includes the questions being proposed and the methods chosen to answer these queries.

While numerous paradigms exist, they each possess four shared features: methodology, epistemology, axiology, and ontology (Davies & Fisher, 2018). Methodologies are the procedures used by researchers to study their chosen topics, including the rationales behind these processes. Epistemology centres on questioning 'how we know what we know' and whether the knowledge we obtain is reliable or not (Epstein, 2012; Scotland, 2012). Axiology refers to the values that exist within a study (Davies & Fisher, 2018; Scotland, 2012); in particular, how one's own biases may influence the project. Ontology covers the nature and characteristics of reality (Davies & Fisher, 2018). This is concerned with the assumptions researchers make about the societies and cultures that they research.

For this study, I adopted a post-positivist paradigm. Post-positivism is considered to be a developed version of 'positivism'. In the context of research paradigms, 'positivism' can be defined as the notion that the world around us can be empirically and objectively measured (Epstein, 2012). Post-positivism endorses the positivist perspective of attempting to objectively measure reality while also acknowledging that such observations can be flawed and influenced by theory. Those that employ a post-positivist

paradigm adhere to a 'critical realist ontology' - this is the recognition that while a single reality may exist, we cannot know it for sure (Creswell, 2009; Davies & Fisher, 2018). In terms of epistemology, post-positivists recognize that complete objectivity is not possible; this is known as a 'modified objectivist epistemology' (Davies & Fisher, 2018). The axiology of this paradigm acknowledges that researcher bias is inevitable, and it is the responsibility of the investigator to identify and correct these biases<sup>1</sup>. With regards to methodologies, post-positivists often make use of 'triangulation' (Davies & Fisher, 2018). Triangulation is the recognition "that using different approaches allows the weaknesses of one approach to be offset by the strength of another" (Davies & Fisher, 2018, p.22; Guest & Fleming, 2015). In my study, triangulation was achieved by employing a mixture of both quantitative and qualitative methods.

### **3.2 Research Design**

In-line with the post-positivist paradigm, the current study adopted a mixed-methods approach. A mixed-methods research design uses both quantitative and qualitative elements in tandem to create an approach that can provide a more comprehensive understanding of an issue than a mono-method can (Creswell, 2009; Creswell & Plano Clark, 2018; Guest & Fleming, 2015). While a mixed-methods approach is not always warranted, Creswell and Plano (2018) explain that research projects which require more than one source of data are typically suited for mixed methods. Within the current study, due to the relative recency of e-cigarettes, there was a need to first explore the topic qualitatively before proceeding with a quantitative approach (Creswell & Plano Clark, 2018; Guest & Fleming, 2015).

The qualitative methods in this study included a thematic analysis of text from a variety of sources – including questions from my own survey, publications by government health-organisations, and newspaper articles. While this phase continued to take place during the survey data collection, it began before the quantitative as it was crucial in influencing the design of the questionnaire. As explained by Fishbein and Ajzen (2010), when constructing a survey to test the Theory of Planned Behaviour, "as a first step, we would conduct formative research to elicit salient behavioral, normative, and control beliefs" (p.184). My thematic analysis, in tandem with my literature review, helped me to identify these beliefs. By guiding the design and construction of my survey, which was needed in order to test the model and the inclusion of other variables, the qualitative methods played an important role in answering my first two research question. The results from

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<sup>1</sup> The biases relevant to my project are described in Chapter Six during the description of the study's limitations.

the qualitative analyses also provided explanations for certain quantitative findings, helping to offset the lack of depth that was present in the quantitative data (Creswell & Plano Clark, 2018) In particular, the qualitative findings identified various reasons why participants held differing perceptions of e-cigarettes. This ensured that my third research question was sufficiently answered.

The quantitative approach was necessary to test the predictive utility of the Theory of Planned Behaviour (Fishbein & Ajzen, 2010). This part of the study employed an anonymous, online survey that contained a total of ten sections. The first portion of the questionnaire measured the variables necessary to test my chosen model – attitudes, subjective norms, behavioural controls, intentions, and actual behaviour. The second part included four variables that were incorporated to see if they could improve upon the original Theory of Planned Behaviour. The use of quantitative methods enabled me to determine the amount of variance (of intentions) explained by the three original factors as well as the individual contributions made by the additional four variables. The quantitative approach allowed for the theory to be tested and strength of the relationships between variables to be established, which could not be done via qualitative methods (Creswell & Plano Clark, 2018; Guest & Fleming, 2015). Testing the original theory and additional variables were both necessary to answer all three proposed research questions.

### **3.3 Qualitative Methods & Materials**

This aspect of the study involved a thematic analysis of online materials which discuss the topic of e-cigarettes. I made the decision to use internet-based materials due to their reduced costs in comparison to hard-copy content, and it provided me with the ability to easily access both international and archived content. Furthermore, some sources – for example, Reddit – can only be found online.

#### **3.3.1 Qualitative Materials**

My qualitative materials fell into three categories: newspapers, webpages, and reports from government (funded) health organisations, and Reddit posts. These three were chosen since they can be readily accessed and read by members of the public. Public accessibility is important here as the Theory of Planned behaviour focuses on respondents' perceptions of a particular behaviour, in this case, e-cigarette use. It could be argued that the public's perceptions of e-cigarettes are more likely to be influenced by the sources that I have chosen, in comparison to academic texts that require larger subscription fees and often contain field-related jargon. Thus, when trying to identify the most relevant beliefs in order to design my survey (and interpret the findings), I decided

to focus on materials that have greater potential to be read and understood by the general public.

The three newspapers selected were: *The Washington Post*, *The New York Times*, and *The Guardian*. The first two are based in the United States while the latter is in the United Kingdom. While I am physically located in New Zealand, my study was made available on an international level and required participants to speak English (fluently); so, I decided to use newspapers that fit more in line with this. These sources were chosen due to their high subscription rates – suggesting a large audience – and the use of English as the primary language. Furthermore, New Zealand based newspapers contained considerably fewer articles discussing the topic of e-cigarettes. This would have greatly limited the content available for examination and suggests that these particular papers do not have a significant influence over peoples' perceptions of e-cigarettes. It is also worth noting that the archiving system of New Zealand newspapers is not as comprehensive as that of companies based in the United States and United Kingdom – this would have limited my access to older content. Sources from these two countries were also chosen to allow for comparisons to previous research, which has been predominately conducted within the United Kingdom and the United States.

Based upon the preliminary data analysis of newspaper articles, I identified four government health organisations to review: the U.S. Surgeon General, the Food and Drug Administration [FDA], the Centers for Disease Control and Prevention [CDC], and Public Health England. These organisations were frequently cited within articles from the chosen newspapers. Those who read these newspapers and wish to know more about e-cigarettes are likely to turn to these sources as they are perceived to be credible, and their content is free and easy to access.

The final source for materials was 'Reddit'. Reddit is a social media platform that allows individuals to share content anonymously. Within the overall website, there are 'subreddits' which are online forums dedicated to discussing specific topics of interest. For my study, I identified two relevant subreddits: r/vaping and r/e-cigarettes. There are other subreddits that could also be considered applicable, these two (at the time of data collection) had the most subscribers. Furthermore, as with any study, my time to collect and analyse data was limited. Reddit was selected as this platform provides a less formal perspective on the chosen topic. Furthermore, the majority of the content in these forums appears to be posted by individuals who use these devices. This meant that I was able to

identify which particular issues are relevant to those who actually vape when designing my survey.

To locate suitable material, I used the terms 'electronic AND cigarettes'; 'e-cigarettes'; 'vape(s)'; and 'vaping' on the chosen sites. Due to time restraints and eventual data saturation, I placed limitations on the amount of content that was analysed. Newspaper articles were only examined if they were published between January 2017 and July 2019. Furthermore, articles were only included if the main focus was the topic of e-cigarettes. If the content merely provided a small paragraph or single line describing e-cigarettes, it was excluded. Reports/publications from the chosen government health organisations were included if they were published between January 2014 and July 2019. This included publications such as the Surgeon General's (2016) report 'E-cigarette use among youth and young adults' as well other resources such as the 'Know The Risks' website established by the Surgeon General and 'Facts Sheets' about e-cigarettes released by the CDC. Similar to the newspapers, the content was only examined if its focus was the topic of e-cigarettes.

In comparison to the previous sources, Reddit posts were not restricted based upon publication date. Within each 'subreddit' hundreds of posts can be made within a single day, meaning that years of data cannot be feasibly examined within this thesis. Instead, I restricted my analysis to the most popular posts. Reddit allows users to sort posts within a subreddit according to various criteria. For my study, the decision was made to review the first 100 posts which were listed after the criteria of 'Top' and 'All Time' were applied. The criterion of 'Top' orders contents so that the most popular posts to the subreddit appear first. These are the posts that obtain the most 'votes' - including **both** 'upvotes' and 'downvotes' - indicating that this is the content which has received the most attention from the subreddit users. The criterion of 'All Time' ensures that the results presented to the reader are the Top posts since the subreddits creation - as opposed to other restrictions such as 'This Week' and 'This Month' which would only provide the most popular posts of that specific week or month, respectively. Unlike the newspaper articles, it is possible for the content of the 'Top' 100 posts of 'All Time' to change. For that reason, it should be specified that the content discussed in my qualitative findings chapter fell into the 'Top' 100 posts of 'All Time' as of May-July 2019. I was, however, reviewing popular posts and making notes regarding common themes prior to this time frame to help guide me during my survey design process. Many of the posts that I examined during these preliminary analyses remained within the 'Top 100' lists once the cut of date of July 2019 was reached.

### 3.3.2 Qualitative Data Analysis

Marshall and Rossman (2011) suggest that qualitative data analysis typically fall into seven phases: “(1) organizing the data, (2) immersion in the data, (3) generating categories and themes, (4) coding the data, (5) offering interpretations through analytic memos, (6) searching for alternative understands, and (7) writing the report” (p.209).

For the current study, qualitative data was organised in one of two ways: publication date or ranking. Articles published by the selected newspapers and the government health organisations were sorted according to their publication dates with the oldest articles analysed first. Reviewing the data chronologically allowed me to determine if perspectives had changed over time. The data collected from the chosen subreddits was organised via ranking - the most popular posts were examined first. This system allowed me to determine which posts were the most widely viewed and could therefore have greater influence. Once it was organised, I took steps to immerse myself in the data. For each article/post/report, I copied and pasted the main content onto a separate document. This helped to ‘declutter’ the information by removing advertisements and comments. I then printed out hardcopies of each article/post/report. This allowed for important quotes to be highlighted and notes in the margins of the data. Each piece of data was read at least three times to ensure a thorough review and analysis.

During the immersion process, I noticed themes and patterns emerging from the data. Some of these themes developed based upon my literature review phase of the project - these are known as ‘theory-generated codes’ (Marshall & Rossman, 2011). Other patterns did not become apparent until the second and third readings of the data. Once the themes and categories were developed, the study moved forward with coding the data. This stage of the analysis required me to develop a coding scheme for the various patterns and themes (Marshall & Rossman, 2011). The current study employed a colour based system - each theme/category/pattern was allocated a specific colour. Sections of text which provided examples of these categories were highlighted in the chosen colour. A colour was also used to indicate if a piece of text demonstrated multiple themes/patterns. A note was left to indicate which categories were thought to be represented by these quotes.

While it is listed as step number five, a researcher can begin writing analytic memos as soon as they begin immersing themselves within the data. Marshall and Rossman (2011) explain “in thematic and theoretical memos, the researcher writes his thoughts about how the data are coming together in clusters or patterns or themes he sees as the data accumulate” (p.213). For the current study, I kept separate documents for each

category/theme/pattern. Within these documents the relevant quotes were copied and pasted, as well as a reference to their source. I then wrote down my interpretations of the data, bringing meaning and coherence to the highlighted patterns, categories, and themes (Marshall & Rossman, 2011). While developing these explanations, I simultaneously sought out alternative understandings. Throughout the data collection and analysis, a researcher should acknowledge their own biases and the effect these may have upon the study (Marshall & Rossman, 2011). For this particular project, I acknowledge that my status as a non-smoker, could bias my interpretations of the data. To help counter this, I discussed my interpretations of the qualitative data with e-cigarette users as a type of informal 'peer-review'.

The act of writing up the qualitative findings is one that takes place across multiple stages of the research process. Marshall and Rossman (2011) argue that even the formulation and construction of the research proposal can influence report writing. The proposal outlines the previous literature and research questions, both of which direct the attention and focus of the researcher - consequently, they guide the final product. Writing then continues throughout the data collection and analysis phases, the outcome of which can be seen in the Methods, Results, and Discussion chapters of the report. For this study, I made the decision to group the results by their research method. Triangulation takes place within the discussion chapter, where I examine how several of the qualitative findings can provide explanations for the quantitative results.

### **3.4 Quantitative Methods**

The quantitative phase of the project involved the construction and distribution of an anonymous, online survey. This questionnaire was intended to measure the main variables outlined in the Theory of Planned Behaviour - attitudes, subjective norms, perceived behavioural control, intentions, and actual behaviour – in the context of e-cigarette use. Fishbein and Ajzen's (2010) textbook includes a guide to assist researchers in constructing surveys to test their theory; and Ajzen (2019) has a similar handbook that is readily available online. I used these guidelines when designing my own items to measure the model's variables with regards to e-cigarette use. My study included additional variables to determine if they could improve the predictive utility of the Theory of Planned Behaviour – self-concept, group identity, nicotine addiction, attention to e-cigarette news, and perceived credibility of such news. These variables were measured using pre-existing scales that were altered to fit the topic of the current study. A copy of the final survey can be found under Appendix C.

### 3.4.3 Pilot Research Instrument

A pilot ( $N = 44$ ) was conducted to ensure the quality of my instruments, gather feedback regarding the scales, and to highlight any areas of concern. Appendix B contains a copy of this pilot. Several important differences were present between the pilot and the final version of the questionnaire. I believe that these changes in survey design could have influenced participants' responses; consequently, the decision was made **not** to include the pilot data as a part of the final data set. The section that follows provides a more in-depth description regarding the items in the final survey and their construction process.

While both the pilot and final survey sought to measure attitudes, subjective norms, and perceived behavioural controls towards vaping, their levels of specificity differed. The pilot examined these three factors in a general sense. For example, one of the attitude related items asked participants to express their level of agreement with the following statement '*Electronic cigarettes contain harmful chemicals...*' Similarly, in relation to subjective norms, respondents were provided with the following claim '*My parents would approve of electronic cigarettes...*' In contrast, the final version focused specifically on participants' attitudes, subjective norms, and perceived behavioural controls towards **regular** e-cigarette use – with the term 'regular' being defined in the instructions (*Regular in this context means using an electronic cigarette at least once a day for a period of at least 30 days*). Furthermore, the new items made a point of examining these perceptions as if the participant themselves was the one vaping. For instance, in the attitudes and subjective norms sections, participants were told to indicate how strongly they agreed with statements such as '*If I were to become a regular electronic cigarette user, I would be exposed to harmful chemicals...*' and '*My parents would approve of me becoming a regular e-cigarette user...*'

Another difference between the pilot and final survey was the depth and frequency of the instructions provided to participants. The pilot questionnaire included instructions for the first section of the survey but not include separate directions for the various sections that followed – this was remedied in the final questionnaire with instructions that specified the purpose of each section.

The 'injunctive norms' and 'motivations to comply' sections also differed in the pilot and final survey. In the initial versions of these sections, respondents were asked to indicate their level of agreement with statements asking whether the chosen referents approve of vaping and how important the views of these referents were on a seven-point Likert scale (1. *Not at all ... 7. Definitely*). The final edition of the survey used this same seven-point

response scale but also provided participants with an eighth choice 'Non-Applicable'. This enabled respondents to indicate when specific referents were not applicable to their situation. In addition, the final version of the survey included an additional two referents that were absent from the pilot questionnaire – '*significant other*' and '*child/children*'.

Finally, the questions designed to measure behavioural beliefs and outcome evaluations were altered considerably between the pilot and final versions of the survey. The initial questionnaire contained nine items within the behavioural beliefs and outcome evaluations, respectively, resulting in a total of 18 questions. In comparison, the final survey only included five items to measure each of these constructs, creating a total of ten. The statement '*Electronic cigarettes are affordable...*' was removed due to its lack of relevance (to attitudes) and its overlaps with a similar item that was present in the perceived behavioural control section ('*Electronic cigarettes are expensive...*'). The item '*The liquid used in electronic cigarettes is available in a variety of flavours...*' was not included in the final survey due to a perceived redundancy. Statements '*Electronic cigarettes are safe for users...*' and '*Electronic cigarettes are safe for nearby people...*' were excluded from the final survey due to concerns regarding the vagueness of the word 'safe'. The question regarding whether e-cigarettes were addictive was expanded upon in the final survey to specify that the topic of interest was e-liquids which contained nicotine.

As previously stated, the differences between the pilot and final survey version were significant enough to influence participants' responses, so the decision was made to exclude this data from final analyses. I will, however, provide a brief report of the findings regarding the core variables of the Theory of Planned Behaviour – behavioural beliefs, outcome evaluations, injunctive norms, motivations to comply, potential barriers, perceived barrier impact, and intentions to use e-cigarettes in the future.

In terms of behavioural beliefs, pilot respondents somewhat agreed that e-cigarettes are affordable ( $M = 4.43, SD = 1.39$ ), contain harmful chemicals ( $M = 4.25, SD = 1.74$ ), are addictive ( $M = 4.73, SD = 1.62$ ), are safe for nearby people ( $M = 4.84, SD = 1.70$ ), and that their use is associated with health risks ( $M = 4.61, SD = 1.69$ ). Statements arguing that e-cigarettes are safe for users ( $M = 3.77, SD = 1.49$ ) and that the second-hand vapour produced by vaping is harmful ( $M = 3.09, SD = 1.71$ ) were met with slight disagreement.

Participants agreed the strongest with claims that e-liquid comes in a variety of flavours ( $M = 6.23, SD = 1.49$ ) and that e-cigarettes can assist with smoking cessation ( $M = 5.70, SD = 1.68$ ). When asked to evaluate the described outcomes, participants indicated that the

most desirable outcomes would be e-cigarettes being safe for users ( $M = 6.02, SD = 1.75$ ) and nearby people ( $M = 6.25, SD = 1.67$ ), and vaping being able to assist with smoking cessation ( $M = 6.11, SD = 1.62$ ). The notion of e-cigarettes being affordable ( $M = 4.60, SD = 2.12$ ) and e-liquids coming in a variety of flavours ( $M = 4.82, SD = 2.20$ ) were seen as somewhat favourable. In comparison, the outcomes seen as undesirable were e-cigarettes: containing harmful chemicals ( $M = 1.70, SD = 1.07$ ), being addictive ( $M = 2.59, SD = 1.45$ ), having health risks associated with their use ( $M = 2.11, SD = 1.42$ ), and producing a second-hand vapour that was harmful to nearby people ( $M = 1.64, SD = .99$ ).

With regards to injunctive norms, pilot participants disagreed that their parents ( $M = 3.50, SD = 2.37$ ), siblings ( $M = 3.72, SD = 2.34$ ), doctor ( $M = 3.32, SD = 2.04$ ), and dentist ( $M = 3.36, SD = 1.84$ ) would approve of e-cigarettes. There was some agreement with the notion that their close friends ( $M = 4.43, SD = 1.99$ ) would approve of vaping. Respondents indicated that the vaping-related perceptions of their doctor ( $M = 4.59, SD = 2.04$ ) and dentist ( $M = 4.23, SD = 2.13$ ) were somewhat important to them, however, the views of their parents ( $M = 3.41, SD = 1.99$ ), siblings ( $M = 3.51, SD = 2.05$ ), and close friends ( $M = 3.40, SD = 1.83$ ) were not as important.

When asked about potential barriers to vaping, participants in the pilot did not believe that it was difficult to: purchase an e-cigarette ( $M = 1.82, SD = 1.23$ ), learn how to use an e-cigarette ( $M = 2.36, SD = 1.30$ ), or find a place where they are allowed to vape ( $M = 2.66, SD = 1.52$ ). Although not strong, there was greater agreement that e-cigarettes are expensive ( $M = 3.84, SD = 1.31$ ) and addictive ( $M = 4.39, SD = 1.53$ ). In terms of the impact of these barriers, respondents indicated that the largest barriers would be the expense of vaping ( $M = 5.02, SD = 1.86$ ) and if it became difficult to purchase an e-cigarette and related paraphernalia ( $M = 4.70, SD = 2.14$ ). The addictiveness of e-cigarettes ( $M = 3.64, SD = 2.37$ ), whether it is difficult to learn how to use them ( $M = 3.89, SD = 2.17$ ) and whether there is difficulty finding a place to vape ( $M = 3.91, SD = 2.21$ ) were not perceived as having a big impact.

Respondents for the pilot survey did not express strong intentions ( $M = 3.41, SD = 2.85$ ), want ( $M = 3.36, SD = 2.68$ ), or expectations ( $M = 3.41, SD = 2.86$ ) to use e-cigarettes over the next six months.

### 3.4.2 Final Research Instrument

#### **Attitudes towards E-cigarettes**

This portion of the survey contained 19 items across four scales –behavioural beliefs, outcome evaluations, general attitudes, and indicators of attitude strength. The former

two combine to create the 'attitudes' variable in the Theory of Planned Behaviour, while general attitudes were included to see if they could improve the final model. Indicators of attitude strength were included as this aspect has been mostly absent from vaping-related research.

#### *General Attitudes*

This scale was designed to gauge participants' general attitudes towards e-cigarettes. For each of the four items, participants were presented with a single descriptive word and asked to indicate on a seven-point scale how well this word described their evaluation of e-cigarettes (*1 = not at all ... 7 = definitely*). Four words were chosen – two negative (*'Dislike' & 'Undesirable'*) and two positive (*'Good' & 'Positive'*). The negative items were reverse coded, meaning that higher scores indicated more favourable attitudes towards e-cigarettes. Cronbach's Alpha (.94) demonstrated strong internal reliability and did not increase with the removal of any items.

#### *Behavioural Beliefs*

The five items in this scale measure participant's beliefs that regular e-cigarette use would lead to specific outcomes. Respondents were asked to indicate on a seven-point scale (*1 = not at all ... 7 = definitely*) how strongly they believed regular e-cigarette use would lead to self-exposure to harmful chemicals, nicotine addiction, negative health consequences, smoking cessation, and exposure of near-by others to harmful chemicals. Higher scores suggest that participants felt these outcomes were likely to occur. Cronbach's Alpha for the complete scale was moderate in strength (.59) but increased considerably (.87) with the removal of the question regarding smoking cessation. Thus, this item was removed and analysed separately.

#### *Outcome Evaluations*

This section was included to measure participants' evaluations of the outcomes that had been described in the previous scale. On a seven-point scale (*-3 = very bad ... 3 = very good*), respondents were told to indicate how positively they viewed the outcomes of self-exposure to harmful chemicals, nicotine addiction, negative health consequences, smoking cessation, and exposure of near-by others to harmful chemicals. Given that the outcome of smoking cessation is objectively desirable in comparison to the other four, scores for this item were reverse coded. Hence, higher scores were indicative of more favourable evaluations of the described outcomes. Similar to the previous scale, Cronbach's Alpha was initially moderate in strength (.63) but increased with the removal of the item related to smoking cessation (.84). This question was removed and analysed separately.

### *Attitude Strength*

This five-item scale was included to gauge dimensions related to the strength of participants' attitudes towards e-cigarettes. Respondents were asked to indicate on a nine-point scale how carefully they had thought about e-cigarettes (-4 = *not at all carefully ... 4 = extremely carefully*), the certainty of their opinions (-4 = *not at all certain ... 4 = extremely certain*), whether their feelings towards e-cigarettes were mixed (-4 = *my feelings are extremely mixed ... 4 = I am clearly on one side or the other*), how knowledgeable they believed themselves to be about e-cigarettes (-4 = *not at all knowledgeable ... 4 = extremely knowledgeable*), and how personally important e-cigarettes were to them (-4 = *not at all important ... 4 = extremely important*). Cronbach's Alpha (.85) demonstrated strong internal reliability and no significant increases were seen with the removal of any items; hence, all questions were included in the final analyses.

### **Subjective Norms**

The three scales within this section – subjective norms, motivations to comply, and descriptive norms – contained a total of 21 items. Subjective norms and motivations to comply merge to create the variable 'Subjective Norms', a core concept in the original Theory of Planned Behaviour. While previous research has suggested that descriptive norms may not influence intentions to use e-cigarettes, the available evidence is limited and so I decided to provide another contribution to the literature. The overall purpose of this section to determine the significance of referents' perceptions in the context of e-cigarette use.

### *Injunctive Norms*

This seven-item scale measured how favourably respondents believed select referents would respond to them becoming regular e-cigarette users. For each of the seven referents – parents, siblings, close friends, significant others, children, doctors, and dentists – participants indicated on a seven-point scale how strongly the referent would approve of them becoming a regular e-cigarette user (1 = *not at all ... 7 = definitely*). If a respondent did not have a specific referent in their lives (for example, someone without siblings), they could select an eighth option 'Non-Applicable'. All seven items were included in the final analyses since Cronbach's Alpha (.96) demonstrated strong internal reliability.

### *Motivations to Comply*

This section was designed to gauge how important participants believed the perceptions of these referents to be. The same seven referents were chosen, however, respondents

were now asked to indicate on a seven-point scale (*1 = not at all important to me...7 = very important to me*) how important the referents' beliefs regarding e-cigarette use were to them. Once again, participants were provided with a 'Non-Applicable' option if they felt a particular referent was not relevant to them. With Cronbach's Alpha (.88) demonstrating strong internal reliability, the decision was made to keep all items within final analyses.

#### *Descriptive Norms*

This portion of the survey was included to assess the actual behaviour of participants' referents. The same referents from the previous two scales were used to create seven items. For each referent, respondents were asked to indicate if that individual regularly used e-cigarettes. Four options were provided – 'Yes', 'No', 'Unsure', and 'Non-Applicable'.

#### **Perceived Behavioural Control**

This portion of the questionnaire measured participants' beliefs regarding barriers to e-cigarette use and the impact these barriers may have. The two scales – potential barriers and barrier impact – contained a total of ten items. Both sections combine to create the variable 'Perceived Behavioural Control'.

#### *Potential Barriers*

This scale gauged respondents' beliefs that certain barriers exist to prevent regular e-cigarette use. While five different obstacles were presented to participants – cost, addictiveness, difficulty purchasing e-cigarettes and their paraphernalia, difficulty learning to use an e-cigarette, and difficulty finding a place to use e-cigarettes – the decision was made to exclude addictiveness from the final analyses. Upon reflection, while addictiveness may deter respondents from vaping, it would not physically prevent them from engaging in this activity. For each item, participants indicated on a seven-point (*1 = not at all ... 7 = definitely*) scale how strongly they felt the barrier existed with regards to regular e-cigarette use. Cronbach's Alpha for the four items was low (.50) and did increase with the removal of the question referring to cost (.60), however, all four items were kept in the final analyses due to the small size of the scale.

#### *Barrier Impact*

This scale expands upon the previous by measuring participants' perceptions of the impact the chosen barriers would have. The same five barriers were presented – cost, addictiveness, difficulty purchasing e-cigarettes and their paraphernalia, difficulty learning to use an e-cigarette, and difficulty finding a place to use e-cigarettes – and respondents indicated on a seven-point scale (*1 = not at all ... 7 = definitely*) how strongly

they believed each barrier would prevent them from using e-cigarettes regularly. Once again, the item referring to addictiveness was removed from analyses as it was decided that it did not represent an obstacle to vaping. Cronbach's Alpha was stronger for this scale (.77) and did not increase with the removal of any items; hence, all four questions were used in the final analyses.

### **Intentions**

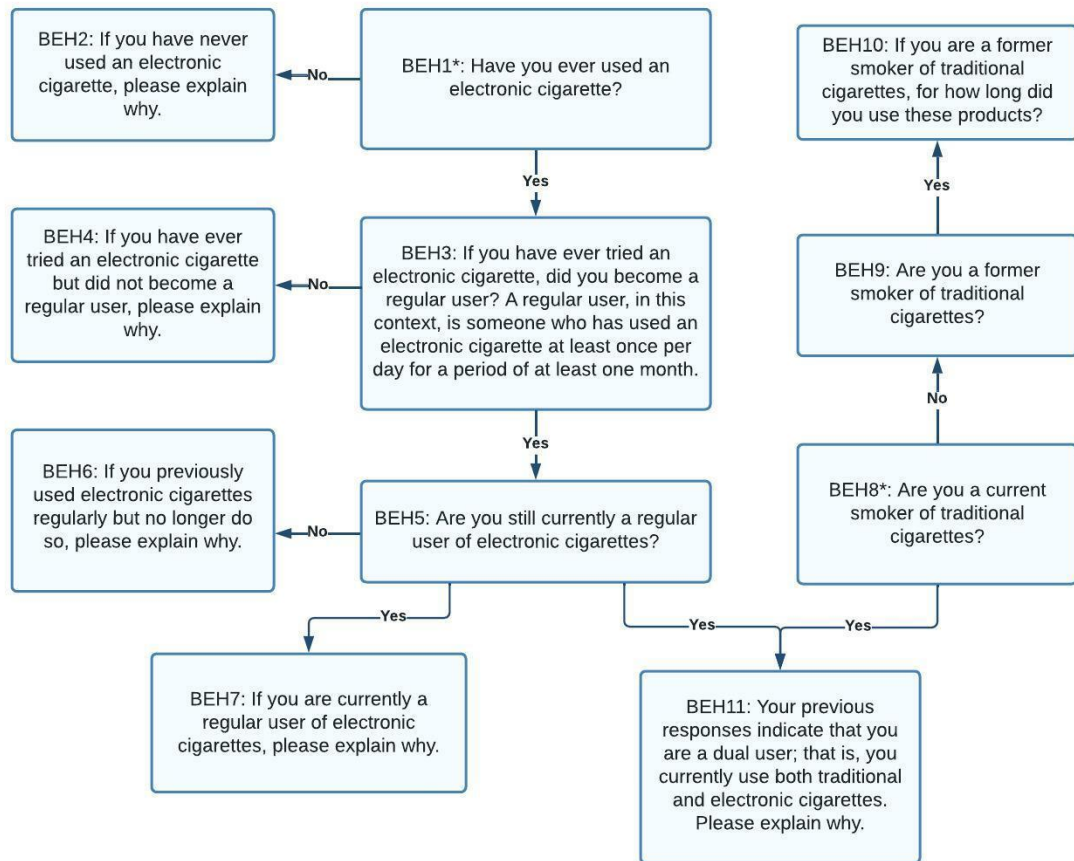
The three items in this section gauged respondents' intentions to use e-cigarettes in the future. Participants were asked to indicate on a seven-point scale (*1 = not at all ... 7 = definitely*) how much they intend, want, and expect to e-cigarettes over the next six months. All three items were included in the final analyses since Cronbach's Alpha was large (.99) and did not increase significantly with the removal of any items. The decision to use a six-month time frame was based upon previous vaping research using similar intervals.

### **Actual Behaviour**

This portion of the questionnaire measured participants' actual behaviour with e-cigarettes. The overall section contained 12 items; however, respondents were not exposed to every question. All participants were asked if they had ever used an e-cigarette. Their responses to this initial item determined what other questions they were asked. The image below, Figure X, provides a visual representation of the first 11 items. Questions that ended with the phrase 'please explain why' provided respondents with a textbox to provide an explanation for their behaviour. The final item from this section asked participants: *From the options below, please select the category you believe best suits e-cigarette users and explain your choice. Those who use e-cigarettes are...* Participants were presented with three options: 1) Smokers, 2) Non-Smokers, and 3) Other; and a textbox to explain their choice.

Figure 3.1

*A visual representation of how participant responses influenced the items presented to them in the 'Actual Behaviour' section.*



*Note.* \* Item was presented to **all** participants.

### Self-Concept

My inclusion of a self-concept measure was motivated by the fact that this variable has been incorporated into prior studies examining smoking-related behaviour (Shadel & Mermelstein, 1996; Sorgen et al., 2021). Shadel and Mermelstein (1996) explain that “when considering a course of action in a given context, individuals reflect on their self-concept to regulate their behaviour” (p.151). Thus, participants’ self-concept could potentially help to predict their intentions to use e-cigarettes in the future. In addition, my analysis of Reddit posts demonstrated that for many individuals consider vaping to be an important and prominent part of their lives – which suggested that this behaviour could potentially influence their self-concept.

My thesis measured the importance of participants' behavioural status in relation to their self-concept. The original questionnaire, 'Smoker Self-Concept Scale', was designed by Shadel and Mermelstein (1996). The five items asked respondents about the impact that smoking had upon their self-image. Examples of these questions include '*Smoking is a part of who I am*' and '*Smoking is a part of my personality.*' For each item, participants responded on a 7-point scale. My study used three versions of this scale – the original (for traditional smokers) and two versions that were altered to fit with the behaviour of non-smokers and e-cigarette users. Copies of these can be found in Appendix B. Participants whose responses indicated that they were non-smokers and traditional smokers completed their respective versions of this scale. Those who were identified as e-cigarette users filled in both the e-cigarette and non-smoking versions. The decision to do this was based upon a theme discovered in the preliminary qualitative data analysis – some e-cigarette users view themselves, and are sometimes viewed by others, as non-smokers<sup>2</sup>. As they engaged in two behaviours, dual users completed the traditional smoker and e-cigarette user versions<sup>3</sup>. For all respondents, a higher score on this scale would reflect a greater significance of their behavioural status.

### **Social Identification**

My decision to include the variable of social identification was influenced by two factors: 1) a recurring theme of e-cigarette use being a social behaviour was identified in the preliminary qualitative data analysis; and 2) previous research has also included social identification in attempts to expand upon the Theory of Planned Behaviour (Phua, 2019A, 2019B; Phua et al. 2018). Prior studies, however, have not included the 12-item version of Cameron's (2004) scale – this study provided the opportunity to address this gap.

My study gauged the significance of behavioural status in relation to participants' social identification. The basis for the scale is Cameron's (2004) research which focused on testing a three-factor model of social identity. After five studies, researchers were advised to employ a 12-item scale that was able to tap into the three-factors with relative reliability and efficiency (Cameron, 2004). These three factors are: in-group ties, centrality, and in-group affect. In-group ties refers to an individuals' perceptions of fitting in and having a shared social bond that binds the self to the group (Cameron, 2004). This includes emotional closeness and the extent to which group members feel 'stuck to' or part of their particular social group. Examples of the items that measure this concept are: '*I feel strong ties to other in-group members*' and '*I find it difficult to form a bond with other in-*

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<sup>2</sup> The final analyses used participants' scores from the e-cigarette user version only.

<sup>3</sup> The final analyses used the averages between smoker and e-cigarette versions.

**group members.** In comparison, centrality is the cognitive prominence of a social identity (Cameron, 2004). This refers to the frequency with which the group comes to mind and the subjective importance of the group to self-definition. Some of the questions used to measure this factor are: *'In general, being a(n) in-group member is an important part of my self-image'* and *'The fact that I am a(n) in-group member rarely enters my mind'*. In-group affect is the emotional valence of group membership (Cameron, 2004). This entails specific emotions that arise from group membership (e.g., being glad or regretful). Items that measure this concept include: *'Generally, I feel good when I think about myself as a(n) in-group member'* and *'I often regret that I am a(n) in-group member'*. Each factor was measured using four items and each item used a 7-point response scale. Similar to the self-concept scale, I used three versions of this questionnaire for my study – one for smokers, one for e-cigarette users, and one for non-smokers. The term 'in-group member' was replaced with the appropriate noun. To see copies of these scales, please refer to Appendix B. As with the previous section, non-smokers and traditional smokers completed the questionnaire relevant to them. E-cigarette users completed both the non-smoker and e-cigarette user versions; and dual users filled in the smoker and e-cigarette user variants. For all participants, a higher score on this scale indicated that a respondent's behavioural status was important to their social identity.

### **Nicotine Dependence**

Previous research has shown that nicotine addiction/dependence can influence intentions to continue and quit using combustible cigarettes (Chen et al., 2021; Feng et al., 2010). I wanted to determine if adding this variable could improve the predictive utility of the Theory of Planned Behaviour in the context of vaping. This scale was only presented to relevant participants – those who had indicated that they were smokers, e-cigarette users, and dual users. The specific scale, the Fagerström Test for Nicotine Dependence, is a "standard instrument for assessing the intensity of physical addiction to nicotine" (National Institute on Drug Abuse, 2022). Examples of the six items include: *'How soon after you wake up do you smoke your first cigarette?'* and *'Do you smoke when you are so ill that you are in bed most of the day?'* The original version of this scale was presented to those who indicated that they were smokers, in addition to a separate question that asked for how long they had smoked conventional cigarettes. An altered version for e-cigarette users was created. E-cigarette users were also presented with questions regarding the typical nicotine strength of their e-liquid, how long they had used these devices, and their most commonly used e-liquid flavours. Participants who indicated they were dual users were presented with both scales to allow comparisons. Scores for this scale range from 0 to 10, with a higher score being indicative of a greater dependence on nicotine (National

Institute on Drug Abuse, 2022). In terms of internal reliability, previous research has found that the Cronbach's alpha for this scale ranges from 0.45 to 0.68, demonstrating low to moderate internal consistency (Heatherton et al., 1991; Sharma et al., 2021). The internal consistency appears to depend upon the population that is being examined (Sharma et al., 2021).

### **Attention to E-Cigarette News**

This portion of the questionnaire measured attention to and the perceived credibility of e-cigarette-related news. These scales were adapted from those used by Lu et al. (2010) to examine participants' food-related, precautionary behaviour following the 2008 melamine milk scandal. The Chinese Government admitted that a well-known food-brand had added melamine to dairy products and infant formula, resulting illness and infant deaths (Lu et al., 2010). Their study found that both attention to and perceived credibility of news stories improved the predictive utility of the Theory of Planned Behaviour. With regards to vaping, there is very little research into whether news consumption influences intentions to use e-cigarettes.

