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Running Head: INFLUENCES ON PERCEIVED RISKS AND BENEFITS OF ENDS

How Do Personality and the Media Shape Perceived Risks and Benefits of E-cigarettes?

A thesis submitted in partial fulfillment for the Bachelor of Arts Degree in Psychology

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Abstract

The use of electronic nicotine delivery systems (ENDS) is one of the most common substance use behaviors among emerging adults. With 68 confirmed vaping-related deaths as of February 2018 and countless other cases of vaping-related lung disease and dysfunction, there is an urgent need to better understand emerging adults' perceptions of ENDS products, and which emerging adults are more/less likely to perceive ENDS products as harmful. In the present study, I examined data from an online survey of seven colleges and universities across the US and from five focus groups conducted with college students. Specifically, I explored the perceived risks and benefits of vaping, including the effects of media coverage on students' behavior, and whether ADHD symptoms and impulsivity were associated with different perceptions of e-cigarette risks and benefits. As hypothesized, students reported that media reports have affected their behaviors and perceptions on vaping and e-cigarette use, although students expressed confusion about chemical makeup and long-term effects of e-cigarettes. Also as hypothesized, there was an indirect effect of impulsivity on frequency of ENDS use and dependence through perceived benefits. ADHD symptoms, however, did not predict using ENDS to concentrate as hypothesized. Implications on these reports for finding effective intervention strategies will be discussed.

How Do Personality and the Media Shape Perceived Risks and Benefits of E-cigarettes?

Vaping is a term used to describe the use of Electronic Nicotine Delivery System (ENDS) devices. There are a variety of ENDS devices on the market today, including over 460 different brands that vary in size, shape, and color (Zhu et al., 2014) and the devices range from single disposable e-cigarettes, hookahs, devices that use pods, tanks, etc. ENDS devices are most commonly battery powered and are comprised of a heating coil and mouthpiece for inhalation. Additionally, they all contain a separate compartment to hold the e-liquids that are inserted into the device, vaporized, and then inhaled into the lungs (CDC, 2019). ENDS products work when the heating coils heat e-liquid into a thick vapor. The vapor is then inhaled through a mouthpiece of the ENDS product and inhaled by the user (Cahn and Siegal, 2011; CDC, 2019; Dvorsky, 2019; Katz, 2019).

The prevalence of e-cigarette use among both adolescent and emerging adult users has rapidly increased in the last few years, proving to be a growing concern among medical professionals, parents, healthcare providers, etc. Between 2017 and 2018 alone, nicotine vaping showed significant growth from 6% to 15% in college students who vaped; nicotine vaping in non-college emerging adults also grew from 7.9% to 12.5%. This is one of the most drastic annual increases of a particular substance in the history of all the surveys done by the National Institute of Drug Abuse (NIDA, 2018). Not only has vape use increased drastically in emerging adults, but the percentage of adolescent vape users also has skyrocketed. In high school students, the prevalence of vaping increased from 11.7% in 2017 to 20.8% in 2018 (Cullen et al., 2018). Due to the marked increase in prevalence of e-cigarette users and recent news coverage, there has been a great concern regarding the safety of these devices. These trends are alarming given that nicotine can have harmful effects to the still developing adolescent brain.

Nicotine's Effects on the Body

ENDS devices were introduced to the market as a safer alternative to smoking. E-cigarettes are thought to be safer than combustible cigarettes because they are free from the combustion process which releases carcinogens that can be toxic to the lungs (Courtney, 2015). Although e-cigarettes are thought to be safer than combustible cigarettes and have an evidently lower number of chemicals than the thousands of chemicals found in combustible cigarettes, e-cigarettes still contain nicotine, a highly addictive drug no matter how it is consumed (CDC, 2019). Nicotine has a variety of negative effects on the brain, including harm to adolescent brain development (CDC, 2019). Nicotine stimulates the reward circuits in the brain causing the release of epinephrine from the adrenal glands to stimulate the central nervous system as well as an increase in the levels of dopamine (NIDA, 2020). There also have been many proven health risks of e-cigarette use. E-cigarette use can result in mild symptoms such as mouth and throat irritation and coughing (Courtney, 2015). ENDS use also can cause more severe symptoms in adolescents such as reduced respiratory function (Wang et al., 2016).

