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The Role of Threat and Efficacy in Anti-Vaping Ads: A Test of the Extended Parallel Process Model

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The Role of Threat and Efficacy in Anti-Vaping Ads:

A Test of the Extended Parallel Process Model

by

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Abstract

Often thought of as a safer alternative to traditional cigarettes, electronic cigarette use among youth and young adults has steadily increased over the past 10 years. With over 34 percent of high school students and over 7.8 percent of young adults using electronic cigarettes, organizations like the CDC and the FDA have created campaigns and advertisements to combat the epidemic (Truth Initiative). This study uses a 2x2 between subject factoral experiment to gain insights into how varying levels of anti-vaping advertisements' threat and efficacy elements effect college age students' perceptions and behaviors towards e-cigarettes. While several of the study's hypotheses returned insignificant findings, the researcher identifies several significant relationships that may be useful to organizations creating future anti-vaping advertisements. Findings suggest that men may be less affected by anti-vaping ads than women as they expressed less overall fear and perceived threat in regard to electronic cigarettes.

Introduction

As vaping continues to rise in popularity, more and more young adults are being exposed to the harmful chemicals found in electronic cigarettes. Although e-cigarette manufacturers market their products as being "safer" than traditional cigarettes, Tobore (2019) explains that either option puts developing brains at risk. The liquid concoctions used in e-cigarettes contain chemicals such as vegetable glycerin and propylene glycol, which according to researchers, are believed to have "varying effects on the body" (Dula, 2016). Additionally, researchers have found that when heated, the liquid used in e-cigarettes has the potential to grow harmful toxins such as formaldehyde (Uchiyama, et al, 2013, and Jensen, et al, 2015, cited in Korfei, 2018). While some immediate risks have been identified, there is very little known about the potential effects of prolonged electronic cigarette use.

To deter young adults from picking up the habit, or encourage those who have started to quit, organizations such as the Truth Initiative, U.S. Department of Health, and Centers for Disease Control have begun creating and disseminating anti-vaping materials and advertisements. These ads use a variety of tactics, but most commonly rely on fear to scare their audience into an attitude or behavior change.

For over 25 years, researchers have been using Witte's Extended Parallel Process Model to better understand the effects that fear appeal messages have on consumers. While prior research has examined how effective these types of ads are in discouraging traditional cigarette smoking, there has been little work done to understand the effect these ads have on today's young adults in regard to vaping and electronic cigarettes. In this study, participants are first

exposed to one of four advertisement manipulations (high threat/high efficacy, high threat/low efficacy, low threat/high efficacy, or low threat/low efficacy) and then asked to fill out a questionnaire revealing their level of fear, perceived threat, self-efficacy, attitudes and intentions toward vaping e-cigarettes. This study looks to give insights into how varying levels of anti-vaping advertisements' threat and efficacy elements effect college age students' perceptions and behaviors towards e-cigarettes. The researcher hopes the results will provide valuable information that can be used by advertisers to create anti-vaping ads in the future.

Definitions of Key Concepts

In order to clearly define the terms used in the study, definitions from the Merriam Webster Dictionary are adopted.

Merriam-Webster defines vape / vaped / vaping as:

> *To inhale vapor through the mouth from a usually batter-operated electronic device (such as electronic cigarette) that heats up and vaporizes a liquid or solid*

Merriam-Webster defines electronic cigarette / e-cigarette as:

> *A battery-operated device that is typically designed to resemble a traditional cigarette and is used to inhale a usually nicotine-containing vapor*

Merriam-Webster defines fear as:

> *An unpleasant often strong emotion caused by anticipation or awareness of danger*

Merriam-Webster defines efficacy as:

> *The power to produce an effect*

Literature Review

Fear Appeals

The idea of fear appeals has been studied and analyzed by researchers for over 60 years. According to Hoog and Stroebe (2007), fear appeals refer to communication efforts that arouse fear, relying heavily on negative outcomes to persuade audiences to change certain behaviors. Fear appeals generally present a threat as well as solutions or actions that can be taken to avoid or mitigate that threat. An example of this is an anti-smoking ad that shares the story of a woman who's longtime smoking habit has led to the need for a tracheostomy. While speaking through a hole in her neck, the woman explains how smoking caused her condition and suggests that staying away from cigarettes can help you avoid needing a tracheostomy yourself (Figure 4A).

Fear appeals have been studied since the 1950's. Hovland, Janis and Kelly (1953) developed the Fear-as-Acquired Drive Model, claiming fear had the ability to create tension and motivate change. However, it would later be discovered that creating too much fear may cause an individual to experience a sense of defensiveness and avoidance (Leventhal, 1970, 1971).

In the 1970's Leventhal developed the Parallel process model which focused on cognitive processes rather than emotional ones. In this model, it was thought that behavior changes were made based on the desire to control the danger at hand, not control the evoked fear (Leventhal, 1970, 1971). Although the model was eventually proven flawed, Witte (1992) said "[It] offered a useful distinction between cognitive and emotional reactions to fear appeals."

Rogers (1983) and Sutton (1982) built upon previous research by bringing the construct of efficacy to the conversation. The addition of efficacy to fear appeals allowed researchers to

better understand how audiences viewed a threat's proposed solutions. Researchers found that if audiences felt like the solutions were obtainable and easy to achieve, they were more likely to conform in an effort to mitigate the threat at hand, however if the solution seemed out of reach or unattainable, people became more likely to ignore the threat.

Continuing to build on the work of researchers before her, Witte (1992) began looking at not only the reasons why fear appeals motivated audiences, but also why, at times, they were proven ineffective. Her work culminated in what is now known as the Extended Parallel Process Model (EPPM). The theory has been used in thousands of studies, across a variety of areas including disaster preparedness, cancer diagnosis, consumption of certain foods and drugs and pollution, among many other health-related topics.

