Words Evaporate, the Images Remain: Testing Visual Warnings in the Context of Intentions to Vape Among U.S. Adults as an Expansion of the Theory of Planned Behavior (TPB)

Carl Arland Ciccarelli

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WORDS EVAPORATE, THE IMAGES REMAIN: TESTING VISUAL WARNINGS IN THE CONTEXT OF INTENTIONS TO VAPE AMONG U.S. ADULTS AS AN EXPANSION OF THE THEORY OF PLANNED BEHAVIOR (TPB)

by

Carl Arland Ciccarelli

Bachelor of Science
The College at Brockport (SUNY), 2016

Master of Arts
Ball State University, 2019

Submitted in Partial Fulfillment of the Requirements

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Accepted by:

Robert McKeever, Major Professor

Taylor Wen, Committee Member

Jungmi Jun, Committee Member

Christine DiStefano, Committee Member

Ann Vail, Dean of the Graduate School
DEDICATION

This project is dedicated to my family and closest friends, who inspire me and strike the perfect balance on an imperfect task of helping to both push me and provide encouragement. Especially to the memory of Raymond Ciccarelli, Rosalie Ciccarelli, Paul Sullivan, and Alyce Sullivan. I dedicate this dissertation to the memory and legacy of Dr. Klaus Krippendorff, Dr. Donald Shaw, Dr. Sharon Dunwoody, Dr. Albert Bandura and all of the monumental people and scholars who have gone before us in recent years.
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ABSTRACT

This dissertation applied the Theory of Planned Behavior (TPB) model variables of attitudes, subjective norms, and perceived behavioral control, along with the variable of fear to explain individuals’ behavioral intentions to vape. Previous studies have explored the social appeal, intrigue, and potential consequences of vaping among adolescent and college student populations. However, these past studies have largely relied upon focus groups and self-reported data conducted among samples of teen, adolescent, and college student populations. Thus, the aims and designs of these previous vaping studies may have been lacking in construct validity and a theoretical approach from which to explain behavioral intentions to vape among a wider, more generalizable population. Additionally, other health behavior research studies, specifically in the context of cigarette smoking and e-cigarette behaviors have shown the capability of factors such as fear or uncertainty for the behavioral outcome to function as a strong predictor of intentions or even mediate the predictive relationship.

This dissertation had two research objectives: 1) To apply and test an extended version of the TPB model, with the inclusion of fear, to predict and examine behavioral intentions to vape. 2) To investigate the effectiveness of gain/loss framed visual-based warnings vs. text-only gain/loss framed messages in influencing behavioral intentions to vape. More specifically, the proposed model within this dissertation study tested gain and loss framed messages with either visual images or text as separate, experimentally manipulated independent variables. Also, the predictive influence of the TPB variables of
attitudes, subjective norms, and perceived behavioral control on the dependent variable of behavioral intentions, mediated by fear.

To achieve these objectives this study applied a 2 (gain vs. loss) x 2 (image vs. no image) online experiment design. The sample for this study was U.S. adults over the age of twenty-two (N = 162). Each participant was randomly assigned to one of the four stimuli conditions and completed a pre-stimuli exposure and post-stimuli exposure questionnaire. This research study proposed and tested a meaningful expansion to the scope of the TPB model, specifically in the context of predicting health behaviors and provides insights to better inform future health communication and social behavioral interventions.
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LIST OF ABBREVIATIONS

CAGR ................................................................. Compound Annual Growth Rate
CDC ................................................................. Center for Disease Control
ENDS ............................................................. Electronic Nicotine Delivery System
FDA ................................................................. Federal Drug Administration
IBM ................................................................. Integrated Behavioral Model
M ........................................................................ Mean
MTurk .............................................................. Amazon Mechanical Turk
PBC ................................................................. Perceived Behavioral Control
SD ...................................................................... Standard Deviation
TAM ................................................................. Technology Acceptance Model
TPB ................................................................. Theory of Planned Behavior
TRA ................................................................. Theory of Reasoned Action
WHO ............................................................... World Health Organization
CHAPTER 1

INTRODUCTION

Imagine in the early 19th century when chew and pipe tobacco had been popular but more nuanced cigarette smoking, which very little was known about began to gain attention. Cigarette smoking substantially increased during and after the Civil War. A federal tax was first imposed on cigarettes in 1864. In the middle of the 19th century the demand for cigarettes grew. As there was much growth potential for a substantial market for cigarettes in the U.S., industrialists explored how cigarettes could be quickly manufactured and sold. In the 1870’s the Allen & Ginter company offered a cash prize to anyone who could invent a feasible cigarette rolling machine (Pritcher, 2000). Without the machine the Kimball tobacco factory could produce about 42,000 cigarettes a day, which was the most at the time. In 1881 James Bonsack patented a cigarette rolling machine that was eventually purchased by W. Duke & Sons in Durham, N.C. By the late 1880’s with this machine in place the Duke company was producing four million cigarettes a day (Pritcher, 2000). Little was known about cigarettes and the effect of tobacco in general but a populist health reform movement around the U.S. from roughly 1880-1920 led to an early but brief anti-smoking era. Although, this had more to do with moral and hygienic concerns of the time than anyone being aware of the serious health risks that would eventually be linked with smoking cigarettes. After this there was a substantial re-emergence of cigarette smoking along with an increase in cigarette sales. This was largely due to the emergence and use of visuals in early forms.
of cigarette advertising, which incorporated various images. In the late 1800s the Duke company first took advantage of the recent development of color lithography and placed small cardboard inserts into the back of each cigarette pack. Each insert card had the brand name and logo of the Duke company, along with various collectible themed cards that displayed baseball players, birds, Civil War generals, and popular actresses of the time etc. (Pritcher, 2000). During World War I some Army surgeons even credited cigarettes for “helping the wounded relax” and “providing pain relief.” This notion that cigarettes could be presented as having medically endorsed benefits became a driving force of the framing and narrative of cigarette advertising that would dominate much of the 1930s and 1940s.

Furthermore, companies like Lucky Strike cigarettes incorporated physicians and medical professionals into the visual imagery used to market their cigarettes. A 1930 ad for Lucky Strike cigarettes featured an image of a physician holding a pack of Lucky Strike cigarettes with the following text, “20,679 Physicians say Luckies are less irritating and your throat protection - against irritation – against cough” (Stine, 2014). Since there was no sufficient knowledge of the effects of smoking and even less knowledge on the effects of misinformation or false advertising many cigarette companies featured visuals and messages from trusted authority figures and health professionals to market their products. Another example of this is a 1949 ad produced by the Brown and Williamson Tobacco Corporation that displayed an image of a dentist saying” Viceroy’s filter the smoke! As your dentist, I would recommend Viceroy’s” (Stine, 2014).
Cigarette smoking was first linked to lung cancer and other diseases in the 1940s and early 1950s. Scientific evidence emerged in 1956, after a Surgeon General’s scientific study group found a causal relationship between cigarette smoking and lung cancer (CDC, 2020). On April 1st, 1970, President Richard Nixon signed into effect legislation banning cigarette ads on television and radio. However, the prevalence of cigarette smoking eventually still increased after the tv and radio ban, as the cigarette companies began to save advertising revenue and creatively found other ways to market cigarettes (CDC, 2020). In the long term the cigarette companies would even find new markets and age groups to target through different types of advertising. This culminated in the 1990’s through the 2010’s when cigarette companies reached younger and wider ranging audiences through cultivating a higher frequency of interactions with visual imagery, such as the use of Joe Camel and other cartoon characters. Along with practices such as, placing tobacco products on lower shelves to attract the eye-level of children, sponsorships and product placements in sporting events, movies, tv shows, concerts, video games, and celebrity endorsements. In all of the PG-13 rated movies released from 2002 – 2013 61% of these films displayed smoking (Tobacco Stops With Me, 2023).

According to the CDC as of 2018 the percentage of U.S. adults 18 years of age or older who smoke cigarettes is at an all-time low when compared to previous years at 13.7%, however, this still accounts for 34.2 million people (CDC, 2020). Presently, the impact of cigarette smoking is known and has been shown scientifically. As of 2020 more than 16 million Americans are living with a disease caused by smoking. Additionally, secondhand smoke exposure contributes to approximately 41,000 deaths among nonsmoking adults and 400 deaths in infants per year (CDC, 2020). The 2020
Surgeon General’s report has shown that smoking cessation tools are beneficial at any age and have the potential to reduce the risk of premature death and can add as much as a decade to an individual’s life expectancy (CDC, 2020).

Moreover, although cigarette smoking is far from eradicated as a health risk to U.S. adults there is an additional newer health risk to children, teens, adolescents, and adults alike, which has been rapidly growing in sales and popularity over the past ten plus years. This trend and health threat is vaping. Much of the emergence and growing popularity of vaping within the U.S. can be likened to a form of history repeating itself. Although differences in society, technology, and other contexts exist the issue of vaping in the U.S. is not a far departure from the narrative we’ve just recounted, of how cigarette smoking grew so rapidly in the U.S. and through the application of some similar practices. The technical term for what is referred to as vaping is electronic nicotine delivery system or (ENDS). ENDS is a broad technical term that can be used to refer to vapes, vape pens, cartridges, electronic cigarettes, or other vapor based smoking devices. ENDS products first entered the U.S. marketplace around 2007. Since 2014 ENDS have been the most commonly used tobacco product in the U.S. (U.S. Department of Health and Human Services, 2016).

Vapes began to attract users as they were initially regarded as “less harmful than smoking cigarettes,” they’re electronic, discrete, and visual advertisements along with flavored vapors piqued the interest of users. Similar, to historical cigarette advertisements vaping products have been advertised through the application of the following techniques: colorful visuals, celebrity endorsements, product placements in tv shows, movies, games, events, billboards, and in lifestyle-based campaigns. The heavy
involvement in product advertising, huge initial growth in U.S. sales, reliance upon frequent visual displays of the product in marketing efforts, and confusion/lack of initial knowledge on potential side effects of the product’s use can be seen as eerily similar to the early emergence of cigarettes within the U.S. However, even more worrisome to health professionals should be the unfounded trust many users place in ENDS products. Largely, as a result of an unfounded and not thoroughly researched belief that vaping is an inherently safer option than smoking cigarettes.

The first commercially successful electronic cigarette was created in Beijing by a pharmacist and former smoker, named Hon Lik. The product was marketed as vapor-based and similar to smoke, but much was unknown about this first commercial vaping product (CASAA, 2023). In 2008 after early ENDS products had been available for about a year the World Health Organization (WHO) made a press release that the organization “does not consider electronic cigarettes to be a legitimate smoking cessation aid and demanded that marketers immediately remove any written statements or suggestions that the WHO considers electronic cigarettes to be safe and effective” (CASAA, 2023).

On June 2009 President Obama signed into law the *Family Smoking Prevention and Tobacco Control Act*. This legislation gave the FDA the power to regulate the tobacco industry. This did not allow for nicotine and cigarettes to be banned as products but rather allowed for the banning of certain types, flavors, and cartridges and also required that new products must meet all FDA pre-market standards (CASAA, 2023). Presently, according to 2023 statistics one in twenty Americans vape. The 2022 findings of the FDA’s annual national youth tobacco survey revealed that “one in four middle school and high school students in the U.S. vape daily” (FDA, 2022). Additionally, vapes
and ENDS classified products have generated an economic appeal within the U.S. as well. Worldwide vaping sales were recorded at $15.7 billion in 2018 and are expected to reach $40 billion in 2023 (Grand View Research Inc., 2021).

Worldwide, overall tobacco use causes nearly eight million deaths per year according to the World Health Organization (WHO) (World Health Organization, 2020). For those trying to quit smoking cigarettes, vaping may seem like a natural alternative but this can be misleading, as vaping is still detrimental to one’s health and not necessarily a healthy alternative to smoking cigarettes. This narrative may be partially attributed to the early marketing efforts of (ENDS) products, which included vaping being promoted by retailers, influencers, and celebrities in a manner that glamorized the product and even included mixed or inaccurate claims that vaping products are less harmful or only contain water-vapor (Albarracin & Shavitt, 2018). This misinformation and past inaccurate vaping portrayals have seriously downplayed the risks of vaping and are likely responsible, at least in part for the popularity and growth of the vaping epidemic in the U.S., among teens, adolescents, and adults (England et al., 2021).

A recent CDC study found that 99% of vapes sold in the U.S. contain nicotine (CDC, 2021). Further, a 2019 survey reported that two-thirds of JUUL users ages 15-21 did not know that the product always contains nicotine (Truth Initiative, 2019). The global e-cigarette and vape market size was valued at $22.45 billion in 2022 and further is expected to increase at a compound annual growth rate (CAGR) of 30.6% from 2022 – 2030. The e-cigarette and vape market revenue forecast for 2030 is $182.84 billion (Grand View Research Inc., 2022). The country, which has generated the most revenue from the sale of e-cigarettes is the United States. Also, the U.S. e-cigarette market is
expected to grow by a (CAGR) of 4.76% from 2022-2027. Moreover, in relation to population figures $27.86 per citizen was generated in e-cigarette sales within the United States alone in 2022.

As a result, the U.S. Food and Drug Administration (FDA) began enforcement on February 7, 2020, against the sale of e-cigarette cartridges with flavors other than tobacco or menthol, an effort aimed at reducing adolescent vaping (FDA, 2020). Further, on June 23rd, 2022, the FDA issued an initial order banning the sale of JUUL products. A federal appeals court moved to temporarily block this ban the following day. The latest action from the FDA against the vaping company JUUL was the issuance of an administrative stay effective as of July 5th, 2022, on the initial ban the FDA had issued for JUUL to remove their e-cigarettes from the marketplace. The FDA at that time clarified that the administrative stay temporarily suspends the marketing denial order, while the FDA conducts further review, but does not rescind the initial order. In issuing this administrative stay action FDA representatives stated the following, “there are scientific issues unique to the JUUL application that warrant additional review” (NPR, 2022).