There is also a much higher concentration of nicotine in e-liquid pods than there is in one combustible cigarette. In one JUUL pod alone, there is as much nicotine as there is in 20 combustible cigarettes (JUUL, 2019). Higher concentrations of nicotine in one unit of pods can lead to more nicotine intake every time a user vapes. Further, this research indicates that this higher concentration of nicotine is one reason vaping can increase the risk of users transitioning to combustible cigarettes (Leventhal et al., 2015). Research suggests that vaping in general, especially in adolescence, can preemptively lead to the transition or occasional use of combustible cigarettes and there have been many studies done supporting this association (Bold et al., 2018; Chaffee et al., 2018; Leventhal et al., 2016; Spindle et al., 2017). Although e-

cigarettes were introduced into the market as a tool for smoking cessation, there is a lack of research proving that e-cigarette use is a successful tool for aiding in smoking cessation. In a study done in Europe that looked at the association between former smokers and e-cigarette use, results indicated that vaping was, in fact, linked with further preventing smoking cessation as opposed to helping lead to smoking cessation (Kulik et al., 2018).

E-Liquids and Lung Injuries

In recent years, there has been a growing concern as to what the e-liquids are actually comprised of. E-liquids, also known as e-cigarette aerosol, have proven to contain a variety of different substances. Some of these substances have been linked to lung disease and have proven to be harmful; others are also thought to be potentially dangerous (CDC, 2019). E-liquids contain nicotine, flavoring, volatile organic compounds, various heavy metals, ultrafine particles, and other unknown harmful chemicals (CDC, 2019). Diacetyl, a chemical commonly used in flavoring has been linked to serious lung disease (CDC, 2019).

In the midst of increased vaping, numerous cases of vaping-related illnesses and deaths have been reported. These illnesses have recently broken out and have been termed E-cigarette or Vaping Product Use-Associated Lung Injury (EVALI). As of December 2019, there had been 2,056 cases of hospitalization due to EVALI reported to the Centers for Disease Control and Prevention, as well as over 50 deaths also reported to the CDC in 27 different states across the US. The largest percentage of those hospitalized were young adults aged 18-24 years old (CDC, 2019). Researchers have been working to figure out what exactly is causing the mysterious lung illnesses that have led to numerous deaths in numerous states. A recent breakthrough discovered that vitamin E-acetate might be the culprit linking these lung diseases and sudden deaths (CDC, 2019). While vitamin E-acetate has proven to be the component of e-liquid most strongly linked

to EVALI, other components are still being investigated as possible other links to EVALI (CDC, 2019).

Reasons for ENDS Popularity Among Youth and Emerging Adults

Ironically, e-cigarettes were first introduced into the market as a safer smoking alternative to combustible cigarettes (NIDA, 2020). There has been a vast amount of research proving the danger of combustible cigarettes as causes for various cancers, health complications, and preventable death due to the many contaminants and toxic chemicals in the smoke and casing of the cigarettes (Center for Disease Control and Prevention, 2019). However, there was little knowledge on the components of e-liquid and the possible danger they could pose to health. Because of the clear danger posed by traditional cigarette use, e-cigarettes were promoted by their developers as an easy and safe way to smoke without the same risks as traditional cigarettes. E-cigarettes, as they have evolved over time, have proven to be incredibly convenient, easy, and highly accessible.

Today, combustible cigarettes and e-cigarettes differ drastically in terms of social acceptability and stigma. Because e-cigarettes are easy to conceal and their vapor is scentless and discrete, they are more widely used and accepted among emerging adults compared to combustible cigarettes. There has been a lot of research indicating that adolescents view e-cigarettes as safer and perceive the social acceptability of e-cigarette use indoors to be substantially higher than combustible cigarette use (Trumbo & Harper, 2013). Flavoring of e-liquids and vape pods has also been shown to make vaping more enticing for experimentation or long-term use because the flavors are appealing and can also cover up the taste of less appealing components within the pods (Ayers et al., 2017). The JUUL is one of the most popular e-cigarettes that was put on the market in 2017 (Fadus et al., 2019). The JUUL is sleekly designed

and closely resembles a USB drive. It is simple to use, complete with slidable pods that can be easily changed out. The small size and overly simplistic design make this device stand out over past popular ENDS devices. The JUUL is so popular that it has taken up almost 75% of the retail market and over half the e-cigarette market in general (Fadus et al, 2019; JUUL, 2019). The JUUL is designed to be incredibly easy to use both discreetly and overtly. Studies have shown that this high accessibility, perceived safety and acceptability of both the JUUL and other e-cigarette devices has led to an increase in use among adolescents and emerging adults (Berg et al., 2015; Chafee et al., 2015; Copeland et al., 2017; Trumbo and Harper, 2013).