Birmingham et al. (2015) defines the EPPM as follows:

> *The EPPM focuses on channeling fear in a protective direction rather than a maladaptive direction. The model is based on the idea that when individuals fear a threat, they will be motivated to take action to reduce the unpleasant state. Fear can then be reduced by adaptive actions to control the danger or by maladaptive actions to control the fear.*

Redmond, Dong and Frazier (2014) used the Extended Parallel Process model to better understand women's fears of prenatal physical activity. The researchers looked at messages targeting expecting mothers and worked to uncover how it made them feel. The study found that efficacy and women exercising had a direct correlation. If efficacy was high, women tended to

be more likely to work out while pregnant. The group also found that messaging around prenatal exercise needed to be looked at further and ultimately needed improvement.

In another study, Batchelder and Matusitz (2014) take a closer look at the "Let's Move" campaign, Michelle Obama's effort to curb obesity and promote regular exercise. The authors use the EPPM model to look at how the campaign tried to persuade its audience. Using messaging that explains potential diseases and other negative effects associated with obesity, the campaign looked to "scare" parents into getting their children up and moving.

Constructs of the EPPM

The Fear Appeal process, and more specifically the Extended Parallel Process Model is based on three main components or constructs; fear, threat and efficacy. The three work in tandem and are the factors that ultimately lead audiences to take actions towards mitigating risks or actions to avoid the presented risk altogether.

Popova (2012) explains fear as "a negative emotional reaction to a perceived threat." For example, telling a someone that not vaccinating will lead to Chicken Pox may lead to that person experiencing fear associated with contracting the infectious disease.

She goes on to explain that the threat is what the audience is fearing. In this case, Chicken Pox, and all of the potentially negative side effects that go with it, are the threat. However, not every audience member will perceive the threat the same way (Popova, 2012). If an audience member has already had chicken pox it is likely that they won't contract the disease again. This person may not perceive the threat as severe as someone who hasn't been exposed to chicken pox yet, because they are at a much lower risk. Fear appeal messages rely on high threat levels in order to motivate an individual to consider the recommended action. If the individual

does not feel susceptible to the threat at hand, they are unlikely to continue processing the message (Shi, et. al, 2019). This leads to the notion that non-smokers will feel less fear when exposed to the anti-vaping advertisements.

The third construct, efficacy, deals with how the audience perceives their ability to mitigate the threat at hand. In the Chicken Pox example, the solution may be as simple as going to the doctor and getting a shot, which for some audiences, may feel easily achievable, resulting in high efficacy. When efficacy is high, there is a greater likelihood that person will take the steps needed to protect themselves. However, when the solution seems too big or unattainable, people may experience low efficacy, making them more likely to ignore or avoid the threat (Witte, 1992).

The three main constructs of the EPPM directly correlate with one another. Depicted in Figure 5A of the appendix (Witte et al, 1998), a message is delivered to the receiver who in turn perceives both the threat (susceptibility and severity) and the efficacy (attainability of solution). The receiver will then feel a level fear and react based on their perceptions of the threat and efficacy. If the individual believes that the threat is severe and the solution is attainable, he or she will accept the message and do what is needed to mitigate the threat. If the individuals fear is met with the notion that the solutions is unattainable, he or she will likely reject the message and use defensive mechanisms to avoid or ignore the threat altogether. Leventhal (1970, 1971) explained that instilling the right amount of fear in an audience is key to whether the message is effective or not. Creating a sense of too much fear will cause the audience to shut down and begin the fear control process rather than the danger control process.

E-Cigarettes and Potential Health Risks

Electronic cigarettes made their way to market in 2007 as an alternative option to smoking traditional cigarettes (Prono, 2019). The new, nearly odorless product allowed individuals to enjoy nicotine in a discrete and potentially more desirable way. Offered by a number of different brands in an array of flavors, vaping quickly became a popular behavior, especially among teens and young adults. According to a 2019 study by the Truth Initiative, 34 percent of high school students had used an electronic cigarette at least once, and 7.8 percent of young adults (ages 18-24) reported use some days or daily (Truth Initiative).

Although there is still little known about the long-term effects of vaping electronic cigarettes, many studies have been and are currently being conducted on the potentially harmful short-term effects. According to Liu et al. (2020), while electronic cigarettes do contain a significantly less amount of chemicals than traditional cigarettes, the chemicals that are used still pose a threat, and the harmful effects of added metals and other complex compounds may carry many unknown risks. Polosa, Farsalinos and Prisco (2019 explain the potential impact on the rate of diseases like cancer cannot be assessed due to the short-term availability of the products.

Cited in Ruszkiewicz et al. (2020), Cho et al. (2016) connects electronic cigarettes to a higher risk of asthma and other respiratory issues among teens and young adults. The CDC (2020) notes that e-cigarettes have been connected to more than 2500 hospital cases related raspatory failure.

Brett et al. (2019) examined how electronic cigarettes impacted sleep in young adults. Findings suggest that much like traditional cigarettes, electronic cigarettes have a significant effect on sleep health, noting that even occasional users can be negatively impacted. Brett et al.

(2019) cites nicotine as the main factor leading to poor sleep quality and insomnia among college age students.

In addition to the known dangers of prolonged nicotine use, researchers have also found that harmful toxins have the ability to grow when the ingredients used to make e-cigarette liquid are heated (Uchiyama, et al, 2013, & Jensen, et al, 2015, cited in Korfei, 2018). In a study testing the effects of electronic cigarette liquids on mice, researchers found evidence to support links to oxidative stress and increased production of inflammatory cytokines, among other potential health risks (Lerner, et. al, 2015, cited in Korfei, 2018).