However, although measures have been taken to police the flavored cartridges, advertising, and the presentation of JUUL and other vape brands attempting to appeal to youth. Although adolescents aren’t the only ones vaping. More than nine million adults in the United States have used e-cigarettes as of 2020, according to a CDC survey (Cornelius et al., 2020). This number only continues to grow and many adults in the United States fail to identify vaping as a legitimate health threat; mainly due to viewing vaping as a healthier alternative when directly compared with smoking cigarettes or by viewing vaping as a possible tool to quit smoking cigarettes. This number is likely to
grow as there continues to be much confusion around issues such as safety, regulation, ingredients, and the marketing of vapes.

1.2 STUDY OBJECTIVES

This dissertation has two main research objectives. The first of which is to expand and test the theory of planned behavior (TPB) model in the context of examining US adults’ intentions to vape. This expansion includes the variable of fear in unison with the main predictive variables of the TPB model, which are attitudes, norms, and perceived behavioral control. Secondly, this dissertation study is unique in that it applied an online experiment to test gain/loss framing not only using text-based messages but also testing the presence of gain/loss framing using a visual warning as well. A pretest manipulation check was conducted prior to the main study to confirm the accuracy of the framing of both the text messaging and the visual warning. The online experiment had four stimuli conditions and each participant was randomly assigned to a single condition. Condition 1): gain framed text with visual; Condition 2): loss framed text with visual; Condition 3): gain framed text with no visual; Condition 4): loss framed text with no visual.

This dissertation study is noteworthy in the following ways: 1) It expands upon the application of the existent TPB model. 2) The design of this study as an online experiment allowed for causation of behavioral intentions specifically within a U.S. adult population to be probed. This expands upon well also differing from previous vaping related studies through the fact that it recruited an adult population rather than a student or adolescent population. Thus far, limited solidified knowledge and research exists regarding interventions to mitigate vaping and incorrect information promoting vaping behaviors (Albarracin & Shavitt, 2018; Chu et al., 2021).
The scope of this present study focused on U.S. adults, intentionally as a sample recruitment decision. Much previous research on vaping had surveyed adolescents and college students on their perceptions of vaping and their vaping habits. However, an experiment, which focuses on an adult population comprised of both current vapers and non-vapers can provide generalizable empirical data that will be useful and have practical applications moving forward. A key aim of this study was to contribute to a better understanding of the current environment of vaping in the U.S., along with investigating what percentage of adults may be motivated to vape, as a means to quit smoking, or are influenced by the perception that they’re pursuing a “healthier behavior.”
CHAPTER 2

REVIEW OF LITERATURE

2.1 THEORY OF PLANNED BEHAVIOR (TPB)

The Theory of Planned Behavior (TPB) was developed by social psychologists as a theoretical expansion of Fishbein and Ajzen’s (1977) Theory of Reasoned Action (TRA). The original TRA model was developed to better understand relationships between the independent variables of attitudes, social norms, and outcomes to form a predictive model that could be applied to the dependent variables of intentions (to perform the behavior) and behaviors (Fishbein, 1967). The TPB model broadened and built upon TRA to answer the call to develop a more predictive model of behavioral change, through the addition of perceived behavioral control along with attitudes and social norms as a parallel theoretical antecedent to behavioral intentions, which in turn, leads to actual behaviors (Fishbein & Ajzen, 1977).

Previous research studies in this area of social psychology, prior to the TPB framework were focused on measuring attitude toward an object and had yet to specify and operationally apply measures to succinctly test individuals’ attitudes toward actual behaviors. Therefore, this previous body of research studies found very low correspondence between attitudes and behaviors. As a result, this past research direction was so unfruitful in the study of behavioral adoption that several social psychology theorists of the time began to propose that attitude be eliminated and replaced as a factor to predict future behavioral outcomes. Thus, the three pertinent studies listed here
scrutinized the role of attitude in an action or reasoned action-based approach and examined whether actions and behavioral outcomes for a variety of issues could exist free from being motivated by attitude (Abelson, 1972; Bright et al., 1993; Wicker, 1969).

According to Ajzen and Sexton (1999): “TPB postulates three conceptually independent determinants of intention. The first is attitude toward the behavior. The second predictor is a social factor termed subjective norms. The third antecedent of intention is the degree of perceived behavioral control” (Ajzen & Sexton, 1999, p. 188). This third antecedent is what differentiates TPB from the original TRA model and was added in response to criticisms that the original model was not sufficient to predict behaviors in situations when an individual does not perceive themselves as having control over their behaviors. The purpose of this new variable within the model was to account for influences outside of the individuals’ control that could impact intentions and behaviors. The behavioral contexts of these three early studies, which were responsible for proposing and testing the use of the variable perceived behavioral control were in the contexts of organizational behavior, leisure participation, and goal-directed behavior, respectively e.g., (Ajzen, 1991; Ajzen & Driver, 1991; Ajzen & Madden, 1986).

TPB is a robust theoretical model and has been applied broadly to explore behavioral intentions in a variety of fields, including but not limited to public health. The following studies are noteworthy for applying TPB as a theoretical framework to explain behavioral intentions associated with research topics in a variety of public health contexts, including but not limited to the following areas: alcohol consumption (Bhochhibhaya & Branscum, 2018; Conner et al., 1999; Cooke et al., 2016; Hagger et al., 2016; Hatching et al., 2008; Johnston & White, 2003; Kyrrestad et al., 2022; Lac et al.,
2013; Lawenthal et al., 2018; McMillan & Conner, 2003; Norman, 2011), dietary behaviors (Ahmad et al., 2014; Ajzen & Driver, 2021; An et al., 2020; Armitage, 2005; Astrom & Rise, 2001; Boudreau & Godin, 2007; Brenes et al., 1998; Brickell et al., 2006; Brouwer & Chan et al., 2016; Chatzisarantis & Hagger, 2005; Fila & Smith, 2006; Gatch & Kendzierski, 1990; Gronhoj et al., 2013; Hagger et al., 2016; Hewitt & Stephens, 2007; Hoyt et al., 2009; Malek et al., 2017; McDermott, 2015; Michels & Kugler, 1998; Mosack, 2015; Norman et al., 2007; Pavey & Churchill, 2014; Pawlak et al., 2009; Povey et al., 2000; Presseau et al., 2010), vaccination (Akbar et al., 2022; Asmare et al., 2021; Breslin et al., 2021; Catalano et al., 2017; Fan et al., 2021; Gerend & Sheperd, 2012; Kim & Choi, 2017; Li & Li, 2020; Li et al., 2021; Limbu et al., 2022; Patwary et al., 2021; Priest, 2015; Servidio et al., 2022; Twum et al., 2021), cancer screening (Abamecha et al., 2019; Chin & Mansori, 2019; Drossaert et al., 2003; Jennings-Dozier, 1999; Kenerson, 2010; Reshavarzi, et al., 2022; Roncancio et al., 2015; Rutter, 2000; Sieverding et al., 2010; Steele & Porche, 2005; Tolma et al., 2006), smoking (Brann & Sutton, 2009; Godin et al., 1992; Harakeh et al., 2004; Hiemstra et al., 2012; Hoie et al., 2012; Hukkelberg et al., 2014; Jalilian et al., 2016; Lee et al., 2006; Lu et al., 2021; Macy et al., 2012; McMillan et al., 2005; Moan & Rise, 2006; Norman et al., 1999; Owotomo et al., 2020; Rise et al., 2008; Shi et al., 2014; Tseng et al., 2018; Zhao et al., 2019), and ENDS use (Doherty et al., 2022; Donaldson et al., 2021; Hershberger et al., 2018; Hester et al., 2021; Katz et al., 2019; Lee et al., 2018; Record et al., 2023; Scheinfeld et al., 2019; Simpson et al., 2022; Wang et al., 2022).

Furthermore, the TPB model has also been applied to predict behavioral intentions in past research studies among various topics within the context of Mass
Communication. These applications within mass communication have included the following sub-areas: risk assessment appraisals based upon heuristic and behavioral communication assessments (Griffin et al., 1999), the relationship between habit formation and media consumer behaviors (LaRose, 2010), predicting behavioral changes throughout the lifecycle of communication campaigns (Martinez & Lewis, 2016), exploring a reasoned action view of how communication about fundraising translates to action in support of causes (McKeever et al., 2016), reasoned action view of predicting carryover from online communication behaviors to related actions (McKeever & McKeever, 2017), impact of emotional framing on advocacy-based behavioral adoption (Pressgrove et al., 2021), and the process through which communication and social interactions build various types of norms (Rimal & Real, 2003).

The TPB model has also been applied to information systems research in various contexts of study, which includes the following topics: examining Facebook users’ intentions to continue using Facebook (Al-Debei et al., 2013), predicting employees’ likelihood to engage in knowledge sharing behaviors within their organization (Bock et al., 2005), and examining user intentions to continue or discontinue their use of new information system technologies (Limayen et al., 2007). Previous studies in this area of information systems research have also tested the TPB model in conjunction with other behavioral change models to develop theoretical adaptations of the TPB model, such as the Integrated Behavioral Model (IBM) and Technology Acceptance Model (TAM) (Albarracin et al., 2001; Albarracin et al., 2004; Albarracin et al., 2005; Armitage & Conner, 2001).
Among the various applications and extensions of the TPB model, the theoretical success and some important practical outcomes have begun to emerge from its broad application in empirical studies examining intentions related to behaviors involving, but not limited to health-related risks, such as cigarette smoking, tobacco use/cessation, and e-cigarettes/vaping etc. Various past applications of the TPB framework across contexts have led to the predictors in the model explaining significant variance in intention to participate in the respective target activities, which have resulted in varied levels of influence produced by each of the antecedent variables in the model, namely in these health behavioral contexts.

Across research disciplines past studies informed by the TPB, which have employed TPB measures have heavily favored a survey based research design (Aljaberi & Yao, 2021; Bauld et al., 2017; Brann & Sutton, 2009; Case et al., 2016; Coleman et al., 2015; East et al., 2019; East et al., 2021; Godin et al., 1992; Guo et al., 2012; Hershberger et al., 2018; Hester et al., 2021; Hill et al., 1997; Laverty et al., 2018; Lee et al., 2006; Lozano et al., 2017; McMillan et al., 2005; Mercken et al., 2011; Moan & Rise, 2006; Norman et al., 1999; Record, 2017; Record et al. 2017; Rise et al., 2008; Scheinfeld et al., 2019; Shi et al., 2014; Swaim et al., 2007; Thapa et al., 2022; Trumbo, 2015; Trumbo & Harper, 2015). These studies applied variations of the main constructs of the TPB model through the use of scale-based survey measures. The TPB model has performed well from a statistical reliability standpoint through many applications with survey designs for predicting intentions to engage in various proposed target behaviors. These types of past studies provide good data and assurance of the capability and consistency of the TPB model to predict behavioral intentions across contexts. However,
these studies through the nature of the survey method remain limited by their reliance upon self-report data. Therefore, although the measures continue to be consistent statistically, a lack of understanding about the depth of the impact on the behavioral intentions process and the exact scope and nature of the causality of these covariates within the TPB model upon the target behaviors exists.

The second most utilized methodology to test the TPB model in past studies has been interviews/focus groups (Coleman et al., 2016; Hiemstra et al., 2012; Katz et al., 2019; McKeganey et al., 2018; Simpson et al., 2022). This is of interest as the use of qualitative methods in the context of the TPB model may unearth unique participant contexts, rationales, motivations, and other drivers of behavioral intention that otherwise would not be known or elicited through applications of TPB variables, which are solely reliant upon self-reported measures. However, the cause-and-effect relationship underlying behavioral adoption still cannot be probed and empirically observed through this type of qualitative data.

Lastly, in attempting to empirically assess, propose, and discuss meaningful expansions and the bounds of the TPB model’s constructs several concept explications, systematic reviews, and meta-analyses about the TPB model and further applications of the framework have been conducted. The following manuscripts have thoroughly reviewed and discussed the TPB: (Montano et al., 2008; Montano & Kasprzyk, 2015; Sniehotta et al., 2014; Topa & Moriano, 2010). Some criticisms of the TPB model and its predictive capabilities across applications have emerged from the many reviews of TPB framework. Among these criticisms is the assertion that not only have experimental design applications testing the TPB model been rare, but they have also mostly failed to
support the model’s assumptions through this methodological context (Sniehotta et al., 2014).

According to Sniehotta and others (2014), “Factorial experimental tests of the TPB [model] with interventions targeting one or all of the theory’s cognitive predictors have either been unsuccessful in modifying the theoretical target variables or when successful in changing conditions, these changes did not translate into changes in behavior” (Sniehotta et al., 2014, p. 1-2). Other criticisms directed at TPB as a theoretical framework have primarily focused on two main areas. These main criticisms are 1) questioning if the theory errors by positing that the theory can explain an entire range of behaviors only using four predictive variables (Sheeran et al., 2013; Sniehotta et al., 2014). 2) Questions of the capability of the predictive validity of TPB and assertions that the theory possesses poor predictive validity. Arguing that the majority of observed variability in behavior is not accounted for by the TPB measures (Orbell & Sheeran, 1998; Sniehotta et al., 2014).