The overall section contained eight items. The first four questions focused on how much attention participants paid to e-cigarette related news; for example, "*I pay attention to e-cigarette news on the radio*" and "*I pay attention to e-cigarette news in the newspaper (incl. digital & print).*" The remaining four items asked respondents to indicate how credible they perceived e-cigarette news to be. Examples include, "*News reports regarding e-cigarettes on TV are credible*" and "*News reports regarding e-cigarettes on the internet (excl. newspapers) are credible.*" For each item, participants are asked to indicate on a seven point scale how strongly they agreed with the statement made (*1 = strongly disagree...7 = strongly agree*).

In addition to the scales described above, I asked participants '*Please indicate which source(s) of information you **most** often use to learn about e-cigarettes*'. The list of options included: newspapers (digital & print), television, radio, academic journal articles, government websites, YouTube, and Reddit. Respondents were also given the ability to select 'Other' and a textbox to specify what other sources they used. Respondents were able to select more than one option. This was included to determine if sources other than the three I examined in my qualitative phase are informing public opinion about e-cigarettes.

### **Demographics**

While participants were asked to provide some demographic data, this information was vague enough that respondents could not be identified. The variables of interest were sex, age, ethnicity, highest level of education, and country of current residence. Copies of the specific questions used can be found in Appendix B.

### **3.4.3 Participant Recruitment**

Participant recruitment occurred across a variety of platforms. Fliers containing a URL and QR code were distributed across AUT campuses (North Shore & City). I also visited lectures in person to deliver a brief introduction to the study and provide additional fliers.

Social media websites were also used to gather participants. Facebook groups dedicated to smoking cessation and e-cigarette use were contacted and their permission sought. In addition, posts were made within groups focused on post-graduate students helping one another to complete their surveys. Reddit was also used to advertise the study. I requested and received permission to post in subreddits dedicated to traditional smoking (r/Cigarettes) and e-cigarette use (r/vaping & r/e-cigarettes). The survey was also advertised in the 'Sample Size' subreddit which centres on helping researchers to recruit participants.

I reached out to various stores which sold e-cigarettes. A select number of stores allowed me to leave fliers/advertisements on their premises. One store was kind enough to distribute an email to subscribers advertising the study.

It should be acknowledged that I did encounter some resistance from certain individuals and groups. A small number of e-cigarette users expressed a distrust towards my intentions and/or the items within questionnaire. I tried to address these concerns when they arose by responding directly with comments intending to clarify the aim and/or methods of the project. On the other end of the opinion spectrum, Parents Against Vaping E-Cigarettes (PAVE) were contacted but declined to distribute the survey link to members.

### **3.4.4 Sample Demographics**

A total of 554 individuals clicked on the link to my final survey. Once I had removed respondents who were missing more than ten data points, I was left with a final sample of 329 participants – giving a completion rate of 59.39%. From this group, there was a somewhat even split between males (51.7%) and females (45.6%). The remaining participants (2.7%) selected the 'Other' option. Respondent ages ranged from 18 to 71 years, with the mean of the sample being 35 years and 7 months. In terms of education,

the largest proportion of respondents indicated that their highest level of education was a Degree/Tertiary level (40.7%). The second and third most common qualifications were Certificate (24.0%) and Secondary School (20.7%), respectively. A post-graduate level qualification was the least frequent (12.8%). With regards to country of residence, the majority of participants lived in New Zealand (52.16%). The rest of the sample proving the responses of United States (15.43%), Australia (15.43%), United Kingdom (7.72%), and 'Other' (9.26%). Responses to the 'Actual Behaviour' section were used to categorize participants as vapers (57.1%) (who only used e-cigarettes daily), non-smokers (30.7%), dual users (7.3%) (who used e-cigarettes daily and smoked combustible cigarettes), and traditional smokers (4.9%). A breakdown of the former three variables (sex, age, education) according to participant behavioural status can be found below in Table 3.1.

**Table 3.1**

*Participant sex, age, and education level across the four behavioural statuses.*

	<b>Non-Smokers</b> (N = 101)	<b>E-Cigarette Users</b> (N = 188)	<b>Smokers</b> (N = 16)	<b>Dual Users</b> (N = 24)
<b>Sex</b>				
Male	37.6%	60.1%	43.8%	50.0%
Female	58.4%	37.8%	56.3%	45.8%
<b>Age</b>				
Mean Age	26.33 (7.75)	40.27 (12.25)	32.31 (9.07)	39.78 (13.55)
Median Age	24.00	39.00	29.50	39.00
<b>Highest Level of Education</b>				
Secondary School	16.8%	22.9%	18.8%	20.8%
Certificate	22.8%	25.0%	25.0%	20.8%
Degree	29.7%	45.2%	50.0%	45.8%
Postgraduate	26.7%	6.4%	6.3%	8.3%

### 3.8 Procedure

The advertisements and fliers distributed contained a URL and/or QR code which would direct potential participants to the information sheet. This outlined the study's purpose, methodology, and any ethical concerns that may be present. Based upon the information provided, individuals were able to provide their fully informed consent. To progress to the survey, respondents needed to select a box which indicated that they had read the information sheet and met the outlined eligibility criteria – that they were at least 18 years of age and possessed a strong enough comprehension of the English language to complete the survey. Participants were presented with the scales in the same order that I described them in section 4.6.

After having completed the questionnaire, respondents were provided with the opportunity to use a separate link to provide contact information to enter a prize draw. Participants were also thanked for their time and my contact details were given should anyone wish to express their concerns about the study.

### **3.9 Ethics**

Since my study required a sample of participants, I was required to complete an ethics application to demonstrate that appropriate steps had been taken to protect the interests of my respondents. The issues relevant to this project were informed consent, respondent anonymity, and participant risks. A copy of my AUTECH approval letter can be found under Appendix A.

To ensure that participants could provide fully informed consent, the information sheet outlined the purpose of the study as well as what was required of the participants. The link/QR code provided via advertisements took potential participants to the information sheet. As an indication of informed consent, participants could not proceed to the survey until they had selected a box which acknowledged that they had read the information sheet, met the eligibility criteria, and were providing their consent.

While a small number of demographic questions were presented, these were vague enough that participants could not be identified and remained anonymous. Respondents were given the opportunity to enter a prize draw which did require a name and email address. This information, however, was collected via a link separate from the main questionnaire – ensuring no link between the two types of data.

In terms of risk, it was anticipated that completing the survey was very unlikely to emotionally harm respondents. While some individuals may find the topic of e-cigarettes to be a sensitive one, such persons would have most likely avoided participating in the study. Participation was entirely voluntary, and the information sheet explained both the topic of interest and my methodology. At the time of data collection most English-speaking countries had set the legal age of requirement to 18 for e-cigarette use; thus, I made the decision to restrict participation to those who were at least 18 years of age. My information sheet also indicated that respondents should only complete the survey if they possessed enough English language skills to successfully comprehend and answer the provided questions. Due to the anonymous nature of the data, I could not identify and

remove specific cases. Participants were advised of this and informed that they could leave the survey at any point.

The qualitative data which was analysed were retrieved from publicly available reports and websites. Members of the public can access articles published by *The Guardian* without a subscription. *The New York Times* allows those without a monthly subscription to read up to five free articles per month, while *The Washington Post* grants readers access to 20 free articles per month. Since I had a relatively large number of stories to review, I paid a monthly subscription fee until I had finished my data collection period. The information and reports published by the Centers for Disease Control, Surgeon General, and Public Health England can be accessed on their relevant websites and incur no charge. The Reddit data was collected by first creating an account with the website and reviewing the relevant 'Terms & Conditions'. I then contacted the moderators of my chosen subreddits and the 'Help Center' for the overall website – both confirmed that I could read and analyse this data. I was told that should I wish to quote any material; I must seek the permissions of the specific authors who wrote those posts.

## Chapter Four: Qualitative Results

### 4.0 Chapter Introduction

This chapter summarizes the findings that emerged from my qualitative data analysis. It begins by describing the themes identified within the newspaper articles and government reports/webpages. The focus is then shifted to the recurring patterns found within the two subreddits that were examined. Following the Reddit-related results, I review participant responses to the open-ended questions within my survey.

### 4.1 Newspapers & Government Funded Websites & Reports

The main purpose of this thematic analysis was to aid in the design and construction of my questionnaire. Based on the understanding that newspaper articles and health-organisation reports can influence audience perceptions of e-cigarettes, analysing content from these sources can indicate which vaping-related issues are most salient in people's minds. It is these prominent beliefs that my questionnaire sought to assess. A secondary goal of this analysis was to determine whether news and government representations of e-cigarettes differ between the United States and the United Kingdom – a comparison which seems to be missing from previous literature. Although my timeline did not allow for me to do a comprehensive and in-depth review, it was sufficient to identify whether future studies should pursue such an examination. From the United States, I studied articles published within *The New York Times* (n = 68) and *The Washington Post* (n = 60), as well as reports and resources released by the FDA, The Surgeon General, and CDC. From the United Kingdom, I examined pieces published within *The Guardian* (n = 52) and publications released by Public Health England. As noted in the previous chapter, the specific health-organisations were chosen based on them being referred to numerous times throughout the newspaper articles that I examined. Consequently, many of the themes found within government sources and news stories overlapped – so the findings from these two features in one section.

#### 4.1.1 Harm Prevention vs. Harm Reduction

Throughout my examination of newspaper articles and health-organisation reports, a single overarching theme emerged – the United Kingdom and United States typically advocated for harm reduction and harm prevention approaches to e-cigarettes, respectively. As it will be shown in the descriptions that follow, the philosophy that each

country adopted influenced which vaping-related topics they were most interested in and how e-cigarette issues were discussed.

Content from Public Health England and *The Guardian* generally promoted the harm reduction perspective. Within the context of vaping, harm reduction primarily focuses on the potential for e-cigarettes to help reduce the well-known harms that are caused by combustible cigarettes. E-cigarettes can lessen the damage linked to smoking by assisting people with smoking cessation attempts or by offering an alternative to cigarettes.

*“The option of switching to electronic cigarettes as an alternative and much safer source of nicotine...has enormous potential to reach smokers currently refractory to existing approaches.” – Public Health England (Britton & Bogdanovica, 2014, p.24)*

*“The report added that while regulation of e-cigarettes was needed, the devices should be considered a valuable tool in helping smokers to quit...” – The Guardian (Walker & Davis, 2017, para. 6)*

*“Electronic cigarettes, and the various new generation nicotine devices development, clearly have the potential to reduce the prevalence of smoking in the UK.” – Public Health England (Britton & Bogdanovica, 2014, p.13)*

It is important to emphasize the term ‘reduction’ in the phrase ‘harm reduction’. The sources that support this perspective acknowledge that e-cigarettes are not free from risks – but emphasize that these dangers are significantly smaller when compared to those posed by combustible cigarettes.

*“Based on current knowledge, stating that vaping is at least 95% less harmful than smoking remains a good way to communicate the large difference in relative risk...It should be noted that this does not mean e-cigarettes are safe.” – Public Health England (McNeill et al., 2018, p.20)*

*“They agree that vaping is safer than smoking, and while these products are not risk free and should not be promoted to children or never smokers, they have a legitimate and positive role to play in tobacco control.” – The Guardian (Bauld, 2017A, para. 3)*

*“...there is also evidence that electronic cigarettes contain toxic substances...Although levels of these substances are much lower than those in convention cigarettes, regular exposure over many years is likely to present some degree of health hazard.” – Public Health England (Britton & Bogdanovica, 2014, p.7)*

In contrast, both the newspapers (*The Washington Post & The New York Times*) and government health organisations (FDA, CDC, and Surgeon General) from the United States typically adopted a harm prevention stance. The focus of this approach is to prevent and avoid all harms that are associated with e-cigarettes – even if they are smaller than the risks associated with smoking.

*“E-cigarette use poses a significant – and avoidable – health risk to young people in the United States. Besides increasing the possibility of addiction and long-term harm to brain development and*

*respiratory health, e-cigarette use is associated with the use of other tobacco products that can do even more damage to the body.” – Surgeon General (U.S. DHHS, 2022F, para. 1)*

*“There are still many unanswered efficacy and safety questions about e-cigs. It’s unclear how well they work as a smoking cessation tool. And while they are almost certainly safer than regular cigarettes, they are not necessarily safe.” – The New York Times (Interlandi, 2019, para. 16)*

*“A National Academies of Sciences, Engineering and Medicine report in January found that while e-cigarettes are far less harmful than conventional cigarettes, which produce a raft of toxic substances when burned, they still pose health risks.” – The Washington Post (McGinley, 2018, para. 16)*

Harm prevention content did acknowledge that e-cigarettes may be used as a smoking cessation tool, however, this issue was discussed less frequently, and authors would express greater doubts as to whether vaping could help smokers to quit.

*“E-cigarettes are not an FDA-approved quit aid and there is no conclusive scientific evidence on the effectiveness of e-cigarettes for long-term smoking cessation.” – Surgeon General (U.S. DHHS, 2016B, p.5)*

*“While promoters of e-cigarettes and e-cigars, which provide nicotine in vapor form, say they can help people quit conventional tobacco products containing harmful tar, there is not a lot of evidence for that claim.” – The New York Times (Editorial Board, 2017, para. 2)*

*“...products such as e-cigarettes may offer a potentially lower risk alternative for individual adult smokers.” – FDA (Gottlieb, 2018B, para. 24)*

Due to their differences in focus, harm prevention and harm reduction approaches often use differing comparison points when evaluating e-cigarettes. Since harm reduction stresses the importance of reducing combustible cigarette use, the potential costs and benefits of vaping are compared to those associated with smoking. Examining e-cigarettes through this lens makes these devices appear more favourable. On the other hand, the harm prevention emphasis on avoiding future harms means that the risks of vaping are assessed in overall or absolute manner. That is, e-cigarette use is compared to the dangers of being a non-smoker. Evaluating vaping through this lens makes this behaviour appear less favourable.

Harm reduction and harm prevention are not mutually exclusive approaches and, as I will demonstrate, they share similar concerns. Where they differ is their acceptance towards and evaluation of different risks. The harm reduction perspective recognises that certain risks are unavoidable and attempting to eliminate all threats is a pointless endeavour. There is a willingness to accept smaller harms if the overall result is a reduction in a more serious harm. Harm prevention, in comparison, is less permissive with risks and is less inclined to accept them regardless of their size when compared to others.

#### 4.1.2 The Needs of Adult Smokers vs. Youth

Newspaper articles and government reports, regardless of whether they adopted a harm prevention or harm reduction approach, identify two sets of needs within the realm of vaping – those of adult smokers and those of youth (and young adults). On the one hand, it is necessary that adult smokers who are trying to quit have access to and are encouraged to use e-cigarettes. On the other hand, vaping could cause physiological harms to non-smoking youth, so this populations should have their access restricted and be discouraged from using e-cigarettes.

*“In developing policies on e-cigarette use in child and youth settings it is appropriate to guard against potential youth uptake, while balancing this with the need to foster an environment where it is easier for adults not to smoke.” - Public Health England (Public Health England, 2016A, p.8)*

*“A balance between closing the on-ramp for kids to become addicted to nicotine through combustible and non-combustible products, while maintaining access to potentially less harmful forms of nicotine delivery through ENDS for adult smokers seeking to transition away from combustible tobacco products.” - FDA (Gottlieb, 2018A, para. 37)*

Harm prevention content was far more likely to emphasize the needs of youth. Most of the articles published within *The Washington Post* and *The New York Times* discussed the topic of youths using e-cigarettes; and the largest report published by the Surgeon General was primarily dedicated to the topic of e-cigarette use amongst youth and young adults. Within the health-organisation publications and news stories, the two biggest youth-related concerns were youth exposure to nicotine and the potential for vaping youths to transition to combustible cigarettes. As previously mentioned, harm prevention texts did acknowledge that e-cigarettes might possess able to help adult smokers, however, sources would explicitly state that the needs of youths were to be prioritized.

*“It is for this rising generation that regulation is most necessary — and concern for them should outweigh worries about reducing smokers’ access to the smoking alternatives they prefer.” - The Washington Post (Editorial Board, 2019, para. 3)*

*“...any policy accommodation to advance the innovations that could present an alternative to smoking – particularly as it relates to e-cigarettes – cannot, and will not, come at the expense of addicting a generation of children to nicotine through these same delivery vehicles.” - FDA (Gottlieb, 2018A, para. 11)*

*“Harnessing technologies, like e-cigarettes and heated tobacco products, to dramatically speed up the decline in cigarette smoking is the opportunity of this century. But this opportunity cannot come at the expense of youth.” - The New York Times (Calantzopoulos, 2019, para. 3)*

Reading newspaper articles and publications by health-organisations, however, indicates that the United States has failed to meet the vaping-related needs of youth. Evidence is cited that, within the United States, the number of youths vaping has risen significantly

and that the use of e-cigarettes is associated with an increased risk of smoking. There is a recurring theme of dissatisfaction with the way governing bodies and health-organisations handled e-cigarette regulation. News stories argued that youths were enticed into vaping and were able to access e-cigarettes so easily due to policies being delayed or not stringent enough.

*“The numbers are clear – we’re experiencing epidemic-level rises in youth e-cigarette use, which is threatening the progress we’ve made toward reducing youth tobacco use.” – FDA (Gottlieb, 2019, para. 17)*

*“Public health experts and Democratic lawmakers lauded the vaping moves as a first step but said they didn’t go far enough.” – The Washington Post (McGinley & Bernstein, 2018, para. 9)*

*“The F.D.A.’s crackdown on flavored e-cigarettes began earlier this year, as the numbers of teenagers vaping reached epidemic proportions and the popularity of such devices soared.” – The New York Times (Kaplan, 2018A, para. 10)*

Content that aligned with the harm reduction approach generally assigned similar levels of importance to the needs of adult smokers and youths. In reference to the needs of adult smokers, *The Guardian* published articles discussing the safety of e-cigarettes as well as their ability to assist with smoking cessation. The needs of youths were also acknowledged, though it should be noted that many of these articles actually discussed the issue of youth vaping within the context of the United States rather than within the United Kingdom. Within their reports, Public Health England dedicated space to discussing the use of e-cigarettes by both adults and youth, the evidence surrounding the efficacy of e-cigarettes as a cessation aid and their safety, and whether vaping appears to be renormalising smoking.

*“In developing policies on e-cigarette use in child and youth settings it is appropriate to guard against potential youth uptake, while balancing this with the need to foster an environment where it is easier for adults not to smoke.” – Public Health England (Public Health England, 2016, p.8)*

*“Whilst protecting non-smoking children and ensuring the products on the market are as safe and effective as possible are clearly important goals, new regulations currently planned should also maximise the public health opportunities of EC.” – Public Health England (McNeill et al., 2015, p.6)*

Based upon the evidence described within these publications, the United Kingdom have been fairly successful in balancing the needs of both adult smokers and non-smoking youth. It is explained to the readers that, within the United Kingdom, e-cigarettes have been responsible for helping many individuals quit combustible cigarettes; and while youths may be experimenting with these devices, the research does not suggest that smoking has been renormalised.

*“Success rates for smokers trying to give up have hit a record high in part thanks to the increasing use of e-cigarettes, figures reveal.” – The Guardian (Busby, 2017, para. 1)*

*“These data suggest that fears that vaping might undermine the contribution that tobacco control measures have made to reducing youth smoking had not been realised, up to 2015, in Great Britain.” – Public Health England (McNeill et al., 2019, p.45)*

*“The sharp increase in the use of e-cigarettes has not led more British children to take up cigarettes or regard smoking as normal, the first study of its kind has shown” – The Guardian (Morris, 2019)*

*“While caution is needed with these figures, the evidence suggests that e-cigarettes have contributed tens of thousands of additional quitters in England.” – Public Health England (McNeill et al., 2018, p.16)*

Content published within the United States typically urged its reader to focus on the needs of youths and gave the impression that it was difficult to meet these needs and those of adult smokers. In such instances, audience members are told that the protection of youths must be prioritised. Content from the United Kingdom, however, tells the reader that both sets of needs are equally important and it possible to successfully fulfil both.

#### **4.1.3 Comparisons to Traditional Cigarettes**

Sources from both countries and harm perspectives acknowledged that there are similarities between vaping and combustible cigarettes. Where they differed was the importance that was assigned to these similarities and whether they saw them as being detrimental to the overall image of e-cigarettes. The most common areas of comparison that I found were – the inclusion of nicotine, incorporation of flavourings, the involvement of Big Tobacco, and advertising.

Newspaper articles and government reports, regardless of their country of origin, recognised that one of the most perceptible similarities between vaping and smoking is the presence of nicotine. While it is possible to purchase pods/cartridges and e-liquids that are nicotine-free, most vapers report using some level of nicotine – one of the most well-known chemicals present with combustible cigarettes. The fact that these two products share such a recognisable substance may encourage some to view vaping and smoking as being similar. This is the perspective of the harm prevention sources that were based within the United States. Articles from *The Washington Post* and *The New York Times* and publications from government health-organisations placed a great emphasis on reminding the reader that nicotine is present within e-cigarettes.

*“Nicotine, the naturally occurring chemical in tobacco, is the addictive element that binds smokers to cigarettes and vapers to Juul and other e-cigarettes.” – The New York Times (Kaplan & Hoffman, 2018, para. 28)*

*“Most e-cigarettes contain nicotine – the same addictive drug in regular cigarettes, cigars, and other tobacco products.” - CDC (U.S. DHHS, 2022A, What are e-cigarettes? section)*

Articles from *The Guardian* and reports by Public Health England recognised that nicotine is a component of most vaping experiences, however, this is mostly framed as being a necessity to help improve the efficacy of e-cigarettes as smoking cessation tools. Nicotine Replacement Therapies, as their name suggests, enable people to quit combustible by delivering nicotine in a manner safer than smoking. This same principle is applied to vaping. In line with the harm reduction approach, it is argued that inhaling nicotine via vaporisation is much safer than doing so via combustion; and that while nicotine is present within e-cigarettes and traditional cigarettes, there are many more chemicals that the two products do not share.

*“Producing nicotine vapour from a solution rather than by burning tobacco means that electronic cigarette vapour is free from almost all of the many toxic chemicals that accompany nicotine in cigarette smoke.” – Public Health England (Britton & Bogdanovica, 2014, p.5)*

*“As nicotine is the addictive substance in tobacco cigarettes, nicotine delivery from electronic cigarettes is essential if these products are to be effective for smoking cessation or harm reduction.” – Public Health England (Britton & Bogdanovica, 2014, p.6)*

*“Overall, there is evidence that nicotine plays a very minor role in the harmfulness of tobacco smoking. The risk profile may be different with inhaled nicotine but this would appear unlikely.” – Public Health England (McNeill et al., 2018, p.61)*

The next area of comparison is the use of flavourings. The solutions used within e-cigarettes can come in a variety of flavours – for example, tobacco, menthol, fruit, and desserts. From the harm prevention perspective, the use of ‘child-friendly’ flavours in e-liquids mimics the way tobacco companies previously incorporated flavours into their products. Flavours such chocolate and menthol have been used in the past to help make combustible cigarettes more palatable and to increase sales by appealing to youths. Newspapers and health-organisations within the United States repeatedly argued that e-cigarette companies were employing a similar tactic.

*“Just look at a couple of the flavored juices you can purchase to vape, which include — but is certainly not limited to — Red Bull, “Stoned Smurf,” “Fruity Fun Cereal” and “Unicorn Poop.” Do these sound like they’re being marketed to adults trying to quit smoking?” – The Washington Post (Gebelhoff, 2018, para. 8)*

*“Flavors have been used for decades to attract youth to tobacco products and to mask the flavor and harshness of tobacco.” – Surgeon General (U.S. DHHS, 2016A, p.11)*

*“Proponents of the ban pointed to some 7,000 products, including those with flavors said to be particularly alluring to young users like bubble gum, chicken and waffles, and unicorn milk.” – The New York Times (Hoffman, 2018B, para. 8)*

Content by Public Health England recognised that e-liquids come in a variety of flavours and that certain flavours may attract youth interest. Given that regular e-cigarette use was found to be low among British youths, however, the issue was not afforded as much importance as it was in the United States. Instead, following the harm reduction approach, the primary concerns with e-liquids flavours were identifying which ones were the most popular and whether flavourings could contribute to the health-related side-effects of vaping. *The Guardian* was less likely than other newspapers to discuss how flavours attracting youths to vaping and most of the articles that did describe the issue focused on the issue within the context of the United States.

Another commonality between vaping and smoking was the involvement of 'Big Tobacco'. The term Big Tobacco is often used to refer to the largest transnational tobacco companies – British American Tobacco, Japan Tobacco International, Philip Morris International, and Imperial Brands. Due to their history of promoting and defending combustible cigarettes, there is an understandably extremely negative perception of the tobacco industry. As a result of the rising popularity of e-cigarettes, all four of the Big Tobacco companies have introduced their own vaping products. Those from the harm prevention perspective made a point to repeatedly remind the audience of Big Tobacco's involvement within the vaping market and argue that these companies are simply using e-cigarettes as a way to generate nicotine addiction amongst a new generation.

*"... the e-cigarette industry has emerged as a potential substitute and Big Tobacco has been among the device developers enjoying new profits from the tobacco alternatives." – The New York Times (Kaplan, 2018B, para. 14)*

*"But critics argue the deal proves Juul is prioritizing profits over safety by teaming up with Big Tobacco, which benefits from a rise in underage smoking." – The Washington Post (Telford, 2018, para. 10)*

*"E-cigarette maker Juul, which has vowed to make cigarettes obsolete, is near to inking a deal to become business partners with Altria, one of the world's largest tobacco companies." – The New York Times (Richtel & Kaplan, 2018)*

Big Tobacco's stake in the vaping market was briefly recognised by Public Health England, and the health-organisation acknowledged their past behaviour. It was pointed out, however, that all companies who sell e-cigarettes are motivated by profit. The involvement of Big Tobacco was seen as an additional reason to keep firm regulations in place so as to avoid issues similar to those in the past involving the production and distribution of combustible cigarettes.

*"Given the ethical record of tobacco industry activity in promoting and defending smoked tobacco, this is an obvious and significant potential threat, but also one that needs to be addressed across the board"*

*as all nicotine suppliers are driven primarily by commercial rather than public health interests.” – Public Health England (Britton & Bogdanovica, 2014, pp.15-16)*

The final area of comparison to describe is the issue of marketing and advertisements. News stories and government publications from the United States repeatedly made comparisons between the way combustible cigarettes were advertised in the past and the way e-cigarettes are marketed today. It was stated that both products are advertised using the same tactics and strategies in order to attract youth interest. Examples of such advertising themes are sexual appeal, customer satisfaction, and social motivations.

*“E-cigarettes are also advertised using the same themes and tactics that have been shown to increase youth initiation of other tobacco products, including cigarettes.” – CDC (U.S. DHHS, 2022G, para. Flavors and Marketing Make E-Cigarettes Appealing to Youth section)*

*“Many themes in e-cigarette marketing, including sexual content and customer satisfaction, are parallel to themes and techniques that the tobacco industry aimed at youth and young adults in their advertising and promotion of conventional cigarettes.” – Surgeon General (U.S. DHHS, 2022C, Marketing to Youth and Young Adults section)*

Since Public Health England’s 2014 report, there has been a recognition that regulations concerning e-cigarette marketing needed to be set in place to avoid these products being advertised in a way that would entice youth interest. Consequently, in that same year, the Advertising Standards Authority introduced a voluntary agreement that required vaping related advertisements to be ‘socially responsible’. In 2016, the United Kingdom shifted regulation to prohibit e-cigarettes from being advertised in various forms, including newspapers, magazines, broadcast media, and online media. This demonstrates that harm reduction proponents saw the potential for vaping to follow in the footsteps of Big Tobacco and pre-emptively restricted this opportunity. These measures explain why it was rare for The Guardian to discuss e-cigarette advertising within the United Kingdom, because it mostly dealt with before a problem could arise.

*“The UK has one of the most comprehensive regulatory systems for e-cigarettes in the world, with high standards of quality and safety, and tight restrictions on promotion and advertising.” – Public Health England (Public Health England, 2016, p.5)*

*“Differing policies may also help explain these differences. In the UK, almost all forms of e-cigarette marketing have been banned since 2016. This is not the case in the US.” – The Guardian (Bauld & Gage, 2019, para. 7)*

*“Marketing restrictions were introduced at least in part to reduce the appeal of vaping products and protect non-smokers and young people from EC uptake [35], based on previous evidence that tobacco marketing influences smoking uptake.” – Public Health England (McNeill et al., 2019, p.42)*

The way in which sources from the United States and the United Kingdom described the similarities between vaping and smoking create two very different experiences for the

reader. Public Health England and *The Guardian* were more likely to recognise that some similarities were unavoidable (the involvement of Big Tobacco) or even necessary (the inclusion of nicotine and flavours), or they proactively identified where a similarity could arise and took steps to stop this process (advertising). Audiences are given the impression that these parallels are indeed present but do not warrant concern or panic so long as they are handled correctly. This aligns with the harm reduction approach that was taken. In comparison, *The New York Times*, *The Washington Post*, and various publications by United States health-organisations want to draw the reader's attention to these similarities and encourage them to believe that such issues are cause for great concern and worry. Corresponding to the harm prevention perspective, the potential for these parallels to cause problems in the future was the focal point of concern. The emphasis on the 'closeness' of smoking and vaping also seems to indicate an attempt at transferring the stigma that is associated with combustible cigarettes onto e-cigarettes, in order to create a negative perception of vaping.

#### **4.1.4 Public Perceptions of E-Cigarettes**

My analysis found that, regardless of whether they incorporated the harm prevention or harm reduction approach, newspapers and government publications stressed the importance of public perceptions of e-cigarettes. Within the United States and the United Kingdom there was a concern that members of the public may developed inaccurate perceptions regarding the dangers of e-cigarette use. Where the two differed was the directionality of these inaccuracies.

Articles from *The Guardian* and publications by Public Health England were concerned that members of the public may overestimate the harms associated with e-cigarette use. For smokers, if they do not believe these devices to be a safer alternative to combustible cigarettes, they may be hesitant to use these devices as smoking cessation tools – which limits the ability of e-cigarettes to reduce smoking-related harms. Public Health England also referenced studies that measure the harm perceptions of non-smokers, indicating that they consider their beliefs to be important as well. While these texts do not encourage non-smokers to use e-cigarettes, there seems to be a recognition that the perceptions of these individuals are important as they will influence policies that regulate vaping.

*"For the average smoker seeking information on vaping, a quick internet search offers little reassurance. Might as well continue smoking, the headlines imply, if these products are so dangerous. But the reality is that they are not." – The Guardian (Bauld, 2017B, para. 2)*

*"But many people overestimate the relative health risks of vaping, which may have contributed to a slowdown in the numbers turning to e-cigarettes." – The Guardian (Ross, 2017, para. 2)*

The evidence reviewed demonstrates that these fears are not unfounded. Within the past decade, the proportion of United Kingdom adults (both smokers and non-smokers) who correctly believe that vaping is less harmful than smoking has decreased; while the percentage of those who incorrectly perceive e-cigarettes to be as harmful or more harmful than combustible cigarettes has increased. Youth perceptions, according to Public Health England, have followed a similar pattern to adults – with the proportion of those who correctly perceive the relative dangers of vaping shrinking in recent years.

*“Most people believe today, compared with a year ago, that e-cigarettes are as harmful as smoking. In fact, these incorrect perceptions have risen year on year...” – The Guardian (Bauld, 2017A, para. 2)*

*“There has been an overall shift towards the inaccurate perception of EC being as harmful as cigarettes over the last year in contrast to the current expert estimate that using EC is around 95% safer than smoking.” – Public Health England (McNeill et al., 2015, p.6)*

In addition to perceptions of the relative harms to vaping, Public Health England expressed a particular concern that members of the public are over-estimating the risks associated with nicotine. While it was acknowledged that nicotine is incredibly addictive, reports by Public Health England referred to evidence that suggests that short-term nicotine use – outside of smoking – is not associated with adverse physiological harms. Results from surveys, however, demonstrate that both smokers and non-smokers are unaware of the actual dangers posed by nicotine. It seems as if the association between cigarettes and nicotine biases peoples’ perceptions of the chemical.

*“When adults in GB are asked what proportion of the health harms of smoking is due to nicotine, the accurate response (most health harms are not caused by nicotine) is the least common response consistently chosen by 8-9%.” – Public Health England (McNeill et al., 2018, p.21)*

*“Knowledge about the portion of harm of smoking attributable to nicotine in the general adult population is poor and not improving.” – Public Health England (McNeill et al., 2018, p.183)*

Articles from *The New York Times* and *The Washington Post* and publications from United States government health-organisations, in line with their harm prevention approach, predominately focused on youth and young adult perceptions of e-cigarettes. Their main concern was the notion that youths are underestimating the harms associated with e-cigarettes. Authors argue that e-cigarette marketing has led youths to believe that vaping is safer than combustible cigarettes or even completely harmless. These perceptions then encourage youths to use these devices, including those who would avoid combustible cigarettes due to health-related concerns.

*“When the perception of risk is low, use goes up. So teenagers who would never pick up a cigarette are using vaporizers, and vaping companies are acquiring young, lifelong customers.” – New York Times (Greeley, 2018, para. 2)*

*“Most youth and young adults believe e-cigarettes are “less harmful” than conventional cigarettes.” Surgeon General (U.S. DHHS, 2016A, p.87)*

*“But a growing number of teenagers who have never smoked are also turning to e-cigarettes, believing that they are relatively harmless products.” – New York Times (Hoffman, 2018A, para. 12)*

The Surgeon General’s report did present evidence that ever-smoking and ever-vaping youths were more likely than never-vapers to believe that e-cigarettes pose fewer risks than combustible cigarettes. In terms of absolute harms, the Surgeon General noted that over half of middle and high school students believed e-cigarettes to cause ‘little or some harm.’ The concerns regarding youths’ perceptions of vaping were so great that the Surgeon General published a ‘tip sheet’ for parents to help them talk to youths about vaping, including their perceptions of harm. The ‘Real Cost’ public education programme was also expanded to include e-cigarettes in hopes that this would deter youths from vaping.

While it was rare for it to be explicitly stated, the tone of many newspaper articles suggested that youths believing e-cigarettes to be safer than combustible cigarettes was undesirable. Based on the notion of avoiding any future harms, any beliefs that may cause youths to view vaping more favourably and potentially engage in the activity are indeed undesirable. From an ethical perspective, however, it could be argued that youth and young adults should be provided accurate information regarding the risks associated with e-cigarette use to make fully informed decisions about these products. This includes the fact that most of the literature suggests that short-term use of e-cigarettes is safer than equivalent use of combustible cigarettes (Eltorai et al., 2019; McNeill et al., 2018; Neczypor et al., 2022). This issue was not raised in the content I examined.

Older adult perceptions of vaping were less commonly referred to in harm prevention newspaper articles and health-organisation publications. When they were acknowledged in the 2016 Surgeon General Report, it was stated that smokers are more likely than non-smokers to perceive e-cigarettes as being less harmful than combustible cigarettes.

Those who read the examined content are told that public perceptions of vaping are important. Content published within the United States will emphasize the views of youths and young adults, giving the reader the impression that youths are unable to properly gauge the risks of vaping and that they are engaging in an activity they know very little

about. Sources based within the United Kingdom, in comparison, tell the audience that people are becoming unnecessarily fearful of vaping and that these exaggerations could hinder the contributions e-cigarettes can make in reducing harm.

#### **4.1.5 Presentation of Information**

Sources that align with the harm prevention and harm reduction approaches demonstrated both similarities and differences in the way they present vaping-related content and information. Some of the tactics used – in particular, the use of combative and fear inciting language – created very skewed depictions of e-cigarettes. While it is typically expected that newspaper articles are subjective in their representations of various issues, it was surprising to find that also occurred within content published by government health-organisations.

Government health-organisations from both the United States and the United Kingdom made a point to use inclusive language when discussing the topic of e-cigarettes. Common examples of this were ‘we’, ‘us’, and ‘our’. Given that e-cigarettes are predominately used by former and current smokers, non-smokers may be tempted to assume that the issues surrounding these devices are not relevant to them. Using inclusive language is a way to help increase reader engagement and encourage non-smokers to garner interest in this topic. In line with the harm reduction approach, Public Health England often used inclusive language to promote the idea that those within the United Kingdom needed to ‘band together’ and continue to work with one another to reduce the risks associated with combustible cigarettes. The Surgeon General, F.D.A, and C.D.C, corresponding to their harm prevention perspective, were likely to use inclusive language when describing how people within the United States need to work together in order to tackle the issue of e-cigarettes. There was often the impression that those who wrote these texts saw vaping as an ‘us vs. them’ scenario.

*“Protecting our nation’s youth from the dangers of tobacco products is among the most important responsibilities of the U.S. Food and Drug Administration...We recognize that if the FDA is to end the tragic cycle of successive generations of nicotine and tobacco addiction, we must take every opportunity to disrupt that process where it starts...” – FDA (Gottlieb, 2018B, para. 1)*

*“We should not forget what is important here. We know that smoking is the number one killer in England and we have a public health responsibility to provide smokers with the information and the tools to help them quit smoking completely and forever.” – Public Health England (Public Health England, 2015, para 8).*

*“... emphasizing the importance of protecting our children from a lifetime of nicotine addiction and associated health risks by immediately addressing the epidemic of youth e-cigarette use...We must take action now to protect the health of our nation’s young people.” – CDC (U.S. DHHS, 2018, Introduction statement)*

Sources that advocated for the harm prevention approach were far more likely to use combative terminology and fearmongering language when discussing the issue of e-cigarettes. This type of phrasing was most noticeably present when content focused on the topic of vaping amongst youth. These descriptors give the reader the impression that the United States was, as a nation, at war with e-cigarettes. Vaping amongst youth was seen ‘as the enemy’ and aggressive action was needed to fight against the problem. Those who read such content are encouraged to develop antagonistic and hostile attitudes towards e-cigarettes.