Tobore (2019) explains that developing brains are particularly susceptible to the negative effects of both traditional and electronic cigarettes. The liquids used to create the smokable substance found in e-cigarettes is known to contain propylene glycol and/or vegetable glycerin; ingredients experts say have "varying effects on the body" (Dula, 2016).

While the vapor that results from puffing on an electronic cigarette is near odorless and appears to dissipate within seconds, Li et al. (2020) have found that the emissions last much longer than one may think, causing potential health issues to those who encounter secondary effects (much like secondhand smoke).

Ultimately deemed unsafe, researchers do admit that electronic cigarettes likely cause less damage to an individual's health than would the use of traditional cigarettes (Li et al., 2020). According to MacDonald and Middlekauff (2019), traditional cigarette use is at an all-time low, however notes that electronic cigarette use has quickly and dramatically risen. Callahan-Lyon (2014) notes that no electronic cigarettes have been approved by the FDA as a safe alternative or cessation tool to traditional cigarettes.

Anti-Smoking Advertisements

In order to combat the rise in electronic cigarette use, organizations like the CDC, Truth Initiative, FDA, and others, have begun producing anti-vaping advertisements to inform teens and young adults about the potential health risks associated with the use of these products. While some use comedic elements to get the point across, the many of these types of ads use fear appeals in an attempt to scare individuals from picking up or continuing the habit.

According to the FDA, these campaigns have been successful, claiming that between 2014 and 2016, anti-vaping ads prevented nearly 350,000 teens from trying electronic cigarettes. These numbers, however, appear inconsistent with the known rise in electronic cigarette use, as previously noted.

While little research has been conducted on the effect of fear appeals in anti-vaping advertisements, Reis et al. (2019) found that traditional anti-smoking ads have had success. The researchers suggest that by creating fear, smokers' urges are reduced, however also noted that these ads may be perceived as more effective than then actually are. Chauchan and Sharma (2017) found that by focusing on ways to quit smoking, using a spokesperson, utilizing social media, and focusing on educating the public, anti-smoking advertisements had a greater effect on youth.

This study sets out to understand what role varying levels of threat and efficacy play on college students' intentions, attitudes and feelings towards vaping electronic cigarettes. By understanding how this new generation of smokers respond, ad creators can tailor their messages to have a greater impact on their intended audiences.

Hypotheses:

H1: Participants exposed to the high threat/high efficacy condition will be more likely to intend on quitting or avoiding the use of e-cigarettes.

H2: Participants exposed to the high threat/high efficacy condition will be more likely to have negative attitudes towards vaping and e-cigarettes.

H3: Participants exposed to the high threat conditions will experience a higher level of perceived threat towards vaping than those exposed to the low threat conditions.

H4: Participants exposed to the high threat/high efficacy conditions will be more likely to experience a higher level of self-efficacy.

H5: Participants exposed to the high threat/high efficacy conditions will be more likely to experience a higher level of fear.

Method

To accurately test the perception of anti-electronic cigarette advertisements using Witte's Extended Parallel Process Model, measures and instruments are adopted from a 1998 study in which McMahan, Witte and Meyer examined the perception of risk messages regarding electromagnetic fields (EMF). Much like electronic cigarettes today, there was little known about the potentially harmful side effects from EMF exposure in 1998. Researchers categorized the messages used into two types, high-threat and low-threat, however, did not manipulate the messages efficacy (McMahan, et. al, 1998). In order to test self-efficacy and response efficacy, the current study adopted methods from Ooms, Jansen and Hoeks (2015), who use a 5-point Likert-type scale to measure how achievable the participant believes the threat-mitigating solution is to them.

Participants

The study population is made up of 154 undergraduate college students from a large southeastern university. At the time of the study, all participants were enrolled in the one of two courses within the university's mass communications program. Only students under the age of 18 were excluded from the study. Participation in this study was completely optional and participants had the ability to leave the study at any time.

Procedures

Adapting the experimental design used by McMahan, Witte and Meyer (1998), four anti-vaping advertisements were manipulated to create high threat/high efficacy, high threat/low efficacy, low threat/high efficacy, and low threat/low efficacy conditions. After agreeing to participate, undergraduate college students in two sections of the same course were randomly assigned one of the four conditions.

Through a survey, participants are asked to provide their age, gender and ethnicity. Then, participants are asked to answer several questions used to identify whether the individual is a smoker or not, and whether or not the individual is susceptible to smoking behavior. Participants are then exposed to one of the four conditions followed by an identical list of questions aimed at measuring their level of perceived threat, efficacy, attitudes and intentions.

Risk Messages

The four messages (Figures 6A-9A) were designed to create high threat/high efficacy, high threat/low efficacy, low threat/high efficacy, and low threat/low efficacy conditions. All four of the advertisements use the same photograph of a young woman holding an electronic cigarette in her hand, blowing out vapor.

In each of the two high threat conditions (Figures 6A & 7A), the messaging looks to evoke fear by describing the harmful chemicals and potential health effects that vaping can expose someone to.

In each of the two low threat conditions (Figures 8A & 9A), the message presents a sentiment that vaping isn't safer than smoking traditional cigarettes. While the message still

frames e-cigarettes as negative, it does not threaten the individual the same way the high threat message does.

In each of the two high efficacy conditions (Figures 6A & 8A), the ad encourages the audience with the sentiment “you can quit!” The ad also provides the link to a website that is described as having tips and resources available to help someone kick the habit.

In each of the two low efficacy conditions (Figures 7A & 9A) the ad avoids encouragement and does not offer a resource. Instead, the ad simply reads “quit now!” By providing a potentially difficult solution, without any help to get there, the audience is less likely to see it as achievable.