Specifically, one critical review of TPB in particular made the claim that social psychological research needs to move on from applications and expansions of TPB due to insufficiencies and find “a better explanation of health behavior change” (Sniehotta et al., 2014, p. 5). Suggested alternative avenues for consideration that were mentioned by the authors included “action theories, which do not make extensive assumptions about cognitions and lend themselves to experimental tests; theories with emphasis on temporal dynamics and temporal frames adopted by individuals when considering benefits and costs of behavioral options; incorporating multiple goals and behaviors in theory; dual process models or sequential models” (Sniehotta et al., 2014, p. 5).
Such ongoing criticisms of the TPB model have been responded to and addressed with additional detailed explanations of the model’s assumptions, functions, and limits (Ajzen, 2015). Specifically, Ajzen (2015) responded to the argument that TPB does “not take into account the effects of behavior on cognitions and future behavior” (Sniehotta et al., 2014). Ajzen (2015) explained that although graphic models of TPB may not map out these considerations and explain feedback loops these considerations are indeed explained within the descriptive body of the theory. This was explained by the following response to this criticism, “when a barrier is carried out, it can result in unanticipated positive or negative consequences, it can elicit favorable or unfavorable reactions from others, and it can reveal unanticipated difficulties or facilitating factors. This feedback is likely to change the person’s behavioral, normative, and control beliefs and thus affect future intentions and actions” (Fishbein & Ajzen, 2010, p. 218).

However, the contentions provided through these reviews require an effective method, design, and sample, which can be applied to test, observe, interpret, and verify or falsify the contentions produced from such past reviews of the theory. Moreover, few studies to this point have applied the TPB framework to study behavioral contexts using an experiment-based design. The known studies that comprise the literature on this causal testing of the TPB model have explored varied topics such as: examining intentions to comply with a diet and healthy eating behaviors (Chatzisarantis & Hagger, 2005), testing the impact of emotional framing through visual frames on advocacy-based behavioral adoption (Pressgrove et al., 2021), testing TPB informed persuasive measures with the goal of increasing physical activity behaviors (Sniehotta, 2009), exploring whether reverse causal relationships exist in the nature of the TPB model in the context of
organizational support intentions and behaviors (Sussman & Gifford, 2019), testing a
TPB-based intervention for smoking behaviors (Zhao et al., 2019). Further, of the four
studies identified in the reviewed literature that have applied an experiment to test TPB,
only one has done so in the context of intentions to use e-cigarettes (Zhao et al., 2019).

In summary, there are several gaps denoted in the literature of previous studies,
which have sought to apply the Theory of Planned Behavior (TPB) model across various
health communication contexts. For the most part past studies have shown limitations in
three main areas: 1) method/design, 2) measurement, and 3) sample. Many past
applications of TPB have favored a survey, focus group, or empirical design, which has
not allowed for causality to be probed, which is crucial for testing the potential for
expansion and the effectiveness of a theory designed to predict intentions for behavioral
adoption. Further, past applications of TPB, especially within health communication
contexts have struggled to use consistent and reliable measures for the TPB model’s
predictive variables. Chiefly among these pitfalls have been the largely favored use of
surveys as an instrument to collect data in studies applying TPB. The reasoning for this
being problematic among applications of a behavioral change theory is the reliance of
this research design instrument upon self-reported measures.

Further, the use of single item measures for variables central to the theory, such as
attitudes and intentions in both survey and qualitative applications of the TPB model
have been problematic. Consistently wording and properly testing the application of
adapted measurement items for TPB variables are areas where past studies have errored
as well. TPB as a theory, which uses several key constructs to predict intentions to
perform a certain behavior requires that the level of the measurement item be consistent
for the application to be valid. This premise, also known as the compatibility principle, points to the importance of researchers employing the TPB framework for examining behaviors to ensure that each of the variables in the model are specifically related to the behavior being studied. Given this, the current study proposes the following research question:

**RQ1**: What is the relationship between the TPB predictor variables (subjective norms, attitudes, and perceived behavioral control) and behavioral intentions to vape?

### 2.2 ATTITUDES

Attitude by nature is formed and evaluated by the individual. Attitudes can have social and environmental influences along with the need to align with and be enforced by the individual’s values and experiences. However, the process of forming attitudes about specific behaviors and informing the likelihood that the individual may partake in those behaviors are primarily influenced by the individual’s beliefs toward performing the behavior. Along with the process of evaluating motivations for partaking in said behaviors and the barriers and risks of behavioral adoption. Simply, these series of assessments lead the individual to formulate whether the behavior is likely to produce a positive or negative outcome, and this framed evaluation ultimately represents their attitude (Albarracín & Ajzen, 2007). Informed by TPB literature the following attitudinal hypothesis is proposed:

**H1**: Attitudes will be positively associated with behavioral intentions to vape.

### 2.3 SUBJECTIVE NORMS

Subjective norms are determined by normative beliefs. Normative beliefs can be best understood in this context as “whether [the individual believes] important referent
individuals approve or disapprove of performing the behavior” (Montano & Kasprzyk, 2015, p. 71). Therefore, subjective norms are socially constructed perceptions of outside factors such as our environment, social groups, moral/ethical guiding principles, familial values/influences and how susceptible we are to the influence of others. Much like attitude formation, these considerations lead us to either a positive or negative valuation of these beliefs, which then form our subjective norms about the behavior.

If individuals perceive their sources of strongest influence or referents to be in accordance with and support their beliefs about the behavior, then the individual will associate positive subjective norms about the behavior. Conversely, if the individual perceives that those others do not support their beliefs and discourage the behavior, then the subjective norms associated with the behavior will be negative. One caveat to this is that subjective norms can be variable or neutral; where other factors could exist, or individuals determine alternative reasons for being less motivated to correspond or comply with their “referents.” Thus, this study proposes the following normative-based hypothesis:

**H2:** Subjective norms will be positively associated with behavioral intentions to vape.

### 2.4 PERCEIVED BEHAVIORAL CONTROL

Perceived behavioral control is a combination of one’s control beliefs and perceived power, regarding a given behavior. Control beliefs can be seen as beliefs established by the individual, which will impact eliciting or avoiding the given behavior. Additionally, perceived power in this context refers to the strength or potential impact of each of the individual’s control beliefs in having the power and potential impact to elicit or avoid the behavior. Within the context of vaping the perception by the individual of
possessing either a high or low degree of behavioral control over the behavior of vaping will predict the perceived power of PBC as an independent variable with the potential to influence an individual’s intentions for and behavioral adoption of vaping.

Perceived behavioral control as a variable in the TPB model is defined as: “the individual’s perception of the extent to which performance of the behavior is easy or difficult” (Ajzen, 1991, p. 183). Within TPB, PBC is differentiated from attitude, more specifically, Ajzen (2002) emphasized that PBC denotes a subjective degree of control over the performance of a behavior and is not in fact concerned with the perceived likelihood that performing the behavior will produce a given outcome. Therefore, PBC should be seen as “perceived control over the performance of a behavior” (Ajzen, 2002, p. 668).

The variable of PBC occurs at the individual level and is an individually processed assessment, which can be observed to occur as the individual’s response to various factors in their direct environment and other social stimuli. As originally hypothesized within the TPB framework a set of control beliefs (c_i) and their perceived power (p_i) (to facilitate or inhibit the performance of a behavior) determine perceived behavioral control (PBC) through an expectancy-value formula (Ajzen, 1991; Pavlou & Fygenson, 2006, p. 117). Supported by how the variable has performed in past TPB literature this study proposes the following perceived behavioral control hypothesis:

**H3:** Perceived behavioral control will be negatively associated with behavioral intentions to vape.

**2.5 BEHAVIORAL INTENTIONS**
According to Conner & Armitage (1998) within the TPB model, behavioral intentions (BI) represent a person’s “motivation in the sense of her or his conscious plan or decision to exert energy to enact the behavior” (Conner & Armitage, 1998, p. 1430). A fundamental assumption of both TRA and TPB is the notion that intentions lead to behavioral adoption. However, further refinement of the TPB model in different research contexts has identified the need for correct applications of the theorized associations with specific situations to occur for this strong causal correlation between intentions and behavioral adoption to be observed. Behavioral intentions are the most proximal variable to behavior.

According to Fishbein & Ajzen (1977) compatibility between all the variables and facets of the TPB model must be maintained, specifically in relation to these areas of the behavior that involve the: action, target, context, and time frame. Additionally, further analytical review of these conditions has yielded and proposed that the time between intentions and behaviors is an important determinant of the strength of the predictive relationship (Randall & Wolff, 1994). A primary assertion of both TRA and TPB is fixated on the role of intentions as “the immediate determinant of action, where action = behavioral adoption within the model” (Fishbein & Ajzen, 1981, p. 279).

While these variables offer insights into behavioral intentions through variables rooted in psychology, the focus of mass communication and media scholars in applying the TPB model has been to examine the role of media messages on - and in relation to – variables within the TPB framework. Among the various ways media effects scholars have expanded the TPB model to incorporate communication phenomena, one of the approaches used by researchers who have applied this framework using experimental
methods has been through the examination of message frames (e.g., Pressgrove et al., 2021).

2.6 FRAMING

This study aims to meaningfully expand the scope and predictive power of the original TPB model. The nature of this expansion is predominantly through adding and testing the variable of gain/loss framing, along with the influence of visual warning stimuli upon the TPB model variables in the behavioral context of vaping. Framing has been operationalized in communication research to function as a subset of agenda-setting theory, often termed “second level agenda setting.” Whereas the aim of agenda-setting is concerned with the salience of issues, frame-setting, or “second-level agenda-setting” (McCombs et al., 1997) is concerned with the salience of issue attributes. In the context of gain/loss framing gain-framed messages focus on the positive outcomes or benefits associated with performing a specific behavior. Whereas loss-framed messages focus on the negative outcomes or costs of the behavior (Rothman & Salovey, 1997).

Past studies rooted in health communication research have investigated the impact of gain/loss framing as a motivator for a range of behavioral outcomes such as: exercise (Ahmad et al., 2014; An et al., 2020; Armitage, 2005; Boudreau & Godin, 2007; Brenes et al., 1998; Brickell et al., 2006; Gatch & Kendenzierski, 1990; Hoyt et al., 2009; Jensen et al., 2018; Lee et al., 2016; Levy et al., 2008; Lu et al., 2022; Michels & Kugler, 1998; Presseau et al., 2010), healthy eating habits (Astrosm & Rise, 2001; Brouwer & Mosack, 2015; Chan et al., 2016; Conner & Norman, 2002; Elbert & Ots, 2018; Fila & Smith, 2006; Gronhoj et al., 2013; Hevey et al., 2010; Hewitt & Stephens, 2007; Malek et al., 2017; Martin et al., 1999; Niu et al., 2020; Pavey & Churchill, 2014; Pawlak et al., 2009;
Povey et al., 2000), sunscreen use (Hillhouse et al., 1997; Starfelt Sutton & White, 2016; Thomson et al., 2012), and cancer screening (Abamecha et al., 2019; Abood et al., 2005; Block & Keller, 1995; Chin & Mansori, 2019; Drossaert et al., 2003; Jennings-Dozier, 1999; Kenerson et al., 2010; Keshavarzi et al., 2022; Roncancio et al., 2015; Rutter et al., 2000; Sieverding et al., 2010; Steele & Porche, 2005; Tolma et al., 2006).

Moreover, in previous studies gain-framed messages have been found to be more often associated with positive attitudes and greater intentions for behaviors such as healthy food consumption (Niu et al., 2020; Pavey & Churchill, 2014) and loss-framed messages have resulted in greater behavioral cessation (Wyllie et al., 2015). A main takeaway from the aforementioned body of literature on gain/loss framing within health contexts is that gain-framed messages and positive visuals have had positive influences on behavioral intentions for individuals to adopt positive behavioral change, such as, a better diet, working out more, being more social etc. However, in the context of cessation tools or attempting to encourage individuals to quit or avoid potentially unhealthy behavioral outcomes loss-framed messaging and negative visuals, which depict potential losses of continuing the harmful behavior have been seen as more effective in motivating intentions for behavioral change.

Furthermore, past literature (Van’t Riet et al., 2014) has argued that the measured degree of effectiveness of the gain/loss framing effect is largely dependent upon how great the perceived risk of the advocated behavior is. This rationale when applied to the potential health risks associated with vaping suggests that the application of gain/loss framed messaging regarding vaping behaviors may have the potential to substantially influence individuals’ attitudes, norms, and perceived behavioral control in this context.
Thus, creating the potential to in turn, lead to downstream outcomes including future intentions to quit/avoid these behaviors. As the perceived risk that vaping presents is substantial there is rationale to believe gain/loss framing when applied to this topic could influence significant shifts in users’ behavioral intentions.

While these associations are posited to exist based on the past body of research, it is also important to recognize the possibility that these message framing-based effects related to vaping behaviors may have varied, based on the factors related to the participant samples. For example, one prior study conducted by Kong and colleagues (2016) found that individuals who vaped preferred loss-framed health risks and social labeling messages, as compared to individuals who don’t vape (Kong et al., 2016). From the extant literature, it is clear that further research is necessary to increase our understanding of the nuanced effects of gain/loss framing within the context of vaping.

Practical stimuli consistent with the characteristics of warning labels found on tobacco and vaping products, such as text paired with visual content need to be tested.

Based on this rationale, future research must examine the effects of visual warnings paired with text on individuals within a controlled design. This requires a design environment where individuals’ interactions with these types of warning messages and cause-and-effect impacts on behavioral intentions can be recorded and further probed. Investigation into this research direction is supported and informed by an array of scholarship in communication that has demonstrated more fruitful positive effects of visuals on individuals’ adherence to the information when compared with just text alone (e.g., Niu et al., 2020). For example, Niu and colleagues (2020) applied visual warnings paired with gain/loss framed text/messaging in a 2 X 2 experiment in the context of
healthy eating behaviors. This study found that “the presence of visual images in text messages had a strong effect on attitudes, intentions, perceived knowledge, and affective risk response” (Niu et al., 2020, p. 210). The findings from this study illustrate several of the theoretical connections that exist between visual warnings paired with gain/loss framed text and variables within the TPB model. The present study will explore the presence of gain/loss framing as an experimentally manipulated independent variable, guided by the following research question:

**RQ2:** What is the relationship between messaging framing (gain vs. loss) and behavioral intentions to vape?

Thus, the following hypothesis is proposed for this study:

**H4:** Messages in the loss-framed conditions will be more strongly associated with decreased behavioral intentions to vape when compared to messages in the gain-framed conditions.