*“To help address this growing use among kids, over the past year, the FDA has taken a rigorous enforcement stance, including a number of actions to combat the illegal sales of e-cigarettes to youth through our enforcement efforts at brick-and-mortar and internet storefronts...” - FDA (Gottlieb, 2019, para. 6)*

*“We must take aggressive steps to protect our children from these highly potent products that risk exposing a new generation of young people to nicotine...To achieve success, we must work together, aligning and coordinating efforts across both old and new partners at the national, state, and local levels. Everyone can play an important role in protecting our nation’s young people from the risks of e-cigarettes. Surgeon General (U.S. DHHS, 2018, p.2)*

In comparison, sources that adopt a harm reduction approach tended to present their vaping-related content in a way that could be described as ‘cautiously optimistic’. Content was more evenly distributed between acknowledging both the potential harms and benefits of vaping. When presenting empirical evidence that was in favour of e-cigarettes, authors made a point to remind the reader that while such results are promising, future research was needed to determine whether these conclusions would continue to be supported. The overarching message to the audience appears to be ‘what we know so far is encouraging, but we need to be thorough’.

*“E-cigarettes do not appear to be undermining the long-term decline in cigarette smoking in the UK among young people...Trends in e-cigarette use and smoking among youth should continue to be monitored...” - Public Health England (McNeill et al., 2015, p.6)*

*“While caution is needed with these figures, the evidence suggests that e-cigarettes have contributed tens of thousands of additional quitters in England... An important focus of future research is longer-term relapse trajectories of people who use e-cigarettes for quitting compared with other stop smoking treatments...” - Public Health England (McNeill et al., 2018, p.16)*

Overall, the differences in how harm reduction and harm prevention content used language to present the topic of vaping created two very distinct reading experiences. While both perspectives encouraged readers to feel as though vaping was an issue relevant to them, there appeared to be different motivations behind this. Those who wrote with a harm prevention mindset want to encourage audience members to view e-

cigarettes as an enemy that needs to be defeated, where authors from the harm reduction approach would prefer the reader to consider the notion that vaping may be one of many solutions to help reduce the harms of smoking.

#### **4.1.6 Summary**

The main purpose of this thematic review was to provide an additional guide during my survey construction process. My analysis highlighted which issues were discussed most frequently and the how they were presented. While my questionnaire could not incorporate all the themes found, this analysis emphasized: perceptions of harm (in particular, nicotine), the perceived efficacy of e-cigarettes as an aid to smoking cessation, how different referents may respond to vaping, and perceptions regarding how accessible and easy to use e-cigarettes are – all of which I included in my final survey. In addition, as it will be shown in Chapter Six, the findings of my qualitative analysis help to explain several of my quantitative results. The secondary purpose of this examination was to compare how two different countries – the United States and the United Kingdom – discuss the topic of vaping in both newspaper articles and reports by government health-organizations. This area has been mostly ignored by the previous literature. While a more comprehensive comparison should be conducted at a later date, my thesis has laid a foundation and demonstrated that there is indeed a need for such a study. Based on the content examined, readers are exposed to similar topics but their significance and the manner in which they are discussed varies considerably depending on the country of origin. These different portrayals could encourage different attitudes towards vaping – an area that future research should also explore.

## **4.2 Reddit Posts**

The paragraphs below provide a narrative of the most common topics that were featured within Reddit posts from r/vaping and r/electronic\_cigarette. While some minor differences were present, there was a considerable amount of overlap between the two forums. Consequently, I have described the findings from both in the same section and have acknowledged if a particular pattern was more prominent within one subreddit than the other. There is a notable lack of depth within my descriptions which reflects the minimalism of the content - a considerable portion of the posts contained only a title and a single image. There is also an absence of direct quotations which is justified by two main factors. Firstly, the moderators of both subreddits explained that direct quotations would require permission from the individual authors of the posts. Since my sample contained 200 posts - from potentially 200 different authors -, this would create a labour-intensive process that would not necessarily improve my reporting of the results. Secondly, I was

concerned that reaching out to authors may foster distrust and potentially cause them to remove their posts – which would disrupt the study population and potentially biased the sample.

#### **4.2.1 In-Jokes & Memes**

In-jokes and memes (digital items and images used to express cultural ideas or behaviours) were the most common type of post present in both subreddits. These typically contained references and inside jokes that were relevant to vaping. Some were somewhat broad and could be understood by those who had never used e-cigarettes, but most were more specific and required an understanding of the vaping process and/or the various components of an e-cigarette. For example, certain jokes and memes which referred to wicks and atomizers. Most jokes were directed towards in-group members (in general) and their behaviour. There were occasional instances of out-group members being made fun of – but this was not the norm.

Within the r/vaping community, one of the more common in-group references were 'hand-checks'. These are simply photographs of an individual's current vape mod and/or e-liquid, often held within the author's hand (hence, a hand-check). There is no apparent purpose of these images, beyond simply sharing an individual's current device/flavour preferences. They seemed to be more prolific amongst those who customized their own mods.

Another type of post that warrants a more in-depth description are references to the cost of e-cigarettes. Members of the r/electronic\_cigarette subreddit, and prior research, suggest that some smokers are motivated to transition to vaping due to the rising cost of combustible cigarettes (McNeill et al., 2015). There were some posts within the r/vaping community, however, that jested about people spending more money on e-cigarettes and related paraphernalia. This appears to be most common amongst those who treat vaping as a hobby, rather than a simple smoking cessation method. Overall, posts that fell into this category provide additional support for previous literature that argues that the vaping community has developed its own subculture (McCausland et al., 2020; Tokle & Pedersen, 2019).

#### **4.2.2 The Issue of 'Child Friendly Flavours'**

As seen in the previous section, advocates of the harm prevention approach have expressed concerns that e-liquids are being made available in 'child friendly' flavours (in particular, fruits, candy, or desserts) with the intent of attracting underaged consumers.

This topic of discussion also featured within posts from both examined subreddits. Members of these communities responded to such claims in two ways. First, it was argued that adults can also enjoy these specific flavours – a claim that is supported by previous research (McNeill et al., 2018; McNeill et al., 2019). Second, community members pointed out that vaping is not the only adult-related industry that incorporates a wide variety of flavours. The most common comparison point made was alcoholic beverage companies who make use of various flavours in order to make their products more palatable. There is evidently a sense of frustration at what appears to be a double standard between the two industries. Those who commented on these posts often emphasized that – as with the alcohol industry – the onus is not on the manufacturer, but the distributor/seller of the product. Stores that sell products intended for adult consumption (such as cigarettes and alcohol) are required to check customer identification and adhere to set regulations. The same standard should be applied to those who sell e-cigarettes and related paraphernalia.

#### **4.2.3 Complaints Towards Government and/or Big Tobacco**

A portion of the posts centred around expressing frustration towards Big Tobacco and/or governing bodies. Such content was featured only within the r/electronic\_cigarette subreddit. The emphasis on Big Tobacco also reflects the concerns found in my analysis of newspaper articles and government reports.

One post provided a link to a news story explaining that the sales of nicotine juice outpaced those of ‘ciga-likes’ – the latter being the most common e-cigarette product made/sold by Big Tobacco companies. This news was presented in a favourable light, indicating that Big Tobacco is not seen to be welcome in the vaping industry. Another post linked the reader to an article which described how British American Tobacco bribed officials to gain access to restricted reports at the WHO Framework Convention of Tobacco Control, which was set to influence vaping related policy and regulations.

One upload provided a visual representation of the United States congress and Big Tobacco in bed together – suggesting that both organisations are perceived to be cooperating with one another. Another comic was so popular that it featured twice in the top 100 posts of the same subreddit. The first panel depicts the government insisting that they will continue to raise cigarette taxes in order to encourage smokers to quit. When the smoker agrees to quit in the second panel, the government official – hugging a cigarette carton titled ‘cigarette tax-funded programmes’ – complains of their decision. The implicit idea here is the notion that the government and Big Tobacco do not really want people to quit smoking – which is why they often oppose the vaping industry.

#### 4.2.4 Smoking Cessation

One of the more common themes amongst the r/electronic\_cigarette subreddit was the notion of using e-cigarettes as a tool for smoking cessation. Posts of this nature mirror the harm reduction perspective of embracing vaping to help people quit their use of combustible cigarettes. The style/content of these posts varied. Some provided a single image, others presented several paragraphs of text, and sometimes links to relevant resources were provided.

The fact that the top three posts of this subreddit focused on the topic of smoking cessation demonstrates its importance to community members. All three of these posts were published on New Years Day (01/01) between 2015 and 2017 – most likely to attract those whose new year resolution was to quit smoking. The focus was on providing assistance to those who wanted to use e-cigarettes in their current/future smoking cessation attempts. Across the years, the content of these posts expanded. The 2015 post provided a brief introduction to the forum and encouraged smokers to join, while the 2016 version expanded upon this introduction and provided readers with a link to a Google Sheet that listed over 200 academia articles which discuss the topic of vaping. The 2017 post incorporated a welcome message, a link to the previously described Google Sheet, and offered vendors the chance to use the post as a ‘giveaway’ (that is, vaping vendors could choose to distribute some of their products, for free). In addition, there were also several posts made by individuals sharing their own cessation experiences or those of family members. This focus on smoking cessation also supports previous research which has found that the majority of e-cigarette users are current or former smokers (McNeill et al., 2018; McNeill et al., 2019).

#### 4.2.5 E-Cigarette ‘Facts’

Some posts within both subreddits provided ‘facts’ about vaping. Content within these posts included both broad claims as well as references to specific issues. Common examples included: stating that e-cigarettes are significantly safer than their combustible counterparts, discussing the topic of ‘popcorn lung’, and the cost of vaping compared to smoking. Many – but not all – of these posts do **not** contain references to support their claims. This does not mean that the statements are false, but it does mean that the statements made are less likely to be seen as credible by outsiders. Similar to the harm reduction authors from the previous section, it seems that the goal of these posts is to address common misconceptions surrounding vaping and educate those who do not use these devices. Authors may also hope to provide reassurance to smokers who are considering using e-cigarettes as a cessation tool but are unsure about the risks.

#### **4.2.6 Poor Quality Products & Undesirable In-Group Members**

Within both subreddits, there was acknowledgement of undesirable in-group behaviours as well as poor-quality products. Posts discussing defective equipment were typically very specific and often named the brands that users experienced the most dissatisfaction with. A recurring brand in this category were 'Smok' products. Sometimes these devices were mocked in comics and jokes, while other posts provided photographs of products leaking or being thrown away. Another post specified a particular brand of batteries and advised users to avoid them. Content such as this seems to be geared towards offering advice and recommendations towards other members of the community.

In addition to recognising poor products, these subreddits highlight undesirable in-group behaviours. Posts within this category did not identify specific individuals, but made statements about particular behaviours that some members participated in. A common example of this was the use of e-cigarettes in enclosed, non-smoking spaces – which was accompanied by the message 'don't be that guy.' Though not explicitly stated, it can be assumed that some members are worried that certain activities will negatively affect the public's perception of vaping and vapers. Another behaviour that was shamed was requesting/demanding that distributors engage in more 'giveaways.' Some vaping companies would dispense their products via these subreddits for free, as a form of promotion. This has led to some community members pestering company representatives for free products. Once again, specific persons were not identified, and these messages were attempts to 'call out' the behaviour in a more general sense. Posts such as these are evidence of in-group reflection and acknowledgement that some members are poor representatives of the overall community. The responses in the comments section of the posts also reinforce the idea that these undesirable persons are a minority within the group.

#### **4.2.7 Changing Attitudes Towards Vaping**

The final type of post I will describe are those that focus on changing attitudes towards e-cigarettes. This refers to content that suggests that vaping is being perceived as more socially acceptable and those who engage in this activity are facing less stigma. The comment sections of these posts often express optimism and positivity towards these changes.

A common example within this category is evidence of vapers being assigned their own 'dedicated spaces' in places such as hospitals and theme parks. When e-cigarettes first entered the market, many institutions required users to vape in areas that were reserved

for smokers. This could be due to the perceived similarities between vaping and smoking that were discussed in the previous section. These posts, however, indicate that some organisations are now more inclined to view the two behaviours as being distinct.

Other posts suggest that prominent and influential institutions are changing their attitudes towards e-cigarettes. For instance, one post linked a news article explaining the state of Alaska was no longer classifying e-cigarettes as a tobacco product. Another post referenced an official statement made by the American Cancer Society indicating that they have altered their stance on vaping – the organisation now recognises that it is preferable for smokers to switch to exclusive e-cigarette use.

#### **4.2.8 Summary**

This section has described the most prevalent themes amongst the top 100 posts of two subreddits – r/vaping and r/electronic\_cigarette. The content of these posts demonstrate that vapers are developing their own subculture that may help to foster positive in-group affect. The community appears to be generally welcoming of outsiders – in particular, smokers who may be interested in using e-cigarettes in their cessation attempts. In-group members offer support to one another in differing ways – addressing misconceptions, describing personal experiences, recommending products, etc; and the acknowledgement of undesirable vaping behaviour is evidence of reflection and self-awareness. Less frequent, but still present, was evidence of distrust and frustration towards institutions that are perceived to treat vaping unfairly and/or may be motivated to hinder peoples' ability to use these products. Individuals who read the content of these forums are more likely to walk away with a positive attitude towards e-cigarettes and those who use these devices. This analysis demonstrated that many people consider vaping to be an important part of their lives and that being part of this group can be a very positive experience – which is why I decided to include measures of self-concept and social identification in my questionnaire.

### **4.3 Open-Ended Survey Questions**

Below is a summary of the recurring themes found within participant responses to open-ended questions within my survey. These themes were uncovered by examining responses to the 'Actual Behaviour' section. Respondents were given a textbox and asked to explain why they had never tried e-cigarettes (17.6%); why they had used these devices but not on a regular basis (14.6%); why they no longer used e-cigarettes on a regular basis (3.0%); why they continued to use e-cigarettes on a regular basis (64.4%); and/or why they used both traditional and e-cigarettes in tandem (7.3%). At the end of the 'Actual

Behaviour' portion, participants were posed the question *'From the options below, please select the category you believe best suits electronic cigarette users and explain your choice. Those who use electronic cigarettes are...'* Three options were provided – Smokers (59.3%), Non-Smokers (22.8%), Neither (16.7%) – and a textbox to explain their choice. The text responses to this question are also analysed. As it will be demonstrated, sometimes the same theme would emerge in response to different questions; other times, an overarching theme would contain considerably different perspectives. Several themes support the findings of previous literature, and some are similar to those that I identified in the Reddit posts, newspaper articles, and government reports.

#### **4.3.1 Lack of Interest/Want/Desire**

Participants who had never tried an e-cigarette often explained that their decision was due to a lack of interest, want, or desire. This same response was also given by those who had previously experimented with e-cigarettes but did not go on to become regular users. The majority of these respondents were identified as non-smokers. This confirms what previous research has shown – non-smokers are unlikely to try vaping and those who do rarely go on to be regular users (McNeill et al., 2018; McNeill et al., 2019).

*Don't want to*

*Doesn't interest me*

*Because I don't have any desire to*

*Additionally, I have no interest or curiosity.*

*I have no desire to*

*Did not see the appeal.*

*No desire to continue*

#### **4.3.2 Lack of Need**

Others explained that their lack of e-cigarette use was a result of them having no **need** for these devices. Specifically, it was often stated that respondents felt that they had no need for e-cigarettes since they themselves were non-smokers.

*...I don't need to because I don't smoke*

*Have never smoked. If I haven't smoked, then it doesn't seem like something meant for me / would benefit me.*

*I don't smoke.*

*Never smoked and not looking for a substitute.*

*I can't see any benefit aside from trying to quit smoking*

Similarly, those who had experimented with vaping argued that since they were non-smokers, they did not see the necessity in becoming a regular e-cigarette user.

*And I didn't see the point since I'm not a smoker*

*Non-smoker. Tried it but see no use in become a regular user.*

*...And I didn't see the point since I'm not a smoker*

*I'm not a smoker.*

It is never explicitly stated why smokers would need e-cigarettes; however, a reasonable assumption would be that these devices are seen as tools that smokers can employ in their cessation attempts. Without the need to quit smoking, there is no need for e-cigarettes.

### **4.3.3 Social Motivations**

Respondents from both ends of the 'use' spectrum cited social motivations as influencing their vaping-related behaviour. On one end, those who fell into the 'never use' category explained that they were worried that using e-cigarettes would worsen their social standing.

*I find it quite unattractive...*

*...it makes you look like a douche*

*...they don't have a great social perception...they're obnoxious to other people around the user...*

At the other end, those who regularly used e-cigarettes stated that their use was motivated by approval from others. It seems that some referents – such as family and significant others – viewed vaping in a more favourably. While the comparison point is not explicitly stated, it is fair to assume that they are referring to smoking. This social support reflects previous findings that show some smokers are motivated to quit by social influences (Grotvedt & Stavem, 2005).

*...girlfriend was a smoker and gets ill from smoke and smell...*

*...it is way less objectionable...*

*...My family are much happier too.*

*...Wife doesnt bug me now.*

*Because when my now two year old was born...*

A specific social factor that was repeatedly mentioned was improvements in respondents' smell. That is, how they smelt to others.

*I don't smell bad anymore...*

*...smells better than cigarettes...*

*...I didn't want him exposed to the chemicals and smell of my cigarettes*

*...and don't smell like an ash tray...*

*...I do not stink...*

While some saw e-cigarettes as a way to gain social approval via smoking cessation, others were encouraged by the notion that vaping itself is a social process/activity. As shown by past research, e-cigarette use for some is a hobby and provides a way for others to find common ground. The constant activity and shared in-jokes that I identified in the Reddit posts also confirms this.

*...and social aspect*

*...and also the social aspect with groups and meetings etc*

*...and the socialisation aspect of it*

*...and so myself and many of my friends started vaping.*

Social situations were also why some individuals had briefly experimented with e-cigarettes (but did not progress to becoming a regular user).

*I was just trying someone else's vape to see what it was like.*

*I just did it for experience once or twice after borrowing my friends electronic cigarettes*

*I just tried my friends electronic cigarette.*

*I tried it because my friend bought one*

#### 4.3.4 Health Concerns

Both participants who had never used e-cigarettes and those who had previously used them on a regular basis, stated that their decisions were motivated by health-related concerns. Several respondents, the vast majority of which were non-smokers, explained that they had never experimented with e-cigarettes due to concerns that these devices would lead to negative health effects. Similar to the harm prevention texts that I analysed; these participants are using their status as a non-smoker as a comparison point to assess the dangers of e-cigarette use. From this perspective, vaping is undesirable due to its potential side-effects.

*No desire to inhale something that won't do my thing good for me*

*...negative health consequences...*

*...they're unhealthy both for regular health...*

*I've read of cases of ecigs and Vapes causing popcorn lung and I've heard there's a new disease that's been found. I try to stay as healthy as I can.*

It should be acknowledged that some respondents admitted that they were uncertain regarding what these side-effects are.

*The jury is still out as to weather e-cigarettes are safe, even without nicotine. Don't want to risk my health.*

*I am also afraid of possible health risks*

*Most of all I do not know too much about the benefits or affects of e-cigarettes to want to use them, as I don't want to cause health issue for myself in the future.*

*I do not want to expose myself or those around me to the harmful effects that may come with smoking electronic cigarettes.*

Of the few individuals who had used e-cigarettes regularly but no longer did so, some stated that their discontinuation was fuelled by them experiencing negative health-related consequences.

*Breathing became difficult, and was coughing too much due to still smoking regular cigarettes/tobacco, at the same time.*

*Lung issues*

*I could tell that it harmed my lung capacity / health...*

Some saw the potential for e-cigarettes to harm the user and nearby others as justification for their decision to categorize vapers as ‘smokers’.

*Although it doesn't smell as bad, ecigs still do damage to users' health  
They always smoke something that is addictive and that lead to health problems*

Health-related reasons were also provided to justify regular e-cigarette use. It was often stated that e-cigarettes are a healthier alternative/option when compared to combustible cigarettes – a claim that mirrors the harm reduction approach and is supported by most research (Eltorai et al., 2019; McNeill et al., 2018; NASEM, 2018). It should be understood that these respondents were former smokers and were explaining why they had switched from traditional cigarettes to vaping; they were not non-smokers who decided to begin vaping simply because it was seen as safer than smoking.

*...and it is healthier than regular cigarettes*

*As although it's still potentially harmful it's better than traditional cigarette use*

*...and healthier than normal cigarette*

*...and this is a healthier alternative.*

*...and it's safer than smoking combustible cigarettes*

Expanding upon the previous sentiment, some respondents explicitly stated that the transition from traditional to electronic cigarette use was associated with improvements to their health. Prior studies have suggested that completely substituting smoking with vaping could lead to health-related benefits (Byrne et al., 2018; Kuntic et al., 2020; NASEM, 2018).

*While I acknowledge it is still not great for my health it has been phenomenally better for my health than continuing to smoke.*

*...I can breathe again.*

*My health improved immensely.*

*...and I believe the transition has benefited my health.*

*My overall health and happiness has improved massively.*

There were participants who referred to the reduction of health risks as their motivation for selecting the ‘non-smoker’ option when asked to categorize those who use e-cigarettes.

*They don't smoke regular cigarettes anymore and don't have the health risks associated with them.*

*Vapour is not smoke and is very different product especially where health is concerned*

*... nor does it contain the thousands of chemicals and carcinogens that a cigarette contains.*

*Smoking and vaping are different things. One is much healthier than the other.*

It is worth noting that only a very small number of individuals went so far as to claim that use of e-cigarettes or exposure to the second-hand vapor carries no risk.

*...it's not different to standing in a steamed up bathroom and breathing.*

*vaping is NOT smoking , it carries little of the personal risk and NONE of the second hand risk of cigarettes*

*It is similar product to asthma inhaler with flavours and optional nicotine, a substitute perhaps, but I can breath now and smoking is detrimental to mine and others health vaping is not.*

#### **4.3.5 Cost**

Several participants stated that financial benefits motivated them to continue vaping on a regular basis. Specifically, it was repeatedly explained that e-cigarettes were a cheaper alternative to traditional cigarettes. This sentiment has been shared by respondents of previous studies (Schmidt et al., 2014; Yong et al., 2019).

*...I find electronic cigarettes to be less expensive than traditional cigarettes...*

*Cost is so much lower...*

*...financial benefits after 10 years vaping*

*Cheaper than cigarettes*

*cheaper the cigarettes*

*...found it a cheaper...*

*...it's much cheaper...*

There were some comments which suggest that certain respondents felt they **had** to switch to e-cigarettes since they could not afford the cost of combustible cigarettes. This could suggest that these participants did not voluntarily choose to become a vaper.

*Cigarettes in NZ have become prohibitively expensive*

*I couldn't afford the cost of smoking*

*Smoked for years, they got expensive...*

*Smoking become expensive...*

*Smoking is too expensive*

Cost was also provided as a justification for no longer using e-cigarettes on a regular basis. These two participants may have been comparing vaping to not smoking, or they may have treated e-cigarettes as a hobby that requires investment – similar to some of the joke posts that were found on Reddit.

*I could tell that it harmed my lung capacity / health and was expensive*

*I couldn't find a flavour i liked that wasn't going to cost me more than smoking does*

#### **4.3.6 Enjoyment**

Lack of enjoyment was an excuse given by those who had experimented with e-cigarettes in the past but did not become regular users.

*It burned, it was disgusting, and I hated it.*

*It was horrible.*

*I did not enjoy it*

*Did not enjoy it*

At the same time, many individuals who were regular vapers stated that their enjoyment motivated to continue using these products.

*...and enjoy doing tricks*

*...I enjoy vaping...*

*...I enjoy it...*

*...Also, I just love it.*

A particular aspect that many highlighted was satisfaction with the flavours they used in their e-liquid. This could be seen as evidence which further supports the harm prevention assumption that the various flavours of e-liquids are an attractive feature of e-cigarettes. It

is important to note, however, that my study focuses on the perceptions of adults – not youth.

*Enjoy the taste*

*...tastes good...*

*Great flavor...*

*I like the flavours...*

*I like the taste and mouth feel...*

Enjoyment was also provided as a justification for those who used both traditional and e-cigarettes.

*Preference*

*I Enjoy them*

*i like both*

*... i enjoy both traditional and electronic cigarettes*

A couple of respondents clarified that e-cigarettes were not able to ‘satisfy’ them the same way traditional cigarettes could. This finding is supported by previous research (Yong et al., 2019).

*I can't get full satisfaction by using electronic cigarettes. So I use traditional ones*

*Many times it don't get the feeling of satisfaction when using vape so tend to use ordinary cigarettes*

#### **4.3.7 Addiction**

Concerns regarding addiction were expressed when participants explained why they had never tried e-cigarettes. These respondents rarely specified what it was they were worried they would become addicted to, but a reasonable assumption is nicotine – which is a valid concern based upon previous literature (McNell et al., 2018; US. DHHS, 2016).

*...Also I don't want to become addicted to it..*

*I don't want to become addicted...*

*Im not into drugs/addiction*

*...but also in terms of addiction...*

Fears around addiction were also present in those who had tried e-cigarettes but not gone on to become regular users. These respondents were more inclined to specify that they were worried they'd become addicted to nicotine.

*not previously addicted to nicotine...*

*Quit smoking cold turkey instead, as opposed to displacing my addiction*

*I am an exsmoker I was already addicted to nicotine*

*Because I am not weak and can tell when I am becoming to addicted to sth bad and then I would stop*

Addiction to nicotine was provided by some as an explanation for their continued use of e-cigarettes on a regular basis. While previous research indicates that e-cigarettes may be perceived as less addictive than combustible cigarettes, there is still a correct understanding that the use of nicotine – even via vaping – can still lead to addiction (Berg et al., 2015; Goniewicz et al., 2013; Gorukanti et al., 2017; Jiang et al., 2019).

*...I am addicted to nicotine.*

*...and my brain expects nicotine*

*I believe they satisfy my addiction to nicotine*

*Addicting...*

*addiction*

It appears that several regular vapers were aware of their addiction and were taking steps to weaken it. Being able to weaken the strength of nicotine within the e-liquid is one of the ways prior literature envisioned e-cigarettes could be used in smoking cessation attempts (Etter, 2016, 2018).

*...Have slowly lowered nicotine level over time.*

*still addicted to nicotine but weaning off*

*...and am lowering my nicotine count in them to be free of my nicotine addiction.*

*...and reduced nicotine*

*...slowly lowering my nicotine on only 1mg now*

A couple of dual users also identified their addiction as a contributing factor to their use of traditional and e-cigarettes in tandem.

*Addiction*

*Because traditional cigarettes are so addictive...*

#### **4.3.8 Smoking Cessation & Reduction**

Smoking cessation was the most common explanation given for regular e-cigarette use. This supports previous research which indicates that the majority of those who vape on a regular basis are either 1) current smokers using these devices as a tool for smoking cessation or reduction, or 2) former smokers who have successfully used e-cigarettes to quit smoking (McNeill et al., 2018; McNeill et al., 2019; Villarroel et al., 2020). This also reflects the content of many Reddit posts that were examined.

*Abstinence from normal cigarettes*

*Electronic cigarettes have allowed me to quit smoking traditionally cigarettes.*

*Giving up smoking*

*Got me off the tobacco...*

Numerous respondents also stated that e-cigarettes had enabled them to cease smoking habits that had spanned decades.

*After 30yrs of combustible cigarettes, vaping was the only cessation method that was effective for me quitting*

*Because I am using it as a tool for quitting 16 years of actual cigarettes*

*Because I was a smoker for over 20 years and have now been smoke free for over 4 years*

*Gave up smoking instantly I tried. That is after 45 years smoking. Have not had cigarette in 2 years.*

*helped me to quit smoking cigarettes after being a smoker for over 50 years*

Other participants argued that e-cigarettes had been the **only** smoking cessation method that they had experienced success with.

*After 30yrs of combustible cigarettes, vaping was the only cessation method that was effective for me quitting*

*I smoked cigarettes for 30 years and electronic cigs have been the only thing that has helped me stop smoking real cigarettes...*

*I smoked for 38 years,quit many times for a few days to a year max, keep on falling back into smoking.At 50 with 4 kids,I started vaping and have not had a cigarette since...*

*I used ekectronic cigarettes to help me to quit smoking. I had tried conventional methods multiple times and failed.*

Smoking cessation success was also provided as an explanation for why **two** participants no longer used e-cigarettes on a regular basis. They had successfully achieved their goal and viewed the devices as unnecessary.

*To give up smoking*

*Used it to quit smoking now use it ocssionally to avoid going back to smoking*

For some participants, their smoking cessation was still a work in progress.

*I am trying to give up cigarettes and have achieved a 50% reduction that is great and hopefully i can quit*

*I am using an e-cigarette to break the traditional cigarette habit. So far it is working well, I do not smoke many cigarettes now.*

*In process of quitting traditional, sometimes revert back to them...*

Other respondents explained that while they may not intend to ever quit combustible cigarettes fully, their use of e-cigarettes had at least enabled them to reduce their consumption.

*I still like having a few cigarettes a week, but it's almost nothing compared to how much I used to smoke*

*I just can't seem to quit smoking, but vaping has let me drastically reduce my cigarette intake.*

*I dont want to quit smoking cigarettes fully, but i want to cut down to 2 a day. After trying electronic cigarettes and reducing traditional cigarettes my health has improved immensely...*

*I am mainly e-cigarettes but I have pretty much stopped traditional cigarettes besides the occasional slip up at a social occasion. Until I feel i have stopped them completely ill still classify myself as a dual user.*

The connection between e-cigarettes and smoking cessation also influenced participants' categorization of e-cigarette users. Some of those who classified vapers as 'non-smokers' argued that they fit into this group since they had successfully used e-cigarettes to quit smoking traditional cigarettes.

*A full time vaper has quit smoking. Vape is not smoke.*

*If someone uses ecigs to transition away from traditional cigs, is successful in this and manages to stay off of traditional cigs, their health will improve in a way that makes them distinct from smokers. As such, they shouldn't be classified as smokers (they don't smoke)*

*most of them are ex-smokers and now vape*

*They have quit traditional combustible cigarettes*

#### **4.3.9 Comparisons to Traditional Cigarettes**

As with the harm prevention sources in my analysis of newspapers and government reports, many participants made comparisons between traditional and e-cigarettes. The responses of some respondents suggested that they had not tried electronic cigarettes due to their perceived similarities to traditional cigarettes. Certain individuals see electronic cigarette use as a form of 'smoking' - even though these devices do not involve combustion and therefore do not produce smoke.

*Because I hate smoking in general*

*Because I have no experience with smoking of any kind and nobody that I know uses them...*

*...like other smoking substances. All smoking should be banned.*

*I do not like smoking.*

*...I don't see the appeal of smoking, ecig or not...*

*I stay away from everything smoking...*

Some respondents stated that e-cigarettes contained the same chemicals as traditional cigarettes. As discussed in the literature review, most of the chemicals associated with conventional cigarettes are absent from vaping (McNeill et al., 2018; McNeill et al., 2019; Villarroel et al., 2020). While some substances may overlap, their concentration in vapor is significantly lower when compared to the smoke produced by combustible cigarettes (McNeill et al., 2018; McNeill et al., 2019; Villarroel et al., 2020). It is perhaps individuals such as these that Reddit users hope to address when making posts regarding 'facts' and 'common myths' about vaping.

*They are ingesting equally harmful chemicals*

*they consume almost the same chemicals*

*They have the same chemicals*

*they're ingesting the same chemical as cig smokers. it's basically smoking*

#### **4.3.10 Summary**

Participant responses to my open-ended questions indicate that there are a variety of factors that are taken into consideration when deciding whether to use e-cigarettes. There is evidence that vapers and non-smokers focus on similar issues within the realm of e-cigarettes – but approach these concepts from different angles. Concerns regarding addiction, cost, health, and social motivations were all cited as reasons to never vape, only experiment with e-cigarettes, and continue using these products on a regular basis. Furthermore, both e-cigarette users and non-smokers generally see vaping as an activity that is intended for those who use combustible cigarettes. As it has been shown, there is overlap between the themes from these open-ended questions and the those found during my review of newspaper articles, government reports, and Reddit content.

#### **4.4 Chapter Conclusion**

This chapter has provided an overview of the key findings from my thematic content analysis. By using a variety of sources, differing perceptions of vaping became apparent. The newspapers (*The New York Times & The Washington Post*) and government reports (*Surgeon General, FDA, & CDC*) based within the United States generally adopted a harm prevention approach to vaping. Their content presented the image that e-cigarettes should be viewed as a problem with the potential to harm future generations. In comparison, the harm reduction perspective that was typically seen in newspapers (*The Guardian*) and government reports (*Public Health England*) from the United Kingdom, portrayed e-cigarettes as a solution to the problem of smoking. By understanding how these sources present the issue of vaping, we can theorise as to how such representations may influence audience attitudes towards e-cigarettes. Given the considerable differences between the two approaches, it is understandable that those who read content from both may become quite confused as to how they are meant to perceive vaping. There is evidence of these conflicting perceptions in both previous research and participants' responses to my open-ended survey questions. My review of Reddit posts was also beneficial as it demonstrated the importance of group membership and highlighted which vaping-related topics are given the most attention by those who use these devices. There is an understanding of how the content of these posts may influence audience perceptions. The Discussion chapter will provide a more in-depth description of how these qualitative findings can assist in explaining several of the quantitative results and how they fit within the context of previous literature.

# Chapter Five: Quantitative Results

## 5.0 Chapter Introduction

The previous chapter discussed the results from my qualitative methods. Those findings, in conjunction with the literature review, assisted with the design of my survey. This chapter focuses on describing the results from that survey. The first portion demonstrates how well the Theory of Planned Behaviour predicts intentions to use e-cigarettes in the future, and whether additional variables improved the predictive utility of this model. The sections that follow describe how participant behavioural status – whether they were a non-smoker, e-cigarette user, dual user, traditional smoker – influenced responses to the various scales.

## 5.1 Testing the Theory of Planned Behaviour

As can be seen in Table 1, the six components that make up attitudes, subjective norms, and perceived behavioural control were able to explain 70% of the variance in participants' intentions to use e-cigarettes over the next six months for the entire sample. It was found that behavioural beliefs, injunctive norms, and barrier impact provided the largest contributions – which corresponds to their significant and moderate to strong correlations with intentions that can be seen in Table 2. For behavioural beliefs, the more a participant believed that regular vaping would lead to negative consequences, the weaker their intentions to use e-cigarettes were. In terms of injunctive norms, a respondent was more likely to express greater intentions to vape if they perceived their friends, family, and medical professionals as being supportive of this behaviour. With regards to barrier impact, if participants' felt that certain barriers would prevent them from using e-cigarettes on a regular basis, they were less likely to possess intentions to use these devices. Although originally included in the behavioural belief and outcome evaluation scales, items regarding the certainty and desirability of smoking cessation via vaping were analysed in next step due to low Cronbach's Alpha. As shown in Step 2 of Table 1, there was a 4% increase in the prediction of intentions when respondents' perceptions of smoking cessation were added to the model. Participants who were more likely to agree that regular vaping could assist with smoking cessation and perceived this outcome more favourably, expressed greater intentions to use e-cigarettes over the next six months. Given that general attitudes include to improve upon the attitude measures already in place, these were incorporated into Step 3 and were shown to improve upon the Theory of Planned Behaviour and provided a 2% increase in the amount of variance explained in participants' intentions. As seen by the strong and significant correlation in

Table 2, respondents who felt that positive descriptors were accurately reflected their evaluations of vaping were more likely to intend on using e-cigarettes in the future.

**Table 5.1**

*Hierarchical linear regression testing the Theory of Planned Behaviour and additional variables.*

	<b>Independent Variable</b>	<b>Beta (<math>\beta</math>)</b>	<b>Adjusted R<sup>2</sup></b>	<b>Change in R<sup>2</sup></b>
<i>Step 1</i>			.70	
	Behavioural Beliefs	-.45**		
	Outcome Evaluations	.10*		
	Injunctive Norms	.32**		
	Motivations to Comply	-.07		
	Potential Barriers	-.03		
	Barrier Impact	-.16**		
<i>Step 2</i>			.74	.04**
	Behavioural Beliefs	-.33**		
	Outcome Evaluations	.10*		
	Injunctive Norms	.26**		
	Motivations to Comply	-.05		
	Potential Barriers	-.01		
	Barrier Impact	-.15**		
	Certainty of Smoking Cessation	.19**		
	Evaluation of Smoking Cessation	.11*		
<i>Step 3</i>			.76	.02**
	Behavioural Beliefs	-.25**		
	Outcome Evaluations	.09*		
	Injunctive Norms	.20**		
	Motivations to Comply	-.04		
	Potential Barriers	.01		
	Barrier Impact	-.12**		
	Certainty of Smoking Cessation	.14*		
	Evaluation of Smoking Cessation	.09*		
	General Attitudes	.25**		
<i>Step 4</i>			.76	<.01*
	Behavioural Beliefs	-.24**		
	Outcome Evaluations	.09*		
	Injunctive Norms	.18**		
	Motivations to Comply	-.05		
	Potential Barriers	.01		
	Barrier Impact	-.11**		
	Certainty of Smoking Cessation	.13*		
	Evaluation of Smoking Cessation	.09*		
	General Attitudes	.24**		
	Attention to E-Cig. News	.09*		
	Perceived Credibility of E-Cig. News	-.02		

\* = Finding is significant at the 0.05 level; \*\* = Finding is significant at the 0.01 level.