Perceived Risks and Benefits of E-Cigarettes

There are many other reasons as to why e-cigarettes are so appealing that resonate with both smokers and non-smokers of traditional cigarettes. These reasons lie in the many perceived benefits commonly reported by users. Copeland et al. (2016) developed the Risks and Benefits of E-cigarettes scale (RABE) to explore how perceived risks and benefits of e-cigarettes are associated with different patterns of use (or nonuse) among college students. The RABE scale was developed to capture the numerous facets of e-cigarettes and their use. According to the RABE scale, common perceived benefits of e-cigarettes include the ability to use indoors, produce vapor instead of smoke, be an easy and effective tool for smoking cessation, have fewer chemicals, and being a “safer” alternative to smoking to name a few. Similar to those benefits cited by Copeland et al (2017), Fadus et al. (2019) described five reasons as to why vaping, and JUULing in particular, have become so acceptable among the adolescent and young adult population. These five reasons include “sleek designs”, “user-friendly function”, “less aversive experiences”, “desirable flavors”, and lastly, “the ability to be used discreetly in places where smoking is forbidden” (Fadus et al., 2019, 85).

Along with many perceived benefits of vaping, users and non-users also take into account perceptions of risk. Some of the commonly perceived risks as reflected in the RABE are the risk of smoking continuation and eventual transition to combustible cigarettes, harm in inhaling the chemicals and other vaporized components, and harm to both children and animals in the vicinity of e-cigarette use. Copeland et al. (2017) explored connections between different smoking frequency behaviors and one's perceived risks and benefits of e-cigarettes in 734 college students. Interestingly, they found that there were no significant differences in perceived risks based on e-cigarette use frequency. Because there was no association between perceived risks and ENDS use, these findings suggest that perceptions of benefits are more influential in differentiating people based on smoking status. Despite developments in our understanding of perceived risks and benefits and their relation to ENDS use, little research to date has examined associations between individual-level factors such as personality traits or symptoms of psychological conditions that might predict the extent to which people perceive risks and benefits of ENDS use.

ADHD Symptoms and Impulsivity

A wealth of research has established a connection between ADHD symptoms and impulsivity and combustible cigarette use (Grant et al., 2019; Goldenson et al., 2018; McClernon & Kollins, 2008; Rodriguez et al., 2008; Tercyak et al., 2002; Wilens et al. 2008). Both of these constructs have been shown to not only predict initiation of use, but recent use. In a nationally representative sample focused on tobacco use, individuals with diagnosed ADHD were found to smoke at much higher rates than undiagnosed individuals (Kollins, McClernon, & Fuemmeler, 2005). Higher ADHD symptoms were also associated with greater increased rapid use and earlier use onset (Fuemmeler et al., 2007).

There is less research establishing a connection between ADHD/impulsivity symptoms and alternative nicotine products, such as ENDS, but preliminary findings suggest there may be an association. For example, Goldenson et al. (2018) found that the risk of ENDS use in college was much greater for those with ADHD symptoms in high school; however, there was a much lower association between ADHD symptoms in high school and a higher risk of endorsing combustible cigarettes in college. Nonetheless, more research is needed on how ADHD symptoms are associated with cognitions (i.e., perceived risks and benefits of ENDS) and actual ENDS behavior. For that purpose, this study is exploring associations between ADHD and impulsivity symptoms on perceived risks and benefits of e-cigarette use.

Theory of Acquired Preparedness

Not only have ADHD and impulsivity symptoms been shown to be linked to combustible cigarette use, but expectancies for combustible cigarette smoking have also been shown to influence smoking patterns and initiation ages. Specifically, positive expectancies for smoking have been linked to earlier initiation of combustible cigarettes use, whereas negative expectancies have been linked to later initiation (Chassin, Presson, Sherman, & Edwards, 1991). The current study was framed by the acquired preparedness model (see Figure 3), a model used to describe patterns of alcohol and various substance dependence (McCarthy, Miller, & Smith, 2001; Smith & Anderson 2001). The acquired preparedness model proposes a connection between reward seeking behavior and specific personality traits. The model suggests that higher scored symptoms of impulsivity result in greater rewarding expectancies and fewer negative expectancies (McCarthy, Miller, & Smith, 2001; Smith & Anderson 2001). Vangsness, Bry, and Labouvie (2005) used the APM to explore a possible connection between impulsivity and marijuana use in a sample of 337 college undergraduates. The study found that students who

exhibited greater impulsivity held fewer negative expectancies, and, in turn, used marijuana more frequently. Although this study focuses on a different substance, it is important in showing the possible connection through the APM between certain personality proclivities and different perceptions of risks and benefits of substances. We used the APM to further examine the possible connections between ADHD symptoms, impulsivity, perceived risks, perceived benefits, and ENDS use.