2.7 VISUAL COMMUNICATION WARNINGS (HEALTH BEHAVIOR CONTEXT)

Visual images have been observed to impact health-related cognitive processes, such as promoting the effectiveness and salience of health decision-making processes (Zillmann, 1999). Graphics and visual images have also been reported as more memorable, leading to greater retention over text and leading to vivid mental imagery that resembles real experiences (Cameron & Chan, 2008; Niu et al., 2020). The combination of text and visuals are processed more efficiently than text alone (Barry, 1997). Images are seen as effective in health domains, such as interventions to promote health behaviors (Berry et al., 2008; Gold et al., 2008). Most importantly, past studies have linked health information presented alongside images to greater levels of
comprehension and attention, message recall, risk perception, and promotion of attitudes and intentions (Boer et al., 2006; Leiner et al., 2004; Lu et al., 2014; Seo et al., 2013). An additional fruitful direction that largely remains unexplored and requires pertinent data in order to be effectively investigated is further indirect effects that individuals’ interactions with visual information may solicit and potentially spill over in unexpected ways to their subsequent behaviors (Niu et al., 2020). Based upon the literature the subsequent research question and hypothesis are proposed to test the presence of visuals, as an experimentally manipulated independent variable in this study:

**RQ3:** What is the relationship between visual warnings (visuals vs. text) and behavioral intentions to vape?

**H5:** Conditions that display visual warnings will be more strongly associated with decreased intentions to vape when compared to conditions with only text.

2.8 FEAR

Fear appeal theory has been applied by scholars to understand individuals’ risk assessment process and thoughts on risky issues. Fear Appeal Theory has been applied as a lens by researchers in health communication and environmental communication contexts (Hoffland et al., 2015). A basic assumption of the theory is that different intensities of fear appeals will produce different levels of actions and information acceptance from individuals. The Extended Parallel Process Model (EPPM) is a proposed extension of Fear Appeal Theory that has identified a range of assessments that the public takes in response to fear appeals and has also posited three specific modes of actions that individuals may take in response to fear appeals (Witte et al., 2001). Through the EPPM view as a theoretical lens assessments of fear appeals can range from “perceived threat”
to “perceived efficacy.” From the perceived threat perspective, the individual assesses their perceptions of fear specific to factors of vulnerability to the fear appeal, such as their perceived susceptibility and perceived severity. The perceived efficacy assessment is more focused on the individuals’ perceptions and assessments of their own capabilities in the context of the fear appeal. This view seeks to consider factors like their self-efficacy and response efficacy as the individual perceives their attributes in these areas.

Further the three modes of action from this theoretical perspective are “no response,” “danger control process,” and “fear control process” (Witte et al., 2001). In this context danger control is described as a cognitive based process, wherein the individual arouses protective behaviors that are elicited under high-efficacy situations, where the individual feels in control (Witte, 1991; Witte et al., 2001). Inversely, the fear control process and no response have been denoted as emotion-based processes than can be stimulated when the individual is under low-efficacy conditions. These two differ importantly in the types of changes that may be elicited by the individual (Witte, 1991; Witte et al., 2001). The danger control process is hypothesized to result in the individual making adaptive changes. Whereas, the fear control process is concerned with the fear appeal itself and can motivate the individual to avoid, ignore, refute, or deny the fear appeal (Witte et al., 2001). An online experiment testing fear appeals on a sample of adolescents in China found that the fear model when applied had the strongest effect on participants’ motivations to protect themselves from risks associated with e-cigarette use. Additionally, the variable of perceived threat was the strongest predictor of fear among this sample as well (Sun et al., 2021). Thus, the following research question and subsequent hypothesis are posed:
**RQ4:** What relationship will fear have on behavioral intentions to vape?

**H6:** Fear will be negatively associated with intentions to vape.
CHAPTER 3
RESEARCH QUESTIONS & HYPOTHESES

3.1 RESEARCH QUESTIONS

The first research question and three related hypotheses posed here were based on the traditional axioms of the TPB model. These research questions and hypotheses were introduced previously in the review of literature section and guided this study’s examination into the nature of the variable relations within the model as posited by TPB theorists. Specifically:

**RQ1:** What is the relationship between the TPB predictor variables (subjective norms, attitudes, and perceived behavioral control) and behavioral intentions to vape?

**H1:** Attitudes will be positively associated with behavioral intentions to vape.

**H2:** Subjective norms will be positively associated with behavioral intentions to vape.

**H3:** Perceived behavioral control will be negatively associated with behavioral intentions to vape.

The second research question and subsequent hypothesis proposed here sought to guide the examination of the effects of gain and loss framing in the context of vaping intentions, informed by past studies discussed in the review of literature (e.g., Kong et al., 2016). Formally stated:

**RQ2:** What is the relationship between message framing (gain vs. loss) and behavioral intentions to vape?
**H4:** Messages in loss-framed conditions will be more strongly associated with decreased behavioral intentions to vape when compared to messages in the gain-framed conditions.

The third research question and subsequent hypothesis proposed here sought to specifically guide the examination of the effects of the visual warning in the context of vaping intentions, as was supported previously in the review of literature. Formally stated:

**RQ3:** What is the relationship between visual warnings (visuals vs. text) and behavioral intentions to vape?

**H5:** Conditions that contain a visual warning will be more strongly associated with decreased behavioral intentions to vape when compared to conditions that contain only text.

Lastly, as this study sought to test the combined effects of gain and loss framing through the lens of TPB’s sufficiency assumption (Ajzen, 1985), which asserts that the effects of all forms of interventions (including those involving communication) on behavioral intentions must occur indirectly through the TPB variables of attitudes, subjective norms, and perceived behavioral control. The variable of fear was integrated into this study’s model as well, to test its potential influence on intentions to vape under varying assessments of perceived self-efficacy. The review of literature previously discussed this research question and hypothesis linking the TPB variables with fear. The final research question and subsequent hypothesis are posed below:

**RQ4:** What relationship will fear have on behavioral intentions to vape?

**H6:** Fear will be negatively associated with behavioral intentions to vape.
3.2 CONCEPTUAL MODEL

![Conceptual Model Diagram]

Figure 3.1: Conceptual Model
CHAPTER 4

METHODOLOGY

4.1 STUDY DESIGN

The research questions and hypotheses posed within this dissertation study were tested using data from a 2 (gain vs. loss) x 2 (image vs. no image) online experiment, which possessed four conditions. All procedures and protocols within this study were approved by the University of South Carolina IRB, University Human Subjects Review Board. This study was reviewed in accordance with 45 CFR 46.104(d)(2) and 45 CFR 46.111(a)(7), and the study received an exemption from Human Research Subject Regulations and was approved by the Institutional Review Board of The University of South Carolina (Pro00125938, 02/01/2023).

4.2 SAMPLE

Amazon Mechanical Turk (MTurk) was contracted for this study to recruit and supply a worker population fit to the desired inclusion criteria to participate in the online experiment. The sample participant eligibility criteria for data collection was U.S. adults who are at least twenty-two years old or older, who are not currently undergraduate students, and are currently U.S. residents. The online experiment questionnaire was designed in Qualtrics. Amazon Mechanical Turk (MTurk) was contracted to recruit 160 workers who met the eligibility criteria to participate in this study. Each participant was compensated $2.15 (USD) for their participation in this study. Initially 177 participants
responded to the task on Amazon MTurk and had their responses to the study questionnaire recorded in Qualtrics. As a result of exclusion criteria, qualifying question responses, and incomplete responses 15 of these responses were removed prior to analysis of the sample data (N=162).

4.3 STIMULI SELECTION

Two potential stimuli options were tested and their means were compared during a pre-test manipulation check (n= 48). Please see Table 5.1 (pg. 48) for the pretest results and Appendix C for a display of the study’s stimuli. The manipulation check data confirmed that the manipulation of a gain/loss framing effect by using both text messaging and a visual warning was indeed proper.

4.4 PROCEDURES

All procedures and protocols within this study were approved by the University of South Carolina IRB, University Human Subjects Review Board. This study was reviewed in accordance with 45 CFR 46.104(d)(2) and 45 CFR 46.111(a)(7), and the study received an exemption from Human Research Subject Regulations and was approved by the Institutional Review Board of The University of South Carolina (Pro00125938, 02/01/2023). The study applied a 2 (gain vs. loss) x 2 (image vs. no image) online experiment. After analyzing the initial data gathered through the pre-test manipulation finalized stimuli was selected for use in the main study. The stimuli and pre/post stimuli exposure questionnaires containing all measurement items was created and edited in Qualtrics. Then pre-programmed with condition assignment determined through randomization. All participants were asked to complete a pre and post stimuli exposure questionnaire. Participants were randomly assigned to one of the four conditions. The
questionnaire measured demographic and control variable questions along with collecting some qualitative data in the form of open-ended questions. Please see Appendix A (pg. 93) for the full pre-stimuli exposure questionnaire and Appendix B (pg. 118) for the full post-stimuli exposure questionnaire.

This method was conducive to the purpose of this research, which sought to examine the hypothesized intervening role of the TPB variables on the effects of gain/loss framing on intentions to vape. While much of the research examining TPB in previous studies had relied on surveys, this online experiment provided a more efficient design because it allowed for randomization and control of temporal precedence, enabling a more robust assessment of the cause-and-effect relationships posited by the application of experimentally manipulated variables on behavioral intentions, through use of the TPB framework. Further, because an ancillary aim of this study was to compare differences amongst groups of cigarettes smokers, vapers, and those who have abstained from these behaviors within an adult population recruited to participate in this study; vaping and smoking status were also recorded among the control measurement questions. Testing this covariate data could be conducive to probing any potential interactions among these controlled factors and the key theoretical variables in this study.

4.5 MEASURES

Demographic and control measures

Several variables will be controlled for within the context of this study. Specifically, the control variable data and demographic representation among this study’s sample population was as follows: age ($M = 5.1; SD = 2.20$) (31-35 years old – N = 38, 23.5%), gender ($M = 1.47; SD = .570$) (Male N = 89, 54.9%; Female N = 72, 44.4%).
race/ethnicity ($M = 5.61; SD = 1.12$) (White/Caucasian N = 129, 79.6%; Black/African American N = 13, 8%; Asian N = 7, 4.3%; Hispanic/Latinx N = 6, 3.7%; Multi-racial N = 5, 3.1%; Other N = 1, .6%, Prefer not to disclose = 1, .6%), education level ($M = 3.47; SD = 1.21$) (Bachelor’s degree N = 68, 42%; High school degree N = 41, 25.3%; Associate’s degree N = 28, 17.3%; Master’s degree N = 14, 8.6%; Doctoral/terminal level degree N = 5, 3.1%; GED N = 3, 1.9%; Other N = 3, 1.9%), political partisanship ($M = 1.87; SD = 1.1$) (Democrat N = 84, 51.9%; Independent N = 37, 22.8%; Republican N = 30, 18.5%; Unaffiliated N = 8, 4.9%; Other N = 2, 1.2%; Prefer not to disclose N = 1, .6%), annual household income ($M = 2.49; SD = .860$) ($20,000 - $49,999 N = 62, 38.3%; $50,000 - $99,999 N = 61, 37.7%; < $20,000 N = 20, 12.3%; $100,000 + N = 19, 11.7%). Please see Table 4.1 for the full control measures and descriptive statistics.

**Table 4.1: Control Variable Items**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Highest/Lowest Frequency</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>31-35 (N = 38, 23.5%)</td>
<td>5.10</td>
<td>2.20</td>
</tr>
<tr>
<td></td>
<td>22-25 (N = 2, 1.2%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>Male (N = 89, 54.9%)</td>
<td>1.47</td>
<td>.570</td>
</tr>
<tr>
<td></td>
<td>Female (N = 72, 44.4%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Race/Ethnicity</td>
<td>White (N = 129, 79.6%)</td>
<td>5.61</td>
<td>1.19</td>
</tr>
<tr>
<td></td>
<td>Hispanic (N = 6, 3.7%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td>Bachelor’s (N = 68, 42%)</td>
<td>3.47</td>
<td>1.21</td>
</tr>
<tr>
<td></td>
<td>GED (N = 3, 1.9%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Political partisanship</td>
<td>Democrat (N = 84, 51.9%)</td>
<td>1.87</td>
<td>1.07</td>
</tr>
<tr>
<td>Category</td>
<td>Description</td>
<td>Unaffiliated (N = 8, 4.9%)</td>
<td></td>
</tr>
<tr>
<td>----------------------------------</td>
<td>--------------------------------------------------</td>
<td>-----------------------------</td>
<td>---</td>
</tr>
<tr>
<td>Household income</td>
<td>$20,000 - $49,999 (N = 62, 38.3%) $100,000 + (N = 19, 11.7%)</td>
<td>2.49</td>
<td>.858</td>
</tr>
<tr>
<td>Avg. Daily News</td>
<td>Less than 2 hours (N = 129, 79.6%) 8 hours or more (N = 1, 0.6%)</td>
<td>2.17</td>
<td>.564</td>
</tr>
<tr>
<td>Avg. Daily Social Media</td>
<td>Less than 2 hours (N = 127, 78.4%) 8 hours or more (N = 1, 0.6%)</td>
<td>2.21</td>
<td>.541</td>
</tr>
<tr>
<td>Relationship status</td>
<td>Serious relationship (N = 84, 51.9%) Single (N = 77, 47.5%)</td>
<td>2.04</td>
<td>.999</td>
</tr>
<tr>
<td>Overall health status</td>
<td>Average health (N = 74, 47.5%) Above average health (N = 7, 4.3%)</td>
<td>3.51</td>
<td>.947</td>
</tr>
<tr>
<td>Vaper in household</td>
<td>No (N = 99, 61.1%) Yes (N = 19, 11.7%)</td>
<td>3.08</td>
<td>.678</td>
</tr>
<tr>
<td>Smoker in household</td>
<td>No (N = 93, 57.4%) Yes (N = 22, 13.6%)</td>
<td>3.02</td>
<td>.747</td>
</tr>
<tr>
<td>Vaping history</td>
<td>No (N = 86, 53.1%) Yes (N = 76, 46.9%)</td>
<td>1.47</td>
<td>.501</td>
</tr>
<tr>
<td>Smoking history</td>
<td>No (N = 96, 59.3%)</td>
<td>1.41</td>
<td>.493</td>
</tr>
</tbody>
</table>
**Control Variable - Current Vaping Status**

<table>
<thead>
<tr>
<th>Current Vaping Status</th>
<th>Yes (N = 123, 75.9%)</th>
<th>No (N = 39, 24.1%)</th>
<th>1.76</th>
<th>.429</th>
</tr>
</thead>
</table>

**Control Variable - Vaping Device Ownership**

**Figure 4.1:** This figure visually displays the breakdown of the total participant sample composition by number of participants who currently vape and do not currently vape.
Figure 4.2: This figure visually displays the number of participants within the total sample who currently own a vaping device vs. participants who do not currently own a vaping device.