Although participants' attention to and perceived credibility of e-cigarette news stories provided a significant contribution, only the former was significantly related to intentions and the change in prediction was less than 1%. This reflects the significant but weak correlations between news-related variables intentions that can be seen in Table 2.

The results from Table 1 demonstrate that the Theory of Planned Behaviour can be applied to the behaviour of e-cigarette use and is able to account for a considerable amount of variance in participants' intentions vape. The section that follows describes how respondent behavioural status – whether or not they vaped and/or smoked – influenced their attitudes towards e-cigarettes.

**Table 5.2***Pearson's correlations between variable composite scores.*

	1.	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Behavioural Beliefs															
2. Outcome Evaluations	-.57**														
3. Subjective Norms	-.64**	.50**													
4. Motivations to Comply	.01	-.02	.21**												
5. Potential Barriers	.31**	-.23**	-.30**	.02											
6. Barrier Impact	.25**	-.27**	-.28**	< .01	.21**										
7. Intentions	-.74**	.54**	.69**	-.03	-.32**	-.38**									
8. General Attitudes	-.71**	.47**	.64**	-.03	-.38**	-.36**	.78**								
9. Indicators of Att. Durability	-.63**	.45**	.58**	-.02	-.32**	-.32**	.74**	.58**							
10. Certainty of Smk. Cess.	-.60**	.37**	.52**	.02	-.27**	-.24**	.67**	.66**	.47**						
11. Evaluation of Smk. Cess.	-.54**	.29**	.41**	-.01	-.28**	-.21**	.58**	.54**	.46**	.63**					
12. Self-Concept	-.02	-.03	.01	-.05	.03	.07	< .01	-.10	.04	.04	.10				
13. Social Identification	-.28**	.19**	.29**	.16**	-.07	-.02	.25**	.16**	.32**	.14**	.12*	.07			
14. Attention to News	-.34**	.21**	.38**	.15**	-.15**	-.12*	.41**	.40**	.46**	.33**	.26**	< .01	.27**		
15. News Credibility	.43**	-.41**	-.34**	.11	.23**	.24**	-.41**	-.41**	-.37**	-.32**	-.27**	.07	-.19**	-.02	
16. Nicotine Dependence	-.53**	.41**	.51**	-.03	-.08	-.05	.65**	.53**	.49**	.42**	.34**	.05	.19**	.28**	-.30**

*Note.* Certainty of Smk. Cess. = Smoking Cessation Behavioural Belief Item; Evaluation of Smk. Cess. = Smoking Cessation Outcome Evaluation Item

\* = Correlation is significant at the 0.05 level; \*\* = Correlation is significant at the 0.01 level.

## 5.2 Attitudes

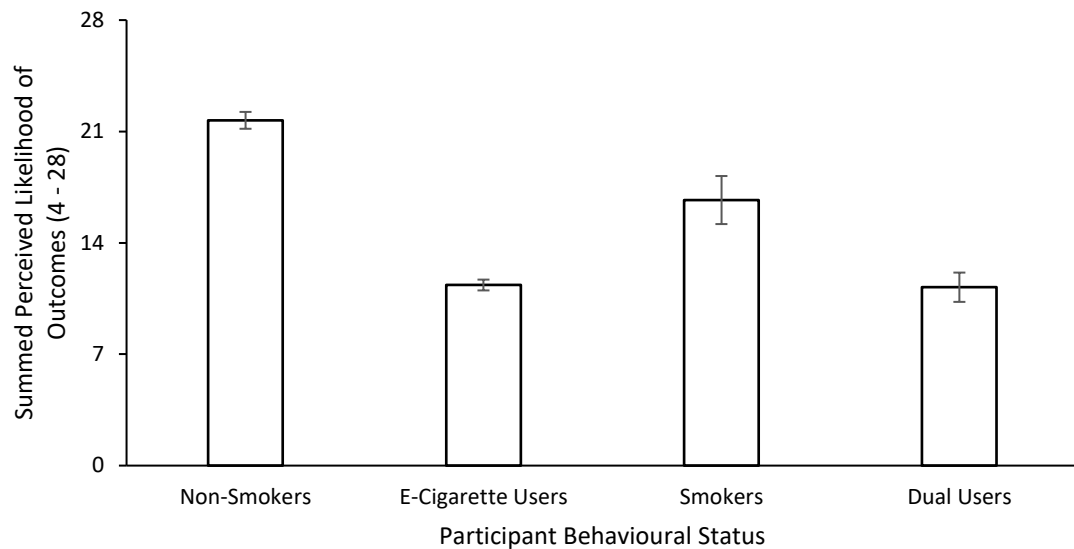
The current study included four attitude related measurements – behavioural beliefs, outcome evaluations, general attitudes, and indicators of attitude strength. The segments that follow describe the findings for each of these components and explain how responses to these scales varied depending on respondents' behavioural status.

### 5.2.1 Behavioural Beliefs

In the context of the current study, behavioural beliefs refer to participants' certainty that regular e-cigarette use would lead to four different outcomes - exposure of the self to harmful chemicals, exposure of others to harmful chemicals, (self-directed) negative health consequences, and addiction (via nicotine). A one-way ANOVA determined that a participants' behavioural status – that is, whether (or not) they smoked and/or vaped – influenced their perceptions that regular e-cigarette use would lead to selected outcomes,  $F(3,325) = 101.21, p < .001$ . Figure 5.1 provides a visual representation of the differences between the groups. Tukey post-hoc analyses demonstrated that non-smokers ( $M = 21.70$ ;  $SD = 5.30$ ) were significantly more likely than vapers ( $M = 11.35$ ;  $SD = 4.69$ ), smokers ( $M = 11.21$ ;  $SD = 4.50$ ), and dual users ( $M = 16.69$ ;  $SD = 6.04$ ) to believe that regular e-cigarette use would result in the described consequences. These same analyses also revealed that while the beliefs of traditional smokers were weaker than those of non-smokers, they expressed a significantly greater certainty that these same consequences would occur in comparison to both vapers and dual users.

**Figure 5.1**

*The perceived likelihood of outcomes due to regular e-cigarette use as a function of participant behavioural status*



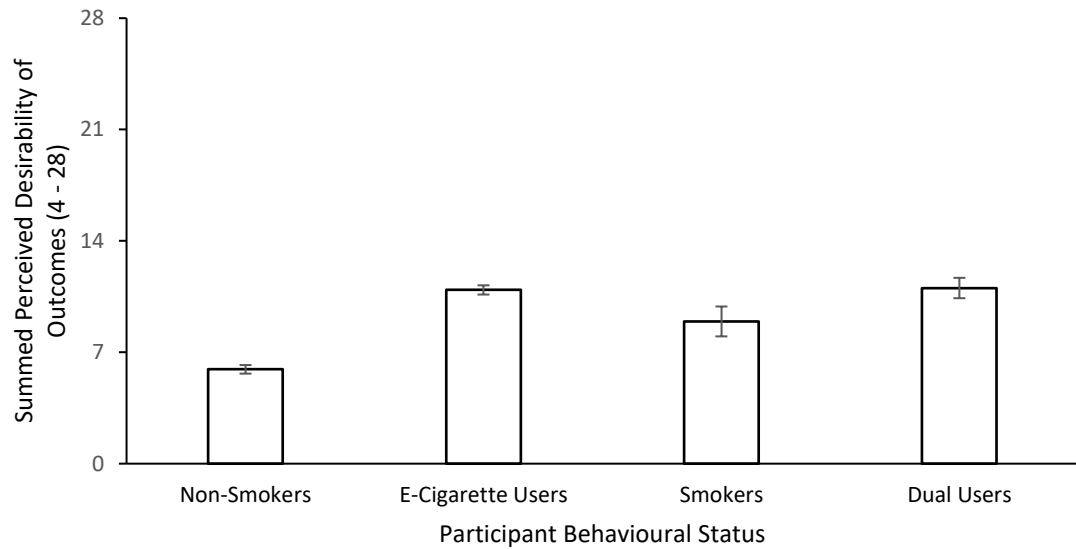
A note-worthy finding was identified when reviewing the individual items of this scale. When respondents were asked if regular vaping with an e-liquid that contained nicotine would lead to addiction, the same pattern of significant differences were present – however, they were visibly smaller than those within the other items. This suggests that participants from the different behavioural statuses were in greater agreement that addiction would take place as a result of e-cigarette use involving nicotine.

### **5.2.2 Outcome Evaluations**

The current study assessed outcome evaluations by asking respondents to indicate whether they viewed the selected consequences of vaping to be desirable/favourable. The same four outcomes that were used in the behavioural beliefs scale were examined - exposure to the self to harmful chemicals, exposure of others to harmful chemicals, (self-directed) negative health consequences, and addiction (via nicotine). As shown in Figure 5.2, despite significant differences being present, none of the four groups perceived the chosen outcomes to being particularly desirable,  $F(3,325) = 45.01, p < .001$ . Tukey post-hoc analyses found that non-smokers ( $M = 5.93; SD = 2.71$ ) were significantly more likely to express that the described consequences were undesirable, in comparison to vapers ( $M = 10.92; SD = 3.98$ ), smokers ( $M = 8.94; SD = 3.77$ ), and dual users ( $M = 11.04; SD = 3.14$ ).

**Figure 5.2**

*The perceived desirability of vaping-related outcomes as a function of participant behavioural status*



A separate analysis of the item specifically concerning addiction via nicotine revealed a finding of interest. The same significant differences were present between the different groups, however, the disparities between the behavioural statuses were noticeably larger than those which existed in other items. This demonstrates greater disagreement amongst the groups as to whether nicotine addiction is a desirable outcome.

### **5.2.3 Smoking Cessation Items**

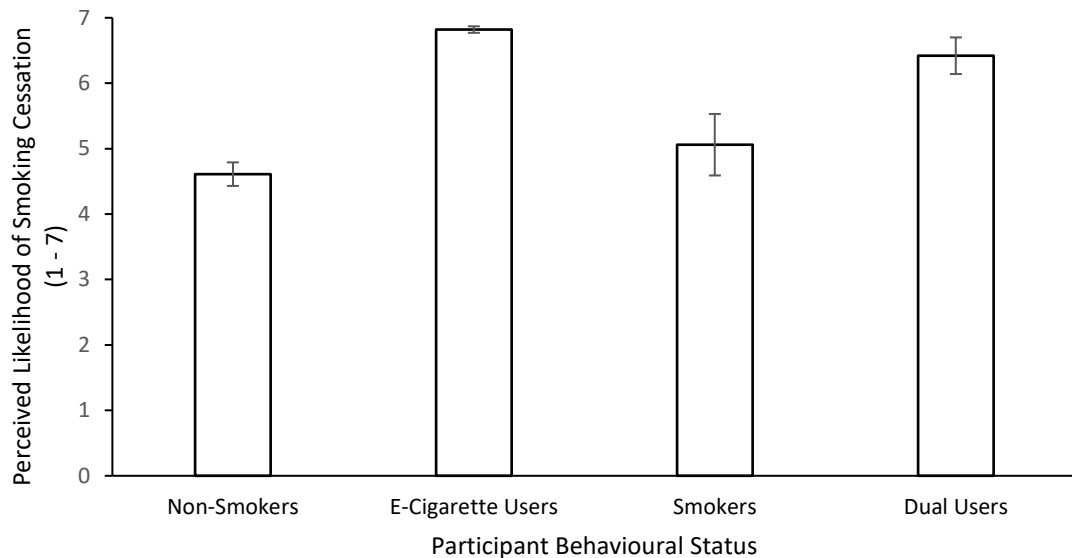
As stated in the Methods chapter, the behavioural beliefs and outcome evaluation scales each originally contained a fifth item – one that focused on smoking cessation. Participants were asked how likely they thought it was that regular e-cigarette use could help with smoking cessation and whether they perceived this to be a favourable outcome. Based on low Cronbach's Alpha scores, the decision was made to examine these items separately.

Participants' perceptions as to whether regular vaping could help with smoking cessation were influenced by their behavioural status,  $F(3,325) = 71.07, p < .001$ . Tukey post-hoc analyses found that vapers ( $M = 6.82; SD = .65$ ) and dual users ( $M = 6.42; SD = 1.39$ ) were significantly more likely than both smokers ( $M = 5.06; SD = 1.88$ ) and non-smokers ( $M =$

4.61;  $SD = 1.85$ ) to believe that e-cigarette use could aid with smoking cessation. Figure 5.3 illustrates these differences between groups.

**Figure 5.3**

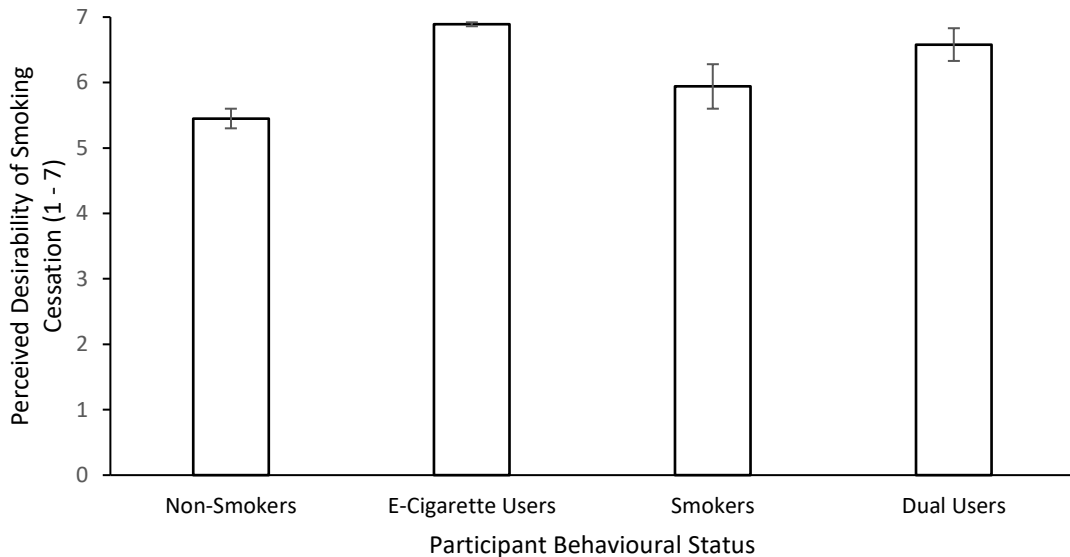
*The perceived likelihood of smoking cessation via regular e-cigarette use, as a function of participant behavioural status*



Members from all four groups perceived smoking cessation via vaping to be a somewhat desirable outcome, as seen in Figure 5.4, but significant differences were still present,  $F(3,325) = 47.31, p < .001$ . According to Tukey post-hoc analyses, both vapers ( $M = 6.89; SD = .45$ ) and dual users ( $M = 6.58; SD = 1.21$ ) were significantly more likely than non-smokers ( $M = 5.45; SD = 1.55$ ) to evaluate this outcome favourably. In addition, traditional smokers ( $M = 5.94; SD = 1.34$ ) were significantly less likely than vapers to perceive this outcome as being desirable.

**Figure 5.4**

*The perceived desirability of smoking cessation via regular e-cigarette use, as a function of participant behavioural status*

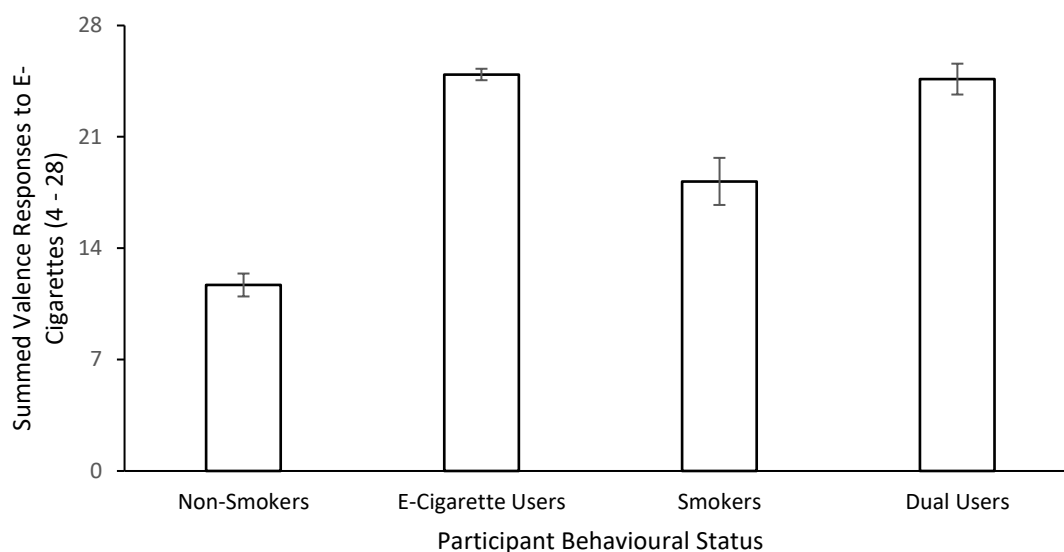


#### **5.2.4 General Attitudes toward E-Cigarettes**

General attitudes were measured by presenting respondents with four descriptive terms – two positive and two negative – and asking them to indicate how well each of these terms described their evaluation of e-cigarettes. My study found that a participant’s behavioural status influenced whether they felt positive or negative descriptors accurately reflected their assessment of e-cigarettes,  $F(3,287) = 119.81, p < .001$ . Tukey post-hoc analyses demonstrated that vapers ( $M = 24.92, SD = 4.49$ ) and dual users ( $M = 24.63; SD = 4.76$ ) were significantly more likely than non-smokers ( $M = 11.69; SD = 6.97$ ) to agree that the positive terms described their assessments of e-cigarettes and less likely to agree that the negative descriptors reflected their perceptions. As Figure 5.5 illustrates, respondents who only smoked combustible cigarettes ( $M = 18.20, SD = 5.74$ ) expressed general attitudes that were more positive than those of non-smokers but not as favourable as those belonging to vapers and dual users.

**Figure 5.5**

*General attitudes towards e-cigarettes as a function of participant behavioural status*



### **5.2.5 Indicators of Attitude Strength**

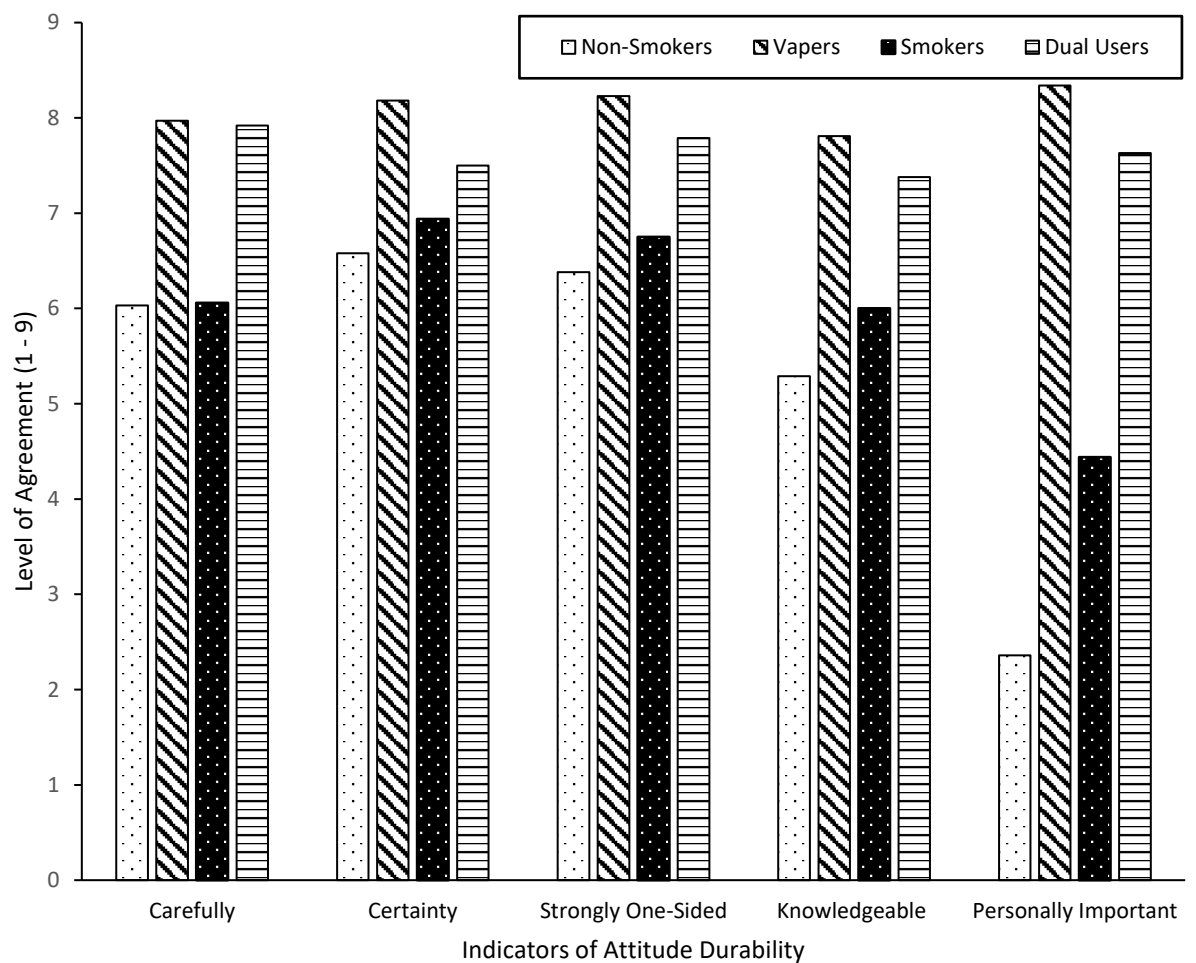
The final attitude-related scale incorporated items that acted as indicators of attitude strength. A total of five aspects were assessed – how carefully participants had considered vaping-related information, how certain they were of their opinion of e-cigarettes, whether their feelings towards vaping were mixed, how knowledgeable they perceived themselves to be about e-cigarettes, and whether e-cigarettes were personally important to them.

The strength of participants' attitudes towards e-cigarettes varied depending upon their behavioural status. Figure 5.6 provides a visual representation of these differences. For all five items, Tukey post-hoc analyses found that non-smokers obtained significantly lower scores than both vapers and dual users. This suggests that, compared to non-smokers, participants who used e-cigarettes – whether alone or in combination with combustible cigarettes – were more likely to have carefully considered vaping-related information, more certain of their opinions regarding e-cigarettes, less likely to hold mixed feelings towards e-cigarettes, perceived themselves to be more knowledgeable about vaping, and felt that e-cigarettes were of personal importance to themselves. The same pattern was found when comparing the responses of vapers to those of smokers – with e-cigarette users demonstrating stronger attitudes. Similarly, compared to smokers, dual users were

significantly more likely to have carefully thought about e-cigarette information, perceive themselves to be knowledgeable about vaping, and agree that e-cigarettes are personally important to them. Only one significant difference was present between smokers and non-smokers. Respondents who smoked were significantly more likely to express that e-cigarettes were of personal importance.

**Figure 5.6**

*Level of agreement with indicators of attitude durability as a function of participant behavioural status*



This section has revealed that those who used e-cigarettes – by themselves or in tandem with smoking – were less likely to believe that vaping would lead to the indicated outcomes and more likely to evaluate those consequences favourably. This provides confirmation for my first hypothesis - *compared to non-smokers, participants who currently use e-cigarettes will express more favourable attitudes towards vaping*. Those who used e-

cigarettes also had a greater likelihood of associating e-cigarettes with positive terms and scored higher on indicators of attitude durability. The segment that follows considers whether participants' behavioural status was related to their perceptions of subjective norms.

## 5.3 Subjective Norms

Two components of subjective norms were measured by the current study – injunctive norms and motivations to comply<sup>4</sup>. These paragraphs review what was found and whether behavioural status interacted with responses.

### 5.3.1 Injunctive Norms

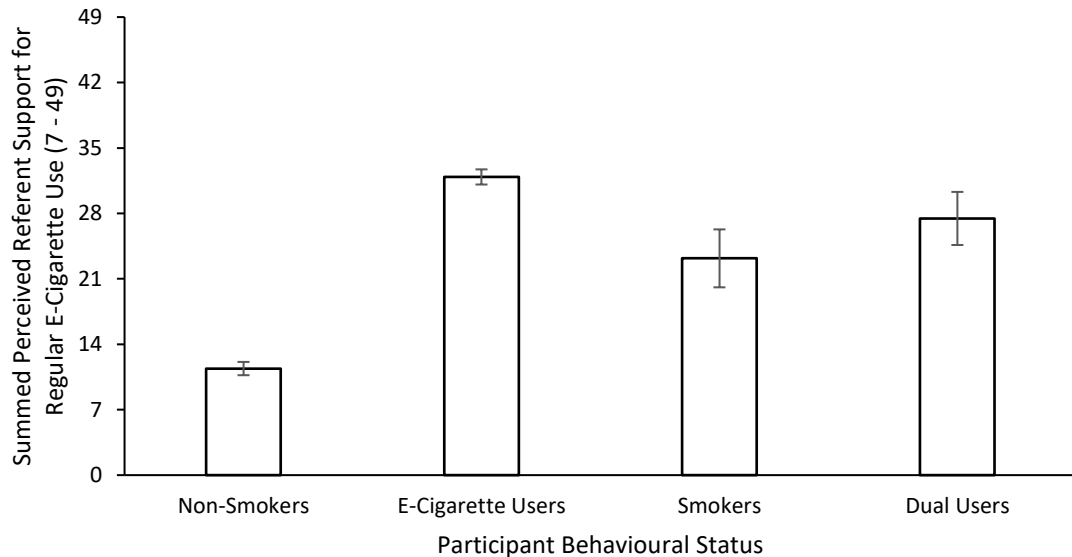
Injunctive norms were gauged by asking participants if they believed that specific referents would approve of them using e-cigarettes on a regular basis. Based upon the literature and my qualitative data analysis, a perceived perceptions of seven different referents were examined - parents, siblings, close friends, significant others, children, doctors, and dentists. A one-way ANOVA demonstrated that participants' behavioural status influenced whether they believed referents would be supportive of them vaping on a regular basis,  $F(3,324) = 86.37, p < .001$ . Figure 5.7 illustrates the differences between groups. Non-smokers ( $M = 11.40; SD = 7.13$ ), according to Tukey post-hoc analyses, were significantly less likely than vapers ( $M = 31.90; SD = 11.11$ ), smokers ( $M = 23.19; SD = 12.28$ ), and dual users ( $M = 27.46; SD = 13.91$ ) to agree that their parents, siblings, close friends, significant others, children, doctors, and dentists would approve of them using e-cigarettes daily. The difference between e-cigarette users and traditional smokers also reached significance, with vapers believing that their referents would be more supportive of their behaviour.

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<sup>4</sup> Measures of descriptive norms were excluded from data analyses due to missing data.

**Figure 5.7**

*Perceived Referent Support for Regular E-Cigarette Use as a Function of Participant Behavioural Status*



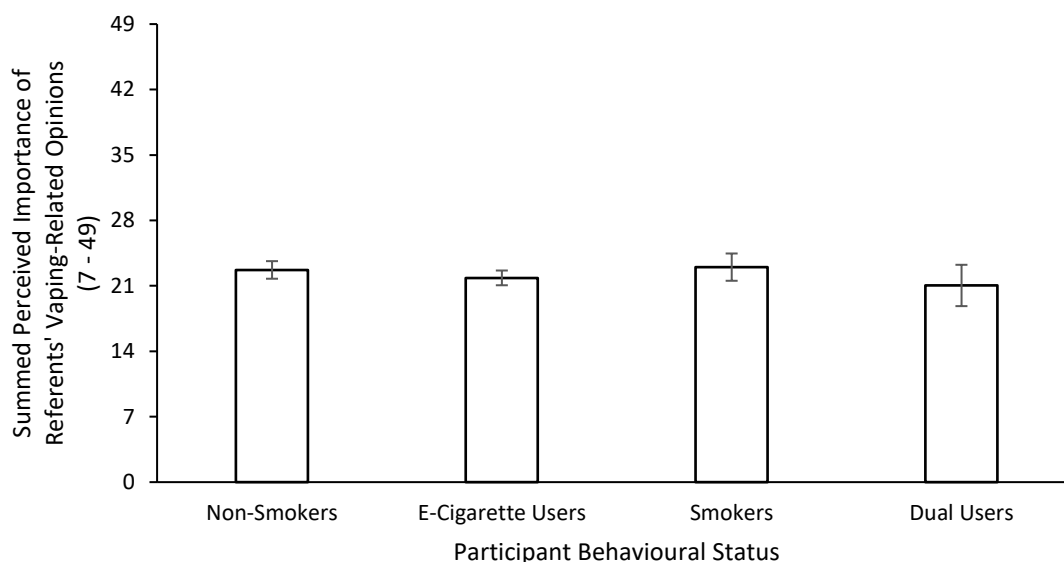
Since they are mostly absent from previous research, two specific referents warrant a more in-depth examination. When asked if their doctor would approve of them using e-cigarettes on a regular basis, vapers were significantly more likely than both smokers and non-smokers to express their agreement. The difference between dual users and vapers also approached significance, with those who only used e-cigarettes believing their doctors would demonstrate greater approve. Similarly, those who used e-cigarettes by themselves were significantly more likely to agree that their dentist would support them vaping, in comparison to non-smokers, smokers, and dual users.

### **5.3.2 Motivations to Comply**

Motivation to comply refers to the importance that participants assign to different referents' vaping-related opinions. A same seven referents from the previous scale were examined – parents, siblings, close friends, significant others, children, doctors, and dentists. Whether or not a respondent vaped and/or smoked did **not** influence the importance they prescribed to the vaping-related opinions of referents,  $F(3,319) = .281, p = .839$ . As see in Figure 5.8, regardless of their behavioural status, participants typically viewed their referents' perceptions of vaping as being somewhat important to them.

**Figure 5.8**

*Perceived importance of referents' vaping-related opinions as a function of participant behavioural status*



Again, due to their near absence from previous literature, the findings related to medical professionals' opinions warrant their own examination. Tukey post-hoc analyses indicated that the differences between non-smokers and vapers reached and approached significance when discussing the opinions of dentists and doctors, respectively. For both referents, non-smokers were more likely than e-cigarette users to agree that the vaping-related perceptions of these individuals were important to them.

This portion of the chapter has demonstrated that while participants' behavioural status did influence whether they thought their referents would approve of them vaping, it did not impact the importance respondents assigned to the opinions of these referents. Individuals who already used e-cigarettes – by themselves or in combination with smoking – were more likely to believe that their referents would approve of them vaping. These findings provide support for my second hypothesis - *compared to non-smokers, respondents who currently use e-cigarettes will perceive chosen referents as being more supportive of them vaping*. The next section considers if behavioural status interacted with participants' perceptions of control in the context of vaping.

## **5.4 Perceived Behavioural Control**

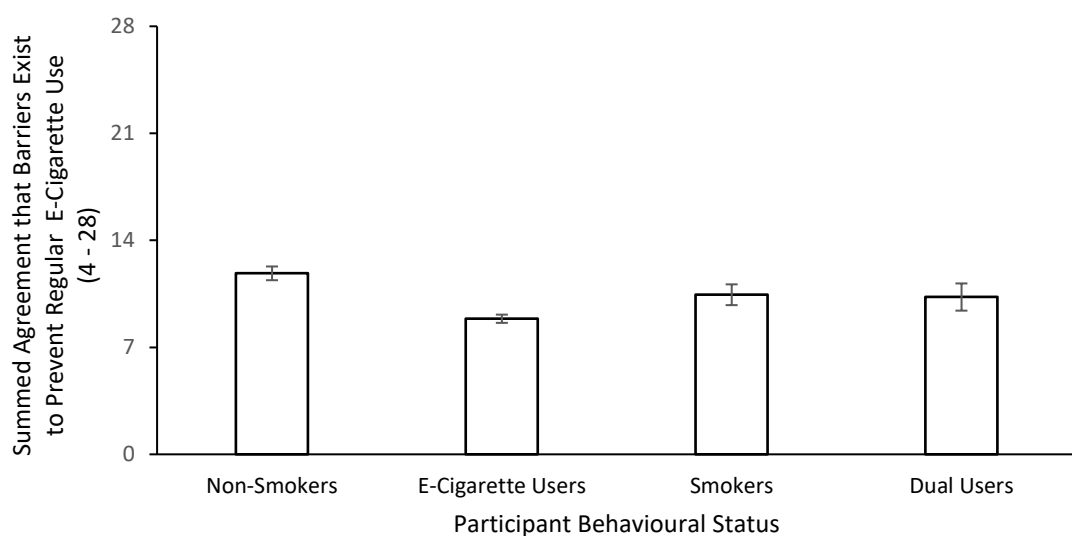
To gauge perceived behavioural control, this study examined participants' perceptions of barriers to e-cigarette use and beliefs as to whether these obstacles would stop them from vaping on a regular basis. The segments that follow determine if behavioural status affected the perceived difficulty of vaping.

#### 5.4.1 Potential Barriers

The potential barriers scale described five potential barriers and asked participants if they thought these obstacles existed in the context of vaping. Based upon the literature review and my qualitative data analysis, four possible barriers were chosen – cost, being able to purchase an e-cigarette, finding a place where vaping is allowed, and learning to use an e-cigarette. While a one-way ANOVA demonstrated that participant behavioural status did influence responses for this scale ( $F(3,320) = 12.21, p < .001$ ), the scores indicated that none of the four groups saw the chosen barriers as being very prominent within the context of vaping. This is seen when examining Figure 5.9. Tukey post-hoc analyses found that non-smokers ( $M = 11.84, SD = 4.46$ ), smokers ( $M = 10.44, SD = 2.73$ ), and dual users ( $M = 10.29, SD = 4.38$ ) were significantly more likely than vapers ( $M = 8.87, SD = 3.72$ ) to agree that the selected obstacles existed.

**Figure 5.9**

*Agreement that barriers exist to prevent regular e-cigarette use as a function of participant behavioural status*



While group differences were apparent when examining the composite scores, this was not true for the individual items that made up the scale. Specifically, significant differences

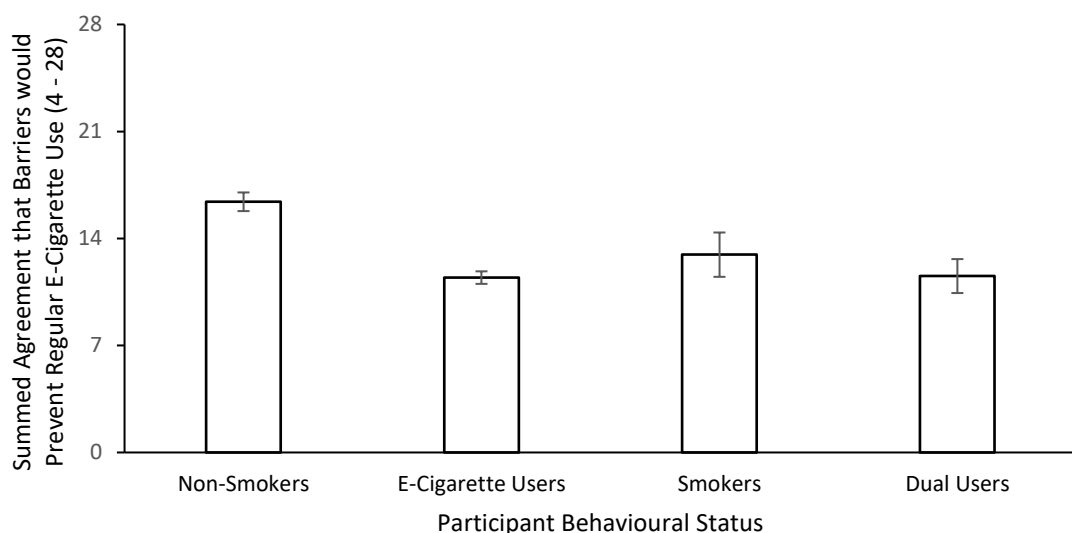
were **absent** within three of the four questions. Participants from all four behavioural statuses saw the existence of three barriers equally – difficulty purchasing an e-cigarette, finding a place where they are allowed to vape, and learning how to use these devices.

### 5.4.2 Barrier Impact

Barrier impact establishes whether participants' believed that the chosen obstacles would prevent them from using e-cigarettes on a regular basis. The same four obstacles from the previous scale were used – cost, being able to purchase an e-cigarette, finding a place where vaping is allowed, and learning to use an e-cigarette. Whether a participant smoked and/or vaped influenced the perceived impact that barriers would have upon the ability to use e-cigarettes,  $F(3,323) = 16.46, p < .001$ . Compared to vapers ( $M = 11.44; SD = 5.66$ ) and dual users ( $M = 11.54; SD = 5.45$ ), respondents who were identified as non-smokers ( $M = 16.40; SD = 6.12$ ) were significantly more likely to agree that the chosen obstacles would prevent them from vaping, according to Tukey post-hoc analyses. Those who only smoked cigarettes ( $M = 12.93; SD = 5.81$ ) expressed greater agreement than e-cigarette users but weaker beliefs than non-smokers, as seen in Figure 5.10.