Measures and Instrumentation

Demographics

Demographics collected include age, race and gender. Participants will also be asked to disclose whether they have vaped or used electronic cigarettes before. If participants answer yes, they will then be asked to disclose if they have smoked more or less than 100 times, which Pierce et. al (1993) believe is the threshold for being considered an established smoker or not.

Duke, et. al (2015) describes the potential significance of smoking susceptibility:

> According to the theory of reasoned action and social cognitive theory, intentions to abstain from smoking may be formed and reinforced by youth's attitudinal and social normative beliefs about smoking and by their perceived ability to reject smoking in the future.

In order to consider whether individuals susceptible to smoking behavior are uniquely affected by the ads, participants identified as non-smokers are asked to respond to three questions adapted from Pierce et. al (1995).

- Do you think you will try vaping soon?
- If one of your friends offer you a pull of their e-cigarette, will you smoke it?
- Do you think you will be vaping one year from now?

Participants respond using a 5-point Likert-type scale from 1 (definitely not) to 5 (definitely). According to Pierce, et. al (1995), answering anyway other than 'definitely not' is enough to deem a participant as a susceptible smoker.

Perceived Threat

Adopting the instruments used by McMahan, et. al (1998), the threats severity and susceptibility will be measured using a 5-point Likert-type scale. The susceptibility will be measures asking a pair of questions such as "It is likely that using electronic cigarettes will be harmful to my health." To test severity, questions will ask if the potential effects of smoking electronic cigarettes are "significant," "serious," and "severe." (McMahan, et. al (1998). The methods are verified by Ooms, Jansen, and Hoeks (2015), who test the extended parallel process model on fear appeals in regard to women and breast cancer. A mean score of susceptibility and severity is used to determine threat (Ooms et. al, 2015).

Efficacy

Rather than testing participant's self-efficacy by altering the messages, McMahan, et. al (1998) used a statistical procedure to split their sample. Because the current study manipulated the advertisements to test efficacy, methods for testing self-efficacy and response-efficacy are adapted from Ooms, Jansen, and Hoeks (2015). Using a 5-point Likert-type scale ranging from 1 (strongly disagree) to 5 (strongly agree), participants are asked to reveal their level of agreeance to the statements "I am able to take the steps necessary to quit vaping," "Quitting vaping is easy to do to avoid potential risks," and "I can quit vaping using available resources." A mean score of self-efficacy and response-efficacy is used to determine efficacy (Ooms et. al, 2015).

Although McMahan, et. al (1998) does not test self-efficacy, the researchers do measure participant's response efficacy. Adapting their methods, the current study uses a 5-point Likert-type scale and asks participants to respond to the following statements:

- By not vaping, I can prevent unwanted health effects.
- Quitting electronic cigarettes is easy to do.
- Avoiding the use of electronic cigarettes greatly decreases my chances of experiencing related health effects.

Fear

McMahan, et. al (1998), use a 5-point Likert-type scale to measure the fear evoked in participants by the advertisements. Ranging from 1 (strongly disagree) to 5 (strongly agree), participants in the current study are asked how "anxious," "frightened," and "scared" they are concerning the potentially harmful health effects associated with vaping.

Attitudes

Attitudes toward quitting or avoiding the use of electronic cigarettes will be measured using a 5-point Likert-type scale, from 1 (extremely undesirable) to 5 (extremely desirable) (McMahan, et. al, 1998). Participants will be asked to respond to the statement "quitting or avoiding the use of e-cigarettes would be."

Intentions

Again using a 5-point Likert-type scale, participants will be asked to measure their intentions by replying to the statement "I plan to quit or avoid smoking electronic cigarettes in

order to lower my chance of experiencing negative health effects," on a scale of 1(strongly disagree) to 5 (strongly agree) (McMahan, et. al, 1998).

Results

Demographics

The study was offered to students enrolled in two different courses within the mass communications program of a large southeastern university. A review of demographic data shows the study's population was 73.4% female and 26% male, with one individual describing themselves as "other." Participants ranged in age from 18 to 25 years old. The students were asked to describe their ethnicity, which revealed 53.9% of the study's population is Caucasian, 13% African American, 24% Hispanic, .6% American Indian, 4.5% Asian, and 3.9% described themselves as "other." Out of the 154 students that participated in the study, 45% identified themselves as electronic cigarette users.

Manipulation Checks

A pilot study was conducted with 12 participants to determine the manipulated advertisements' effectiveness. The low efficacy condition was proven effective as the six participants exposed to this condition all agreed that the advertisement did not provide consumers with enough help to avoid the potential effects of vaping and did not provide advice or tools to help them avoid or quit vaping. The high efficacy condition was proven effective as 83.3% of participants found the ad to be helpful, believing it provided advice or tools to help them avoid or quit vaping. All participants exposed to the low threat condition did not find the ad threating and felt it did not create a sense of fear in them. Five of the six participants exposed to the high threat condition found the ad was threatening and said it instilled some level of fear in

them. Overall, the pilot study confirmed that all advertisement manipulations were effective at creating the intended conditions.

Intentions (H1)

Using a one-way ANOVA, no significant differences were found between participants intentions to quit or avoid vaping and the condition participants were exposed to *[F (3, 150) = .646, p = .587]*. Because Levene's test for equality of variances was found to be violated [F (3, 150) = 4.286, p = .006] the data was then analyzed using both the Welch *[F (3, 81.5) = .979, p = .407]* and Brown-Forsythe robust tests of equality of means *[F (3, 137.44) = .647, p = .586]*, however the finding remained insignificant. This finding is inconsistent with EPPM predictions. While the number of participants per condition may have had some effect on these results, the variable means reveal intentions did not differ much between conditions, however the high threat /high efficacy condition appeared to have the most influence [high threat/high efficacy *M = 4.55, SD = .55, n = 38*; high threat/low efficacy *M = 4.36, SD = .873, n = 39*; low threat/high efficacy *M = 4.32, SD = .873, n = 38*; low threat/low efficacy *M = 4.36, SD = .903, n = 39]*.