ATTITUDE

Attitude was measured by asking participants to rate their agreement with four items adapted from (Aggarwal et al., 2014; Ajzen & Sheikh, 2013; Hester et al., 2021; Hung & Khoa, 2022; Simpson et al., 2022). The items used within the study’s questionnaire were as follows: “Vaping is addictive,” “Vaping would cause me to feel embarrassed,” “Vaping is harmful to my health,” and “It is important to me that I avoid vaping.” Agreement to the statements was measured on a 7-point Likert scale, anchored by the extreme values 1 = strongly disagree & 7 = strongly agree. The internal consistency of the scale was assessed using Cronbach’s alpha reliability coefficient, which is reported parenthetically alongside measures of central tendency and dispersion ($M =$).
5.05, $SD = 1.65, a = .88$). For the item statistics for the attitude scale please see Table 4.2 (pg. 42).

NORMS

Norms were measured by asking participants to rate their agreement with three items adapted from (Ajzen & Sheikh, 2013; Hester et al., 2021; Scheinfeld et al., 2019; Thapa et al., 2022). The measurement items used for norms in the study’s questionnaire were the following: “Most people who are important to me would approve of me vaping,” “My vaping would be acceptable to my closest friends,” “It is socially acceptable for me to vape.” Agreement to the statements was measured on a 7-point Likert scale, anchored by the extreme values 1 = strongly disagree & 7= strongly agree. The internal consistency of the scale was assessed using Cronbach’s alpha reliability coefficient, which is reported parenthetically alongside measures of central tendency and dispersion ($M = 3.26, SD = 1.74, a = .90$). For the item statistics for the norms scale please see Table 4.3 (pg. 43).

PERCEIVED BEHAVIORAL CONTROL

Perceived behavioral control was measured by asking participants to rate their agreement with three items adapted from (Al-Debei et al., 2013; Katz et al., 2019; Pressgrove et al., 2021; Simpson et al., 2022). The measurement items used to represent perceived behavioral control in the study’s questionnaire were the following: “It is my decision whether I vape or not,” “I am confident that I can avoid vaping,” “I am in control with vaping.” Agreement to the statements was measured on a 7-point Likert scale, anchored by the extreme values 1 = strongly disagree & 7= strongly agree. The internal consistency of the scale was assessed using Cronbach’s alpha reliability
coefficient, which is reported parenthetically alongside measures of central tendency and dispersion ($M = 6.22$, $SD = 1.22$, $a = .88$). For the item statistics for the perceived behavioral control scale please see Table 4.4 (pg. 43).

FEAR

Fear was measured by asking participants to rate their agreement with four items adapted from (Grummon & Hall, 2020; Kahlor, 2010; Leary, 1983; Wong & Capella, 2009). The measurement items used for the variable of fear in the study’s questionnaire were as follows: “I am fearful of infections caused or worsened by vaping,” “I feel fearful of vaping,” “I fear potential risks of vaping,” “Vaping is a serious threat to my health.” Agreement with the statements was measured on a 7-point Likert scale, anchored by the extreme values 1 = strongly disagree & 7 = strongly agree. The internal consistency of the scale was assessed using Cronbach’s alpha reliability coefficient, which is reported parenthetically alongside measures of central tendency and dispersion ($M = 4.72$, $SD = 1.93$, $a = .94$). For the item statistics for the fear scale please see Table 4.5 (pg. 44).

BEHAVIORAL INTENTIONS

Behavioral intentions (to vape) were measured by asking participants to rate their agreement with three items adapted from (Ajzen & Sheikh, 2013). The measurement items used for the dependent variable of behavioral intentions were as follows: “I intend to avoid vaping,” “I would not vape,” “I will not try vaping.” Agreement with the statements was measured along a 7-point Likert scale, anchored by the extreme values 1 = strongly disagree & 7 = strongly agree. The internal consistency of the scale was assessed using Cronbach’s alpha reliability coefficient, which is reported parenthetically
alongside measures of central tendency and dispersion \((M = 5.69, SD = 1.85, \alpha = .98)\).

For the item statistics for the behavioral intentions scale please see Table 4.6 (pg.45).

Open-ended questions were also included at the end of the questionnaire. There were five open-ended questions, which elicited participants responses regarding takeaways on their perception of vaping, their recall of the stimuli, and their likelihood to socially share the messages they encountered about vaping. The following were the open-ended questions that appeared at the end of the questionnaire: “What do you think are some of the advantages of vaping?” “What do you think are some of the disadvantages of vaping?” “In what way(s) if any would you say that this experience has affected your intentions to vape or not?” “In what way(s) if any would you say that this experience has influenced you to encourage those in your social circle to not vape?” “What aspects of the vaping message that you encountered made it memorable to you?”

### Table 4.2: Attitude Scale Items

<table>
<thead>
<tr>
<th>Item:</th>
<th>Mean:</th>
<th>Standard Deviation:</th>
<th>Responses (N):</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Vaping is addictive.”</td>
<td>5.91</td>
<td>1.192</td>
<td>162</td>
</tr>
<tr>
<td>“Vaping would cause me to feel embarrassed.”</td>
<td>3.40</td>
<td>1.986</td>
<td>162</td>
</tr>
<tr>
<td>“Vaping is harmful to my health.”</td>
<td>5.49</td>
<td>1.509</td>
<td>162</td>
</tr>
</tbody>
</table>
“It is important to me that I avoid vaping.”

<table>
<thead>
<tr>
<th>Item:</th>
<th>Mean:</th>
<th>Standard Deviation:</th>
<th>Responses (N):</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Most people who are important to me would approve of my vaping.”</td>
<td>2.51</td>
<td>1.585</td>
<td>162</td>
</tr>
<tr>
<td>“My vaping would be acceptable to my closest friends.”</td>
<td>3.86</td>
<td>1.930</td>
<td>162</td>
</tr>
<tr>
<td>“It is socially acceptable for me to vape.”</td>
<td>4.03</td>
<td>1.795</td>
<td>162</td>
</tr>
</tbody>
</table>

Table 4.3: Norms Scale Items

<table>
<thead>
<tr>
<th>Item:</th>
<th>Mean:</th>
<th>Standard Deviation:</th>
<th>Responses (N):</th>
</tr>
</thead>
<tbody>
<tr>
<td>“It is my decision whether I vape or not.”</td>
<td>6.56</td>
<td>.912</td>
<td>162</td>
</tr>
</tbody>
</table>

Table 4.4: Perceived Behavioral Control Scale Items
“I am confident that I can avoid vaping.”

<table>
<thead>
<tr>
<th>Item</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Responses (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>“I am fearful of infections caused or worsened by vaping.”</td>
<td>3.78</td>
<td>2.094</td>
<td>162</td>
</tr>
<tr>
<td>“I am fearful of vaping.”</td>
<td>3.66</td>
<td>2.034</td>
<td>162</td>
</tr>
<tr>
<td>“I fear potential risks of vaping.”</td>
<td>4.67</td>
<td>2.046</td>
<td>162</td>
</tr>
<tr>
<td>“Vaping is a serious threat to my health.”</td>
<td>4.80</td>
<td>1.902</td>
<td>162</td>
</tr>
</tbody>
</table>

**Table 4.5: Fear Scale Items**

**Table 4.6: Behavioral Intentions Scale Items**
<table>
<thead>
<tr>
<th>Statement</th>
<th>Score 1</th>
<th>Score 2</th>
<th>Score 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>“I intend to avoid vaping.”</td>
<td>5.78</td>
<td>1.724</td>
<td>89</td>
</tr>
<tr>
<td>“I would not vape.”</td>
<td>5.49</td>
<td>1.925</td>
<td>89</td>
</tr>
<tr>
<td>“I will not try vaping.”</td>
<td>5.35</td>
<td>2.040</td>
<td>89</td>
</tr>
</tbody>
</table>
CHAPTER 5

RESULTS

First a pretest was conducted to check that the gain/loss manipulation through both text and visual warning was proper. Pretest participants (N = 48) viewed each of the four stimuli options (two different visual warning options, each possessing two conditions – gain and loss). After viewing each stimuli option participants were asked the same four questions (two scale based and two open ended). The stimuli manipulation check items were the following: **Question one**, “after reading the message above, I believe that the message emphasized: 1) Significantly more benefits to adults who choose not to vape/quit vaping; 2) About the same benefits or losses regardless of vaping decisions; 3) Significantly more consequences to adults who choose to vape.” **Question two**, “After viewing the message I felt: more certain about my attitude toward vaping; more uncertain about my attitude toward vaping; more fearful about vaping (0 = completely agree, 5 = neither agree or disagree, 10 = completely agree).” **Question three** (open-ended), “after viewing the message, please comment in the space provided below any additional feelings or thoughts that you may have. (Ex. Uncertainty, fear, made me want to learn more about vaping etc.).” **Question four**, “After viewing the message, please comment in the space provided below any thoughts or feelings you may have about any of the components of the message. (Image, wording choice, colors used, topic of information provided, critiques etc.).” The descriptive statistics for the manipulation check, displayed in **Table 5.1** (pg. 48) below show that visual stimuli option #2, which was used in
messages # 3 and # 4 had the better performing mean for both gain-framed ($M = 1.55$) and loss-framed ($M = 2.75$) conditions. Therefore, based upon the pretest results visual stimuli option # 2 was chosen for use in the main study.

**Table 5.1: Manipulation Check Items**

<table>
<thead>
<tr>
<th>Message Emphasis</th>
<th>Mean:</th>
<th>Standard Deviation:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message #1</td>
<td>$M = 1.69$</td>
<td>$SD = .930$</td>
</tr>
<tr>
<td>Message #2</td>
<td>$M = 2.73$</td>
<td>$SD = .583$</td>
</tr>
<tr>
<td>Message #3</td>
<td>$M = 1.55$</td>
<td>$SD = .888$</td>
</tr>
<tr>
<td>Message #4</td>
<td>$M = 2.75$</td>
<td>$SD = .645$</td>
</tr>
</tbody>
</table>
For hypothesis testing SPSS (V 28.10) was used. The independent variables in this study are in the experimental conditions. PROCESS (Hayes, 2013) models one and four respectively, were run to test model main effects (H1-H3), swapping out the variables as covariates.

**RQ1:** What is the relationship between the TPB predictor variables (attitude, subjective norms, and perceived behavioral control) and intentions to vape?

Using SPSS (V 28.10) RQ1 was examined using a two-way between-groups analyses of variance (ANOVA), which was run to explore the differences between the experimentally manipulated conditions and participants’ attitudes, norms, perceived behavioral control, and intentions.

Recall **H1** predicted that, “Attitudes will be positively associated with behavioral intentions to vape.” [F (3, 158) = .01, p = .93] Findings from the analysis indicated that there was not a statistically significant effect of attitudes on behavioral intentions to vape at the p < .05 level. Thus, H1 was not supported.

Recall **H2** predicted that, “Norms will be positively associated with behavioral intentions to vape.” [F (3, 158) = .37, p = .65] Findings from the analysis indicated that there was not a statistically significant effect for norms on behavioral intentions to vape at the p < .05 level. Thus, H2 was not supported.

Recall **H3** predicted that, “Perceived behavioral control will be negatively associated with behavioral intentions to vape.” [F (3, 158) = .93, p = .38] Findings from the analysis indicated that there was not a statistically significant effect for perceived behavioral control on behavioral intentions to vape at the p < .05 level. Thus, H3 was not supported.

Therefore, H1-H3 were not supported.
**RQ2:** What is the relationship between message framing (gain vs. loss) and intentions to vape?

To test these predictions in relation to the hypothesized influence of the experimentally manipulated independent variables of gain/loss framing (H4) and visuals (H5) an ANOVA was run.

Recall H4 predicted that, “Messages in the loss-framed conditions will be more strongly associated with decreased intentions to vape when compared to messages in the gain-framed conditions.” To examine the effect of framing on intentions to vape a one-way ANOVA of framing (gain vs. loss) was conducted. Findings from the analysis indicated that the effect of framing (gain vs. loss) on behavioral intentions to vape was not significant [F (3, 85) = .995, p = .39]. Thus, H4 was not supported.

**RQ3:** What is the relationship between visual warnings (visuals vs. text) and intentions to vape?

Recall H5 predicted that, “Conditions that contain a visual warning will be more strongly associated with decreased intentions to vape when compared with conditions that contain text only.” To examine the effect of visual warnings on behavioral intentions to vape a one-way ANOVA of visuals (visual vs. text only) was conducted. Findings from the analysis indicated that the effect of a visual warning (visual vs. text only) on behavioral intentions to vape was not significant [F (1, 87) = .95, p = .33]. Thus, H5 was not supported.