**Figure 5.10**

*Agreement that barriers would prevent regular e-cigarette use as a function of participant behavioural status*



This section has shown that individuals who already vape and/or smoke were less likely to believe that barriers exist to vaping and perceived these obstacles as having less of an impact over their ability to use e-cigarettes. Thus, these findings confirm my third

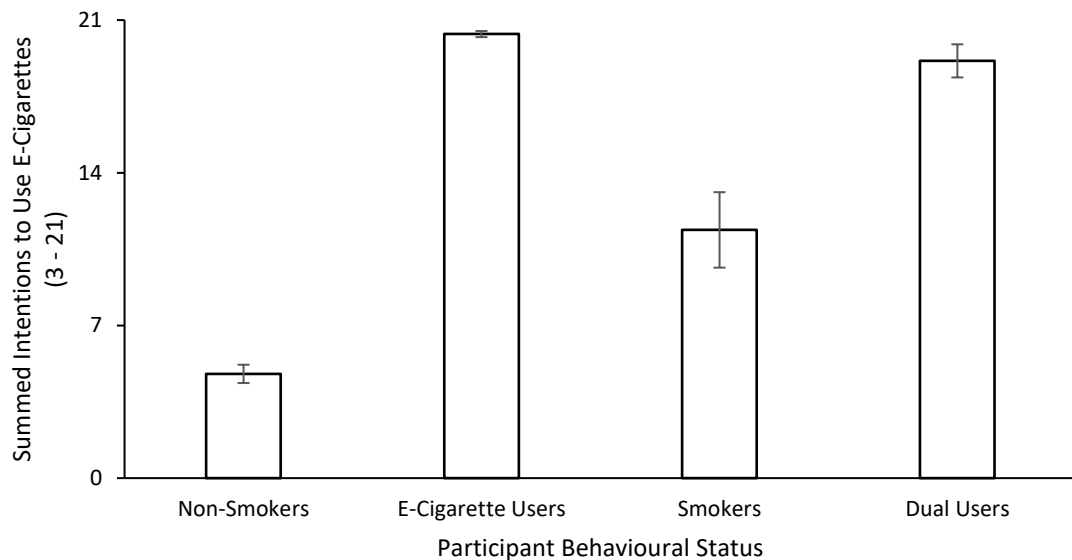
hypothesis - *compared to non-smokers, participants who currently use e-cigarettes will believe that they have greater control over their ability to access and use e-cigarettes.* The next paragraph explains how behavioural status influenced intentions to use e-cigarettes over the next six months.

## 5.5 Intentions

As expected, a one-way ANOVA found that a participants' current behavioural status influenced their intentions to use e-cigarettes over the next six months,  $F(3,325) = 516.78$ ,  $p < .001$ . Tukey post-hoc analyses showed that participants who used e-cigarettes at the time of data collection – whether alone ( $M = 20.36$ ;  $SD = 1.91$ ) or in tandem with convention cigarettes ( $M = 19.13$ ;  $SD = 3.73$ ) – expressed significantly stronger intentions to vape compared to non-smokers ( $M = 4.78$ ;  $SD = 4.19$ ). Traditional smokers ( $M = 11.38$ ;  $SD = 6.91$ ), as seen in Figure 5.11, occupied a middle-ground with their intentions being significantly greater than those of non-smokers but significantly smaller than vapers and dual users. These results confirm my fourth hypothesis - *compared to non-smokers, respondents who currently use e-cigarettes will express greater intentions to vape over the next six months.* The next section of the chapter describes the role that behavioural status played with regards to participants' self-concept, and if the Theory of Planned Behaviour could be improved upon by including this variable.

**Figure 5.11**

*Intentions to use e-cigarettes over the next six months as a function of participant behavioural status*

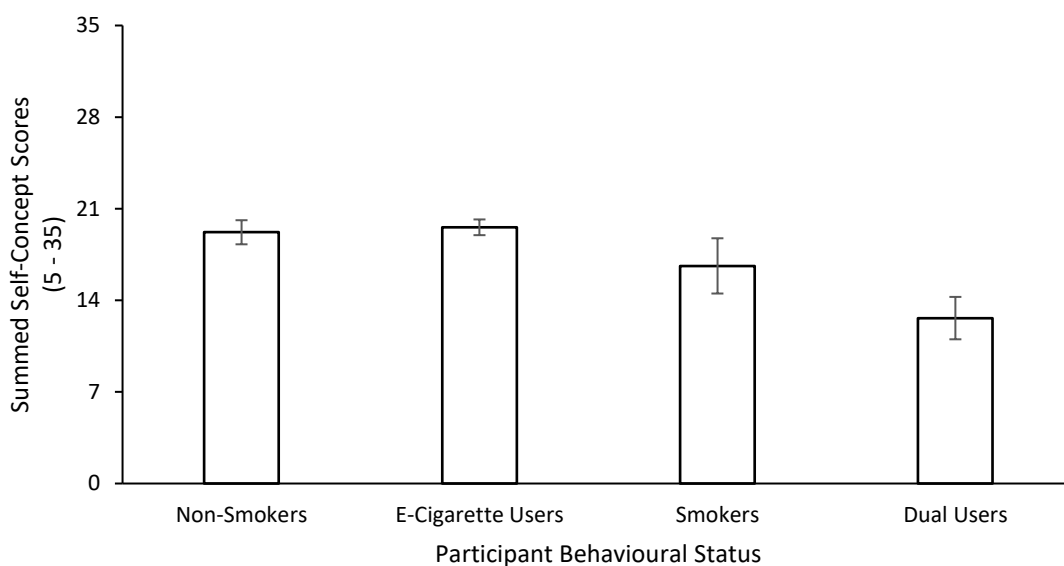


## 5.6 Self-Concept

A scale to measure self-concept was included in the study to determine if this variable could improve the predictive capabilities of the Theory of Planned Behaviour with regards to e-cigarette use. In the current study, self-concept refers to whether a participants' behavioural status – their use (or lack of) combustible and e-cigarettes – contributed to their self-identity. While none of the groups perceived their behaviour as playing a large role in their self-concept, significant differences were present,  $F(3,323) = 4.80, p = .003$ . Vapers ( $M = 19.58, SD = 8.21$ ) and non-smokers ( $M = 19.20, SD = 9.21$ ) felt that their activity (or lack of) played a significantly greater role in the formation of their self-concept compared to dual users ( $M = 12.64, SD = 7.58$ ), according to Tukey post-hoc analyses. While the difference was not significant, respondents who only used combustible cigarettes ( $M = 16.63, SD = 8.42$ ) also believed that their behaviour provided a greater contribution to their self-concept than dual users. Figure 5.12 provides a visual representation of these differences.

**Figure 5.12**

*Self-concept scores as a function of participant behavioural status*



### **5.6.1 Contributions to the Theory of Planned Behaviour**

While all the respondents completed at least one version of the self-concept scale, it was anticipated that non-smoker, vaper, smoker, and dual user self-concepts would interact differently with participants' intentions to use e-cigarettes. For example, an individual who used e-cigarettes and perceived this to be an important part of their self-concept should theoretically possess greater intentions to vape in the future. On the other hand, a non-smoker who saw their lack of vaping and smoking to play a significant role in their self-concept should arguably possess weaker intentions to use e-cigarettes. Due to these expected differences, the relationship between self-concept and intentions to vape was examined on a group-by-group basis. Amongst all four behavioural statuses, there were **no** significant correlations between self-concept scores and intentions to use e-cigarettes over the next six months (all  $ps > .122$ ). For non-smokers, vapers, and smokers, including self-concept did **not** improve the Theory of Planned Behaviour's ability to predict respondents' intentions to vape. For dual users, however, there was a near significant contribution that increased predictions by 8% ( $R^2$  change = .08,  $p = .067$ ).

### **5.6.2 Differences in Self-Concept within Specific Groups**

Two groups of participants – vapers and dual users – completed two different versions of the self-concept scale. Since dual users engage in both smoking and e-cigarette use, they

filled in two editions of the scale – one for each behaviour. A paired samples t-test indicated that dual users perceived their smoking ( $M = 14.83, SD = 7.91$ ) and vaping ( $M = 14.50, SD = 7.20$ ) behaviours as playing equally important roles with regards to their self-concept,  $t(23) = -.239, p = .813$ . Due to many of my vaping respondents being former smokers and shifting perceptions of e-cigarettes, participants who only used e-cigarette completed both a vaper and non-smoker version of the self-concept scale. Those who used e-cigarettes viewed their vaping ( $M = 19.58, SD = 8.21$ ) and lack of smoking ( $M = 19.51, SD = 9.61$ ) to perform equally important roles in terms of their self-concept,  $t(187) = .099, p = .921$ .

### 5.6.3 Differences in Self-Concept between Specific Groups

As some groups completed the same versions of these scales, analyses were run to determine if responses to these particular versions differed depending on behavioural status. Both vapers and dual users filled in a self-concept scale that focused on e-cigarette use. An independent samples t-test found that vapers ( $M = 19.58, SD = 8.21$ ) perceived their use of e-cigarettes as having a significantly greater contribution to their self-concept than dual users ( $M = 14.50, SD = 7.20$ ),  $t(210) = 2.89, p = .004$ . Dual users and smokers each completed a version of the self-concept scale that centred on their use of combustible cigarettes. It was found that smokers ( $M = 16.63, SD = 8.42$ ) and dual users ( $M = 14.83, SD = 7.91$ ) saw their use of conventional cigarettes as playing equally important roles in terms of their self-concept,  $t(38) = .684, p = .498$ .

This portion of the chapter has shown that while non-smokers and e-cigarette users were more likely to believe that their behaviour (or lack of) played an important role in their self-concept, adding this variable to the Theory of Planned Behaviour did not increase the model's ability to predict intentions to vape. The next segment explores how social identification may differ depending on participants' behavioural status and if this variable may improve upon the Theory of Planned Behaviour.

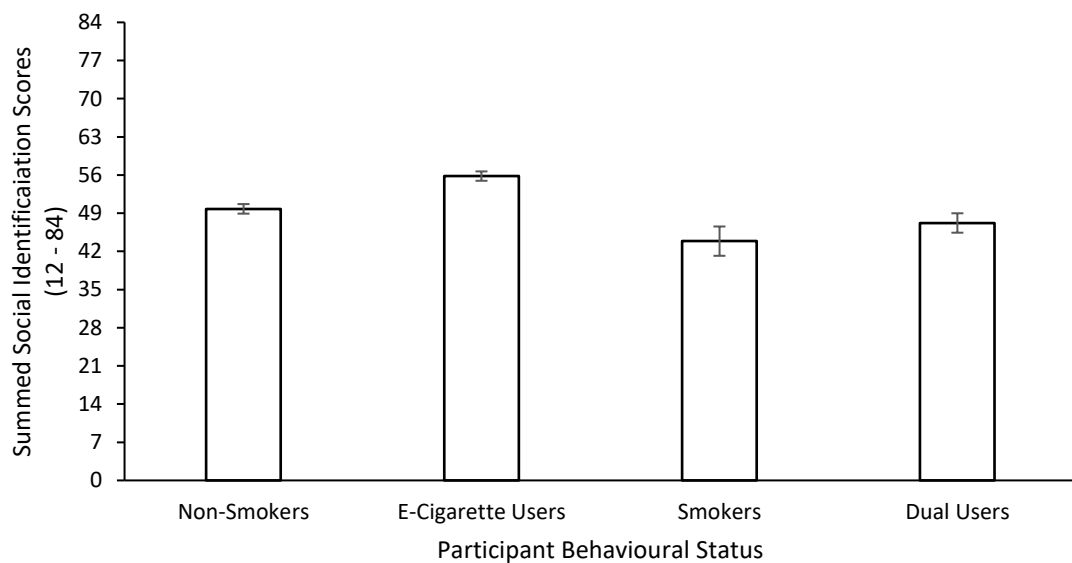
## 5.7 Social Identification

A scale to measure social identification was incorporated into the survey to determine if this variable (or its individual factors) could improve the predictive utility of the Theory of Planned Behaviour. In the current study, social identification refers to the aspect of self-concept that participants derived from their knowledge of their group membership. Group membership was based upon behavioural status (non-smokers, vapers, smokers, and dual users). As Figure 5.13 demonstrates, respondents from all four behavioural statuses indicated that their group membership was of moderate importance to them, however,

significant differences between the groups were present,  $F(3,325) = 13.38, p < .001$ . Tukey post-hoc analyses showed that, compared to non-smokers ( $M = 49.80, SD = 8.87$ ), smokers ( $M = 43.88, SD = 10.75$ ), and dual users ( $M = 47.21, SD = 8.70$ ), participants who only vaped ( $M = 55.81, SD = 11.83$ ) perceived their group membership to hold the most importance.

**Figure 5.13**

*Social identification scores as a function of participant behavioural status*



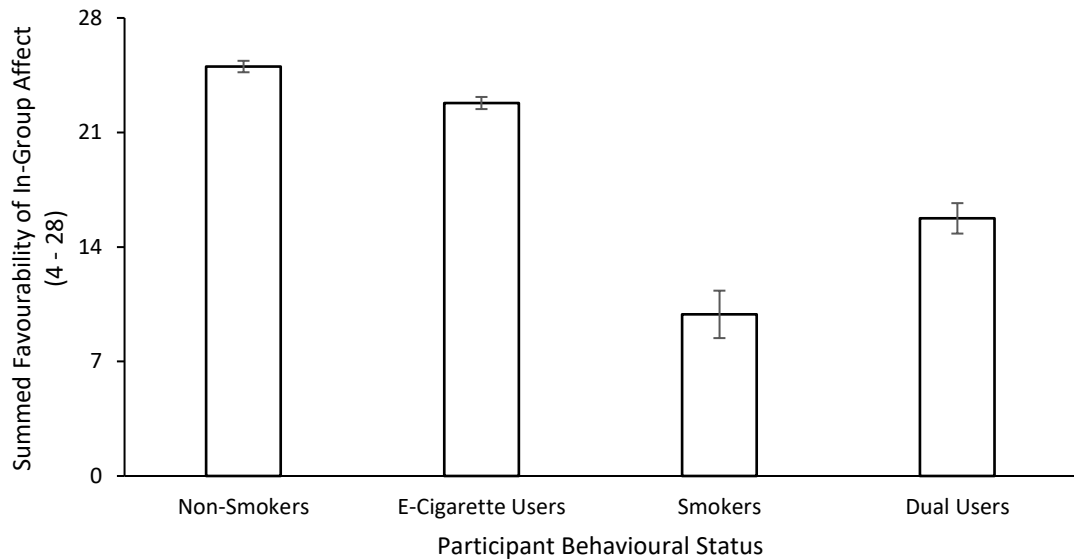
The paragraphs that follow provide an examination of the three factors that combine to create the variable of social identification – in-group affect, in-group ties, and membership centrality.

### 5.7.1 In-Group Affect Factor

In-group affect refers to whether participants feel positively or negatively about belonging to their particular group. It was found that the emotional connotations of group membership differed according to behavioural status,  $F(3,325) = 65.76, p < .001$ . Figure 5.14 provides a visual representation of these differences. Tukey post-hoc analyses indicated that all groups were significantly different from each other. Non-smokers ( $M = 25.03, SD = 3.51$ ) felt the most positive emotions towards their group membership, whereas traditional smokers ( $M = 9.88, SD = 5.78$ ) derived the least amount of happiness from being a member of their group. The group membership of vapers ( $M = 22.80, SD = 5.10$ ) and dual users ( $M = 15.75, SD = 4.54$ ) lead to more positive affect than smokers but less than that of non-smokers.

**Figure 5.14**

*Favourability of in-group affect as a function of participant behavioural status*

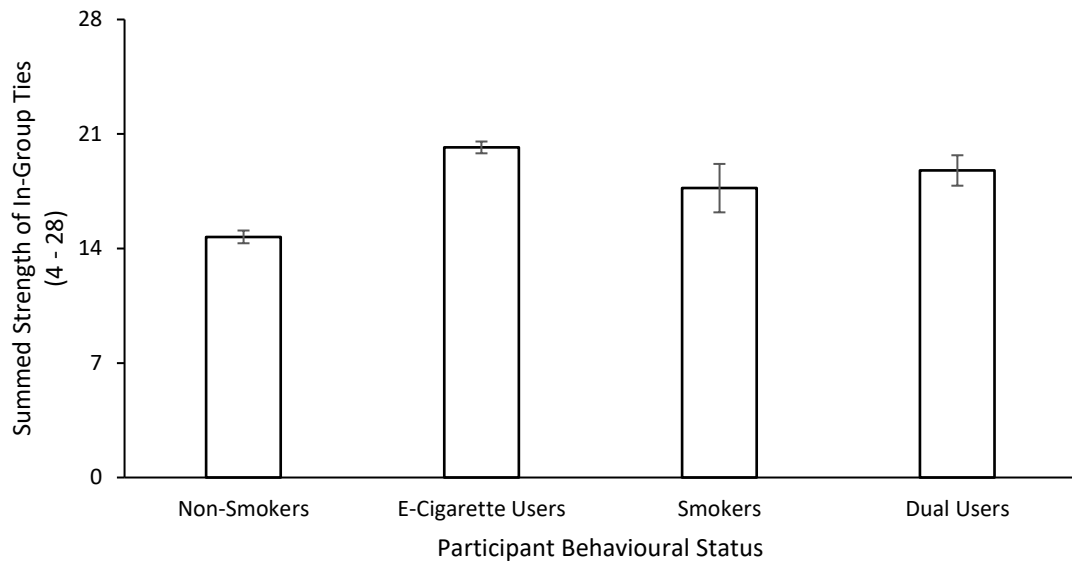


### **5.7.2 In-Group Ties Factor**

In-group ties, how strongly an individual feels attached to their group, also differed depending on participant behavioural status,  $F(3,325) = 29.53, p < .001$ . Tukey post-hoc analyses found that, compared to non-smokers ( $M = 14.71, SD = 3.96$ ), respondents who vaped ( $M = 20.18, SD = 5.00$ ) or dual used products ( $M = 18.77, SD = 4.56$ ) felt significantly stronger ties to their respective groups. Similarly, smokers ( $M = 17.69, SD = 5.91$ ) expressed stronger levels of group attachment than non-smokers – a difference that approached significance.

**Figure 5.15**

*Strength of in-group ties as a function of participant behavioural status*

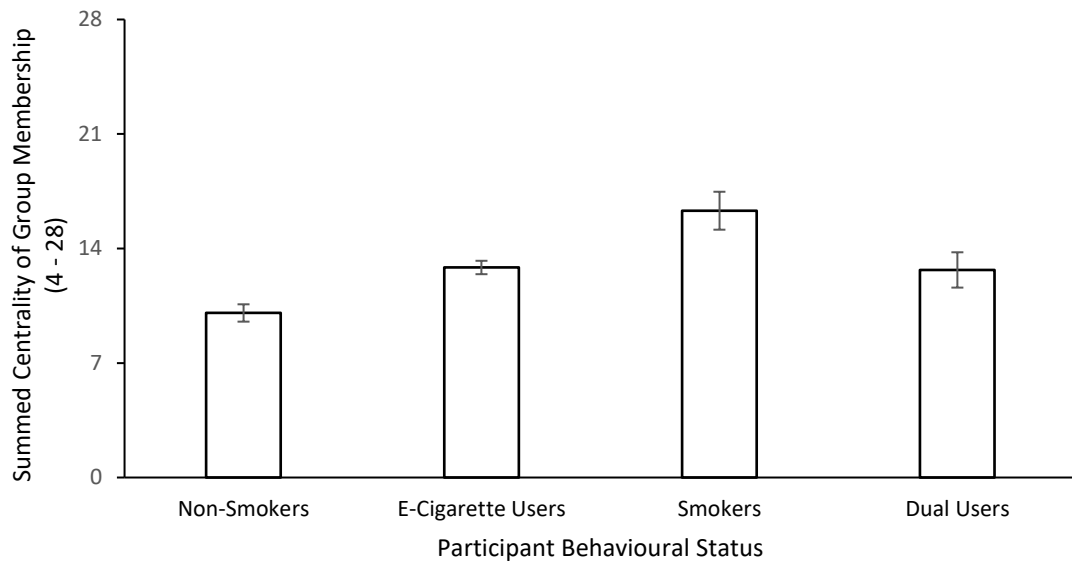


### **5.7.3 Centrality of Group Membership Factor**

Centrality refers to how salient respondents perceive their group membership to be. A one-way ANOVA demonstrated that participants' behavioural status influenced how often they thought of their group membership,  $F(3,325) = 9.24, p < .001$ . Tukey post-hoc analyses found that non-smokers ( $M = 10.06, SD = 5.30$ ) were significantly less likely than vapers ( $M = 12.84, SD = 5.56$ ) and smokers ( $M = 16.31, SD = 4.63$ ) to indicate that their group membership was at the forefront of their mind. The difference between smokers and vapers also approached significance. Dual users ( $M = 12.69, SD = 5.27$ ), as shown by Figure 5.16, were less likely to think about their group membership than smokers and vapers but more likely than non-smokers.

**Figure 5.16**

*Centrality of group membership as a function of participant behavioural status*



#### **5.7.4 Contributions to the Theory of Planned Behaviour**

As with self-concept, while all participants did complete at least one version of the social identification scale, it was expected that this variable would interact differently with intentions depending on the respondents' behavioural status. Consequently, the relationship between social identification and intentions was examined on a group-by-group basis. This included the overall composite scores as well as the three individual components (in-group affect, in-group ties, centrality of membership). For non-smokers, smokers, and dual users, there were not significant correlations between social identification and intentions to vape (all  $ps > .228$ ). Adding social identification to the non-smoker, traditional smoker, and dual user versions of the model did **not** improve the predictive utility of the Theory of Planned Behaviour. No significant increases to the amount of variance explained were found. For vapers, however, incorporating social identification into the model resulted in a significant change and provided a 3.4% increase to the amount of variance in intentions that could be explained ( $R^2$  change = .03,  $p = .010$ ). Vapers possessed stronger intentions to continue using e-cigarettes if they assigned their group membership a greater importance to their social identification.

Adding the individual components – in-group affect, in-group ties, and centrality – did **not** improve the model's ability to predict the vaping intentions of non-smokers, smokers, and

dual users. Including in-group ties and membership centrality did not improve the Theory of Planned Behaviour's ability to predictor vapers' intentions to continue using e-cigarettes. In-group affect, however, provided a significant contribution and was able to increase the amount of variance explained by 4.5% ( $R^2$  change = .05,  $p = .034$ ). Vapers who viewed their group membership in a more positive light were more likely to want to continue using e-cigarettes. Overall, these results indicate that social identification – in particular, in-group affect – only provides a valuable contribution to the Theory of Planned Behaviour when predicting the vaping intentions of current e-cigarette users (who do not smoke).

### 5.7.5 Differences in Social Identification within Specific Groups

Like the self-concept scale, respondents who were identified as dual users and vapers each completed two versions of the social identification scale. In terms of overall social identification scores, dual users assigned a significantly greater importance to their vaper ( $M = 51.08$ ,  $SD = 10.53$ ) rather than their smoker ( $M = 43.50$ ,  $SD = 9.06$ ) identity,  $t(23) = -3.96$ ,  $p < .001$ . With regards to the individual components, a paired samples t-test found that dual users demonstrated equally strong ties to their vaping ( $M = 19.00$ ,  $SD = 5.06$ ) and smoking ( $M = 18.54$ ,  $SD = 5.05$ ) groups,  $t(23) = -.52$ ,  $p = .610$ . In comparison, there were significant differences when assessing the factors of in-group affect ( $t(23) = -6.00$ ,  $p < .001$ ) and membership centrality ( $t(23) = 2.09$ ,  $p = .048$ ). Dual users expressed that more favourable emotions were associated with their vaping ( $M = 20.13$ ,  $SD = 5.67$ ) rather than their smoking ( $M = 11.54$ ,  $SD = 5.63$ ) status. These same respondents, however, acknowledged that being a smoker ( $M = 13.42$ ,  $SD = 5.42$ ) was more salient in their minds than being a vaper ( $M = 11.96$ ,  $SD = 5.66$ ).

When comparing e-cigarette users' vaper ( $M = 55.91$ ,  $SD = 11.77$ ) and non-smoker ( $M = 54.43$ ,  $SD = 12.01$ ) social identification scores, a marginally nonsignificant difference was found ( $t(186) = -1.76$ ,  $p = .079$ ). In terms of the individual components, significant differences were identified within in-group affect ( $t(187) = 2.28$ ,  $p = .024$ ), in-group ties ( $t(187) = -9.17$ ,  $p < .001$ ), and membership centrality ( $t(186) = 2.70$ ,  $p = .008$ ). Those who vaped expressed that they had stronger ties with their fellow vapers ( $M = 20.18$ ,  $SD = 5.00$ ) than other non-smokers ( $M = 16.68$ ,  $SD = 4.58$ ), however, they also indicated that their status as a non-smoker ( $M = 13.92$ ,  $SD = 6.25$ ) was more prominent in their minds than their status as a vaper ( $M = 12.81$ ,  $SD = 5.56$ ). In terms of affect, more positive emotions were associated with the non-smoker ( $M = 23.74$ ,  $SD = 4.94$ ) rather than the vaper ( $M = 22.80$ ,  $SD = 5.10$ ) identity.

### 5.7.6 Differences in Social Identification between Specific Groups

Comparisons were also made between individuals from different behavioural statuses who completed the same version of the social identification scale. The differences in vaper social identification scores of e-cigarette users ( $M = 55.81, SD = 11.83$ ) and dual users ( $M = 51.08, SD = 10.53$ ) approached statistical significance,  $t(210) = 1.86, p = .064$ . An examination of the three factors found that there were no significant differences with regards to in-group ties ( $t(210) = 1.08, p = .280$ ) and membership centrality ( $t(210) = .727, p = .468$ ). In the context of their vaping group membership, dual users and vapers experienced group ties of comparable strength and thought about their membership at similar frequencies. A significant difference was found when reviewing in-group affect ( $t(210) = 2.39, p = .018$ ). Compared to dual users ( $M = 20.13, SD = 5.67$ ), participants who only used e-cigarettes ( $M = 22.80, SD = 5.10$ ) experienced more favourable emotions in relation to their vaping group membership.

When comparing the smoker social identification scores of traditional smokers ( $M = 43.88, SD = 10.75$ ) and dual users ( $M = 43.50, SD = 9.06$ ), no significant differences were found,  $t(38) = .119, p = .906$ . Individuals from both behavioural statuses assigned their group membership equal importance. No significant differences were identified when examining the in-group affect ( $t(38) = -.91, p = .370$ ) and in-group ties ( $t(38) = -.49, p = .627$ ). With reference to their smoking group membership, both dual users and smokers experienced similar levels of affect and attachments of similar strengths. A near significant difference was found when reviewing membership centrality ( $t(38) = 1.75, p = .088$ ), with traditional smokers ( $M = 16.31, SD = 4.63$ ) indicating that their group membership featured more prominently in their mind, compared to dual users ( $M = 13.42, SD = 5.42$ ).

This portion of the chapter has shown that group membership held the most significance for those who only used e-cigarettes. While non-smokers were the most likely to feel positive about their group membership, they were the least likely to express that this membership was a prevalent part of their lives; and they displayed the weakest attachment to their group. In contrast, those who only used combustible cigarettes evaluated their group membership the least favourably but were also more likely to acknowledge that this membership was salient for them. With regards to the Theory of Planned Behaviour, social identification appears to be useful when predicting the vaping intentions of individuals who currently use these devices by themselves. The next section examines whether participants paid attention to e-cigarette news and how credible they thought such stories were.

## 5.8 News Consumption & Credibility

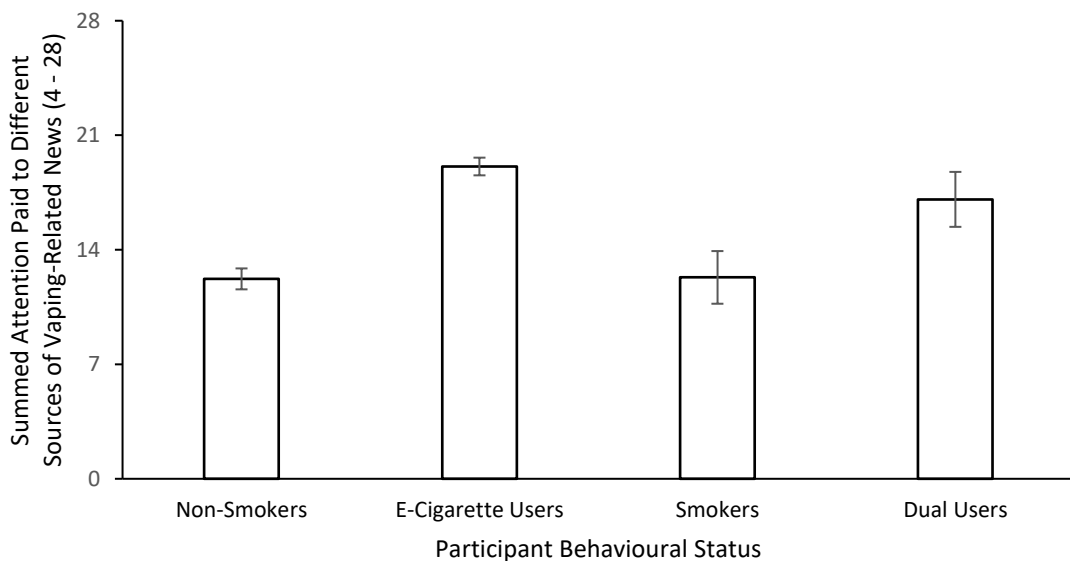
This portion of the survey incorporated two scales – one to assess the amount of attention given to different sources of vaping-related news and another to determine the perceived credibility of e-cigarette news stories from those same sources. Based upon the literature review, four different news sources were examined - newspapers (incl. digital and print), radio, internet (excl. newspapers), and television. An item was also included to establish whether participants' behaviour status influenced where they obtained information about e-cigarettes.

### 5.8.1 Attention to E-Cigarette News

While all four groups expressed paying at least some attention to the selected sources, as seen in Figure 5.17, a one-way ANOVA demonstrated that there were significant differences between the behavioural statuses,  $F(3, 325) = 22.33, p < .001$ . Tukey post-hoc analysis revealed that individuals who used e-cigarettes – whether by themselves ( $M = 19.09, SD = 7.39$ ) or in combination with traditional cigarettes ( $M = 17.08, SD = 8.25$ ) – paid significantly more attention than non-smokers ( $M = 12.22, SD = 6.38$ ) to news via the television, radio, internet, and newspapers. Vapers were also significantly more likely than smokers ( $M = 12.31, SD = 6.44$ ) to pay attention to the same sources.

**Figure 5.17**

*Attention to sources of e-cigarette-related news as a function of participant behavioural status*

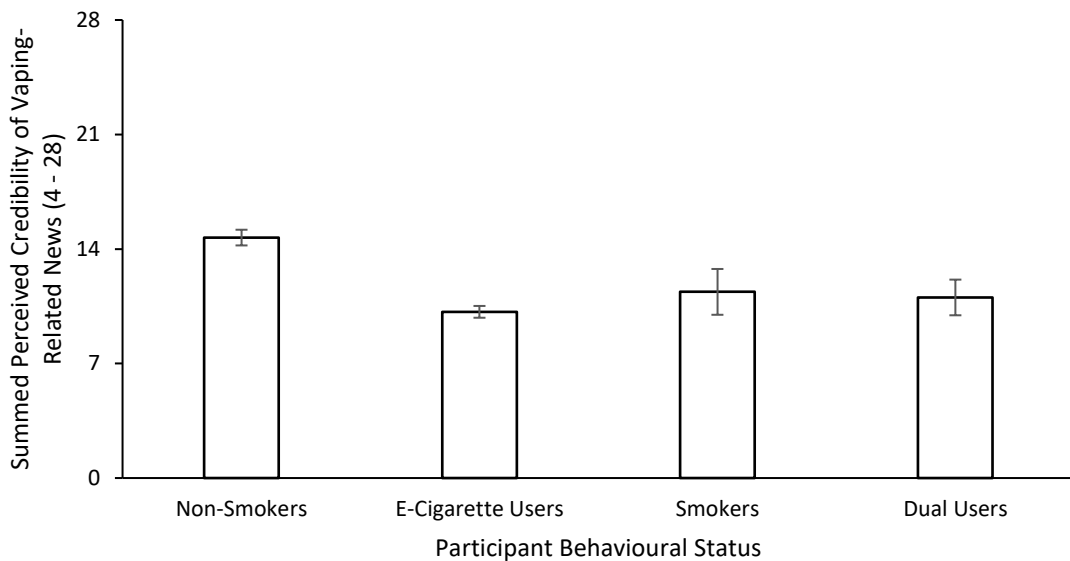


### 5.8.2 Perceived Credibility of E-Cigarette News

It was found that participants' behaviour status significantly interacted with their perceptions of news credibility,  $F(3, 325) = 18.82, p < .001$ . Tukey post-hoc analyses showed that, while they only perceived e-cigarette news to be somewhat reliable, non-smokers ( $M = 14.70, SD = 4.85$ ) still assigned such stories significantly greater credibility than vapers ( $M = 10.16, SD = 4.92$ ) and dual users ( $M = 11.04, SD = 5.34$ ). Figure 5.18 provides a visual representation of these differences. Compared to non-smokers, smokers ( $M = 11.38, SD = 5.34$ ) perceived vaping news from the television, radio, internet, and newspapers to be less credible – a difference that neared significance.

**Figure 5.18**

*Perceived credibility of news reports discussing e-cigarettes as a function of participant behavioural status*



### 5.8.3 Sources of Vaping-Related Information

This study also measured which sources of information respondents most often used to learn about e-cigarettes. By understanding where people obtain their vaping-related information, researchers can review these sources to assess how they may influence audience perceptions of e-cigarettes. As Table 3 illustrates, participants' behaviour status held some influence over their preferred source of vaping-related information. Non-smokers were most likely to defer to newspaper content, whereas academic journal

articles were preferred by vapers, smokers, and dual users. Respondents from all four groups were unlikely to use radio sources to obtain information about e-cigarettes.

**Table 5.3**

*Participants most often used sources for obtaining e-cigarette information*

	Non-Smokers	E-Cigarette Users	Smokers	Dual Users
<b>Newspapers (digital &amp; print)</b>	42.57%	30.85%	12.5%	33.33%
<b>Television</b>	26.73%	17.55%	12.5%	16.67%
<b>Radio</b>	7.92%	11.17%	6.25%	8.33%
<b>Academic Journal Articles</b>	24.75%	47.34%	31.25%	50.00%
<b>Government Websites</b>	28.71%	42.02%	25.00%	33.33%
<b>YouTube</b>	17.82%	34.04%	37.5%	50.00%
<b>Reddit</b>	20.79%	26.065	12.5%	29.17%
<b>Other</b>	18.81%	27.13%	31.25%	20.83%

This section has shown that those who use e-cigarettes – whether by themselves or in combination with combustible cigarettes – are more likely to pay attention to vaping-related news but less likely to perceive these stories as being credible. This is further supported by their preference for using academic journal articles to learn about e-cigarettes. Non-smokers paid the least amount of attention but were simultaneously more likely to believe vaping-related news stories were credible. The next segment describes preferences for nicotine strength and e-liquid flavours, whether behavioural status influenced nicotine dependence, and if this variable was able to improve upon the Theory of Planned Behaviour.

## **5.9 Nicotine Preferences & Dependence**

Based upon previous literature, the decision was made to examine whether nicotine dependence could improve the predictive utility of the Theory of Planned Behaviour within the context of e-cigarette use. To allow for comparisons to prior studies, data was also collected regarding the nicotine strength and flavour preferences of both vapers and dual users.

### **5.9.1 Nicotine Strength & Flavour Preferences**

Vapers and dual users displayed similar preferences regarding nicotine strength and e-liquids flavours. Consequently, the inclinations of both groups will be described as a single cohort. In terms of nicotine strength, the majority of e-cigarette users indicated that they preferred e-liquids low in nicotine – with 3mg (36.80%) and 6mg (26.40%) being the most

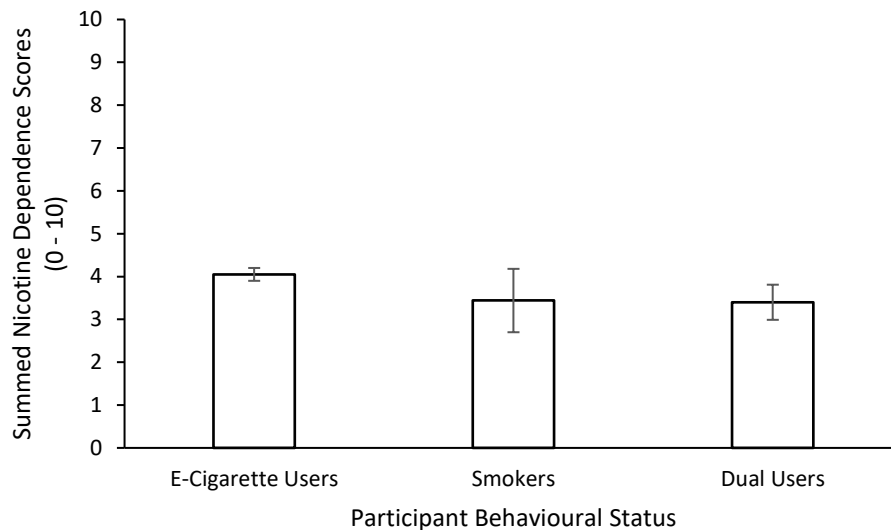
frequently selected options. Those who favoured stronger concentrations, such as 12mg (8.50%) and 18mg (3.80%), were less common. Amongst those who selected the 'Other' (24.50%) option, the most frequent responses were 0mg, 1mg, 4.5mg, and 9mg. Very rarely did participants suggest that they used strengths 30mg or higher. With regards to tastes, the most popular flavours were 'Fruit' (42.60%) and 'Dessert' (25.50%). 'Tobacco' (9.70%) flavour e-liquid was not frequently used. The only notable difference between dual users and those who only vaped were their inclinations towards 'Menthol-Mint', with the former (33.33%) displaying a much stronger preference than the latter (15.96%).