Using a one-way ANOVA, a significant relationship was a found between smoker status and intentions *[F (1, 152) = 7.88, p = .000]*. This finding suggests that those who already vape electronic cigarettes are less likely to quit vaping, while those who do not vape are less likely to start [smoker *M = 4.14, SD = .791, n = 69;* non-smoker *M = 4.60, SD = .775, n = 85).*

Attitudes (H2)

Using a one-way ANOVA, no significant effect was found between attitude and the condition participants were exposed to *[F (3, 150) = 2.54, p = .058]*. Because Levene's test for

equality of variances was violated *[F (3, 150) = 7.504, p = .000]* the data was then analyzed using both Welch *[F (3, 80.84) = 2.67, p = .052]* and Brown-Forsythe robust tests of equality of means *[F (3, 119.35) = 2.57, p = .057],* however the finding remained insignificant. Inconsistent with EPPM predictions, the nearly significant finding may have been caused by the sample size. After reviewing the means of participants' attitudes in each condition, it would appear that those subjected to the high efficacy messages were more likely to have a negative attitudes towards vaping electronic cigarettes, however because this finding was statistically insignificant no scientific inference can be made [high threat/high efficacy *M = 4.63, SD = .489, n = 38;* high threat/low efficacy *M = 4.26, SD = .938, n = 39;* low threat/high efficacy *M = 4.58, SD = .599, n = 38;* low threat/low efficacy *M = 4.26, SD = .993, n = 39].*

Using a one-way ANOVA, significance was found in the relationship between gender and overall attitude towards vaping, no matter the condition *[F (2, 151) = 11.27, p = .000].* This finding suggests that women have more negative attitude towards electronic cigarettes than men [men *M = 4.33, SD = .917, n = 40;* female *M = 4.50, SD = .683, n = 113].* This finding may suggest that men are more susceptible to vaping habits than women.

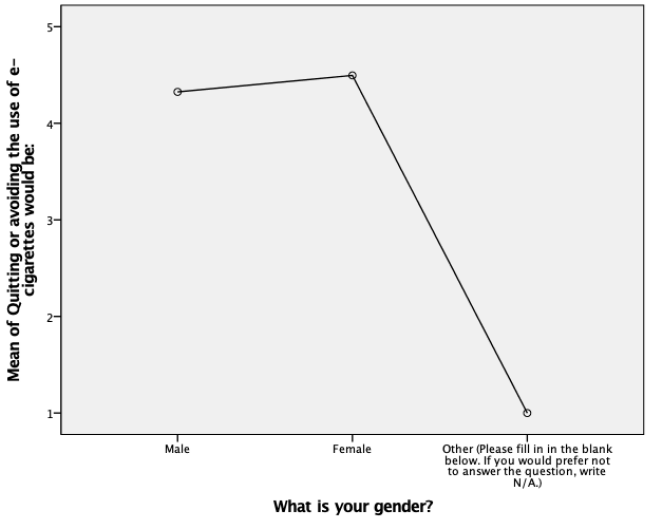

Figure 1: Gender and Attitude*

**A means plot showing the relationship between gender and attitude toward vaping electronic cigarettes.*

Perceived Threat (H3)

Perceived threat was measured through six survey questions that were later combined into a single means score. To test the reliability of the measure, a Cronbach's alpha was performed *(.975)*. Using the Welch *[F (3, 79.56) = 3.60, p = .01]* and Brown-Forsythe robust tests of equality of means *[F (3, 129.45) = 3.14, p = .02],* a significant difference was found for perceived threat. These tests were conducted after the findings violated the Levene's test for equality of variances *[F (3, 150) = 3.649, p = .014].* Because the Welch and Brown-Forsythe tests were significant, the Games-Howell Post Hoc Test was used, revealing that participants in the high threat/low efficacy group perceived the threat to be greater than those exposed to the low threat/low efficacy condition *[p = .01].* Interestingly enough, the perceived threat between participants exposed to the high threat/high efficacy and low threat/high efficacy conditions did not reveal a significant difference, suggesting that varying levels of efficacy have the ability to change the way a message's threat is perceived. Although not statistically significant, the means

of perceived threat reveal participants in the high threat conditions were more likely to perceive the threat as high [high threat/high efficacy *M = 27.78, SD = 4.33, n = 38;* high threat/low efficacy *M = 28.43, SD = 2.43, n = 39;* low threat/high efficacy *M = 26.92, SD = .658, n = 38;* low threat/low efficacy *M = 25.79, SD = 4.10, n = 39].*

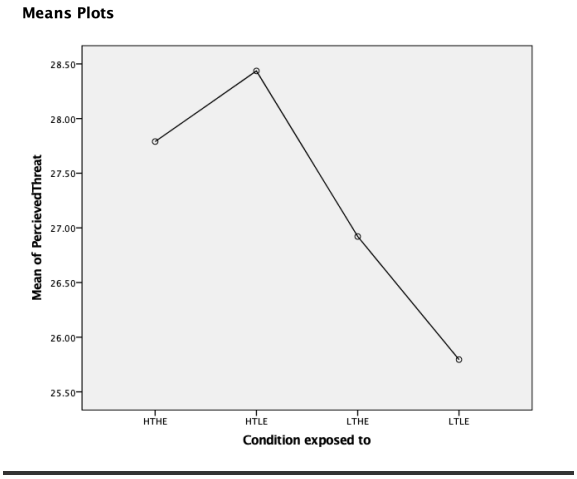

Figure 2: Perceived Threat*

**A means plot showing the relationship between perceived threat and each study condition.*

Using a one-way ANOVA, a significant relationship was also found between smoker status and perceived *threat [F (1, 152) = 9.01, p = .003],* revealing that overall, no matter the condition exposed to, those who describe themselves as smokers had less perceived fear of vaping electronic cigarettes than those who described themselves as non-smokers [smoker *M = 26.15, SD = 4.70, n = 69*; non-smoker *M = 28.10, SD = 3.32, n = 85).*