**RQ4:** What mediated effect will participants’ perceptions of fear, elicited through the stimuli have on their intentions to vape?
Recall H6 predicted that, “Fear will be negatively associated with intentions to vape.” To examine the mediation hypotheses H6 PROCESS (Hayes, 2013) models nine and thirteen were run. Findings from this analysis indicated that a significant effect did not exist between fear and behavioral intentions to vape. [F (4, 84) = 30.74, p = .00]. Thus, H6 was not supported. H1-H6 were not statistically supported.

Table 5.2: Correlations Between Variables

<table>
<thead>
<tr>
<th></th>
<th>Attitude</th>
<th>Norms</th>
<th>PBC</th>
<th>Fear</th>
<th>Intentions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attitude</td>
<td>Pearson</td>
<td>.684**</td>
<td>.392**</td>
<td>.758**</td>
<td>.043</td>
</tr>
<tr>
<td></td>
<td>Correlation Sig.</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
<td>.690</td>
</tr>
<tr>
<td></td>
<td>(2-tailed)</td>
<td>162</td>
<td>162</td>
<td>162</td>
<td>162</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>162</td>
<td>162</td>
<td>162</td>
<td>162</td>
</tr>
<tr>
<td>Norms</td>
<td>Pearson</td>
<td>-.684**</td>
<td>1</td>
<td>-.137</td>
<td>-.587**</td>
</tr>
<tr>
<td></td>
<td>Correlation Sig.</td>
<td>&lt;.001</td>
<td>.081</td>
<td>&lt;.001</td>
<td>.794</td>
</tr>
<tr>
<td></td>
<td>(2-tailed)</td>
<td>162</td>
<td>162</td>
<td>162</td>
<td>162</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>162</td>
<td>162</td>
<td>162</td>
<td>162</td>
</tr>
<tr>
<td>PBC</td>
<td>Pearson</td>
<td>.392**</td>
<td>-.137</td>
<td>1</td>
<td>-.249**</td>
</tr>
<tr>
<td></td>
<td>Correlation Sig.</td>
<td>&lt;.001</td>
<td>.081</td>
<td>.001</td>
<td>.978</td>
</tr>
<tr>
<td></td>
<td>(2-tailed)</td>
<td>162</td>
<td>162</td>
<td>162</td>
<td>162</td>
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<tr>
<td></td>
<td>N</td>
<td>162</td>
<td>162</td>
<td>162</td>
<td>162</td>
</tr>
<tr>
<td>Fear</td>
<td>Pearson</td>
<td>.758**</td>
<td>-.587**</td>
<td>-.249**</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Correlation Sig.</td>
<td>&lt;.001</td>
<td>&lt;.001</td>
<td>.001</td>
<td>.228*</td>
</tr>
<tr>
<td></td>
<td>(2-tailed)</td>
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<td></td>
<td>N</td>
<td>162</td>
<td>162</td>
<td>162</td>
<td>162</td>
</tr>
</tbody>
</table>
## Table 5.3: ANOVA Output

<table>
<thead>
<tr>
<th>Interaction</th>
<th>Sum of Squares</th>
<th>Df</th>
<th>Mean square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Attitude * Frame</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between Groups</td>
<td>.040</td>
<td>1</td>
<td>.040</td>
<td>.026</td>
<td>.871</td>
</tr>
<tr>
<td>Within Groups</td>
<td>243.590</td>
<td>160</td>
<td>1.522</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>243.630</td>
<td>161</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Norms * Frame</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between Groups</td>
<td>.011</td>
<td>1</td>
<td>.011</td>
<td>.005</td>
<td>.941</td>
</tr>
<tr>
<td>Within Groups</td>
<td>323.106</td>
<td>160</td>
<td>2.019</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>323.117</td>
<td>161</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>PBC * Frame</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between Groups</td>
<td>.003</td>
<td>1</td>
<td>.003</td>
<td>.003</td>
<td>.956</td>
</tr>
<tr>
<td>Within Groups</td>
<td>146.700</td>
<td>160</td>
<td>.917</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>146.703</td>
<td>161</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Between Groups</td>
<td>Within Groups</td>
<td>Total (Combined)</td>
<td>Between Groups</td>
<td>Within Groups</td>
</tr>
<tr>
<td>----------------</td>
<td>----------------</td>
<td>---------------</td>
<td>------------------</td>
<td>----------------</td>
<td>---------------</td>
</tr>
<tr>
<td>Fear * Frame</td>
<td></td>
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<td>.022</td>
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<td>425.586</td>
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<tr>
<td>INT * Frame</td>
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<td>4.745</td>
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<td></td>
<td></td>
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<td>286.809</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 5.1 Statistical Model:** See the above figure for the variable effect outputs.
QUALITATIVE DATA ANALYSIS

Further, this study also collected some data, which was qualitative in nature using four open-ended questions. The qualitative data was grouped by frequency and also coded and grouped based upon themes expressed by participants in their open-ended responses. The themes used here for grouping were the following: desire to quit vaping, desire to continue vaping, motivation to act/share info about vaping, neutral, negative view of vaping, positive view of vaping, beliefs that vaping is unhealthy, beliefs that vaping is a healthier alternative, fear, uncertainty, other emotion, other. The open-ended questions at the end of the questionnaire were as follows: “What do you think are some of the advantages of vaping?” “What do you think are some of the disadvantages of vaping?” “In what way(s) if any would you say that this experience has affected your intentions to vape or not?” “In what way(s) if any would you say that this experience has influenced you to encourage those in your social circle to not vape?” “Since you answered yes to the previous question (you will remember the message you were shown when you encounter vaping information), why do you believe so? What aspects of the vaping message that you encountered made it memorable to you?”

There are several takeaways that stood out from the analysis of the qualitative data yielded from the open-ended questions. In addition to the patterns and themes recorded in the table at the end of this chapter (Table 5.4 pg. 55). Beginning with question 104, “In what way(s) if any would you say that this experience has influenced you to encourage those in your social circle to not vape?” The frequency data for this question in the table on pg. 66-67 displays that most participant responses to this question represented a “neutral” position (N = 81) and responses that mentioned “taking action or
sharing this information with others” (N = 55). Specifically, among the neutral open-ended responses a vast majority of participants’ rationale for this choice was related to the perceived autonomy of others around them. Responses such as “those in my social circle are adults and can make their own decisions” or “I don’t believe in trying to sway or tell others what they should do” were common responses. In the context of this question a different sample may have responded in a different manner. It is plausible that a younger, collegiate, or adolescent sample could have noted more peer-approval, recommendations, and normative influences. However, the adult participant sample within this current study described high levels of decision-making autonomy and a desire to not interfere with the decisions of those in their social circle, even in situations where they acknowledged vaping as presenting health risks and not something they would do themselves.

It is notable and interesting that for question 104, which asked the participants to explain why they found the information they had viewed memorable; most participants recorded an answer related to listing some type of fear as a motivator to recall health risks related to vaping mentioned in the study (“fear” N = 73). Beyond this, responses for why the information was memorable were more varied in nature and coded as “other” (N = 37). Among these “other” responses many participants specifically named the visual stimuli as effective and stated that it was presented/framed in a memorable way. Some participants simply stated that the recency of the information made it memorable to them, but they were unsure how long they would retain it. Other participants stated that when they were discussing vaping socially or saw information about the health risks of vaping the stimuli messaging about the link between vaping and infections would be the first
thing on their mind. A small portion of the responses cited reasons like believing the information was false in nature or the presence of the CDC logo as alternative reasons for remembering this information. The analysis and coding of the qualitative data in the form of open-ended responses are presented in Table 5.4 (pg. 55).

Table 5.4: Open-Ended Questions Qualitative Data

<table>
<thead>
<tr>
<th>Theme &amp; Frequency:</th>
<th>Q: What do you think are some advantages of vaping?</th>
<th>Q: What do you think are some disadvantages of vaping?</th>
<th>Q: In what way(s) if any would you say that this experience has affected your intentions to vape or not?</th>
<th>Q: In what way(s) if any would you say that this experience has influenced you to encourage those in your social circle to not vape?</th>
<th>Q: What aspects of the vaping message that you encountered made it memorable to you?</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vaping is unhealthy:</td>
<td><strong>Ex:</strong> “There is no advantage to vaping.” (N = 19)</td>
<td><strong>Ex:</strong> “Everything. Cost, damage to health, not attractive, addictive.” (N = 142)</td>
<td><strong>Ex:</strong> “I am more aware that vaping can cause infections.” (N = 8)</td>
<td><strong>Ex:</strong> (Na/)</td>
<td><strong>Ex:</strong> (Na/)</td>
<td>N = 162</td>
</tr>
<tr>
<td>Vaping is a healthier alternative:</td>
<td><strong>Ex:</strong> “Can control the amount of nicotine” (N = 3)</td>
<td><strong>Ex:</strong> “I truly do not see any major ones.” (N = 2)</td>
<td><strong>Ex:</strong> (Na/)</td>
<td><strong>Ex:</strong> “I will not encourage anyone not to vape.” (N = 2)</td>
<td><strong>Ex:</strong> (Na/)</td>
<td>N = 162</td>
</tr>
<tr>
<td>Category</td>
<td>Ex: (Na/)</td>
<td>Ex: “Risk of lung cancer and serious health problems.” (N = 9)</td>
<td>Ex: “It makes me worry about having healthy lungs.” (N = 8)</td>
<td>Ex: “I would talk to them about the dangers of vaping and risk for infections.” (N = 5)</td>
<td>Ex: “because the message was clear, the visuals were effective and it’s scary to vape under any circumstances.” (N = 73)</td>
<td>N = 162</td>
</tr>
<tr>
<td>----------------------</td>
<td>-----------</td>
<td>----------------------------------------------------------------</td>
<td>---------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------</td>
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<tr>
<td>Neutral:</td>
<td>Ex: “Na.” (N = 7)</td>
<td>Ex: “Hasn’t changed them in any way.” (N = 66)</td>
<td>Ex: “I can’t convince others, they are adults.” (N = 81)</td>
<td>Ex: (Na/)</td>
<td>N = 162</td>
<td></td>
</tr>
<tr>
<td>Fear:</td>
<td>Ex: (Na/)</td>
<td>Ex: “Risk of lung cancer and serious health problems.” (N = 9)</td>
<td>Ex: “It makes me worry about having healthy lungs.” (N = 8)</td>
<td>Ex: “I would talk to them about the dangers of vaping and risk for infections.” (N = 5)</td>
<td>Ex: “because the message was clear, the visuals were effective and it’s scary to vape under any circumstances.” (N = 73)</td>
<td>N = 162</td>
</tr>
<tr>
<td>Desire to socially share</td>
<td>Ex: (Na/)</td>
<td>Ex: “Want to find out more”</td>
<td>Ex: “Make sure me and others get”</td>
<td>Ex: “By telling them it is harmful to their health.”</td>
<td>Ex: “To am curious to look and find out”</td>
<td>N = 162</td>
</tr>
<tr>
<td>Info about vaping/act:</td>
<td>(Na/)</td>
<td>vapes that are 3rd party tested,” (N = 1)</td>
<td>(N = 55)</td>
<td>more about this.” (N = 1)</td>
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<tr>
<td>Other:</td>
<td><strong>Ex:</strong> (Na/)</td>
<td><strong>Ex:</strong> “People don’t know if they need to quit.” (N = 3)</td>
<td><strong>Ex:</strong> “I am less likely to vape and it makes me feel guilty.” (N = 2)</td>
<td><strong>Ex:</strong> “I think it would be beneficial if my friends did not vape.” (N = 5)</td>
<td><strong>Ex:</strong> “Because I’ve seen it so recently I will remember it.” (N = 37)</td>
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CHAPTER 6

DISCUSSION

This dissertation study sought to accomplish two primary research objectives. These objectives were the following: 1) To expand and test the theory of planned behavior (TPB) model in the context of examining U.S. adults’ intentions to vape. This expansion included the variable of fear and the experimentally manipulated independent variables of gain/loss framing and a visual warning, in combination with the main predictive variables of the TPB model, which are attitudes, norms, and perceived behavioral control. Secondly, this dissertation study was unique in design, as it utilized an online experiment to test gain/loss framing. 2) While also testing the presence of a gain/loss framed visual warning, in comparison with just text-based gain/loss framing. The online experiment used within this study contained four conditions. 1) Gain framed with visual; 2) Loss framed with visual; 3) Gain framed with text; 4) Loss framed with text.

There were no significant main effects or indirect effects found. Interestingly though a Pearson’s correlation test revealed that the mediating variable of Fear was strongly correlated with the other predictive variables of attitudes, perceived behavioral control, and norms at the .01 level (2-tailed) and also correlated with the dependent variable of intentions at the .05 level (2-tailed). [Fear/Attitude = .758**; Fear/Norms = -
.587**; Fear/PBC = .249**; Fear/Intentions = .228*]. These correlations between the variables are shown in Table 5.2. The variable of fear was not shown to mediate or influence behavioral intentions to vape in the manner hypothesized. However, the correlations between the other variables and fear are important to note as fear warrants consideration as a factor in future behavioral studies. Although, the participants’ intentions to vape did not significantly change both the quantitative and qualitative data collected in this study denotes that participants did experience fear while being exposed to the stimuli. However, the fearful reaction or simply the presence of fear through the stimuli was not enough to alter their intentions to vape.