### 5.9.2 Nicotine Dependence

Comparisons between the participants who used nicotine – vapers ( $M = 4.05, SD = 2.02$ ), smokers ( $M = 3.44, SD = 2.94$ ), and dual users ( $M = 3.40, SD = 1.99$ ) – identified **no** significant differences,  $F(2, 225) = 1.52, p = .221$ . As shown in Figure 5.19, participants who vaped, smoked, or engaged in both activities displayed similar levels of nicotine addiction. According to the Fagerstrom scoring system, dual users and smokers demonstrated low nicotine dependence whereas those who only used e-cigarettes expressed moderate dependence on nicotine. Due to their use of both combustible and e-cigarettes, dual users completed two corresponding versions of nicotine addiction scale. A paired samples t-test found that those who used both products had a significantly greater dependence on nicotine via vaping ( $M = 3.96, SD = 2.22$ ) than they did from smoking ( $M = 2.83, SD = 2.57$ ),  $t(23) = -2.073, p = .050$ .

**Figure 5.19**

*Nicotine dependence scores as a function of participant behavioural status*



### **5.9.3 Contributions to the Theory of Planned Behaviour**

When the variable of nicotine dependence was added into the regression models for dual users and smokers, it did not improve upon the predictive utility of the Theory of Planned Behaviour. In comparison, including nicotine dependence in the model for vapers resulted in a near significant increase of 1.5% in accounting for the variance in participants' intentions to use e-cigarettes ( $R^2$  change = .02,  $p = .096$ ). Respondents who demonstrated stronger addiction to nicotine were more likely to express greater intentions to use e-cigarettes over the next six months. Similar to social identification, it appears that nicotine dependence is best included when attempting to predict the vaping intentions of those who already use these devices (by themselves).

## **5.10 Chapter Conclusion**

This chapter has described the findings obtained from the quantitative methods of my study. The results indicated that the Theory of Planned Behaviour can be successfully applied to the behaviour of vaping and is able to account for a considerable amount of variance in participants' intentions to use e-cigarettes over the next six months. In terms of improvements, only general attitudes were able to increase the predictivity utility of the model for the entire sample. The variables of social identification (in particular, in-group affect) and nicotine dependence appear to be relevant only when examining the intentions

of those who already use e-cigarettes (without smoking). Responses to nearly all of the variables measured were influenced by participants' behavioural status – with the only exceptions being nicotine dependence and motivations to comply with the perceived beliefs of referents. Together, these results provide support for four of the five hypotheses that were outlined earlier.

## **Chapter Six: Discussion & Conclusion**

### **6.0 Chapter Introduction**

The previous two chapters described the qualitative and quantitative findings of my research, respectively. This section of the thesis summarizes the key quantitative results and uses both the qualitative findings and previous literature to provide possible explanations for what was found. I then highlight the key strengths and weaknesses of my project, before identifying areas of interest for future research. The report is then finished with an overall conclusion.

### **6.1 The Theory of Planned Behaviour in the Context of Vaping**

The overarching aim of the current study was to establish the predictive capabilities of the Theory of Planned Behaviour when applied to the behaviour of e-cigarette use. To do this, I designed and distributed a survey that measured behavioural beliefs, outcome evaluations, injunctive norms, motivations to comply, potential barriers, and barrier impact. While many studies combine the individual components to create single variables for attitudes, subjective norms, and perceived behavioural control (Fishbein & Ajzen, 2010), my analysis kept my measures distinct and assessed the individual contributions of each component. This approach has not yet been taken with vaping-related research that has tested the model – thus contributing to a gap in the literature. Chapter Five demonstrated that the six components were able to account for 70% of variance in participants' intentions to use e-cigarettes over the next six months. These results correspond to what has been found in previous literature that has applied the Theory of Planned Behaviour to various health-related behaviours (Armitage & Conner, 2001; Conner & Sparks, 2005; Fishbein & Ajzen, 2010). Amongst the variables, behavioural beliefs, injunctive norms, and barrier impact provided the largest contribution. Participants demonstrated stronger intentions to vape when they believed that regular e-cigarette would: not lead to negative outcomes, be supported by important individuals in their lives, and not be hindered by possible obstacles. These findings answer my main research question and confirm that the Theory of Planned Behaviour is an appropriate model to use when attempting to predict people's intentions to use e-cigarettes.

In addition to assessing the base model, this thesis sought to determine if other factors could be incorporated to improve upon the theory's predictive capabilities. Based upon the literature review and evidence from my preliminary qualitative analyses, five extra components were examined – general attitudes, self-concept, social identification, news

consumption and credibility, and nicotine dependence. Of these variables, general attitudes were the only one able to slightly improve upon the model when applied to the overall sample. Respondents who felt that their evaluations of e-cigarettes could be better described by positive terms expressed stronger intentions to use these devices in the future. Social identification (in particular, in-group affect) and nicotine dependence, however, provided small increases in the predictive utility of the model when focusing only on participants who vaped but did not smoke. Vapers whose group membership led to more favourable emotions and those who expressed a greater dependence on nicotine were more likely to possess intentions to continue using e-cigarettes. Although there are insufficient data to draw any firm conclusions, these results suggest that the Theory of Planned Behaviour would benefit from including additional variables when attempting to predict intentions to vape – but that the specific variables differ depending on the behavioural status of those being examined.

## **6.2 Attitudes**

### **6.2.1 Behavioural Beliefs & Outcome Evaluations**

Within the Theory of Planned Behaviour, behavioural beliefs and outcome evaluations are used to gauge attitudes towards performing a specific behaviour (Ajzen, 2005, 2011; Fishbein & Ajzen, 2010). In the context of the current study, behavioural beliefs referred to participants' perceptions that regular e-cigarette use would lead to certain outcomes, while outcome evaluations were assessments of how 'good/bad' these consequences were seen to be. Previous vaping-related research has often ignored outcome evaluations and has instead focused on gauging behavioural beliefs by examining perceptions of harm (Berg et al., 2015; Goniewicz et al., 2013; Jiang et al., 2019; Laurene et al., 2019; Naidoo et al., 2021; Vogel et al., 2021). Furthermore, the measures used have often failed to distinguish between different types of harm and few have specified whether they are interested in the consequences of experimentation with e-cigarettes or regular use of these products (Abadi et al., 2017; Laurene et al., 2019; Manzione et al., 2020; Tan et al., 2016). The current project addressed these gaps by including four different potential harms and a possible benefit of vaping, as well as specifying that participants should estimate the likelihood of these events taking place as a result of daily e-cigarette use. My survey also asked respondents to rate the (un)desirability of each of these consequences to assess outcome evaluations. The four harms examined by this study were exposure of the self and others to harmful chemicals, experiencing negative health effects, and addiction via nicotine; and the single benefit was smoking cessation. The results showed that both the perceived likelihood and favourability of these outcomes were influenced by

participants' behavioural status. Non-smokers expressed the strongest beliefs that the described harms would occur, the weakest agreement that vaping would help with smoking cessation, and the least favourable evaluations of all five outcomes. Those who already used e-cigarettes – whether by themselves or in tandem with combustible cigarettes – demonstrated the weakest beliefs that vaping would lead to harms, the strongest beliefs that e-cigarettes could assist with smoking cessation, and the most favourable evaluations of the five consequences. Respondents who only smoked occupied a middle ground between non-smoker and e-cigarette users. These findings correspond to those of previous studies (Barker et al., 2019; Chudech & Janmailmool, 2021; Gaiha et al., 2022; Kale et al., 2020; Laurene et al., 2019; Popova et al., 2018; Ruther et al., 2016; Vogel et al., 2021).

Based upon my qualitative analysis, I was able to determine two likely explanations for non-smokers' perceptions regarding the likelihood and desirability of vaping-related harms. First, it is possible that non-smokers feel certain that vaping will lead to undesirable consequences due to the presumed association between e-cigarettes and smoking. When asked why they had never used an e-cigarette or gone on to become a regular vaper, respondents often explained that they had no need for e-cigarettes since they were not smokers or that they had no interest in engaging in an activity similar to smoking. These responses demonstrate that, for many, the activities of vaping and smoking are implicitly connected with one another. Consequently, e-cigarettes may carry some of the stigma that is associated with combustible cigarettes; namely, the ability to cause adverse side-effects. Second, when non-smokers are asked to consider the potential harms of vaping, they are most likely using their current behavioural status as a reference point. The 'act' of being a non-smoker is associated with no increased risk of harm; thus, when e-cigarette use is compared to this 'no risk activity', the potential dangers are going to be perceived as more likely and more severe in nature – a belief which is supported by empirical evidence (Eltorai et al., 2019; National Academies of Sciences, Engineering, and Medicine, 2018; Neczypor et al., 2022). This is like the approach taken by Harm Prevention content that I analysed, and their comparisons similarly resulted in less favourable representations of e-cigarettes.

While non-smokers may use their own behaviour as a reference point, vapers and dual users could be more likely to use conventional cigarettes as their point of comparison. The vast majority (95.7%) of vapers (n = 188) from my sample (n = 329) were former smokers, and many of these individuals explained that they had used e-cigarettes as a tool to reach their smoke-free status. Hence, when these individuals are asked about the harms

of vaping, they may refer to their current/previous smoking behaviour as a comparison point – as Harm Reductions texts were shown to do in my qualitative findings. Combustible cigarettes are known to cause serious health-issues, and when this reference point is used, the risks of vaping seem less certain and less severe – a perspective which is supported by the available evidence (Eltorai et al., 2019; McNeil et al., 2018; National Academies of Sciences, Engineering, and Medicine, 2018; Neczypor et al., 2022).

Another possible explanation for the favourable views of vapers and dual users is the use of personal experiences to guide perceptions. Respondents who use e-cigarettes may reflect on their own encounters with vaping when asked to rate the likelihood and desirability of different outcomes. Many of vapers stated that e-cigarettes had enabled them to quit smoking, with some of them explaining that vaping was the only cessation tool they'd experienced success with and others claiming that these devices had allowed them to quit habits that spanned several years. There were also reports of experiencing health benefits after transitioning from smoking to vaping. Although they still used combustible cigarettes, dual users reported that e-cigarettes had helped them to reduce the amount they smoked. Similar success stories were also presented within Reddit posts. These positive experiences could explain why both vapers and dual users were less likely to believe that e-cigarette use would result in serious risk but more likely to agree that this activity could help with smoking cessation.

Cognitive dissonance can be used to justify why vapers, smokers, and dual users held their beliefs. In psychology, cognitive dissonance refers to an unpleasant/uncomfortable state that an individual experiences when there are inconsistencies between affect, behaviour, or cognitions (Cooper, 2007). For example, using e-cigarettes while simultaneously possessing strong beliefs that these devices cause adverse side-effects is an inconsistency that could lead to cognitive dissonance. To avoid this, vapers and dual users are less likely to believe that their activity could cause them harm. Smokers, in comparison, may hold less favourable views of e-cigarettes to also prevent cognitive dissonance. If those who only use combustible cigarettes feel that vaping is unlikely to cause harms but very likely to help with smoking cessation, it might make it difficult for them to justify not using these devices themselves in order to quit smoking. Hence, they are more likely than e-cigarette users to believe that vaping is associated with harms and less certain that this behaviour could assist with smoking cessation.

By incorporating different types of harm into my survey, I can examine which particular risks participants perceived to be least/most likely and which ones were evaluated to be

the least/most favourable. Participants from all four behavioural statuses agreed that the least likely outcome of vaping would be to expose nearby others to harmful chemicals. Since the dangers of e-cigarette aerosol appear to be uncertain – especially when compared to the well-known risks of second-hand smoke – this may help to explain why Reddit posts reported more institutions allowing vaping to happen in places where smoking is banned. Respondents from all four behavioural statuses were also in agreement that becoming addicted if the e-liquid contained nicotine was the most likely consequence of vaping on a regular basis. This supports prior research which has found that members of the public generally understand the addictive nature of nicotine (McNeill et al., 2018). With regards to the desirability of the outcomes, non-smokers, smokers, and dual users agreed that the least desirable consequence of vaping would be to experience negative health consequences; in comparison, vapers expressed that the least favourable outcome would be to expose nearby others to harmful chemicals. This ties in with the recurring theme of vapers being socially conscious. There were a number of Reddit posts that discouraged in-group members from using their e-cigarettes in places where they were banned or in a manner that would inconvenience non-vapers. A number of my respondents also explained that the health and approval of others is why they switched to e-cigarettes. Understanding the perceived likelihood and evaluations of different vaping-related risks is valuable information that can be taken into consideration when designing educational programmes to improve public knowledge of e-cigarettes, or it can be applied to interventions that attempt to discourage or encourage certain groups to use e-cigarettes. For example, this study indicates that beliefs regarding the safety of vaping are one of the strongest predictors of intentions to use e-cigarettes. A programme that would seek to discourage non-smokers from vaping should emphasize that e-cigarette use is not a risk-free behaviour and that, compared to not smoking, it can be detrimental to their health. In contrast, to encourage smokers to consider e-cigarettes as a method of smoking cessation, interventions should focus on explaining that while vaping is associated with its own risks, they are not as severe as those associated with combustible cigarettes.

### **6.2.2 General Attitudes & Indicators of Attitude Strength**

General attitudes and indicators of attitude strength were included in the current study to provide an additional contribution to the limited literature and to assess if the former could improve upon the Theory of Planned Behaviour.

In term of general attitudes, those who vaped – whether alone or in combination with combustible cigarettes – indicated that favourable terms best suited their perceptions, while the negative descriptors did not. Non-smokers were the most likely to express that

negative terms, rather than the positive ones, reflected their evaluations of e-cigarettes. Respondents who only smoked once again occupied a middle ground. As mentioned earlier, both vapers and dual users have had positive experiences with e-cigarettes which is the likely explanation for their favourable general attitudes. Smoking cessation/reduction is an incredibly difficult task which is why individuals who have accomplished this via vaping are more likely to agree that positive descriptors best suit their perceptions. Many vapers also cited that they used e-cigarettes because they enjoyed the product, which provides another possible explanation. The negative general attitudes of non-smokers could once again be attributed to 1) the stigma of smoking being transferred to e-cigarettes due to their assumed connection, and 2) vaping being perceived less favourably when compared to participants' own current behavioural status.

With regards to indicators of Attitude Strength, vapers and dual users were most likely to express that they: had carefully thought about e-cigarettes, were certain of their vaping-related opinions, perceived themselves to be knowledgeable about vaping, held feelings about e-cigarettes that were more one-sided (rather than mixed), and believed e-cigarettes to be of personal importance to them. For these same five indicators, non-smokers held the weakest beliefs, whereas smokers' opinions were between the two. E-cigarette users perceiving themselves to be more knowledgeable about vaping and believing that they have carefully considered the topic can be linked to these individuals paying greater attention to e-cigarette news stories and their preference for using academia journal articles to learn about vaping. As a result of paying more attention and consuming more relevant content, it is expected that vapers and dual users also felt more certain of their opinions and held beliefs that were on one side. The finding that smokers considered e-cigarettes to be of greater personal importance to them likely reflects the recognition that vaping is seen as a smoking cessation tool, so those who use combustible cigarettes would have a greater need for these devices than non-smokers.

## **6.2 Subjective Norms**

Subjective norms, according to the Theory of Planned Behaviour, consist of injunctive norms and motivations to comply (Ajzen, 2005, 2011; Fishbein & Ajzen, 2010). The former refers to participants' perceptions that referents would approve of them using e-cigarettes on a regular basis, whereas the latter reflects on how important referents' perceptions of vaping are to the respondent. Prior literature has typically focused on injunctive norms and the social acceptability of e-cigarettes, with few studies incorporating measurements of motivations to comply with the beliefs of others (Alber et al., 2021; Trumbo & Harper, 2013, 2015). Past studies are also limited by their range of referents, with most surveys

only asking participants what their parents, friends and/or peers think of e-cigarette use (Abadi et al., 2017; Amin et al., 2021; Berg et al., 2015). I was also unable to locate a study where the researchers specified if they were interested in referents' beliefs regarding regular e-cigarette use or experimentation with these products. These gaps are addressed by my thesis which asked about the perceptions of seven different referents, questioned respondents on how important these opinions were to them and specified that participants' focus on how others would feel about daily e-cigarette use. The referents included in the current study were parents, siblings, close friends, significant others, children, doctors, and dentists. Non-smokers felt that these referents would express the least approval if they decided to vape; and although smokers perceived their referents as being more supportive, vapers and dual users were very confident that the selected individuals would approve of them continuing to use e-cigarettes. Unlike most other variables, however, the importance of referents' beliefs did not vary according to behavioural status. Non-smokers, vapers, smokers, and dual users all expressed that the vaping-related views of their referents were somewhat important to them.

As with behavioural beliefs and outcome evaluations, non-smokers perceptions of referent approval could be explained by 1) e-cigarettes being viewed less favourably when compared to not smoking, and 2) the stigma of smoking carrying over to e-cigarettes. Due to the recognition that being a non-smoker is associated with fewer health risks, it can be expected that the referents of non-smokers would not be pleased by their decision to engage in a behaviour that puts them at risk. Based upon the similarities between vaping and smoking, non-smokers may presume that e-cigarette use carries the same social stigma as smoking; consequently, they then assume that referents would not approve of them using these products. This is similar to Barker et al.'s (2019) finding that participants were significantly less likely to have ever used an e-cigarette if they believed that vaping would result in them looking like a smoker. Vapers, smokers, and dual users are most likely expecting their referents to compare e-cigarette use to smoking as this is the current/former behaviour for the majority. Comparing the more likely and severe consequences of smoking to the uncertain and less adverse risks of vaping may encourage respondents to believe that their referents would approve of them using e-cigarettes daily. It is worth noting that vapers and dual users' perceptions of injunctive norms may be more accurate than those of smokers and non-smokers since these individuals have already experienced their referents' reactions to them using e-cigarettes on a regular basis.

In terms of motivations to comply, both vapers' and non-smokers' responses to the open-ended survey questions demonstrated that their e-cigarette use (or lack of) was influenced by social motivations. Non-smokers explained that they were motivated to avoid e-cigarettes due to concerns regarding social disapproval, whereas vapers stated that their behaviour was driven to maintain social approval. Non-smokers were worried that they would look silly, whereas vapers explained that they smelt better, and referents preferred their use of e-cigarettes. This demonstrates that while the perceptions of others encouraged these two groups to act in different ways, both groups took into consideration the opinions of referents. This could help to explain why no significant differences were found for this variable.

In terms of specific referents, non-smokers, smokers, and dual users agreed that their close friends would provide the greatest support if they decided to use e-cigarettes on a regular basis. This may reflect previous research which has found that vaping is perceived as being more common amongst peer and friends rather than parents (Dobbs et al., 2020; Gorukanti et al., 2017; Lotrean, 2015). In comparison, participants who only used e-cigarettes felt that their significant others would demonstrate the strongest approval. This parallels the open-ended responses where respondents explained that their significant others supported their decision to vape (rather than smoke). In relation to the importance of referents' perceptions, there was agreement amongst non-smokers, vapers, and dual users that the most significant perceptions were those belonging to their children. This belief may be linked to the fear that youth may be tempted to try e-cigarettes and that these devices could renormalize smoking – a concern that was acknowledged by Harm Reduction texts and emphasized by Harm Prevention content. For vapers and dual users, it might be important to them that their children recognize e-cigarettes as tools for smoking cessation rather than a 'fun activity' or hobby. A previous study reported that children whose parents vaped were told by their mothers/fathers that these devices were being used to help them quit smoking (Brown et al., 2020). Reinforcing this understanding may dissuade child/youth interest in e-cigarettes. Smokers, on the other hand, expressed that the vaping-related perceptions of their doctor were the most important to them. This may reflect their need to seek out doctors' recommendations when considering different methods of smoking cessation. If their doctor approves of these devices, smokers may be more inclined to consider using them in their future quit attempts. By understanding which referents are assumed to provide the least/most support and whose opinion is the most important in the context of vaping, this knowledge can be incorporated into interventions that are intended to encourage or discourage e-cigarette use. For instance, as smokers consider the vaping-related perceptions of their doctors to be the most

important, it may be prudent to encourage greater awareness of and support for e-cigarettes amongst General Practitioners – so that they can suggest this cessation method to their patients who smoke but have been unsuccessful with other cessation tools. If their doctors are more supportive of these devices, those who use combustible cigarettes should be more willing to try them. Another example could be programmes that seek to encourage vapers to quit using e-cigarettes. As the views of their children are most important to them, advertising campaigns that emphasize how children prefer their parents to be smoke-free and vape-free could provide motivation to assist with cessation attempts.

### **6.3 Perceived Behavioural Controls**

Within the Theory of Planned Behaviour, perceived behavioural control incorporates measures of potential barriers and barrier impact (Ajzen, 2005, 2011; Fishbein & Ajzen, 2010). The former refers to participants' perceptions as to whether certain barriers to vaping exist, and the latter considers the impact respondents' think these barriers would have on their ability to use e-cigarettes daily. These components of the model have been mostly ignored by previous literature and what is available does not provide a side-by-side comparison of the contributions made by each (Alber et al., 2021; Dobbs et al., 2020). My study considered four possible barriers to regular vaping – cost, learning to use an e-cigarette, purchasing an e-cigarette and related paraphernalia, and finding a place where one is allowed to vape. Non-smokers were the most likely to agree that these barriers with present and would hinder their ability to use e-cigarettes regularly. Despite the differences, none of four groups felt strongly that the described obstacles existed in the context of vaping. Members of all four behavioural statuses agreed that it was not very difficult to: learn how to use an e-cigarette, purchase an e-cigarette and related items, or find a place where vaping is allowed.

Being a non-smoker is a status that requires no effort from the individual. There is no time spent on being a non-smoker, no need to purchase any products, and there is no necessity to find a place where one can be a non-smoker. While vaping may not be as heavily restricted as smoking, it is still an activity that requires the attention and effort of those who engage in it. While this comparison in mind, it can be seen why non-smokers are more likely to believe that there are obstacles to vaping and that these barriers would hinder their ability to use e-cigarettes. Vapers, smokers, and dual users, on the other hand, already engage in e-cigarette use or a similar activity (smoking) and overcome these obstacles on a regular basis. Consequently, these barriers may seem less prominent and

their impact not as severe. This personal experience also means that the perceptions of those who vape and/or smoke may be more accurate than those of non-smokers.

With regards to specific barriers, non-smokers, smokers, and dual users agreed that the obstacle to vaping that they felt was most prominent was cost. In contrast, those who only used e-cigarettes expressed that finding a place where they were allowed to use their devices was the most identifiable barrier to regular vaping. In terms of impact, non-smokers, vapers, and dual users agreed that cost would have the greatest effect upon e-cigarette use. Smokers, on the other hand, explained that difficulty purchasing these devices would present the greatest impact. The cost of vaping was a recurring theme amongst vapers justifications for using e-cigarette use. Many respondents explained that they had begun using e-cigarettes as they offered a cheaper alternative to combustible cigarettes. Given that the barrier of cost is what motivated these individuals to switch to vaping, it is understandable that the same obstacle could also prevent these persons from using e-cigarettes. Previous research has suggested that raising the cost of e-cigarettes may motivate some vapers to quit e-cigarettes but also encourage former smokers to use combustible cigarettes again (Dobbs et al., 2021; Minami & Teo, 2019). Knowing whether people think certain barriers exist to vaping and the impact of the different obstacles can help to better understanding when smokers may be dissuaded from using e-cigarettes as a smoking cessation tool.

## **6.4 Intentions**

To measure intentions to use e-cigarettes, respondents were asked to indicate how much they wanted to, intended to, and expected to use e-cigarettes over the next six months. Those who already used e-cigarettes – both alone and in combination with smoking – expressed very strong intentions to continue using their devices. Non-smokers, in comparison, demonstrated weak intentions to engage in this activity. The intentions of traditional smokers were greater than those of non-smokers but weaker than those of e-cigarette users.

Non-smokers' weak intentions are readily explained by their responses to the open-ended survey questions. The most frequently given explanation that participants gave when asked why they had never used e-cigarettes or gone on to become regular vapers was a lack of interest, want, or desire. Another commonly cited reason was the lack of need, based upon the assumption that e-cigarettes are products intended to be used as smoking replacement tools. These findings help to explain why my study, and previous research, found that regular e-cigarette use amongst non-smokers was rare (McNeill et al., 2018;

McNeill et al., 2019; Villarroel et al., 2020). Smokers may have expressed greater interest in vaping due to the assumption that these devices could be used in their future cessation attempts. Based upon their qualitative survey responses, dual users' intentions to continue vaping are motivated by the desire to completely transition from combustible cigarettes or maintain reduced rates of smoking. Prior research has found that most vapers show low intentions to quit vaping (Etter, 2018; Skerry et al., 2018; Simmons et al., 2016). With regards to my sample, many vapers expressed that they had previously struggled with smoking cessation and perhaps a fear of relapse dissuades these individuals from quitting their use of e-cigarettes (Etter, 2018; Etter & Bullen, 2011). Another possible explanation is compromise. While it is not as safe as being a non-smoker, vaping is able to satisfy nicotine cravings, is met with greater social approval, and poses fewer risks than smoking – which may be 'sufficient' for some users. There may be a concern amongst vapers that quitting nicotine entirely would be too difficult to accomplish, so they settle for the status quo.

## **6.5 Self-Concept & Social Identification**

Based upon my literature review and preliminary qualitative findings, measures of self-concept and social identification were incorporated into the current study. Their main purpose was to determine if they could improve upon the predictive utility of the Theory of Planned Behaviour; however, it also provided an opportunity to contribute to the vaping-related literature.

### **6.5.1 Self-Concept**

Three versions of a self-concept scale were administered, with participants' behavioural status determining which version(s) they received – non-smoker, e-cigarette user, and smoker. Smokers and non-smokers completed their respective scales, while e-cigarette users completed both the e-cigarette user and non-smoker editions, and dual users responded to e-cigarette user and smoker versions. While none of the groups considered their behaviour to be a very important part of their self-concept, there were differences between them. Non-smokers and vapers were more likely than smokers and dual users to agree that their activity (or lack of) contributed to their self-concept.

Although they report greater use and dependence upon vaping, dual users perceive smoking to be just as important to their self-concept. Perhaps the negative health and social consequences of smoking lead to it playing a larger role in self-concept than the actual use of the product would suggest. With regards to vapers, despite e-cigarette use being a far more involved activity than not smoking, they perceived both statuses as

providing equal contributions to their self-concept. Since many of the vapers were former smokers, it is possible that being a non-smoker is seen to be just as important to their sense of self since it is something they had to work hard to achieve, and this accomplishment is an important part of their lives. Both smokers and dual users assigned their smoking behaviour a relatively small role in their self-concept. It is likely that this is motivated by a desire to avoid internalising the stigma that accompanies smoking. When focusing on e-cigarette users, it was found that participants who only vaped viewed this activity as being more important to their self-concept than respondents who both vaped and smoked. The current study is not in a position to explain why findings related to dual users occurred and further research into this particular topic is recommended.

### **6.5.2 Social Identification**

As with self-concept, three different versions of the social identification scale were used – non-smoker, e-cigarette user, and smoker – and respondents' behavioural status influenced which version(s) they completed. While participants from all four behavioural statuses indicated that their group membership was somewhat important to their self-concept, vapers expressed the strongest belief. Differences between the groups were also found when examining the individual factors of the scale – in-group affect, in-group ties, and membership centrality.

In terms of in-group affect, non-smokers and vapers associated more favourable emotions with their group membership than smokers and dual users. Being a non-smoker may encourage positive affect due to this status being the norm (i.e., the majority of the population are non-smokers) and the recognition that their group does not engage in harmful behaviour. Vapers' in-group affect could reflect their perceptions that e-cigarette use poses fewer risks to themselves and others, when compared to their previous activity of smoking. Support for this notion can be found when comparing the smoker and e-cigarette user in-group affect for dual users. These participants expressed feeling more positive emotions in association with their vaper rather than their smoker group membership. The social stigma that accompanies smoking could account for smokers and dual users demonstrating weaker positive affect in relation to their groups.

With regards to in-group ties, non-smokers felt the weakest levels of attachment to fellow group members compared to those who vaped and/or smoked. Research has shown that smoking is a social activity that individuals can bond over, and the available evidence suggests that e-cigarette use is similar (Barbeau et al., 2013; McCausland et al., 2020; Simmons et al., 2016; Tokle & Pedersen, 2019). My qualitative analyses of Reddit posts

and survey questions also emphasized this factor. Within the examined posts, there were examples of e-cigarette users bonding with one another over shared jokes and in-group references, as well as trying to offer advice to one another regarding issues such as smoking cessation and product recommendations. Similarly, when asked why they vaped on a regular basis, a number of respondents stated they enjoyed the social aspect of e-cigarette use. The similarity of vaping and smoking in terms of social bonds is also seen by dual users expressing that their ties to each group were similar in strength. There is a lack of bonding opportunities amongst non-smokers, as indicated by vapers expressing that they felt stronger ties to other e-cigarette users than they did other non-smokers.

When focusing on membership centrality, participants who smoked and/or vaped were more likely to agree that they often thought about their group membership whereas non-smokers were less likely to share this sentiment. As previously mentioned, e-cigarette use and smoking require individuals to invest time and money and can influence both health and social standing. With this level of involvement, it is not surprising that respondents who engaged in these activities agreed that their group membership was salient in their minds. The finding that dual users' centrality scores were higher for their smoker rather than their e-cigarette user group membership, suggests that memberships which carry more negative connotations are more prominent in members' minds.

## **6.6 Attention to & Credibility of Vaping News**

Measures of participants' attention to vaping-related news and their perceived credibility of such stories were incorporated so as to address a gap in e-cigarette literature and to establish whether they could improve upon the Theory of Planned Behaviour in the context of vaping. All respondents indicated that they paid a moderate amount of attention to vaping news stories across different sources, however, those who already used e-cigarettes paid the most attention. Although none of the groups saw e-cigarette news stories as being very credible, non-smokers were the most likely to perceive them as being reliable.

As previously mentioned, many non-smokers explained that they had never tried e-cigarettes or gone on to become a regular vaper due to a lack of interest or need. Based on this assumption, non-smokers perceive e-cigarettes to be an issue not relevant to them which then translates into them paying less attention to vaping-related news. It is also possible that the non-smokers in my sample may not accurately reflect the behaviour of this group overall; it is likely that the non-smokers who agreed to participate in my study were already interested in the topic of vaping – hence why they agreed to participate and

why they expressed paying moderate attention to vaping-related news stories. Since vapers and dual users employ e-cigarettes on a daily basis, it is expected that individuals from these groups would be personally invested in news stories that discuss the topic. With regards to news credibility, my qualitative analysis found that both newspapers published within the United States often use combative phrases and fearful language when discussing the topic of e-cigarettes. The overall impression is that vaping should be viewed in a negative manner. These representations contradict vapers and dual users' own personal, positive experiences with e-cigarettes, which may explain why these respondents were the least likely to perceive vaping-related news as being credible. That being said, none of the groups believed news about e-cigarettes to be very credible, which may indicate a distrust in the media or a belief that mass media often provide less than accurate portrayals of certain issues.

## **6.7 Nicotine Dependence**

Due to its use in both smoking- and vaping-related research, nicotine dependence was included in the current study to determine whether it could improve the predictive capabilities of the Theory of Planned Behaviour (Azagba et al., 2019; Goniewicz et al., 2013; Pulvers et al., 2021; Ruther et al., 2016). Participants' preferences for e-liquid nicotine strength and flavours were also measured to allow for comparisons to previous research.

E-cigarette users, regardless of whether they only vaped or used these devices in tandem with conventional cigarettes, preferred e-liquids with sweeter flavours (Fruits & Desserts) and comparatively low levels of nicotine. While prior research confirms that adult e-cigarette users prefer sweeter flavours, it is difficult to compare nicotine preferences as studies differ in how this is measured/defined (milligrams, percentages, or descriptors) (Zare, Nemati, & Zheng, 2018). There is some evidence to suggest that the majority of those who use e-cigarettes prefer e-liquids with strengths weaker than 20 mg/mL (McNeill et al., 2019, 2021; O'Connor et al., 2019); however, preferences may be influenced by smoking status (Zare et al., 2018). In their systematic review, Zare et al. (2018) reported that non-smokers who used e-cigarettes favoured no nicotine or low nicotine vapes, whereas experienced vapers and smokers preferred e-liquids with medium to high levels of nicotine. In the current study, vapers, smokers, and dual users displayed similar levels of Nicotine Dependence. When using the Fagerstrom scoring system, smokers and dual users fell within the higher end of the 'low dependence' category, whereas vapers fit within the lower end of the 'moderate dependence' category (National Institute on Drug Abuse, 2022). Comparing dual users' nicotine dependence via

vaping to that of smoking revealed that these respondents demonstrated a greater addiction to nicotine via e-cigarettes. This larger dependence via vaping could be explained by the greater regulatory and social acceptance. As previously mentioned, some organisations/institutions are permitting e-cigarette use to take place in areas where smoking is banned. This provides both vapers and dual users the opportunity to vape in more spaces and potentially develop a greater nicotine dependence. Dual users often explained that they were using e-cigarettes as a way to reduce and eventually quit combustible cigarettes, and these findings suggest that they have been successful in transferring their nicotine dependence from one source to another. The greater addiction via vaping rather than smoking may also explain why dual users consistently held more favourable attitudes towards e-cigarettes than those who only smoked conventional cigarettes.

While there were no differences in composite scores, dual users were significantly more likely than vapers to express that they found it difficult to refrain from using their e-cigarette in places where it was forbidden and indicated that they were more likely to use their e-cigarette more frequently during their first waking hours than the rest of the day. In comparison, traditional smokers were significantly more likely than dual users to indicate that they found it difficult to refrain from smoking combustible cigarettes in places where it is forbidden. Traditional smokers were also more likely than vapers to express that they use their product during the first hours after waking than the rest of the day.

It is important to acknowledge that there are other factors that can impact a person's exposure – and therefore addiction – to nicotine via vaping. For instance, characteristics of the specific device chosen, and the puffing behaviour of the individual user can both influence the amount of nicotine extracted during the vaping process (Jacobson et al., 2021). Variables such as these were not considered by the current study, which means that Nicotine Dependence may affect intentions to use e-cigarettes but requires a different measurement to properly gauge it. Future studies should seek to test whether a relationship between exists when other scales are employed, for example, the Penn State Electronic Cigarette Dependence Index (PS-ECDI) and the e-cigarette Wisconsin Inventory of Smoking Dependence Motives (e-WISDM). In hindsight, it would have been more appropriate to use one of these scales in this study due to their previous testing and greater reliability.

## **6.8 Limitations of the Current Study**

Acknowledging the limitations of a study allows for the findings to be contextualised and assists in identifying directions for future research. Although the current project provides a valuable contribution to previous literature, it is not without its weaknesses. This section describes the limitations present within my own work, focusing on those that I perceived to have the largest impact on the study.

My thesis has successfully demonstrated that the Theory of Planned Behaviour can account for a large proportion of peoples' intentions to use e-cigarettes, however, the current study fails to examine the association between intentions and actual behaviour. I have identified which factors may result in stronger intentions to vape but have not determined if these plans correspond with future e-cigarette use. Systematic reviews and meta-analyses have found that mean intention-behaviour correlations are usually between .45 and .62, indicating that intentions are moderately accurate in predicting activity (Fishbein & Ajzen, 2010). That being said, the strength of the relationship may vary depending on the particular behaviour that is being examined. Thus, a longitudinal study would be best to determine how well intentions to vape practice their actual use of e-cigarettes.

The inability to determine whether perceived behavioural control is a sufficient stand-in for actual control limits the current study. Within the Theory of Planned Behaviour, there is a distinction between actual and perceived behavioural control. The former is an individual's actual control over whether they can perform the behaviour of interest; this includes skills/abilities and environmental factors (Fishbein & Ajzen, 2010). The latter refers to whether a person perceives themselves as being able to engage in the activity of interest (Fishbein & Ajzen, 2010). Although actual control is thought to moderate the relationship between intentions and behaviour, measures of this factor are rarely available – instead, perceived control acts as a proxy. In order for perceptions of control to be used as a stand-in, however, they must accurately reflect actual control (Fishbein & Ajzen, 2010). Without the measures of actual control, however, it cannot be established if perceptions of control are sufficient representations. In relation to the current study, there is no way to tell if participants' perceptions regarding their ability use e-cigarettes mirror their actual control over this behaviour. This is further exacerbated by the fact that a person's actual control over vaping will vary depending on their country of residence and the specific regulations concerning e-cigarettes.

This project is limited by the (relatively small) sample size (n = 329). I believe that the disinterest of non-smokers and the distrust of e-cigarette users contributed to this issue.

As shown by the literature and my qualitative findings, vaping is often perceived to be an activity for smokers. Based on this assumption, non-smokers might have believed that the findings of this study would not be of relevance to themselves and subsequently not participated. Due to a lack of personal investment in the topic, non-smokers may also have had little to say about e-cigarettes which could further discourage participation. Those who use e-cigarettes, in contrast, may have avoided this project due to distrust. During the recruitment process, a small number of individuals did express scepticism towards me and/or my study. This could be linked to the understanding that the funding of a project can create a conflict of interest and bias the outputs. There may have been concerns that my study was funded by anti-vaping organisations and would not provide a fair and accurate representation of those who use these devices. To dissuade such thoughts, I did explicitly state that the project was funded by my university; however, it cannot be determined how effective this was. It should also be acknowledged that the majority of my sample indicated that their current country of residence was New Zealand (where most of the recruitment took place), so the findings of this study are most applicable to this particular context.