Self-Efficacy (H4)

Perceived threat was measured through four survey questions that were later combined into a single means score. To test the reliability of the measure, a Cronbach's alpha was performed *(.724)*. Using a one-way ANOVA, no significant effect was found between self-efficacy and the condition participants were exposed to *[F (3, 150) = 1.77, p = .154].* Because Levene's test for equality of variances was violated *[F (3, 150) = 3.870, p = .01]* the data was then analyzed using both Welch *[F (3, 81.60) = 1.39, p = .250]* and Brown-Forsythe robust tests of equality of means *[F (3, 125.27) = 1.78, p = .153],* however the finding remained insignificant. This finding is inconstant with EPPM predictions as self-efficacy is believed to be the highest when a high threat and high efficacy is presented. The means for self-efficacy reflect the insignificant findings as they vary just slightly from condition to condition [high threat/high efficacy *M = 17.55, SD = 2.37, n = 38;* high threat/low efficacy *M = 17.17, SD = 2.79, n = 39;* low threat/high efficacy *M = 17.57, SD = 1.82, n = 38;* low threat/low efficacy *M = 16.33, SD = 3.52, n = 39].*

Fear (H5)

Perceived threat was measured through three survey questions that were later combined into a single means score. To test the reliability of the measure, a Cronbach's alpha was performed *(.972)*. Fear did not violate the Levene's test for equality of variances was violated *[F (3, 150) = .287, p = .835],* but was found to be insignificant using a one-way ANOVA *[F (3, 150) = 1.57, p = .198).* This finding is inconsistent with the EPPM as fear is predicted as being higher in high threat conditions, particularly in a high threat/high efficacy condition. After reviewing the means, it appears fear was higher in both high threat conditions, however the

findings could not be verified statistically [high threat/high efficacy *M = 11.44, SD = 3.48, n = 38;* high threat/low efficacy *M = 11.12, SD = 3.87, n = 39;* low threat/high efficacy *M = 9.97, SD = 3.89, n = 38;* low threat/low efficacy *M = 10.02, SD = 3.63, n = 39].*

Using a one-way ANOVA, fear and gender were found to have a significant relationship as women were overall more fearful of vaping electronic cigarettes no matter the condition they were exposed to *[F (2, 151) = 4.03, p = .02].* The means reveal the significant difference between the genders [male *M = 9.32, SD = 4.00, n = 40;* female *M = 11.07, SD 3.55, n = 113].* The findings suggest that men may be less fearful and more susceptible to vaping behaviors.

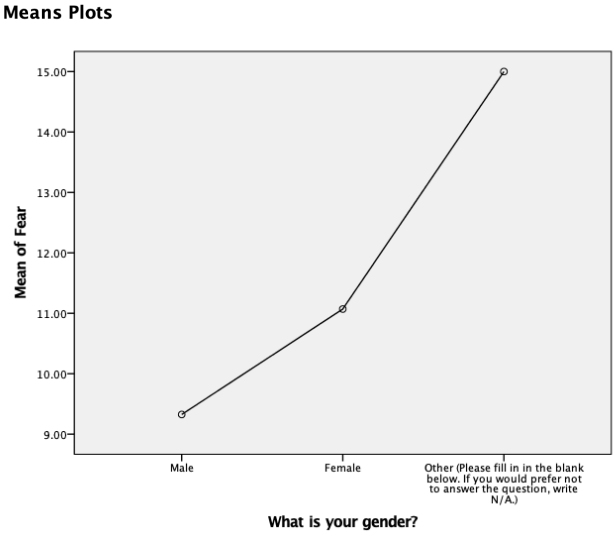

Figure 3: Gender and Fear*

**A means plot showing the relationship between gender and fear towards vaping electronic cigarettes.*

Using a one-way ANOVA, a significant relationship was also found between smoker status and fear *[F (1, 152) = 5.06, p = .02],* revealing that overall, no matter the condition exposed to, those who describe themselves as smokers felt less fear than those who described

themselves as non-smokers [smoker $M = 9.89$, $SD = 3.79$, $n = 69$; non-smoker $M = 11.24$, $SD = 3.62$, $n = 85$). This finding suggests that individuals who already partake in vaping behaviors may be less affected by anti-vaping advertisements.

Discussion

While several of the study's hypotheses resulted in insignificant findings, the study still revealed valuable takeaways that can be considered during the creation of future anti-vaping advertisements and materials. By learning more about the target audience and better understanding how various ad elements play a role in young adults' attitudes, intentions and behaviors toward electronic cigarettes, advertisers will have more data available, to help them create effective messages in today's landscape.