This finding can be potentially explained by a few areas of thought. First, the control questions regarding past vaping history and current vaping status (within the past 30 days) show that over 70% of the participant sample for this study were current vapers. This not only allows for bias to be present through their self-reporting of their own future intentions to vape. Another potential explanation is that similar to cigarette smoking or other substances current users are aware of information and risks to undertaking the behavior to the point where they are able to notice the presence of fear and feel the emotion when exposed to the stimuli information. However, this information ultimately has no impact on their intentions to vape as the current user feels addicted to the behavior. Or as previous TPB studies have referenced as the target behavior is at the habit level it becomes more subconscious and engrained in the nature of the individual’s behavioral processes. Moreover, this study still contains several meaningful implications.

6.1 FUTURE IMPLICATIONS
Practical implications for this study include testing the impact of visual-based stimuli on attitudes, perceived behavioral control, and behavioral intentions for vaping among an adult population, showing promise as a stimulus for related behavioral contexts in future studies. The 2 X 2 online experiment was a method rarely applied in past studies to test the TPB model, so this design provided a jumping off point for future studies to further evidence the effectiveness of this approach as a fruitful direction to measure and understand behavioral intentions for many target behaviors going forward. Additionally, the application of visual stimuli among a U.S. adult population has provided another potential avenue for measuring similar behavioral intentions and outcomes among other samples, such as adolescent and teen populations. Also, the addition of fear and further exploring in future research designs the strong correlations to TPB variables revealed here could be a fruitful avenue for future studies. Lastly, measurement items for all variables recorded high reliability coefficients and validity lending for future use to gather more data and reliably test additional applications in this focal area with the result hopeful of informing more efficient future behavioral health interventions.

Although TPB has been tested and verified numerous times as a consistent and reliable predictor of intentions for various behaviors, intentions remain a cognitive level measure and therefore not able to probe affective level interactions and is not capable of fully predicting or observing the actual adoption of the target behavior. Therefore, the presently proposed design of my dissertation study would have potentially fruitful applications for health communicators and practitioners in designing research supported, visual-laden interventions attempting to mitigate vaping use among U.S. adults.

6.2 LIMITATIONS
Potential limitations for the data collection include the potential for participants to be hesitant or untruthful when disclosing their behaviors such as smoking or vaping in the pretest and posttest questionnaires. However, controlling for potential confounding influences and exposure to stimuli from which the participants’ answers ought to be based are some of the measures in place hopeful of mitigating any sampling error.

Additionally, the use of an online experiment for this study recruited a smaller sample size as compared to that of other methods, which have previously applied the TPB model, such as a survey. The potential also exists for sample-based limitations on this study as only adults were able to participate. As, the sample size was relatively small to expect effect sizes within the context of this 2 X 2 design. Although for the total sample (N = 162), due to incompletes or other reasons the response measures for the dependent variable of behavioral intentions only 89 of the response cases were valid when the model was run.

However, as a fit for the context and purposes of this study an experiment is thought to be optimal to accurately test and observe cause and effect relationships for participants’ behavioral intentions to vape. Additionally, a power analysis was conducted and given a 2 X 2 experimental design the participant sample can be seen as proper to measure these proposed effects with good validity. Drawing from a larger and more diverse sample population in the future could lead to substantially different findings.

6.3 CONCLUSION

In conclusion, this dissertation tested an expanded TPB model with the inclusion of fear, as an additional variable using a 2 X 2 online experiment. This study also used visual stimuli to manipulate gain/loss framing along with text to predict behavioral
intentions to vape among a U.S. adult sample. Although the results from this sample were not significant this study still provided meaningful insights. Among these the variable of fear was found to be strongly correlated with the other variables. This shows that although a significant main effect was not found the variable of fear should be explored further as a mediating or moderating influence on behavioral intentions for not only vaping but other potential health behaviors that are associated with varying levels of risk.

Further, when comparing the means from the descriptive statistics in the measurement data it can be seen that perceived behavioral control is an important factor to individuals in this context and that these individuals feel highly in control of their decision whether to vape or not as the mean for the perceived behavioral control scale was at the very high end of the 7-point Likert scale (PBC: $M = 6.22$; highest rated item: “it is my decision whether I vape or not.” $M = 6.56$). On the other end of the scale the lowest mean among all items was the following item measuring norms, “most people who are important to me would approve of my vaping.” ($M = 2.51$). Lastly, the item, “vaping is addictive” scored highest among the attitudinal measures ($M = 5.91$).

Although no significant effects were found to influence participants’ intentions to vape there are findings in this dissertation that are interesting and warrant further testing and consideration within future research designs.

For instance, the notion that individuals comprehend the addictive nature of vaping including the risks, admit that those important to them in their lives do not want them vaping, and further report feeling fearful but continue to vape is counterintuitive in nature. Although, it does provide support for the notion that those who vape regularly are severely addicted to vaping and it has a very strong influence on their decision-making.
These insights should serve as a cornerstone for future research studies and if measured among a larger sample, recruiting younger participants and with the inclusion of new types of stimuli possess real potential to uncover significant and meaningful findings, which vaping interventions could be built around going forward.
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APPENDIX A

PRETEST QUESTIONAIRE:

Start of Block: Informed Consent

Q18 **Informed consent & invitation to participate:**
Thank you for your interest in participating in this research. It should take approximately 15 minutes to complete. Your participation in this study is 100% anonymous, voluntary, and confidential. The purpose of this research is to better understand the impact of vaping related messages on U.S. adults. You will be asked to answer questions, view a message presented to you, and indicate your agreement or disagreement with several statements. If you are uncomfortable with the statements or any of the questions, you may discontinue your participation at any time. Your identity will not be linked to the questionnaire you complete. This research has been reviewed and approved by the IRB at the University of South Carolina. Questions about participants’ rights as research subjects should be directed to Thomas Coggins, Director of the USC Office of Research Compliance (803-777-7095, tcoggins@mailbox.sc.edu). Any questions concerning this research project should be directed to the principal investigator Carl A. Ciccarelli (ciccarc@email.sc.edu).

Q19 Please indicate your voluntary agreement to participate in this study by selecting “agree to participate” below. I have read and understood the above consent form and desire of my own free will to participate in this study.

- [ ] Agree to participate (1)
- [ ] Do not agree to participate (2)

*Skip To: End of Survey If Please indicate your voluntary agreement to participate in this study by selecting “agree to part... = Do not agree to participate*
Q34 Are you currently an undergraduate student?

- No (21)
- Yes (22)

**Skip To: End of Survey If Are you currently an undergraduate student? = Yes**

Q35 Are you currently under 22 years of age?

- No (21)
- Yes (22)

**Skip To: End of Survey If Are you currently under 22 years of age? = Yes**

End of Block: Informed Consent

Start of Block: Demographics/control block
Q33 Please select the following option that best corresponds with your current age:

- 22-25 (1)
- 26-30 (2)
- 31-35 (3)
- 36-40 (4)
- 41-45 (5)
- 46-50 (6)
- 51-55 (7)
- 56-60 (8)
- 61-65 (9)
- 66-70 (10)
- 70+ (11)
- Other (12)

Please indicate your gender:

- Male (1)
- Female (2)
- Non-binary (3)
- Other (4)
- Prefer not to disclose (5)
Q2 What do you consider your primary race?

- American Indian or Alaska Native (1)
- Asian (2)
- Black or African American (3)
- Native Hawaiian or Other Pacific Islander (4)
- Hispanic or Latinx (5)
- White or Caucasian (6)
- Multi-Racial (7)
- Other (8)
- Prefer not to disclose (9)

Q3 Which of the following corresponds with the highest level of education you have completed?

- GED (1)
- High school degree (2)
- Associate's degree (3)
- Bachelor's degree (4)
- Master's degree or equivalent (5)
- Doctoral/terminal level degree (6)
- Other (7)
- Prefer not to disclose (8)
Q42 Which of the following choices best corresponds with your political party affiliation:

- Democrat (1)
- Republican (2)
- Independent (3)
- Unaffiliated (4)
- Other (5)
- Prefer not to disclose (6)

Q43 Which of the following choices most closely corresponds with your annual household income range:

- < $20,000 (1)
- $20,000 - $49,999 (2)
- $50,000 - $99,999 (3)
- $100,000 + (4)
Q4 In an average day how many hours do you spend consuming news media?

- No time (1)
- Less than 2 hours (2)
- 4 hours or more (3)
- 6 hours or more (4)
- 8 hours or more (5)

Q5 Which of the following social media platforms do you use most frequently? (please select all that apply)

- Facebook (1)
- Twitter (2)
- Instagram (3)
- LinkedIn (4)
- Snapchat (5)
- Other (6)
Q6 In an average day how much combined time do you spend consuming social media content across each of the social media platforms mentioned in question 5?

- No time (1)
- Less than 2 hours (2)
- 4 hours or more (3)
- 6 hours or more (4)
- 8 hours or more (5)

Q109 What is your current relationship status?

- Single (1)
- Casual relationship (2)
- Serious relationship (3)

Q110 How would you describe your current overall health status?

- Very good health (1)
- Above average health (2)
- Average health (3)
- Poor health (4)
- Currently have one or more serious health conditions/concerns (5)
Q107 Do you live in the same household as someone who smokes cigarettes?

- Yes, I live with multiple people other than myself who smoke cigarettes (1)
- Yes, I live with one person other than myself who smokes cigarettes (2)
- No, I do not live with anyone who smokes cigarettes (3)
- I live by myself (4)

Q7 Do you currently smoke cigarettes?

- No (1)
- Yes (2)

Q8 Have you ever smoked cigarettes?

- No (1)
- Yes (2)

Q108 Do you live in the same household as someone who vapes?

- Yes, I live with multiple people other than myself who vape (1)
- Yes, I live with one person other than myself who vapes (2)
- No, I do not live with anyone who vapes (3)
- I live by myself (4)
Q9 Do you currently vape (within the past 30 days)?

- No (1)
- Yes (2)

Q18 Have you ever vaped (even only 1-2 puffs)?

- No (1)
- Yes (2)

**Display This Question:**

If Do you currently vape (within the past 30 days)? = Yes

Q19 How many of the past 30 days have you vaped?

- None (7)
- 1-2 days (1)
- 3-5 days (2)
- 6-9 days (3)
- 10-19 days (4)
- 20-29 days (5)
- Daily (6)

**Display This Question:**

If Have you ever vaped (even only 1-2 puffs)? = Yes
Q20 When was the first time you ever vaped?

- Never (1)
- In the past week (2)
- In the past 30 days (3)
- In the past 3 months (4)
- In the past 6 months (5)
- In the past year (6)
- More than a year ago (7)

Q21 Do you currently own at least one vaping device?

- No (1)
- Yes (2)

Display This Question:
If Have you ever vaped (even only 1-2 puffs)? = No

Q22 Do you think you would vape in the next 6 months?

- Yes (1)
- No (2)

Display This Question:
If Have you ever vaped (even only 1-2 puffs)? = No
Q23 Are you curious about vaping?

- Yes (1)
- No (2)

End of Block: Demographics/control block

Start of Block: Pre-stimuli Attitude

Q47 Vaping is a healthier alternative to smoking cigarettes.

- Strongly disagree (13)
- Disagree (14)
- Somewhat disagree (15)
- Neither agree nor disagree (16)
- Somewhat agree (17)
- Agree (18)
- Strongly agree (19)
Q49 Vaping is addictive.

- Strongly disagree (13)
- Disagree (14)
- Somewhat disagree (15)
- Neither agree nor disagree (16)
- Somewhat agree (17)
- Agree (18)
- Strongly agree (19)

Q48 Vaping would cause me to feel embarrassed.

- Strongly disagree (16)
- Disagree (17)
- Somewhat disagree (18)
- Neither agree nor disagree (19)
- Somewhat agree (20)
- Agree (21)
- Strongly agree (22)
Q50 Vaping for me would be wise.

- Strongly disagree (16)
- Disagree (17)
- Somewhat disagree (18)
- Neither agree nor disagree (19)
- Somewhat agree (20)
- Agree (21)
- Strongly agree (22)

Q63 Vaping is harmful to my health.

- Strongly disagree (11)
- Disagree (12)
- Somewhat disagree (13)
- Neither agree nor disagree (14)
- Somewhat agree (15)
- Agree (16)
- Strongly agree (17)
Q64 It is important to me that I avoid vaping.

- Strongly disagree (11)
- Disagree (12)
- Somewhat disagree (13)
- Neither agree nor disagree (14)
- Somewhat agree (15)
- Agree (16)
- Strongly agree (17)

End of Block: Pre-stimuli Attitude

Start of Block: Pre-stimuli PBC

Q51 It is my decision whether I vape or not

- Strongly disagree (16)
- Disagree (17)
- Somewhat disagree (18)
- Neither agree nor disagree (19)
- Somewhat agree (20)
- Agree (21)
- Strongly agree (22)
Q54 The curiosity of vaping would encourage me to vape.

- Strongly disagree (16)
- Disagree (17)
- Somewhat disagree (18)
- Neither agree nor disagree (19)
- Somewhat agree (20)
- Agree (21)
- Strongly agree (22)

Q66 Adhering to regulations against vaping would prevent me from vaping.

- Strongly disagree (11)
- Disagree (12)
- Somewhat disagree (13)
- Neither agree nor disagree (14)
- Somewhat agree (15)
- Agree (16)
- Strongly agree (17)
Q53 I am confident that I can avoid vaping.

- Strongly disagree (16)
- Disagree (17)
- Somewhat disagree (18)
- Neither agree nor disagree (19)
- Somewhat agree (20)
- Agree (21)
- Strongly agree (22)

Q52 I feel that whether I vape or not is entirely up to me.

- Strongly disagree (16)
- Disagree (17)
- Somewhat disagree (18)
- Neither agree nor disagree (19)
- Somewhat agree (20)
- Agree (21)
- Strongly agree (22)
Q55 I feel that vaping is beyond my control.