The qualitative sample in the current study was also constrained. Since I am monolingual, all the qualitative content that was examined was published in English. The newspapers articles and government reports were all sourced from either the United Kingdom or the United States. Despite their (cultural) similarities, it was found that the United Kingdom and United States took considerably different approaches to discussing the topic of e-cigarettes. This means that my qualitative findings are not necessarily applicable to other countries. In addition, while it was valid to base my choice in newspapers on subscription rates, the political leanings of the selected newspapers may have biased the qualitative findings. Mitchell et al. (2014) reported that, compared to the average respondent, those who obtained their news from my chosen newspapers were more likely to hold liberal ideological preferences. Hence, while the findings of my qualitative analyses were valuable, they are limited in their scope. Future research should seek to establish whether the news representations of e-cigarettes vary depending on their country and/or newspaper of origin.

Another limitation regarding the qualitative component of the project is my own biases. Marshall and Rossman (2011) explain that studies are influenced by the researchers' "identity and one's sense of voice and perspectives, assumptions, and sensitivities" (p.96). These factors can influence various components of the study; for example, the initial questions that are being proposed, the methods chosen, interpretations of the data, and

the conclusions that are reached. One way to help minimize the impact of biases is for researchers to acknowledge their existence and actively reflect on how they may impact their study (Marshall & Rossman, 2011). Those who read the final report should also be made aware of an author's predispositions so that they can consider how such biases could impact the study and the write up (Marshall & Rossman, 2011). Within the context of this project, the aspect of identity that would arguably have the greatest impact is my status as a non-smoker. Personally, I have never smoked combustible cigarettes and have only briefly experimented with e-cigarettes. This makes it more difficult for me to incorporate the perspectives of vapers, traditional smokers, and dual users. To lessen the effects of these biases, I did informally consult with e-cigarette users throughout the various stages of my thesis. The analysis of the Reddit posts also provided me with the opportunity to identify what issues, at the time of data collection, were perceived to be most relevant within the vaping community. My status as a non-smoker does act as a potential bias for this study, however, I do recognise this limitation and have taken steps to help lessen its effects.

Like most studies examining the Theory of Planned Behaviour, my research relied upon self-report measures of perceptions and behaviour (Fishbein & Ajzen, 2010). The two primary concerns associated with self-report scales are accuracy of recall and social desirability bias (Fishbein & Ajzen, 2010). When questioning an individual on their experiences with a particular behaviour, it is possible that their recall may be flawed and lead to inaccurate responses (Fishbein & Ajzen, 2010). Within the current study, for example, it is possible that both smokers and non-smokers may have experimented with e-cigarettes in the past but did not remember doing so when asked if they had ever-used an e-cigarette. Participants' responses to survey questions may also be influenced by their desire to respond in a way that reflects more favourably on them (Cozby & Bates, 2020; Fishbein & Ajzen, 2010). As established in the qualitative findings, there is an assumed connection between vaping and smoking that may result in e-cigarettes developing a stigma similar to that of their combustible counterparts. Consequently, it is possible that some respondents were motivated to lie about their use of e-cigarettes or present exaggerated negative perceptions. To help minimize the effects of this bias, my survey was anonymous and online, allowing it to be completed in the privacy of the respondents' own home. The participant information sheet also described the purpose of the project – so that people could make a fully informed decision about whether they were comfortable discussing this topic.

## **6.9 Strengths & Contributions of the Current Study**

The purpose of a thesis is to provide an original contribution to the available literature and knowledge. While the previous section recognised the limitations of my study, this section focuses on highlighting the strengths of my approach and the theoretical and practical contributions of this work.

The use of a mixed methods approach is a core strength of this study. My research incorporated both qualitative (thematic analysis) and quantitative (questionnaire) methods. Both approaches were necessary in order to properly answer my research questions. The use of survey enabled me measure attitudes, subjective norms, and perceived behavioural controls towards e-cigarettes, and establish how much variance in participants' intentions to vape was explained by these variables. The questionnaire was also necessary to determine if the Theory of Planned Behaviour could be improved upon and the individual contributions of each variable within the model. This survey, however, would not have been constructed so well without my thematic analysis. Fishbein and Ajzen (2010) explain that formative research (typically qualitative) is used to identify salient beliefs to develop scales that can measure attitudes, subjective norms, and perceived behavioural controls. This is the approach that my study adopted. In addition, as I have demonstrated within this chapter, several of the themes and patterns identified helped to provide explanations for many of my quantitative findings. The use of both qualitative and quantitative approaches allowed me to best answer the research questions and lead to an in-depth and thorough investigation of my topic of interest.

The current study provides valuable contributions to the available literature concerning both e-cigarettes and the Theory of Planned Behaviour. As discussed in Chapter Two, previous research has predominately focused on examining attitudes and social norms towards e-cigarettes. Very few studies have attempted to comprehensively test and attempt to expand upon the Theory of Planned Behaviour within the context of vaping (Alber et al., 2021; . Aljaber & Yao, 2021; Dobbs et al., 2020). By following the guidelines set out by Fishbein and Ajzen (2010) and Ajzen (2019), I have constructed a scale that is able to predict a larger proportion of intentions to use e-cigarettes based off attitudes, subjective norms, and perceived behavioural control. While additional testing and adjustments will be required, the results indicate that my questionnaire has provided a strong starting point for future research. Furthermore, this project goes beyond the core theory and considers how other variables may improve the predictive utility of the Theory of Planned Behaviour. My findings suggest that additional measurements of attitudes (general attitudes & indicators of attitude strength), social identification (in particular, in-group affect) and nicotine dependence have the potential to provide useful contributions

to the original model – though the latter two seem to be only relevant to individuals who already use e-cigarettes but not in combination with smoking. The findings that self-concept, attention to vaping-related news, and the perceived credibility of e-cigarette news stories did not improve upon the Theory of Planned Behaviour also provide useful information. These results suggest that these factors do not influence intentions to vape once attitudes, subjective norms, and perceived behavioural controls have been taken into consideration; however, additional testing is needed to confirm whether this is the case. Overall, my thesis has provided an original and valuable contribution to existing academic literature and knowledge.

The practical applications of my findings are a strength of this thesis. Since previous studies have combined the components to create single measures for attitudes, subjective norms, and perceived behavioural controls, they did not distinguish between the contributions of each factor – a gap which my approach has addressed (Alber et al., 2021; Aljaber & Yao, 2021; Dobbs et al., 2020). This study has been able to determine that individuals' intentions to use e-cigarettes are predominately influenced by the perceived likelihood of harm, beliefs that referents will approve of their behaviour, and whether they believe that certain obstacles would hinder their ability to vape. A more in-depth examination can identify which specific harms are perceived to be the least/most likely, who among the referents are thought to provide the least/most support, and which particular barriers would have the smallest/greatest impact on someone's ability vape. This knowledge can now be applied to the design and construction of interventions relating to e-cigarette use. For example, based on my findings, programmes designed to discourage non-smoking youths from vaping will have the greatest influence on intentions if they are able to convince them that: e-cigarette use is likely to cause negative health-related outcomes, referents such as friends and family would not approve of their behaviour, and there are barriers in place that make it difficult for them to access and use e-cigarettes. On the other hand, a programme with the goal of encouraging smokers to switch to e-cigarettes would be more successful if it can persuade them to believe that: regular vaping is not likely to lead to adverse side-effects, important individuals in their lives would support their decision to vape, and e-cigarettes and their accessories are readily accessible and easy to use.

## **6.10 Directions for Future Research**

The current study has provided a strong foundation that can be used to support and potentially guide future research. First and foremost, the scales constructed during this thesis would benefit from continued testing and potential adjustments. As mentioned

earlier, it can be difficult – but not impossible – to gauge whether perceived behavioural controls are an accurate substitute for actual controls. It would be beneficial to conduct a separate study to compare these two constructs and confirm whether it is acceptable to continue using perceptions as an alternative. Given how nations differ in their regulations concerning e-cigarettes, I suggest examining whether an individual's country of residence influences perceptions of and actual control. By establishing whether the measures are a genuine reflection of reality, it can be properly established whether perceptions of barriers and their impact influence peoples' intentions to use e-cigarettes.

Another area of interest is the connection between intentions and actual behaviour. As mentioned earlier in this chapter, the current study used a cross-sectional approach to only measure intentions at one point in time. While prior research has suggested that the correlation between intentions and behaviour is moderate in strength, this can vary depending on the behaviour being examined. Thus, a future project should adopt a longitudinal approach and determine whether intentions to use e-cigarettes translate into actual behavioural change.

While reviewing the literature, I found that perceptions of vaping-related harms often fall into two categories – absolute harms and relative harms. Absolute harms refer to how dangerous respondents believe e-cigarettes to be overall (that is, in comparison to not smoking), whereas relative harms ask participants to estimate how harmful e-cigarettes are in comparison to combustible cigarettes. My items were intended to measure absolute harms, however, I have reason to believe that some participants may have (consciously or otherwise) answered as if they were questions of relative harm. Based upon responses to the open-ended survey questions, there is a presumed association between smoking and vaping, and this could influence participants' answers. It perhaps needs to be specified within absolute harm items that respondents need to estimate the risks of vaping compared to those of not smoking. A later study could also measure perceptions of both absolute and relative harms, and then examine which approach is best for predicting intentions to use e-cigarettes.

While studies have shown that e-cigarettes can be successfully used as smoking cessation tools, there has been comparatively little research into the use of these products once smoking cessation has been achieved. Most government approved nicotine replacement therapies are designed to be used for a set amount of time. For example, the Surgeon General recommends that those trying to quit cigarettes use nicotine gum and lozenges for no more than 3 months, while nasal sprays and oral inhalers can be implemented for up to

6 months (U.S. DHHS, 2020B). Due to so few vaping products being approved by governing bodies, there is a lack of official guidelines for how these products should be used during cessation attempts. Without these recommendations, vapers may be encouraged to use their devices for unnecessarily long periods of time (perhaps, indefinitely). The majority of vapers within my study were former smokers, many of which explained that they used e-cigarettes as a smoking cessation tool. On average, however, vapers had been using these products for 3 years and demonstrated strong intentions to continue using them over the next six months – despite already having achieved their goal. Future studies should continue to explore how e-cigarette users might be motivated to quit vaping once they have successfully quit combustible cigarettes. It is possible that an altered version of my instrument could be applied in order to specifically measure intentions to cease vaping.

Within New Zealand, there are sociodemographic disparities in smoking prevalence and outcomes. During the 2021-22 New Zealand Health Survey, it was found that 19.96% of Māori adults are daily smokers, compared to 7.2% of adults classified as 'European and other' (Ministry of Health, 2022). Similarly, 18.2% of Pacific peoples identified as daily smokers. Furthermore, individuals who lived in the 'most deprived' neighbourhoods were more than four times likely to be daily smokers than those who resided in 'least deprived' areas (Ministry of Health, 2022). A study by Walsh and Wright (2020) reported that, between 2013 and 2015, 22.6% of deaths among Māori could be attributed to smoking, compared to 13.8% of Pacific people and 12.3% of non-Māori/non-Pacific individuals. While the current study did ask participants to indicate their ethnicity, the sample size of Māori and Pacific participants was not large enough to allow for meaningful comparisons to be made. Given these inequalities and the potential for e-cigarettes to assist with smoking cessation, it is important that future research investigates the vaping-related behaviour of vulnerable populations within New Zealand. In particular, studies should examine whether the Theory of Planned Behaviour can be applied to e-cigarette use within Māori and Pacific populations.

## **6.11 Final Remarks**

The aim of this thesis was to determine the applicability of the Theory of Planned Behaviour to the activity of vaping and establish whether additional variables could improve the model's predictive capabilities. Based upon previous literature and a thematic analysis of newspaper articles, government reports/publications, and Reddit posts, I constructed a survey to measure the core variables of the model as well as those that could enhance its strength. The results showed that the base theory was able to account for 70% of variance in participants' intentions to use e-cigarettes over the next six months.

Incorporating measures of general attitudes, social identification, and nicotine dependence was able to improve the model – with the latter two variables only being relevant to the intentions of current vapers.

In summary, attitudes, subjective norms, and perceived behavioural controls vary depending on the current behavioural status of the individual. Non-smokers demonstrated the strongest beliefs that regular e-cigarette use would: lead to adverse side-effects, not be supported by the referents in their lives, and be hindered by certain barriers. Those who already used these devices, whether alone or in combination with combustible cigarettes, typically believed that: daily vaping was not associated with severe side-effects, referents would approve of their (continued) use of e-cigarettes, and their ability to vape would not be significantly impacted by the described barriers. Generally, but not always, smokers occupied a middle-ground with their perceptions being more favourable than those of non-smokers but not as positive as those belonging to vapers and dual users. The thematic analyses conducted provided valuable insights and helped to identify a variety of possible explanations for the results found.

This thesis has not only provided an original contribution to knowledge but has also begun the process of addressing gaps within the prior literature and has laid a strong foundation for future studies to build upon. I hope to continue working on my instruments and collecting data so that this information may be applied to real-world settings and potentially help others.

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# Appendices

## Appendix A - Ethics Approval



### Auckland University of Technology Ethics Committee (AUTEC)

Auckland University of Technology  
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T: +64 9 921 9999 ext. 8316  
E: [ethics@aut.ac.nz](mailto:ethics@aut.ac.nz)  
[www.aut.ac.nz/researchethics](http://www.aut.ac.nz/researchethics)

15 April 2019

Jay Wood  
Faculty of Culture and Society

Dear Jay

Re Ethics Application: **19/130 Theory of planned behaviour in the context of electronic cigarette use**

Thank you for providing evidence as requested, which satisfies the points raised by the Auckland University of Technology Ethics Subcommittee (AUTEC).

Your ethics application has been approved for three years until 15 April 2022.

#### Standard Conditions of Approval

1. A progress report is due annually on the anniversary of the approval date, using form EA2, which is available online through <http://www.aut.ac.nz/research/researchethics>.
2. A final report is due at the expiration of the approval period, or, upon completion of project, using form EA3, which is available online through <http://www.aut.ac.nz/research/researchethics>.
3. Any amendments to the project must be approved by AUTEC prior to being implemented. Amendments can be requested using the EA2 form: <http://www.aut.ac.nz/research/researchethics>.
4. Any serious or unexpected adverse events must be reported to AUTEC Secretariat as a matter of priority.
5. Any unforeseen events that might affect continued ethical acceptability of the project should also be reported to the AUTEC Secretariat as a matter of priority.

Please quote the application number and title on all future correspondence related to this project.

AUTEC grants ethical approval only. If you require management approval for access for your research from another institution or organisation, then you are responsible for obtaining it. You are reminded that it is your responsibility to ensure that the spelling and grammar of documents being provided to participants or external organisations is of a high standard.

For any enquiries, please contact [ethics@aut.ac.nz](mailto:ethics@aut.ac.nz)

Yours sincerely,

Kate O'Connor  
Executive Manager  
Auckland University of Technology Ethics Committee

Cc: [lostone@aut.ac.nz](mailto:lostone@aut.ac.nz); Erik Landhuis; Sharyn Graham Davies

# Appendix B – Pilot Survey

2/25/23, 12:03 PM

Qualtrics Survey Software

## Section 1

**Instructions:** Below is a list of words that could be used to describe your overall evaluation of an issue. Please use the list below to describe your evaluation of electronic cigarettes. If the word "definitely" describes your evaluation of electronic cigarettes, then circle the number "7". If you decide that the word does "not at all" describe your evaluation of electronic cigarettes then click the number "1". Use the intermediate numbers between 1 and 7 to indicate responses between these two extremes.

Dislike

1 Not at all      2      3      4      5      6      7 Definitely  
                                   

Good

1 Not at all      2      3      4      5      6      7 Definitely  
                                   

Undesirable

1 Not at all      2      3      4      5      6      7 Definitely  
                                   

Positive

1 Not at all      2      3      4      5      6      7 Definitely  
                                   

## Section 2

**Instructions:** In the sections that follow are a series of questions pertaining to electronic cigarettes. Many of the items in this survey make use of rating scales with seven places; you are to circle the number that best describes your opinion. Some of the questions may appear to be similar, but they do address somewhat different issues. Please read each question carefully and answer truthfully.

Electronic cigarettes are affordable...

1 Not at all      2      3      4      5      6      7 Definitely  
                                   

Electronic cigarettes contain harmful chemicals...

[https://aut.au1.qualtrics.com/Q/EditSection/Blocks/Ajax/GetSurveyPrintPreview?ContextSurveyID=SV\\_39uuFXCaiijmRL&ContextLibraryID=UR...](https://aut.au1.qualtrics.com/Q/EditSection/Blocks/Ajax/GetSurveyPrintPreview?ContextSurveyID=SV_39uuFXCaiijmRL&ContextLibraryID=UR...) 1/20

1 Not at all      2      3      4      5      6      7 Definitely  
                                   

Electronic cigarettes are addictive...

1 Not at all      2      3      4      5      6      7 Definitely  
                                   

There are health risks associated with electronic cigarettes use...

1 Not at all      2      3      4      5      6      7 Definitely  
                                   

The liquid used in electronic cigarettes is available in a variety of flavours...

1 Not at all      2      3      4      5      6      7 Definitely  
                                   

The secondhand vapour produced by electronic cigarettes is harmful...

1 Not at all      2      3      4      5      6      7 Definitely  
                                   

Electronic cigarettes are safe for users...

1 Not at all      2      3      4      5      6      7 Definitely  
                                   

Electronic cigarettes are safe for nearby people...

1 Not at all      2      3      4      5      6      7 Definitely  
                                   

Electronic cigarettes can assist with smoking cessation...

1 Not at all      2      3      4      5      6      7 Definitely  
                                   

Electronic cigarettes being affordable would be...

-3 Very bad      -2      -1      0      1      2      3 Very good  
                                   

Electronic cigarettes containing harmful chemicals would be...

-3 Very bad      -2      -1      0      1      2      3 Very good  
                                   

Electronic cigarettes being addictive would be...

-3 Very bad      -2      -1      0      1      2      3 Very good

Having health risks associated with electronic cigarettes would be...

-3 Very bad    -2    -1    0    1    2    3 Very good

The liquid used in electronic cigarettes being available in a variety of flavours would be...

-3 Very bad    -2    -1    0    1    2    3 Very good

The secondhand vapour of electronic cigarettes being harmful would be...

-3 Very bad    -2    -1    0    1    2    3 Very good

Electronic cigarettes being safe for users would be...

-3 Very bad    -2    -1    0    1    2    3 Very good

Electronic cigarettes being safe for nearby people would be...

-3 Very bad    -2    -1    0    1    2    3 Very good

Electronic cigarettes being able to assist with smoking cessation would be...

-3 Very bad    -2    -1    0    1    2    3 Very good

How carefully have you thought about information that you have been exposed to regarding electronic cigarettes?

-4 Not at all carefully    -3    -2    -1    0    1    2    3    4 Extremely Carefully

Overall, how certain are you of your opinion regarding electronic cigarettes?

-4 Not at all certain    -3    -2    -1    0    1    2    3    4 Extremely certain

Would you say that you are strongly on one side or the other regarding electronic cigarettes, or would you say that your feelings are mixed?

-4 My feelings are extremely mixed    -3    -2    -1    0    1    2    3    4 I am clearly on one side or the other

How knowledgeable do you think you are about electronic cigarettes?

-4 Not at all knowledgeable   -3   -2   -1   0   1   2   3   4 Extremely knowledgeable

How personally important are electronic cigarettes to you?

-4 Not at all important   -3   -2   -1   0   1   2   3   4 Extremely important

**Section 3**

My parents would approve of electronic cigarettes...

1 Not at all   2   3   4   5   6   7 Definitely

My siblings would approve of electronic cigarettes...

1 Not at all   2   3   4   5   6   7 Definitely

My close friends would approve of electronic cigarettes...

1 Not at all   2   3   4   5   6   7 Definitely

My doctor would approve of electronic cigarettes...

1 Not at all   2   3   4   5   6   7 Definitely

My dentist would approve of electronic cigarettes...

1 Not at all   2   3   4   5   6   7 Definitely

My parents' perceptions of electronic cigarettes are...

1 Not at all important to me   2   3   4   5   6   7 Very important to me

My siblings' perceptions of electronic cigarettes are...

1 Not at all important to me   2   3   4   5   6   7 Very important to me

My close friends' perceptions of electronic cigarettes are...

1 Not at all important to me  2  3  4  5  6  7 Very important to me

My doctor's perceptions of electronic cigarettes are...

1 Not at all important to me  2  3  4  5  6  7 Very important to me

My dentist's perceptions of electronic cigarettes are...

1 Not at all important to me  2  3  4  5  6  7 Very important to me

My parents use electronic cigarettes...

- Yes
- No
- Unsure

My siblings use electronic cigarettes...

- Yes
- No
- Unsure

My close friends use electronic cigarettes...

- Yes
- No
- Unsure

My doctor uses electronic cigarettes...

- Yes
- No
- Unsure

My dentist uses electronic cigarettes...

- Yes
- No

Unsure

**Section 4**

Electronic cigarettes are expensive...

1 Not at all      2      3      4      5      6      7 Definitely  
                                   

Electronic cigarettes are addictive...

1 Not at all      2      3      4      5      6      7 Definitely  
                                   

It is difficult to purchase an electronic cigarette and related paraphernalia...

1 Not at all      2      3      4      5      6      7 Definitely  
                                   

It is difficult to learn how to use an electronic cigarette...

1 Not at all      2      3      4      5      6      7 Definitely  
                                   

It is difficult to find a place where I am allowed to use an electronic cigarette...

1 Not at all      2      3      4      5      6      7 Definitely  
                                   

If electronic cigarettes are expensive, this will make it difficult for me to use them...

1 Not at all      2      3      4      5      6      7 Definitely  
                                   

If electronic cigarettes are addictive, this will make it difficult for me to use them...

1 Not at all      2      3      4      5      6      7 Definitely  
                                   

If it is difficult to purchase electronic cigarettes and related paraphernalia, this will prevent me from using them...

1 Not at all      2      3      4      5      6      7 Definitely  
                                   

If it is difficult to learn how to use an electronic cigarette, this will prevent me from using them...

1 Not at all      2      3      4      5      6      7 Definitely

If it is difficult to find a place which allows me to use an electronic cigarette, this will prevent me from using them...

- 1 Not at all
- 2
- 3
- 4
- 5
- 6
- 7 Definitely

**Section 5**

In the next six months, I intend to use electronic cigarettes...

- 1 Not at all
- 2
- 3
- 4
- 5
- 6
- 7 Definitely

In the next six months, I want to use electronic cigarettes...

- 1 Not at all
- 2
- 3
- 4
- 5
- 6
- 7 Definitely

In the next six months, I expect to use electronic cigarettes...

- 1 Not at all
- 2
- 3
- 4
- 5
- 6
- 7 Definitely

**Section 6**

Have you **ever** used an electronic cigarette?

- Yes
- No

If you have **never** used an electronic cigarette, please explain why...

If you have **ever** tried an electronic cigarette, did you become a **regular** user? A *regular user, in this context, is someone who has used an electronic cigarette at least once per day for a period of at least one month.*

- Yes
- No

If you have **ever** tried an electronic cigarette but did **not** become a **regular** user, please explain why...

Are you still **currently** a **regular** user of electronic cigarettes?

- Yes
- No

If you **previously** used electronic cigarettes **regularly but no longer do so**, please explain why...

If you are **currently** a **regular user** of electronic cigarettes, please explain why...

Are you a **current** smoker of **traditional** cigarettes?

- Yes
- No

Are you a **former** smoker of **traditional** cigarettes?

- Yes
- No

If you are a **former** smoker of **traditional** cigarettes, for how long did you use these products?

Your previous responses indicated that you are a **dual user**; that is, you currently use **both traditional and electronic cigarettes**. Please explain why...

From the options below, please select the category you believe best suits electronic cigarette users and explain your choice. Those who use electronic cigarettes are...

- Smokers
- Non-Smokers
- Neither

**Section 7A**

Not smoking is a part of my self-image.

- 1 Strongly Disagree
- 2
- 3
- 4
- 5
- 6
- 7 Strongly Agree



Not smoking is a part of "who I am."

1 Strongly Disagree

2

3

4

5

6

7 Strongly Agree

Not smoking is a part of my personality.

1 Strongly Disagree

2

3

4

5

6

7 Strongly Agree

Not smoking is a large part of my daily life.

1 Strongly Disagree

2

3

4

5

6

7 Strongly Agree

Others view not smoking as part of my personality.

1 Strongly Disagree

2

3

4

5

6

7 Strongly Agree

Generally, I feel good when I think about myself as a non-smoker

1 Strongly disagree

2

3

4

5

6

7 Strongly agree

I don't feel a sense of being "connected" with other non-smokers

1 Strongly disagree

2

3

4

5

6

7 Strongly agree

I don't feel good about being a non-smoker

1 Strongly disagree

2

3

4

5

6

7 Strongly agree

I feel strong ties to other non-smokers

1 Strongly disagree

2

3

4

5

6

7 Strongly agree

I find it difficult to form of bond with other non-smokers

1 Strongly disagree

2

3

4

5

6

7 Strongly agree

I have a lot in common with other non-smokers

1 Strongly disagree    2    3    4    5    6    7 Strongly agree  
                       

I often regret that I am a non-smoker

1 Strongly disagree    2    3    4    5    6    7 Strongly agree  
                       

I often think about the fact that I am a non-smoker

1 Strongly disagree    2    3    4    5    6    7 Strongly agree  
                       

In general, being a non-smoker is an important part of my self-image

1 Strongly disagree    2    3    4    5    6    7 Strongly agree  
                       

In general, I'm glad to be a non-smoker

1 Strongly disagree    2    3    4    5    6    7 Strongly agree  
                       

Overall, being a non-smoker has very little to do with how I feel about myself

1 Strongly disagree    2    3    4    5    6    7 Strongly agree  
                       

The fact that I am a non-smoker rarely enters my mind

1 Strongly disagree    2    3    4    5    6    7 Strongly agree  
                       

**Section 7B**

Smoking is part of my self-image.

1 Strongly Disagree    2    3    4    5    6    7 Strongly Agree  
                       

Smoking is part of "who I am."

1 Strongly Disagree    2    3    4    5    6    7 Strongly Agree

Smoking is a part of my personality.

1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Smoking is a large part of my daily life.

1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Others view smoking as part of my personality.

1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

I have a lot in common with other smokers

1 Strongly disagree	2	3	4	5	6	7 Strongly agree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

I feel strong ties to other smokers

1 Strongly disagree	2	3	4	5	6	7 Strongly agree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

I find it difficult to form of bond with other smokers

1 Strongly disagree	2	3	4	5	6	7 Strongly agree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

I don't feel a sense of being "connected" with other smokers

1 Strongly disagree	2	3	4	5	6	7 Strongly agree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

I often think about the fact that I am a smoker

1 Strongly disagree	2	3	4	5	6	7 Strongly agree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Overall, being a smoker has very little to do with how I feel about myself

1 Strongly disagree	2	3	4	5	6	7 Strongly agree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

In general, being a smoker is an important part of my self-image

1 Strongly disagree      2      3      4      5      6      7 Strongly agree  
                                   

The fact that I am a smoker rarely enters my mind

1 Strongly disagree      2      3      4      5      6      7 Strongly agree  
                                   

In general, I'm glad to be a smoker

1 Strongly disagree      2      3      4      5      6      7 Strongly agree  
                                   

I often regret that I am a smoker

1 Strongly disagree      2      3      4      5      6      7 Strongly agree  
                                   

I don't feel good about being a smoker

1 Strongly disagree      2      3      4      5      6      7 Strongly agree  
                                   

Generally, I feel good when I think about myself as a smoker

1 Strongly disagree      2      3      4      5      6      7 Strongly agree  
                                   

**Section 7C**

Using electronic cigarettes is a part of my self-image

1 Strongly Disagree      2      3      4      5      6      7 Strongly Agree  
                                   

Using electronic cigarettes is a part of "who I am."

1 Strongly Disagree      2      3      4      5      6      7 Strongly Agree  
                                   

Using electronic cigarettes is a part of my personality.

1 Strongly Disagree      2      3      4      5      6      7 Strongly Agree

Others view using electronic cigarettes as part of my personality.

1 Strongly Disagree   2   3   4   5   6   7 Strongly Agree

Using electronic cigarettes is a large part of my daily life.

1 Strongly Disagree   2   3   4   5   6   7 Strongly Agree

Generally, I feel good when I think about myself as an electronic cigarette user

1 Strongly disagree   2   3   4   5   6   7 Strongly agree

I don't feel a sense of being "connected" with other electronic cigarette users

1 Strongly disagree   2   3   4   5   6   7 Strongly agree

I don't feel good about being an electronic cigarette user

1 Strongly disagree   2   3   4   5   6   7 Strongly agree

I feel strong ties to other electronic cigarette users

1 Strongly disagree   2   3   4   5   6   7 Strongly agree

I find it difficult to form of bond with other electronic cigarette users

1 Strongly disagree   2   3   4   5   6   7 Strongly agree

I have a lot in common with other electronic cigarette users

1 Strongly disagree   2   3   4   5   6   7 Strongly agree

I often regret that I am an electronic cigarette user

1 Strongly disagree   2   3   4   5   6   7 Strongly agree

I often think about the fact that I am an electronic cigarette user

1 Strongly disagree    2    3    4    5    6    7 Strongly agree  
                       

In general, being an electronic cigarette user is an important part of my self-image

1 Strongly disagree    2    3    4    5    6    7 Strongly agree  
                       

In general, I'm glad to be an electronic cigarette user

1 Strongly disagree    2    3    4    5    6    7 Strongly agree  
                       

Overall, being an electronic cigarette user has very little to do with how I feel about myself

1 Strongly disagree    2    3    4    5    6    7 Strongly agree  
                       

The fact that I am an electronic cigarette user rarely enters my mind

1 Strongly disagree    2    3    4    5    6    7 Strongly agree  
                       

**Section 8**

For how long have you been using traditional cigarettes?

How soon after you wake up do you smoke your first cigarette?

- Within 5 minutes
- 6 - 30 minutes
- 31 - 60 minutes
- After 60 minutes

How many cigarettes a day do you smoke?

- 10 or less
- 11 - 20
- 21 - 30
- 31 or more

Which cigarette would you hate most to give up?

- The first one in the morning
- All others

Do you find it difficult to refrain from smoking in places where it is forbidden?

- Yes
- No

Do you smoke more frequently during the first hours after waking than the rest of the day?

- Yes
- No

Do you smoke if you are so ill that you are in bed most of the day?

- Yes
- No

How long have you used electronic cigarettes?

Which nicotine strength do you most commonly use in your e-liquids?

- 3mg
- 6mg
- 12mg
- 18mg
- Other (Please Specify)

Which type(s) of e-liquid flavour do you most commonly use:

- Tobacco
- Menthol-Mint
- Fruit
- Dessert
- Other (Please Specify)

How soon after you wake up do you use your electronic cigarette?

- Within 5 minutes
- 6 - 30 minutes
- 31 - 60 minutes
- After 60 minutes

How many times per day do you use your electronic cigarette continuously for a period of two minutes or more?

- 10 or less
- 11 - 20
- 21 - 30
- 31 or more

Which use of your electronic cigarette would you hate most to give up?

- The first one in the morning
- All others

Do you find it difficult to refrain from using your electronic cigarette in places where it is forbidden?

- Yes
- No

Do you use your electronic cigarette more frequently during the first hours after waking than the rest of the day?

- Yes
- No

Do you use your electronic cigarette if you are so ill that you are in bed most of the day?

- Yes
- No

**Section 9**

I pay attention to electronic cigarette news on television

1 Strongly Disagree      2      3      4      5      6      7 Strongly Agree

I pay attention to electronic cigarette news in the newspaper (digital & print)

1 Strongly Disagree      2      3      4      5      6      7 Strongly Agree

I pay attention to electronic cigarette news on the radio

1 Strongly Disagree      2      3      4      5      6      7 Strongly Agree  
                                   

I pay attention to electronic cigarette news on the internet (excluding newspapers)

1 Strongly Disagree      2      3      4      5      6      7 Strongly Agree  
                                   

News reports regarding electronic cigarettes on television are credible

1 Strongly Disagree      2      3      4      5      6      7 Strongly Agree  
                                   

News reports regarding electronic cigarettes in the newspapers (digital & print) are credible

1 Strongly Disagree      2      3      4      5      6      7 Strongly Agree  
                                   

News reports regarding electronic cigarettes on the radio are credible

1 Strongly Disagree      2      3      4      5      6      7 Strongly Agree  
                                   

News reports regarding electronic cigarettes on the internet (excluding newspapers) are credible

1 Strongly Disagree      2      3      4      5      6      7 Strongly Agree  
                                   

Please indicate which source(s) of information you **most** often use to learn about electronic cigarettes:

- Newspapers (digital & print)
- Television
- Radio
- Academic Journal Articles
- Government Websites (e.g. Centers for Disease Control; Public Health England; Surgeon General)
- Youtube
- Reddit
- Other (Please Specify)

**Section 10**

Sex

- Female
- Male
- Other

Age (Years)

Ethnicity (Provide multiple answers if applicable):

Highest Level of Education Attained:

- Secondary School
- Certificate
- Degree/Tertiary
- Post-Graduate

Country of **current** residence

**Section 11**

Thank you for your participation in this pilot. Your contribution is greatly appreciated and will help to expand our understanding of why people do (not) use electronic cigarettes.

Please do not disclose the survey items to anyone who might participate in this study in the future, as it could affect the results of the study.

If you would like to receive a summary of the findings when the study is completed, please feel free to contact me using the email address provided.

If you have any questions or concerns regarding this pilot, or if you want to provide feedback, please feel free to use the text box below or contact the me using the following email address:

lostone@aut.ac.nz

# Appendix C - Participant Information Sheet & Final Survey

5/18/2021

Qualtrics Survey Software

## Participant Information Sheet



## Participant Information Sheet

### Date Information Sheet Produced:

12th April 2019

### Project Title

The Theory of Planned Behaviour in the Context of Electronic Cigarette Use

### An Invitation

Greetings! My name is Louise Stone and through this information sheet, I would like to invite you to participate my research study. This project is being undertaken by myself and three academic supervisors from the Auckland University of Technology (AUT), towards the completion of a Doctorate of Philosophy. Participation in this research is entirely voluntary and you can choose to withdraw at any stage prior to the submission of your data.

### What is the purpose of this research?

The purpose of the current study is to develop an understanding of attitudes towards and experiences with electronic cigarettes. I want to encompass a variety of perspectives, including those who have and have not used these devices. The data collected will contribute to the completion of my Doctorate at AUT. The research is also likely to produce content for a conference paper, academic journal article(s), or other academic publications/presentations.

[https://aut.au1.qualtrics.com/Q/EditSection/Blocks/Ajax/GetSurveyPrintPreview?ContextSurveyID=SV\\_5ApmD5r2IX6bA2h&ContextLibraryID=UR\\_0...](https://aut.au1.qualtrics.com/Q/EditSection/Blocks/Ajax/GetSurveyPrintPreview?ContextSurveyID=SV_5ApmD5r2IX6bA2h&ContextLibraryID=UR_0...) 1/32

**How was I identified and why am I being invited to participate in this research?**

You and other individuals have been recruited via digital and hard-copy advertisements. The information provided to all potential participants has been an identical general introduction to the study. You have been invited to participate as you have expressed interest and indicated that you are legally an adult (aged 18 years or older) and are able to converse in English.

**How do I agree to participate in this research?**

The completion of the questionnaire will be taken as an indication of your consent. Your participation in this study is voluntary (it is your choice) and whether or not you choose to participate will neither advantage or disadvantage you. While completing the survey, you are able to withdraw from the study; however, due to the anonymous nature of the data, we cannot identify and remove individual data sets once they have been submitted.

**What will happen in this research?**

Participation in the study will involve you completing an anonymous, online survey. The items within this survey centre on your perceptions and experiences with electronic cigarettes. You do not have to be a current or former user of these devices – we are seeking to collect a wide range of perspectives.

**What are the discomforts and risks?**

There are no physical risks posed by completing the survey. It is possible that a small number of participants may experience slight emotional discomfort when answering questions regarding electronic cigarettes. This risk is very low, however, as every potential participant will be aware that this is the topic of interest.

**How will these discomforts and risks be alleviated?**

In the unlikely event that you do experience emotional discomfort during the questionnaire, you are welcome to withdraw from the survey at any stage prior to the submission of your data.

**What are the benefits?**

At the completion of the survey, participants are provided with the opportunity to enter a prize draw to win one of ten Amazon gift cards each valued at 100NZD. To enter this draw, you need only provide your name and email address. In addition, participants will

not only be provided with the opportunity to further understand the empirical research process, but their contributions may assist them in achieving a better understanding of their attitudes towards and experiences with electronic cigarettes.

Completion of the questionnaire will benefit me by contributing towards the achievement of my Doctorate, as well as the products of this thesis – for example, academic journal articles and conference papers.

In an academic sense, this study will help contribute to the limited knowledge that is available regarding electronic cigarettes. Furthermore, by improving our understanding of electronic cigarette use, this study could potentially assist with future laws and policies related to electronic cigarettes.

**How will my privacy be protected?**

If you choose to enter the draw and provide your name and an email address, only my supervisors and I will have access to this information. These shall only be used for the purposes of contacting you in relation to the prize draw. All contact information shall be collected and kept separate from the data so that no data set is identifiable. All participants shall remain unidentifiable in the final thesis and any publications.

The information you give us will be kept permanently, and may be used for future research related to electronic cigarettes. It may also be given to other researchers, but they will not be able to identify you from the data we give them.

**What are the costs of participating in this research?**

It is estimated that the questionnaire will take approximately 45 minutes to complete.