The study found that participants in the high threat/low efficacy group perceived the threat of the advertisements to be greater than those exposed to the low threat/low efficacy condition. While this is in line with the EPPM's predictions, it is worth noting that no significant relationship was found between the high threat/high efficacy group and the low threat/high efficacy group. This finding suggests that varying levels of efficacy have the ability to change the way a message's threat is perceived. When a message's efficacy is low and the threat is high, individuals may interpret the threat as being more severe because they do not see a way to mitigate the risk. Conversely, if the message efficacy is high, people may feel like the threat is avoidable or can be easily mitigated, easing the way they feel about the threat at hand. Further research in this area may find that efficacy is no longer a useful tool to reach today's young adult population. If ridding these advertisements of efficacy elements can lead to a higher level of negative perceptions toward electronic cigarettes, the ads may become more effective and the number of young adults vaping may start to decrease. Although efficacy is a major construct of

the Extended Parallel Process Model and fear appeals as a whole, new generations coupled with today's landscape may call for new ideas and models to predict the effectiveness of public health ads. What seemed threatening and deterring in the 1980's, 90's and early 2000's, may not have the same impact moving forward.

The current study also found significant relationships between "vaper status" and several variables, revealing that individuals who already vape perceive electronic cigarettes as a lower threat than "non-vapers." Vapers were also less fearful of the potential health consequences associated with e-cigarettes. The study suggests that those who vape are less likely to intend on quitting or avoiding e-cigarettes, while those who do not vape expressed that they are unlikely to start. This finding may suggest that advertisers should focus their attention and target ads towards existing smokers and those susceptible to the behavior, rather than trying to reach young adults as a whole. Individuals who have no intention to vape are unlikely to need this kind of information or find the ads useful. Through further research, ad creators can learn more about the personalities and demographics of current vapers and those susceptible to the habit, enabling them to reach the audience that needs this information most.

Gender also played a role in several significant relationships as the study suggests men perceive the dangers of vaping as less severe than women and were overall less fearful of the potential health risks associated with e-cigarettes. While additional research is required, this finding suggests that men may be less affected by anti-vaping advertisements than women. With this information, advertisers may look to create a number of ads specifically targeting a young male audience, conducting further research to find the most effective ways to effectively reach them. Once again, by heavily targeting active users and those who are more susceptible to future

use of electronic cigarettes, the ads may start to have a greater impact, and the number of new and existing young adult vapers may start to diminish.

Limitations

The current study a few limitations that could be improved upon in future research. Conducted for the researcher's master's thesis, the study's data was originally to be collected through in-person surveys, handed out to students in several classes on a university campus. Due to the coronavirus pandemic, the university where this data collection was to occur was shut down, limiting the amount of student participants the researcher had access to. A total of 154 students participated in this study, exposing between 38 and 39 students to each condition. Had the sample size been larger, the researcher believes the study would have had additional significant results that could lead further insights into the effectiveness of fear appeals in anti-vaping ads.

The study's sample includes participants, who identified as both vapers and non-vapers. While it is valuable to understand how these advertisements deter individuals from picking up the habit, future research may look to focus solely on individuals who use e-cigarettes in order to get a clearer understanding of how these ads affect users of these products.

Conclusion and Future Research Directions

Overall the study identified several areas that should be further researched. Although some of the study's hypotheses came back inconclusive, several notable findings create questions around the roles of gender, smoker status and efficacy in the ability to effectively create anti-vaping messages.

Based on the current study's findings, males were less fearful of the potential health risks associated with vaping e-cigarettes and were less threatened by the anti-vaping ads. Researcher's looking to continue work in this area may consider focusing on how to effectively discourage vaping in young men, potentially giving ad creators the information they need to tailor messages to this target audience.

The study also suggests that a low level of efficacy may actually increase the level at which a message's threat is perceived. While further research with a larger sample size is needed, the finding reveals a potential flaw in the EPPM's prediction model.