- Strongly disagree (16)
- Disagree (17)
- Somewhat disagree (18)
- Neither agree nor disagree (19)
- Somewhat agree (20)
- Agree (21)
- Strongly agree (22)

Q65 I am in control with vaping.

- Strongly disagree (11)
- Disagree (12)
- Somewhat disagree (13)
- Neither agree nor disagree (14)
- Somewhat agree (15)
- Agree (16)
- Strongly agree (17)

End of Block: Pre-stimuli PBC

Start of Block: Pre-stimuli Norms
Q56 Most people who are important to me would approve of my vaping.

⊙ Strongly disagree (16)
⊙ Disagree (17)
⊙ Somewhat disagree (18)
⊙ Neither agree nor disagree (19)
⊙ Somewhat agree (20)
⊙ Agree (21)
⊙ Strongly agree (22)

Q59 The people in my life whose opinions I value vape.

⊙ Strongly disagree (16)
⊙ Disagree (17)
⊙ Somewhat disagree (18)
⊙ Neither agree nor disagree (19)
⊙ Somewhat agree (20)
⊙ Agree (21)
⊙ Strongly agree (22)
Q58 My family would not approve of my vaping.

- Strongly disagree (16)
- Disagree (17)
- Somewhat disagree (18)
- Neither agree nor disagree (19)
- Somewhat agree (20)
- Agree (21)
- Strongly agree (22)

Q57 My vaping would be acceptable to my closest friends.

- Strongly disagree (16)
- Disagree (17)
- Somewhat disagree (18)
- Neither agree nor disagree (19)
- Somewhat agree (20)
- Agree (21)
- Strongly agree (22)
Q67 It is socially acceptable for me to vape.

- Strongly disagree (11)
- Disagree (12)
- Somewhat disagree (13)
- Neither agree nor disagree (14)
- Somewhat agree (15)
- Agree (16)
- Strongly agree (17)

Q68 People who influence my decisions would think that I shouldn't vape.

- Strongly disagree (11)
- Disagree (12)
- Somewhat disagree (13)
- Neither agree nor disagree (14)
- Somewhat agree (15)
- Agree (16)
- Strongly agree (17)
Q69 I have lost friends because of my vaping.

○ Strongly disagree (11)
○ Disagree (12)
○ Somewhat disagree (13)
○ Neither agree nor disagree (14)
○ Somewhat agree (15)
○ Agree (16)
○ Strongly agree (17)

End of Block: Pre-stimuli Norms

Start of Block: Pre-stimuli Fear

Q70 I fear what other people will think of me if I vape.

○ Strongly disagree (11)
○ Disagree (12)
○ Somewhat disagree (13)
○ Neither agree nor disagree (14)
○ Somewhat agree (15)
○ Agree (16)
○ Strongly agree (17)
Q71 I am fearful of infections caused or worsened by vaping.

- Strongly disagree (16)
- Disagree (17)
- Somewhat disagree (18)
- Neither agree nor disagree (19)
- Somewhat agree (20)
- Agree (21)
- Strongly agree (22)

Q72 I feel fearful of vaping.

- Strongly disagree (11)
- Disagree (12)
- Somewhat disagree (13)
- Neither agree nor disagree (14)
- Somewhat agree (15)
- Agree (16)
- Strongly agree (17)
Q73 I fear potential risks of vaping.

- Strongly disagree (11)
- Disagree (12)
- Somewhat disagree (13)
- Neither agree nor disagree (14)
- Somewhat agree (15)
- Agree (16)
- Strongly agree (17)

Q74 Vaping is a serious threat to my health.

- Strongly disagree (16)
- Disagree (17)
- Somewhat disagree (18)
- Neither agree nor disagree (19)
- Somewhat agree (20)
- Agree (21)
- Strongly agree (22)

End of Block: Pre-stimuli Fear

Start of Block: Pre Behavioral Intentions
Q125 I intend to avoid vaping.

- Strongly disagree (13)
- Disagree (14)
- Somewhat disagree (15)
- Neither agree nor disagree (16)
- Somewhat agree (17)
- Agree (18)
- Strongly agree (19)

Q126 I would not vape.

- Strongly disagree (12)
- Disagree (13)
- Somewhat disagree (14)
- Neither agree nor disagree (15)
- Somewhat agree (16)
- Agree (17)
- Strongly agree (18)
Q127 I will not try vaping.

○ Strongly disagree (11)
○ Disagree (12)
○ Somewhat disagree (13)
○ Neither agree nor disagree (14)
○ Somewhat agree (15)
○ Agree (16)
○ Strongly agree (17)

End of Block: Pre Behavioral Intentions
APPENDIX B

POSTTEST QUESTIONNAIRE:

Start of Block: Post stimuli Attitude

Q77 After viewing the message presented to me I believe vaping is a healthier alternative to smoking cigarettes.

- Strongly disagree (11)
- Disagree (12)
- Somewhat disagree (13)
- Neither agree nor disagree (14)
- Somewhat agree (15)
- Agree (16)
- Strongly agree (17)
Q76 After viewing the message presented to me I believe vaping is addictive.

- Strongly disagree (11)
- Disagree (12)
- Somewhat disagree (13)
- Neither agree nor disagree (14)
- Somewhat agree (15)
- Agree (16)
- Strongly agree (17)

Q81 After viewing the message presented to me vaping would cause me to feel embarrassed.

- Strongly disagree (11)
- Disagree (12)
- Somewhat disagree (13)
- Neither agree nor disagree (14)
- Somewhat agree (15)
- Agree (16)
- Strongly agree (17)
Q80 After viewing the message presented to me I believe vaping for me would be wise.

- Strongly disagree (11)
- Disagree (12)
- Somewhat disagree (13)
- Neither agree nor disagree (14)
- Somewhat agree (15)
- Agree (16)
- Strongly agree (17)

Q79 After viewing the message presented to me I believe vaping is harmful to my health.

- Strongly disagree (11)
- Disagree (12)
- Somewhat disagree (13)
- Neither agree nor disagree (14)
- Somewhat agree (15)
- Agree (16)
- Strongly agree (17)
Q78 After viewing the message presented to me it is important to me that I avoid vaping.

- Strongly disagree (11)
- Disagree (12)
- Somewhat disagree (13)
- Neither agree nor disagree (14)
- Somewhat agree (15)
- Agree (16)
- Strongly agree (17)

End of Block: Post stimuli Attitude

Start of Block: Post stimuli PBC

Q82 After viewing the message presented to me I believe it is my decision whether I vape or not.

- Strongly disagree (11)
- Disagree (12)
- Somewhat disagree (13)
- Neither agree nor disagree (14)
- Somewhat agree (15)
- Agree (16)
- Strongly agree (17)
Q84 After viewing the message presented to me I believe the curiosity of vaping would encourage me to vape.

- Strongly disagree (11)
- Disagree (12)
- Somewhat disagree (13)
- Neither agree nor disagree (14)
- Somewhat agree (15)
- Agree (16)
- Strongly agree (17)

Q85 After viewing the message presented to me I believe adhering to regulations against vaping would prevent me from vaping.

- Strongly disagree (11)
- Disagree (12)
- Somewhat disagree (13)
- Neither agree nor disagree (14)
- Somewhat agree (15)
- Agree (16)
- Strongly agree (17)
Q88 After viewing the message presented to me I am confident that I can avoid vaping.

- Strongly disagree (11)
- Disagree (12)
- Somewhat disagree (13)
- Neither agree nor disagree (14)
- Somewhat agree (15)
- Agree (16)
- Strongly agree (17)

Q83 After viewing the message presented to me I feel that whether I vape or not is entirely up to me.

- Strongly disagree (11)
- Disagree (12)
- Somewhat disagree (13)
- Neither agree nor disagree (14)
- Somewhat agree (15)
- Agree (16)
- Strongly agree (17)
Q87 After viewing the message presented to me I feel that vaping is beyond my control.

- Strongly disagree (11)
- Disagree (12)
- Somewhat disagree (13)
- Neither agree nor disagree (14)
- Somewhat agree (15)
- Agree (16)
- Strongly agree (17)

Q86 After viewing the message presented to me I believe I am in control with vaping.

- Strongly disagree (11)
- Disagree (12)
- Somewhat disagree (13)
- Neither agree nor disagree (14)
- Somewhat agree (15)
- Agree (16)
- Strongly agree (17)
Q95 After viewing the message presented to me I believe most people who are important to me would approve of my vaping.

- Strongly disagree (11)
- Disagree (12)
- Somewhat disagree (13)
- Neither agree nor disagree (14)
- Somewhat agree (15)
- Agree (16)
- Strongly agree (17)

Q91 After viewing the message presented to me I believe the people in my life whose opinions I value vape.

- Strongly disagree (11)
- Disagree (12)
- Somewhat disagree (13)
- Neither agree nor disagree (14)
- Somewhat agree (15)
- Agree (16)
- Strongly agree (17)
Q94 After viewing the message presented to me I believe my family would not approve of my vaping.

- Strongly disagree (11)
- Disagree (12)
- Somewhat disagree (13)
- Neither agree nor disagree (14)
- Somewhat agree (15)
- Agree (16)
- Strongly agree (17)

Q89 After viewing the message presented to me I believe my vaping would be acceptable to my closest friends.

- Strongly disagree (11)
- Disagree (12)
- Somewhat disagree (13)
- Neither agree nor disagree (14)
- Somewhat agree (15)
- Agree (16)
- Strongly agree (17)
Q90 After viewing the message presented to me I believe it is socially acceptable for me to vape.

- Strongly disagree (11)
- Disagree (12)
- Somewhat disagree (13)
- Neither agree nor disagree (14)
- Somewhat agree (15)
- Agree (16)
- Strongly agree (17)

Q93 After viewing the message presented to me I believe people who influence my decisions would think that I shouldn't vape.

- Strongly disagree (11)
- Disagree (12)
- Somewhat disagree (13)
- Neither agree nor disagree (14)
- Somewhat agree (15)
- Agree (16)
- Strongly agree (17)
Q92 After viewing the message presented to me I believe I have lost friends because of my vaping.

○ Strongly disagree (11)
○ Disagree (12)
○ Somewhat disagree (13)
○ Neither agree nor disagree (14)
○ Somewhat agree (15)
○ Agree (16)
○ Strongly agree (17)

End of Block: Post stimuli Norms

Start of Block: Post stimuli Fear

Q99 The message presented to me made me fear what other people will think of me if I vape.

○ Strongly disagree (9)
○ Disagree (10)
○ Somewhat disagree (11)
○ Neither agree nor disagree (12)
○ Somewhat agree (13)
○ Agree (14)
○ Strongly agree (15)
Q100 The message presented to me made me fearful of infections caused or worsened by vaping.

- Strongly disagree (11)
- Disagree (12)
- Somewhat disagree (13)
- Neither agree nor disagree (14)
- Somewhat agree (15)
- Agree (16)
- Strongly agree (17)

Q98 The message presented to me made me feel fearful of vaping.

- Strongly disagree (11)
- Disagree (12)
- Somewhat disagree (13)
- Neither agree nor disagree (14)
- Somewhat agree (15)
- Agree (16)
- Strongly agree (17)
Q97 The message presented to me made me fear the potential risks of vaping.

- Strongly disagree (11)
- Disagree (12)
- Somewhat disagree (13)
- Neither agree nor disagree (14)
- Somewhat agree (15)
- Agree (16)
- Strongly agree (17)

Q96 The message presented to me made me believe vaping is a serious threat to my health.

- Strongly disagree (11)
- Disagree (12)
- Somewhat disagree (13)
- Neither agree nor disagree (14)
- Somewhat agree (15)
- Agree (16)
- Strongly agree (17)

End of Block: Post stimuli Fear

Start of Block: Post Behavioral Intentions
Q122 After viewing the message presented to me I intend to avoid vaping.

- Strongly disagree (13)
- Disagree (14)
- Somewhat disagree (15)
- Neither agree nor disagree (16)
- Somewhat agree (17)
- Agree (18)
- Strongly agree (19)

Q123 After viewing the message presented to me I would not vape.

- Strongly disagree (13)
- Disagree (14)
- Somewhat disagree (15)
- Neither agree nor disagree (16)
- Somewhat agree (17)
- Agree (18)
- Strongly agree (19)
Q124 After viewing the message presented to me I will not try vaping.

○ Strongly disagree (13)
○ Disagree (14)
○ Somewhat disagree (15)
○ Neither agree nor disagree (16)
○ Somewhat agree (17)
○ Agree (18)
○ Strongly agree (19)

End of Block: Post Behavioral Intentions

Start of Block: Open-ended questions

Q101 What do you think are some of the advantages of vaping?

________________________________________________________________

________________________________________________________________

Q102 What do you think are some of the disadvantages of vaping?

________________________________________________________________

________________________________________________________________

Q103 In what way(s) if any would you say that this experience has affected your intentions to vape or not?

________________________________________________________________

________________________________________________________________
Q104 In what way(s) if any would you say that this experience has influenced you to encourage those in your social circle to not vape?

________________________________________________________________

Q105 Do you think that you will remember the message your were shown the next time you encounter information about vaping either online or in-person?

○ No (21)
○ Yes (22)

Display This Question:
If Do you think that you will remember the message your were shown the next time you encounter infor... = Yes

Q106 Since you answered yes to the previous question, why do you believe so? What aspects of the vaping message that you encountered made it memorable to you?

________________________________________________________________

End of Block: Open-ended questions

Start of Block: Code

Q121 Please click submit and proceed to the end of survey page to complete this questionnaire. Then once you've submitted please enter this code back in the Amazon Mechanical Turk page to verify your survey completion and collect your compensation for participation.
Code: 1252

End of Block: Code
APPENDIX C

STIMULI:

Condition # 1

If you quit vaping, your body’s ability to fight off infections will significantly increase within the first few months.
If you vape you will have an increased risk for infections.

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If you vape you will have an increased risk for infections.