**What opportunity do I have to consider this invitation?**

The survey will be available for a period of at least 12 months, starting 16/04/2019.

**Will I receive feedback on the results of this research?**

Using the details provided, you are welcome to contact me and ask to receive an electronic summary outlining the results of the completed study. Furthermore, the finished thesis will be available to all members of the public online.

**What do I do if I have concerns about this research?**

Any concerns regarding the nature of this project should be notified in the first instance to the Project Supervisor, Dr Jay Wood, jay.wood@aut.ac.nz, + 64 9 921 9999 Ext. 8506.

Concerns regarding the conduct of the research should be notified to the Executive Secretary of AUTEK, Kate O'Connor, ethics@aut.ac.nz , 921 9999 ext 6038.

**Whom do I contact for further information about this research?**

Please keep this Information Sheet for your future reference. You are also able to contact the research team as follows:

**Researcher Contact Details:**

Louise Stone

Email: lostone@aut.ac.nz

Telephone: + 64 9 921 9999 Ext. 6918

**Project Supervisor Contact Details:**

Dr Jay Wood

Email: jay.wood@aut.ac.nz

Telephone: + 64 9 921 9999 Ext. 8506

***Approved by the Auckland University of Technology Ethics Committee on type the 15/04/19, AUTEK Reference number 19/130.***

I have read the above information sheet and understand that my completion of the survey will be taken as an indication of my consent.

I understand.

**Section A**

**Instructions:** Below is a list of words that could be used to describe your overall evaluation of an issue. Please use the list below to describe your evaluation of electronic

cigarettes. If the word "definitely" describes your evaluation of electronic cigarettes, then circle the number "7". If you decide that the word does "not at all" describe your evaluation of electronic cigarettes then click the number "1". Use the intermediate numbers between 1 and 7 to indicate responses between these two extremes.

Dislike

1 Not at all      2      3      4      5      6      7 Definitely  
                                   

Good

1 Not at all      2      3      4      5      6      7 Definitely  
                                   

Undesirable

1 Not at all      2      3      4      5      6      7 Definitely  
                                   

Positive

1 Not at all      2      3      4      5      6      7 Definitely  
                                   

**Instructions:** The following items ask about the consequences of you becoming a regular electronic cigarette user. Regular in this context means using an electronic cigarette at least once a day for a period of at least 30 days. Please select the number that best describes your opinion of what would happen. Some of the questions may appear to be similar, but they do address somewhat different issues. Please read each question carefully and answer truthfully.

If I were to become a regular electronic cigarette user, I would be exposed to harmful chemicals...

1 Not at all      2      3      4      5      6      7 Definitely

If I were to become a regular electronic cigarette user whose e-liquid contained nicotine, I would become addicted...

1 Not at all      2      3      4      5      6      7 Definitely  
                                   

If I were to become a regular electronic cigarette user, I would experience negative health consequences...

1 Not at all      2      3      4      5      6      7 Definitely  
                                   

If I were to become a regular electronic cigarette user, I would expose nearby people to harmful chemicals...

1 Not at all      2      3      4      5      6      7 Definitely  
                                   

If I was a smoker, regular electronic cigarette use could help me quit smoking...

1 Not at all      2      3      4      5      6      7 Definitely  
                                   

Being exposed to harmful chemicals via regular electronic cigarette use would be...

-3 Very bad      -2      -1      0      1      2      3 Very good  
                                   

Becoming addicted to nicotine via regular electronic cigarette use would be...

-3 Very bad      -2      -1      0      1      2      3 Very good  
                                   

Experiencing negative health consequences via regular electronic cigarette use would be...

-3 Very bad      -2      -1      0      1      2      3 Very good

Exposing near by people to harmful chemicals via regular electronic cigarette use would be...

-3 Very bad      -2      -1      0      1      2      3 Very good

If I was a smoker, being able to quit smoking via regular electronic cigarette use would be...

-3 Very bad      -2      -1      0      1      2      3 Very good

**Instructions:** The following items ask about the importance of the issue of electronic cigarettes to you. Some of the questions may appear to be similar, but they do address somewhat different issues. Please read each question carefully and answer truthfully.

How carefully have you thought about information that you have been exposed to regarding electronic cigarettes?

-4 Not at all carefully      -3      -2      -1      0      1      2      3      4 Extremely Carefully

Overall, how certain are you of your opinion regarding electronic cigarettes?

-4 Not at all certain      -3      -2      -1      0      1      2      3      4 Extremely certain

Would you say that you are strongly on one side or the other regarding electronic cigarettes, or would you say that your feelings are mixed?

-4 My feelings are extremely mixed      -3      -2      -1      0      1      2      3      4 I am clearly on one side or the other

How knowledgeable do you think you are about electronic cigarettes?

-4 Not at all knowledgeable    -3    -2    -1    0    1    2    3    4 Extremely knowledgeable

How personally important are electronic cigarettes to you?

-4 Not at all important    -3    -2    -1    0    1    2    3    4 Extremely important

## Section B

**Instructions:** The following questions focus on how others would perceive you becoming a regular electronic cigarette user. Some of the questions may appear to be similar, but they do address somewhat different issues. Please read each question carefully and answer truthfully.

My parents would approve of me becoming a regular electronic cigarette user...

1 Not at all    2    3    4    5    6    7 Definitely    Non-Applicable

My siblings would approve of me becoming a regular electronic cigarette user...

1 Not at all    2    3    4    5    6    7 Definitely    Non-Applicable

My significant other would approve of me becoming a regular electronic cigarette user...

1 Not at all    2    3    4    5    6    7 Definitely    Non-Applicable

My close friends would approve of me becoming a regular electronic cigarette user...

1 Not at all    2    3    4    5    6    7 Definitely    Non-Applicable

My child/children would approve of me becoming a regular electronic cigarette user...

1 Not at all    2    3    4    5    6    7 Definitely    Non-Applicable

My doctor would approve of me becoming a regular electronic cigarette user...

1 Not at all    2    3    4    5    6    7 Definitely    Non-Applicable

My dentist would approve of me becoming a regular electronic cigarette user...

1 Not at all    2    3    4    5    6    7 Definitely    Non-Applicable

My parents' perceptions of regular electronic cigarette use are...

1 Not at all important to me    2    3    4    5    6    7 Very important to me    Non-Applicable

My siblings' perceptions of regular electronic cigarette use are...

1 Not at all important to me    2    3    4    5    6    7 Very important to me    Non-Applicable

My significant other's perceptions of regular electronic cigarette use are...

1 Not at all important to me    2    3    4    5    6    7 Very important to me    Non-Applicable

My close friends' perceptions of regular electronic cigarette use are...

1 Not at all important to me  2  3  4  5  6  7 Very important to me  Non-Applicable

My children's perceptions of regular electronic cigarette use are...

1 Not at all important to me  2  3  4  5  6  7 Very important to me  Non-Applicable

My doctor's perceptions of regular electronic cigarette use are...

1 Not at all important to me  2  3  4  5  6  7 Very important to me  Non-Applicable

My dentist's perceptions of regular electronic cigarette use are...

1 Not at all important to me  2  3  4  5  6  7 Very important to me  Non-Applicable

My parents regularly use electronic cigarettes...

- Yes
- No
- Unsure
- Non-Applicable

My siblings regularly use electronic cigarettes...

- Yes
- No
- Unsure

Non-Applicable

My significant other regularly uses electronic cigarettes...

- Yes
- No
- Unsure
- Non-Applicable

My close friends regularly use electronic cigarettes...

- Yes
- No
- Unsure
- Non-Applicable

My children regularly use electronic cigarettes...

- Yes
- No
- Unsure
- Non-Applicable

My doctor regularly uses electronic cigarettes...

- Yes
- No
- Unsure
- Non-Applicable

My dentist regularly uses electronic cigarettes...

Yes

- No  
 Unsure

### Section C

**Instructions:** The following questions focus on potential barriers to you becoming a regular electronic cigarette user. Some of the questions may appear to be similar, but they do address somewhat different issues. Please read each question carefully and answer truthfully.

Regular electronic cigarette use is expensive...

- 1 Not at all    2    3    4    5    6    7 Definitely

Regular electronic cigarette use is addictive...

- 1 Not at all    2    3    4    5    6    7 Definitely

It is difficult to purchase an electronic cigarette and related paraphernalia...

- 1 Not at all    2    3    4    5    6    7 Definitely

It is difficult to learn how to use an electronic cigarette...

- 1 Not at all    2    3    4    5    6    7 Definitely

It is difficult to find a place where I am allowed to use an electronic cigarette...

- 1 Not at all    2    3    4    5    6    7 Definitely

If regular electronic cigarette use is expensive, this will prevent me from becoming a regular user...

1 Not at all      2      3      4      5      6      7 Definitely  
                                   

If regular electronic cigarette use is addictive, this will prevent me from becoming a regular user...

1 Not at all      2      3      4      5      6      7 Definitely  
                                   

If it is difficult to purchase an electronic cigarette and related paraphernalia, this will prevent me from becoming a regular user...

1 Not at all      2      3      4      5      6      7 Definitely  
                                   

If it is difficult to learn how to use an electronic cigarette, this will prevent me from becoming a regular user...

1 Not at all      2      3      4      5      6      7 Definitely  
                                   

If it is difficult to find a place which allows me to use an electronic cigarette, this will prevent me from becoming a regular user...

1 Not at all      2      3      4      5      6      7 Definitely  
                                   

## Section D

**Instructions:** The following questions focus on your actual behaviours regarding electronic cigarettes. Some of the questions may appear to be similar, but they do address somewhat different issues. Please read each question carefully and answer truthfully.

In the next six months, I intend to use electronic cigarettes...

1 Not at all      2      3      4      5      6      7 Definitely

In the next six months, I want to use electronic cigarettes...

- 1 Not at all      2      3      4      5      6      7 Definitely

In the next six months, I expect to use electronic cigarettes...

- 1 Not at all      2      3      4      5      6      7 Definitely

Have you **ever** used an electronic cigarette?

- Yes  
 No

If you have **never** used an electronic cigarette, please explain why...

If you have **ever** tried an electronic cigarette, did you become a **regular** user? A *regular user, in this context, is someone who has used an electronic cigarette at least once per day for a period of at least one month.*

- Yes  
 No

If you have **ever** tried an electronic cigarette but did **not** become a **regular** user, please explain why...

Are you still **currently** a **regular** user of electronic cigarettes?

- Yes  
 No

If you **previously** used electronic cigarettes **regularly but no longer do so**, please explain why...

If you are **currently** a **regular user** of electronic cigarettes, please explain why...

Are you a **current** smoker of **traditional** cigarettes?

- Yes  
 No

Are you a **former** smoker of **traditional** cigarettes?

- Yes  
 No

If you are a **former** smoker of **traditional** cigarettes, for how long did you use these products?

Your previous responses indicated that you are a **dual user**; that is, you currently use **both traditional** and **electronic cigarettes**. Please explain why...

From the options below, please select the category you believe best suits electronic cigarette users and explain your choice. Those who use electronic cigarettes are...

- Smokers

- Non-Smokers
- Neither

**Section EA**

**Instructions:** The following questions focus on your identity as a non-smoker. Some of the questions may appear to be similar, but they do address somewhat different issues. Please read each question carefully and answer truthfully.

Not smoking is a part of my self-image.

1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Not smoking is a part of "who I am."

1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Not smoking is a part of my personality.

1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Not smoking is a large part of my daily life.

1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Others view not smoking as part of my personality.

1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Generally, I feel good when I think about myself as a non-smoker

1 Strongly disagree	2	3	4	5	6	7 Strongly agree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

I don't feel a sense of being "connected" with other non-smokers

1 Strongly disagree	2	3	4	5	6	7 Strongly agree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

I don't feel good about being a non-smoker

1 Strongly disagree	2	3	4	5	6	7 Strongly agree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

I feel strong ties to other non-smokers

1 Strongly disagree	2	3	4	5	6	7 Strongly agree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

I find it difficult to form of bond with other non-smokers

1 Strongly disagree	2	3	4	5	6	7 Strongly agree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

I have a lot in common with other non-smokers

1 Strongly disagree	2	3	4	5	6	7 Strongly agree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

I often regret that I am a non-smoker

1 Strongly disagree	2	3	4	5	6	7 Strongly agree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

I often think about the fact that I am a non-smoker

1 Strongly disagree	2	3	4	5	6	7 Strongly agree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

In general, being a non-smoker is an important part of my self-image

1 Strongly disagree	2	3	4	5	6	7 Strongly agree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

In general, I'm glad to be a non-smoker

1 Strongly disagree	2	3	4	5	6	7 Strongly agree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Overall, being a non-smoker has very little to do with how I feel about myself

1 Strongly disagree	2	3	4	5	6	7 Strongly agree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

The fact that I am a non-smoker rarely enters my mind

1 Strongly disagree	2	3	4	5	6	7 Strongly agree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## Section EB

**Instructions:** The following questions focus on your identity as a smoker. Some of the questions may appear to be similar, but they do address somewhat different issues. Please read each question carefully and answer truthfully.

Smoking is part of my self-image.

1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Smoking is part of "who I am."

1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Smoking is a part of my personality.

1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Smoking is a large part of my daily life.

1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Others view smoking as part of my personality.

1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

I have a lot in common with other smokers

1 Strongly disagree	2	3	4	5	6	7 Strongly agree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

I feel strong ties to other smokers

1 Strongly disagree	2	3	4	5	6	7 Strongly agree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

I find it difficult to form of bond with other smokers

1 Strongly disagree	2	3	4	5	6	7 Strongly agree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



I don't feel a sense of being "connected" with other smokers

1 Strongly disagree

2

3

4

5

6

7 Strongly agree

I often think about the fact that I am a smoker

1 Strongly disagree

2

3

4

5

6

7 Strongly agree

Overall, being a smoker has very little to do with how I feel about myself

1 Strongly disagree

2

3

4

5

6

7 Strongly agree

In general, being a smoker is an important part of my self-image

1 Strongly disagree

2

3

4

5

6

7 Strongly agree

The fact that I am a smoker rarely enters my mind

1 Strongly disagree

2

3

4

5

6

7 Strongly agree

In general, I'm glad to be a smoker

1 Strongly disagree

2

3

4

5

6

7 Strongly agree

I often regret that I am a smoker

1 Strongly disagree

2

3

4

5

6

7 Strongly agree

I don't feel good about being a smoker

1 Strongly disagree  2  3  4  5  6  7 Strongly agree

Generally, I feel good when I think about myself as a smoker

1 Strongly disagree  2  3  4  5  6  7 Strongly agree

**Section EC**

**Instructions:** The following questions focus on your identity as an electronic cigarette user. Some of the questions may appear to be similar, but they do address somewhat different issues. Please read each question carefully and answer truthfully.

Using electronic cigarettes is a part of my self-image

1 Strongly Disagree  2  3  4  5  6  7 Strongly Agree

Using electronic cigarettes is a part of "who I am."

1 Strongly Disagree  2  3  4  5  6  7 Strongly Agree

Using electronic cigarettes is a part of my personality.

1 Strongly Disagree  2  3  4  5  6  7 Strongly Agree

Others view using electronic cigarettes as part of my personality.

1 Strongly Disagree      2      3      4      5      6      7 Strongly Agree  
                                   

Using electronic cigarettes is a large part of my daily life.

1 Strongly Disagree      2      3      4      5      6      7 Strongly Agree  
                                   

Generally, I feel good when I think about myself as an electronic cigarette user

1 Strongly disagree      2      3      4      5      6      7 Strongly agree  
                                   

I don't feel a sense of being "connected" with other electronic cigarette users

1 Strongly disagree      2      3      4      5      6      7 Strongly agree  
                                   

I don't feel good about being an electronic cigarette user

1 Strongly disagree      2      3      4      5      6      7 Strongly agree  
                                   

I feel strong ties to other electronic cigarette users

1 Strongly disagree      2      3      4      5      6      7 Strongly agree  
                                   

I find it difficult to form of bond with other electronic cigarette users

1 Strongly disagree      2      3      4      5      6      7 Strongly agree  
                                   

I have a lot in common with other electronic cigarette users

1 Strongly disagree    2    3    4    5    6    7 Strongly agree

I often regret that I am an electronic cigarette user

1 Strongly disagree    2    3    4    5    6    7 Strongly agree

I often think about the fact that I am an electronic cigarette user

1 Strongly disagree    2    3    4    5    6    7 Strongly agree

In general, being an electronic cigarette user is an important part of my self-image

1 Strongly disagree    2    3    4    5    6    7 Strongly agree

In general, I'm glad to be an electronic cigarette user

1 Strongly disagree    2    3    4    5    6    7 Strongly agree

Overall, being an electronic cigarette user has very little to do with how I feel about myself

1 Strongly disagree    2    3    4    5    6    7 Strongly agree

The fact that I am an electronic cigarette user rarely enters my mind

1 Strongly disagree    2    3    4    5    6    7 Strongly agree

**Section FA**

**Instructions:** The following questions focus on your use of traditional cigarettes. Some of the questions may appear to be similar, but they do address somewhat different issues. Please read each question carefully and answer truthfully.

For how long have you been using traditional cigarettes?

How soon after you wake up do you smoke your first cigarette?

- Within 5 minutes
- 6 - 30 minutes
- 31 - 60 minutes
- After 60 minutes

How many cigarettes a day do you smoke?

- 10 or less
- 11 - 20
- 21 - 30
- 31 or more

Which cigarette would you hate most to give up?

- The first one in the morning
- All others

Do you find it difficult to refrain from smoking in places where it is forbidden?

- Yes
- No

Do you smoke more frequently during the first hours after waking than the rest of the day?

- Yes  
 No

Do you smoke if you are so ill that you are in bed most of the day?

- Yes  
 No

### Section FB

**Instructions:** The following questions focus on your use of electronic cigarettes. Some of the questions may appear to be similar, but they do address somewhat different issues. Please read each question carefully and answer truthfully.

How long have you used electronic cigarettes?

Which nicotine strength do you most commonly use in your e-liquids?

- 3mg  
 6mg  
 12mg  
 18mg  
 Other (Please Specify)

Which type(s) of e-liquid flavour do you most commonly use:

- Tobacco  
 Menthol-Mint

- Fruit
- Dessert
- Other (Please Specify)

How soon after you wake up do you use your electronic cigarette?

- Within 5 minutes
- 6 - 30 minutes
- 31 - 60 minutes
- After 60 minutes

How many times per day do you use your electronic cigarette continuously for a period of two minutes or more?

- 10 or less
- 11 - 20
- 21 - 30
- 31 or more

Which use of your electronic cigarette would you hate most to give up?

- The first one in the morning
- All others

Do you find it difficult to refrain from using your electronic cigarette in places where it is forbidden?

- Yes
- No

Do you use your electronic cigarette more frequently during the first hours after waking than the rest of the day?

Yes

No

Do you use your electronic cigarette if you are so ill that you are in bed most of the day?

Yes

No

### Section G

**Instructions:** The following questions focus on your consumption of media related to electronic cigarettes. Some of the questions may appear to be similar, but they do address somewhat different issues. Please read each question carefully and answer truthfully.

I pay attention to electronic cigarette news on television

1 Strongly  
Disagree

2

3

4

5

6

7 Strongly  
Agree

I pay attention to electronic cigarette news in the newspaper (digital & print)

1 Strongly  
Disagree

2

3

4

5

6

7 Strongly  
Agree

I pay attention to electronic cigarette news on the radio

1 Strongly  
Disagree

2

3

4

5

6

7 Strongly  
Agree

I pay attention to electronic cigarette news on the internet (excluding newspapers)

1 Strongly  
Disagree

2

3

4

5

6

7 Strongly  
Agree

News reports regarding electronic cigarettes on television are credible

1 Strongly Disagree      2      3      4      5      6      7 Strongly Agree

News reports regarding electronic cigarettes in the newspapers (digital & print) are credible

1 Strongly Disagree      2      3      4      5      6      7 Strongly Agree

News reports regarding electronic cigarettes on the radio are credible

1 Strongly Disagree      2      3      4      5      6      7 Strongly Agree

News reports regarding electronic cigarettes on the internet (excluding newspapers) are credible

1 Strongly Disagree      2      3      4      5      6      7 Strongly Agree

Please indicate which source(s) of information you **most** often use to learn about electronic cigarettes:

- Newspapers (digital & print)
- Television
- Radio
- Academic Journal Articles
- Government Websites (e.g. Centers for Disease Control; Public Health England; Surgeon General)
- Youtube
- Reddit
- Other (Please Specify)

[https://aut.au1.qualtrics.com/Q/EditSection/Blocks/Ajax/GetSurveyPrintPreview?ContextSurveyID=SV\\_5ApmD5r2IX6bA2h&ContextLibraryID=UR\\_...](https://aut.au1.qualtrics.com/Q/EditSection/Blocks/Ajax/GetSurveyPrintPreview?ContextSurveyID=SV_5ApmD5r2IX6bA2h&ContextLibraryID=UR_...) 28/32

## Section H

**Instructions:** The following questions refer to some basic demographic information. Please read each question carefully and answer truthfully.

Sex

- Female
- Male
- Other

Age (Years)

Ethnicity (Provide multiple answers if applicable):

Highest Level of Education Attained:

- Secondary School
- Certificate
- Degree/Tertiary
- Post-Graduate

Country of **current** residence

## Section I

Thank you for your participation! Your contribution is greatly appreciated and will help to expand our understanding of people's experiences with and attitudes towards electronic cigarettes.

Please do not disclose the survey items to anyone who might participate in this study in the future, as it could affect the results of the study.

If you would like to receive a summary of the findings when the study is completed, please feel free to contact me using the email address provided.

If you have any questions or concerns regarding this survey, or if you want to provide feedback, please feel free to use the text box below or contact me using the following email address:

lostone@aut.ac.nz

Thank you for your participation! As a show of appreciation, participants who completed this survey are offered the chance to enter a prize draw. If you would like to go into the draw to win one of ten Amazon gift cards each valued at 100NZD, please click on the link below. You will be asked to provide a name and email address.

[https://aut.au1.qualtrics.com/jfe/form/SV\\_8CAMCPAAVmpZVE9](https://aut.au1.qualtrics.com/jfe/form/SV_8CAMCPAAVmpZVE9)

For SurveyCircle users (www.surveycircle.com): The Survey Code is: 44XY-S994-MAM7-8RPG

Powered by Qualtrics

## Appendix D: Results Across Participant Sex, Education & Age<sup>5</sup>

### Participant Sex & Key Variables

#### Behavioural Beliefs & Outcome Evaluations

An independent samples t-test found that male ( $M = 13.91$ ;  $SD = 6.19$ ) respondents were significantly less likely than females ( $M = 15.66$ ;  $SD = 7.35$ ) to believe that regular e-cigarette use would result in the described outcomes ( $t(318) = 2.32$ ;  $p = .021$ ).

Furthermore, in a near significant difference, male ( $M = 9.73$ ;  $SD = 4.00$ ) participants were more likely than female ( $M = 8.81$ ;  $SD = 4.43$ ) respondents to evaluate the chosen outcomes in a favourable manner ( $t(318) = -1.96$ ;  $p = .051$ ).

While males ( $M = 6.16$ ;  $SD = 1.61$ ) were more likely than female ( $M = 5.89$ ;  $SD = 1.63$ ) participants to believe that regular e-cigarette use could assist with smoking cessation, the difference between the two groups was not statistically significant ( $t(318) = -1.53$ ;  $p = .126$ ). In comparison, male ( $M = 6.53$ ;  $SD = 1.30$ ) respondents were significantly more likely than their female ( $M = 6.21$ ;  $SD = 1.13$ ) counterparts to evaluate smoking cessation via vaping as a desirable outcome ( $t(318) = -2.38$ ;  $p = .018$ ).

#### General Attitudes Towards E-Cigarettes

Compared to female participants ( $M = 18.82$ ;  $SD = 8.45$ ), respondents who indicated they were male ( $M = 21.68$ ;  $SD = 7.77$ ) were significantly more likely to agree that favourable terms described their attitudes towards e-cigarettes ( $t(283) = -2.98$ ;  $p = .003$ ).

#### Indicators of Attitude Strength

When compared to female ( $M = 6.98$ ;  $SD = 2.22$ ) respondents, male ( $M = 7.58$ ;  $SD = 1.81$ ) participants were significantly more likely to express that they had carefully thought about vaping-related information they had been exposed to ( $t(318) = -2.68$ ;  $p = .008$ ). Males ( $M = 7.29$ ;  $SD = 1.79$ ) were also significantly more likely than females ( $M = 6.54$ ;  $SD = 1.96$ ) to indicate that they believed themselves to be knowledgeable about e-cigarettes ( $t(317) = -3.58$ ;  $p < .001$ ). respondents who were female ( $M = 5.70$ ,  $SD = 3.48$ ) were significantly less likely than those who were male ( $M = 6.74$ ;  $SD = 2.94$ ) to agree that e-cigarettes are personally important to them ( $t(318) = -2.90$ ;  $p = .004$ ).

While males ( $M = 7.74$ ;  $SD = 2.01$ ) were more likely than females ( $M = 7.33$ ;  $SD = 2.29$ ) to indicate that their feelings towards e-cigarettes were strongly on one side or the other, this difference only approached statistical significance ( $t(318) = -1.70$ ;  $p = .089$ ).

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<sup>5</sup> While data regarding ethnicity was collected, results from different groups were not compared due to the large number of ethnic groups present and the small sample size of most groups.

Female ( $M = 7.43$ ;  $SD = 1.75$ ) and male ( $M = 7.72$ ;  $SD = 1.72$ ) respondents were equally certain of their opinions regarding e-cigarettes ( $t(317) = -1.51$ ;  $p = .132$ ).

### **Subjective Norms & Motivations to Comply**

Respondents who indicated they were male ( $M = 26.84$ ;  $SD = 13.53$ ) were significantly more likely to express that the chosen referents would support them using e-cigarettes on a regular basis, compared to participants who said they were female ( $M = 22.79$ ;  $SD = 13.95$ ), ( $t(317) = -2.63$ ;  $p = .009$ ). In contrast, male ( $M = 22.02$ ;  $SD = 10.05$ ) and female ( $M = 21.99$ ;  $SD = 9.93$ ) respondents were assigned similar levels of importance to their referents' vaping-related opinions ( $t(312) = -.027$ ;  $p = .978$ ).

### **Potential Barriers & Perceived Barrier Impact**

Female ( $M = 10.02$ ;  $SD = 4.14$ ) and male ( $M = 9.89$ ;  $SD = 4.22$ ) participants expressed similar sentiments about the likelihood of the described barriers to regular vaping ( $t(313) = .28$ ;  $p = .778$ ). In terms of barrier impact, however, males ( $M = 11.89$ ;  $SD = 5.78$ ) were significantly less likely than females ( $M = 14.37$ ;  $SD = 6.51$ ) to agree that the chosen obstacles would prevent them from using e-cigarettes on a regular basis, ( $t(316) = 3.60$ ;  $p < .001$ ).

### **Intentions to Use E-Cigarettes**

Compared to female ( $M = 13.45$ ;  $SD = 8.31$ ) participants, males ( $M = 16.48$ ;  $SD = 7.11$ ) were significantly more likely to express intentions to use e-cigarettes over the next six month ( $t(318) = -3.51$ ;  $p < .001$ ).

### **Vaping-Related News Consumption & Perceived Credibility**

While male ( $M = 17.25$ ;  $SD = 8.00$ ) participants indicated that they paid greater attention to vaping-related news stories than female ( $M = 15.78$ ;  $SD = 7.48$ ) respondents, this difference only approached statistical significance ( $t(318) = -1.70$ ;  $p = .091$ ). Participants who indicated that they were female ( $M = 12.41$ ;  $SD = 5.70$ ) were significantly more likely to perceive vaping-related news stories as being credible, when compared to respondents who said they were male ( $M = 11.12$ ;  $SD = 5.03$ ), ( $t(318) = 2.15$ ,  $p = .032$ ).

### **Nicotine Dependence**

No significant differences existed between the nicotine dependence scores of female ( $M = 4.00$ ;  $SD = 2.09$ ) and male ( $M = 3.89$ ;  $SD = 2.14$ ) respondents, ( $t(221) = .38$ ,  $p = .704$ )

## **Conclusion**

It can be seen that the perceptions of male respondents were similar to those of vapers and dual users, whereas the opinions of female participants more closely resembled those of non-smokers. The most likely explanation for this finding is the fact that males (within this sample) were more likely to be e-cigarette users while females were more likely to be non-smokers.

## **Participant Education & Key Variables**

### **Behavioural Beliefs & Outcome Evaluations**

A one-way ANOVA and Tukey's post-hoc analyses demonstrated that participants with a post-graduate qualification ( $M = 19.38$ ;  $SD = 7.34$ ) were significantly more likely than those with secondary school ( $M = 13.72$ ;  $SD = 6.62$ ;  $p < .001$ ), certificate ( $M = 13.73$ ;  $SD = 6.90$ ;  $p < .001$ ), and degree ( $M = 14.47$ ;  $SD = 6.31$ ;  $p < .001$ ) level education to believe that regular e-cigarette use will result in the described outcomes, ( $F(3, 319) = 8.00$ ,  $p < .001$ ). In contrast, participant education level did **not** influence how favourably they evaluated the described outcomes ( $F(3,319) = 1.29$ ,  $p = .28$ ).

Respondents with a post-graduate qualification ( $M = 4.62$ ;  $SD = 2.12$ ) were significantly less likely to believe that regular vaping could assist with smoking cessation, when compared to those with secondary school ( $M = 6.24$ ;  $SD = 1.36$ ;  $p < .001$ ), certificate ( $M = 6.28$ ;  $SD = 1.44$ ;  $p < .001$ ), and degree ( $M = 6.22$ ;  $SD = 1.46$ ;  $p < .001$ ) level education, ( $F(3, 319) = 13.53$ ,  $p < .001$ ). Furthermore, a one-way ANOVA demonstrated that education level influenced how favourably participants evaluated the outcome of smoking cessation via e-cigarette use ( $F(3,319) = 9.30$ ,  $p < .001$ ). Respondents with a secondary school ( $M = 6.44$ ;  $SD = 1.04$ ,  $p < .001$ ), certificate ( $M = 6.47$ ;  $SD = 1.15$ ;  $p < .001$ ), and degree ( $M = 6.57$ ;  $SD = 1.06$ ,  $p < .001$ ) level qualification evaluated this outcome more favourably than those with a post-graduate education ( $M = 5.50$ ,  $SD = 1.67$ ).

### **General Attitudes Towards E-Cigarettes**

In terms of general attitudes, participants with a post-graduate ( $M = 14.24$ ;  $SD = 8.71$ ) level education were significantly less likely to agree that positive descriptors reflected their perceptions of e-cigarettes, in comparison to those with a secondary school ( $M = 20.59$ ;  $SD = 8.42$ ,  $p < .001$ ), certificate ( $M = 21.18$ ;  $SD = 7.83$ ,  $p < .001$ ), and degree level education ( $M = 21.58$ ;  $SD = 7.43$ ,  $p < .001$ ), ( $F(3, 282) = 8.57$ ,  $p < .001$ ).

### **Indicators of Attitude Strength**

Analysis indicated that participant education level did **not** influence how carefully respondents had considered vaping-related information ( $F(3, 319) = .88, p = .450$ ), whether they considered their feelings towards e-cigarettes as being mixed ( $F(3, 319) = 1.79, p = .148$ ), nor how knowledgeable participants perceived themselves to be about e-cigarettes ( $F(3, 318) = 1.75, p = .157$ ).

Participants with a post-graduate level education ( $M = 7.02; SD = 2.17$ ) were significantly less likely to be certain of their opinions regarding e-cigarettes than respondents with a secondary-school level education ( $M = 7.97; SD = 1.29, p = .029$ ), ( $F(3, 318) = 2.98, p = .032$ )

Respondents who had a post-graduate ( $M = 4.19; SD = 3.40$ ) qualification were significantly less likely to indicate that e-cigarettes were personally important to them, when compared to those with a secondary-school ( $M = 6.68; SD = 3.16, p < .001$ ), certificate ( $M = 6.54; SD = 3.22, p < .001$ ), and degree ( $M = 6.59; SD = 2.99, p < .001$ ) level education, ( $F(3, 319) = 7.19, p < .001$ ).

### **Subjective Norms & Motivations to Comply**

A one-way ANOVA demonstrated that a participants' education level influenced how favourably they believed referents would react to them vaping on a regular basis ( $F(3,318) = 3.42; p = .018$ ). Compared to respondents with secondary school ( $M = 26.91; SD = 13.64, p = .015$ ) and degree ( $M = 25.66; SD = 13.38, p = .025$ ) qualifications, post-graduates ( $M = 18.79; SD = 12.64$ ) were significantly less likely to agree that their referents would approve of them using e-cigarettes. The difference between post-graduates and those with a certificate ( $M = 25.09; SD = 14.72, p = .077$ ) level education also approached significance. That being said, education level did **not** influence the importance that participants assigned to the vaping-related opinions of their referents ( $F(3, 313) = .44, p = .728$ ).

### **Potential Barriers & Barrier Impact**

Participants' education level did **not** influence their beliefs regarding the existence of different barriers to regular e-cigarette use ( $F(3, 314) = 1.58, p = .194$ ) nor did it affect the perceived impact those barriers would exert over the ability to vape on a regular basis ( $F(3, 317) = .45, p = .721$ ).

### **Intentions to Use E-Cigarettes**

A one-way ANOVA found that participant education level did influence their intentions to use e-cigarettes over the next six months ( $F(3, 319) = 9.52, p < .001$ ). Respondents with a secondary school ( $M = 16.06; SD = 7.54, p < .001$ ), certificate ( $M = 15.80; SD = 7.69; p < .001$ ),

and degree ( $M = 16.09$ ;  $SD = 7.34$ ,  $p < .001$ ) level education were significantly more likely to agree that they wanted to vape during the next six months, in comparison to those with a post-graduate qualification ( $M = 9.38$ ;  $SD = 7.56$ ).

### **Vaping-Related News Consumption & Perceived Credibility**

A one-way ANOVA and Tukey's post-hoc analysis indicated that while those with a degree ( $M = 17.60$ ;  $SD = 7.29$ ) were more likely to pay attention to vaping-related news than those with a post-graduate ( $M = 14.21$ ;  $SD = 8.44$ ;  $p = .066$ ) qualification, the difference only approached significance, ( $F(3, 319) = 2.20$ ,  $p = .088$ ). The perceived credibility of e-cigarette news stories, however, was **not** influenced by participant education status ( $F(3, 319) = 2.09$ ,  $p = .102$ ).

### **Nicotine Dependence**

A one-way ANOVA found that respondent education level did **not** influence nicotine dependence scores ( $F(3, 222) = .13$ ,  $p = .945$ ).

### **Conclusion**

The results related to those with a post-graduate education are somewhat similar to those of non-smokers, whereas the perceptions of those holding other qualifications more closely resembled vapers and dual-users. There are two likely explanations for these patterns – 1) those with a post-graduate qualification were less likely to use e-cigarettes on a regular basis and/or 2) the small sample size of those with a post-graduate education.

### **Participant Age & Key Variables**

#### **Behavioural Beliefs & Outcome Evaluations**

Pearson's correlation indicated that older participants were less likely to believe that regular e-cigarette use would result in the described outcomes ( $r = -.46$ ,  $p < .001$ ).

Furthermore, as participants got older, they were more likely to evaluate the chosen outcomes in a favourable manner ( $r = .45$ ,  $p < .001$ ).

Although the relationships were not strong, participant age was positively related to the belief that regular e-cigarette use could assist with smoking cessation ( $r = .38$ ,  $p < .001$ ) and evaluating smoking cessation via e-cigarette use in a favourable manner ( $r = .33$ ,  $p < .001$ ).

#### **General Attitudes towards E-Cigarettes**

Older participants were more likely to agree that favourable terms described their attitudes towards e-cigarettes ( $r = .51, p < .001$ ).

### **Indicators of Attitude Strength**

Older respondents were more likely to agree that they had carefully considered vaping-related information ( $r = .39, p < .001$ ), that they were certain of their opinions towards e-cigarettes ( $r = .28, p < .001$ ), that they were on one side regarding e-cigarettes ( $r = .32, p < .001$ ), that they considered themselves to be knowledgeable about vaping ( $r = .44, p < .001$ ), and that e-cigarettes were personally important to them ( $r = .55, p < .001$ ).

### **Subjective Norms & Motivations to Comply**

While respondents were more likely to agree that the chosen referents would support their decision to use e-cigarettes on a regular basis ( $r = .45, p < .001$ ), participant age did not have an effect over the perceived importance of referent's vaping-related perceptions ( $r = .06, p = .281$ ).

### **Potential Barriers & Perceived Barrier Impact**

The older a participant was, the less likely they were to believe that the described barriers existed in the context of regular e-cigarette use ( $r = -.19, p < .001$ ) and the smaller the perceived impact these barriers would have on their ability to vape ( $r = -.23, p < .001$ ).

### **Intentions to Use E-Cigarettes**

Age was positively correlated with intentions to use e-cigarettes, with older respondents expressed greater desire to vape over the next six months ( $r = .49, p < .001$ ).

### **Vaping-Related News Consumption & Perceived Credibility**

Older respondents were more likely to indicate that they paid attention to vaping-related news stories ( $r = .35, p < .001$ ) but were less likely to perceive such stories as being credible ( $r = -.26, p < .001$ ).

### **Nicotine Dependence**

No significant relationship was present between age and nicotine dependence scores ( $r = .08, p = .207$ ).

### **Conclusions**

These results suggest that the perceptions of older participants were similar to those of vapers and dual users, whereas the beliefs of younger respondents more closely

resembled those of non-smokers. The most likely explanation for this is the fact that average age of vapers and dual users was higher than the average age of non-smokers.