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Appendices

Appendix A

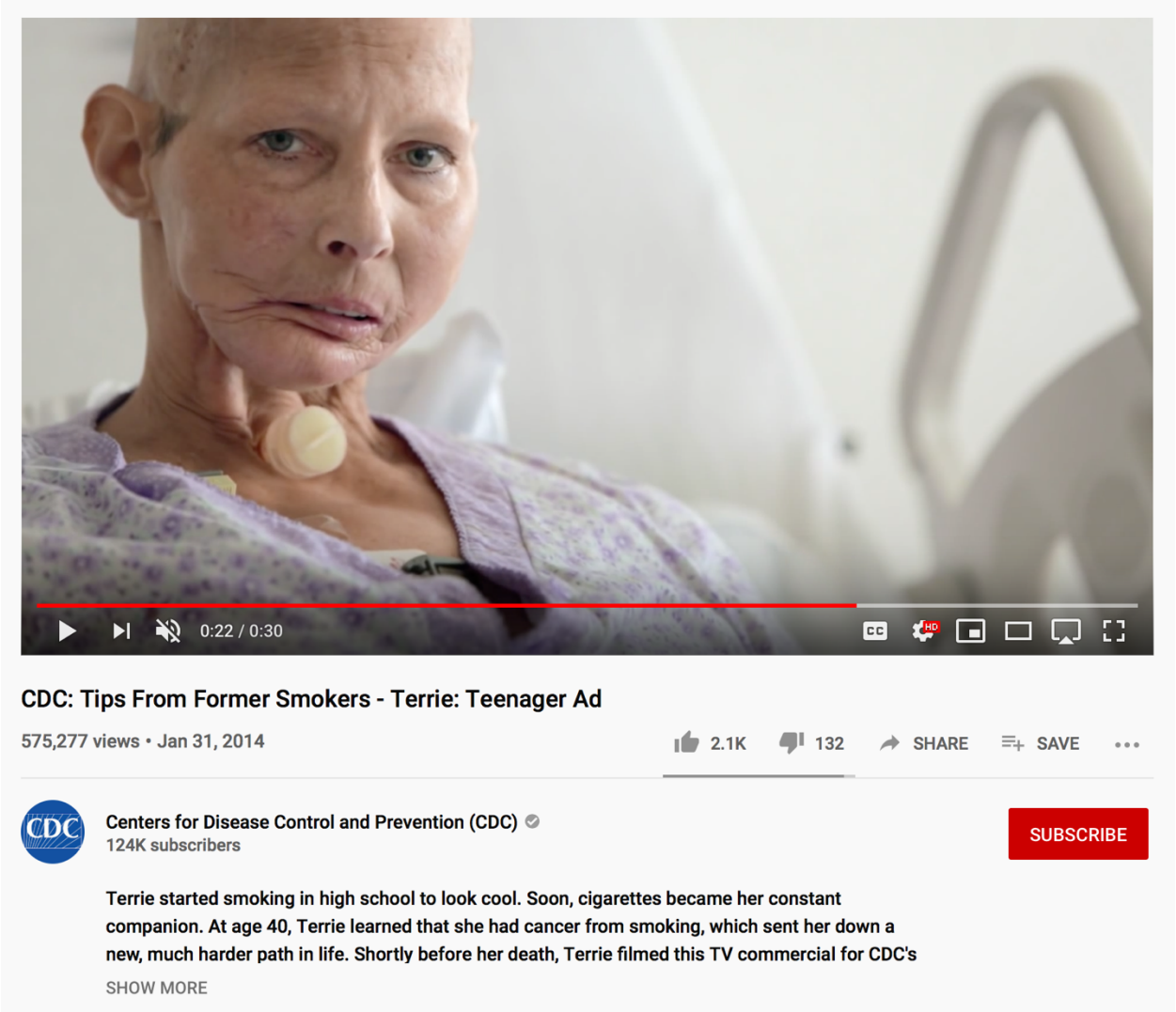

Figure 4A: "Terry Ad"
An Anti-smoking ad from the Center for Disease Control and Prevention

Centers for Disease Control and Prevention (CDC). (2014, January 31). Retrieved September 26, 2019, from https://www.youtube.com/watch?v=_th5U5hRu8k.

Appendix B

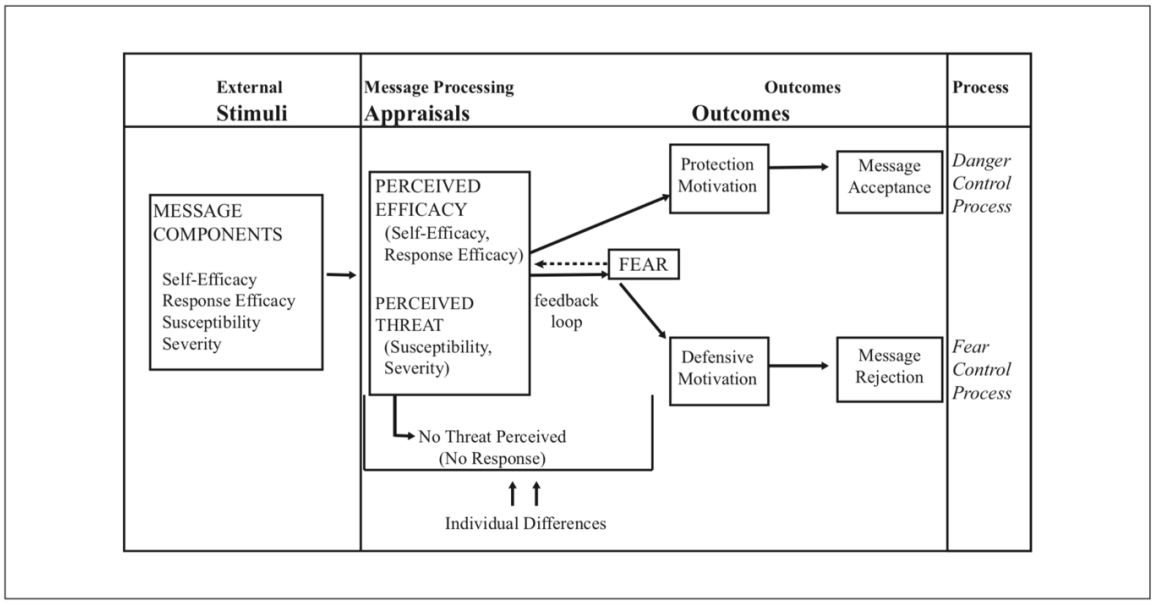

Figure 5A: EPPM Diagram
A diagram explaining Witte's Extended Parallel Process Model

Witte, K., Berkowitz, J. M., Cameron, K.A., & McKeon, J.K. (1998). Preventing the Spread of Genital Warts: Using Fear Appeals to Promote Self-Protective Behaviors. *Health and Behavior,* (5), 571. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=edsbl&AN=RN049920106&site=eds-live

Appendix C

Figure 6A: High Threat / High Efficacy Advertisement
One of the four conditions participants were exposed to.

Photo Credit: https://thefederalist.com/2019/09/13/banning-flavors-wont-stop-teen-vaping/

Appendix D

Figure 7A: High Threat / Low Efficacy Advertisement
One of the four conditions participants were exposed to.

Photo Credit: https://thefederalist.com/2019/09/13/banning-flavors-wont-stop-teen-vaping/

Appendix E

Figure 8A: Low Threat / High Efficacy Advertisement
One of the four conditions participants were exposed to.

Photo Credit: https://thefederalist.com/2019/09/13/banning-flavors-wont-stop-teen-vaping/

Appendix F

Figure 9A: Low Threat / Low Efficacy Message
One of the four conditions participants were exposed to.

Photo Credit: https://thefederalist.com/2019/09/13/banning-flavors-wont-stop-teen-vaping/