Currently, there is little to no research that draws on the acquired preparedness model as a way to explain the possible associations between impulsivity and ADHD symptoms, expectancies of e-cigarettes use, and patterns of e-cigarette use. One study, however, examined connections between impulsivity, expectancies for combustible cigarettes, and cigarette smoking. Doran et al. (2013) applied the acquired preparedness model to test these associations in 400 college-aged participants. This was a longitudinal study with a prospective design and a multi-dimensional measure of impulsivity symptoms that included sensation-seeking and urgency, as well as a separate measure of positive and negative reinforcement expectancies. Doran et al. (2013) found evidence supporting the associations suggested by the model, in that those with higher impulsivity symptoms evidenced higher positive expectancies and fewer negative expectancies. Specifically, negative urgency and sensation seeking tendencies predicted earlier initiation of smoking for emerging adults (Doran et al., 2013). The major difference between this study and the present study is that the present study focuses on e-cigarette use rather than combustible cigarette use and examines both trait impulsivity and impulsivity symptoms associated with ADHD.

Interestingly, research has shown that those who are higher in sensation-seeking tendencies seem to respond differently to nicotine. Perkins et al. (2000) found that those with

higher ADHD/impulsivity and sensation seeking symptoms were more likely to have greater sensitivity to initial effects of nicotine. This might help to explain why emerging adults with ADHD symptoms maintain more positive expectancies regarding nicotine use.

Similar to Doran et al. (2013), for the current study, the acquired preparedness model will be applied to the following three factors: impulsivity and Attention deficit disorder hyperactivity (ADHD), one's perceived risks and benefits of e-cigarettes, and lastly, one's pattern of e-cigarette use and dependence. There is little to no research that addresses the connection between ADHD/impulsivity symptoms and one's perceived risks and benefits of e-cigarette use. The following study aims to explore the possible connection between those who score higher in ADHD and impulsivity and the positive or negative expectancies that these individuals hold regarding ENDS use.

Media Reports about Vaping-Related Illnesses

E-cigarette use has become an increasingly noteworthy topic in the media. The number of reports on vaping in the media have drastically increased in the past few years. Between 2015-2018 alone, the number of news articles on vaping had increased 75% (Wackowski et al., 2020). This increase in news coverage on e-cigarettes is important to note given the strong impact news reports can have on one's perceptions of both the safety and allure of these products (Tan et al., 2017; Wackowski et al., 2019; Wackowski et al., 2017). Despite this increase in vaping media coverage, there has only been little research done examining how these increased reports have potentially altered individuals' behavior and e-cigarette use. One prominent study in the literature today is Wackowski et al.'s (2019) study which aimed to determine how news coverage impacted or altered the perceptions and behaviors of individuals regarding e-cigarette use. Wackowski et al. (2019) found significant associations between participants' e-cigarette

perceptions and the nature of media coverage they had been exposed to. With a sample size of 876 young adults, participants were assigned to watch specific media reports that consisted of either mainly positive or negative coverage and were then asked to fill out a survey. Participants in this study who were exposed to mainly negative coverage on e-cigarettes were more likely to perceive e-cigarettes as harmful compared to participants mainly exposed to positive news coverage. Negative news exposure on e-cigarettes was also a significant predictor of lower e-cigarette susceptibility compared to positive news exposure on e-cigarettes which was associated with a higher likelihood of e-cigarette susceptibility. Intentions of quitting were also more likely to occur with greater exposure to negative media coverage (Wackowski et al., 2019). Given the weight that the nature of news coverage can have on one's maladaptive perceptions of e-cigarettes, a portion of the present study aims to further examine this media impact by focusing specifically on the impact of various media coverage that report lung-disease and various ENDS-related illnesses.

Hypotheses and Research Question

1. Students who score higher in impulsivity will perceive fewer risks and more benefits of ENDS and, in turn, will be more likely to use ENDS products [acquired preparedness]
2. Among ENDS users, students who score higher in ADHD symptoms will be more likely to report using ENDS to concentrate
3. How have recent media reports of ENDS-related illnesses affected students' attitudes and behaviors around ENDS?

Method

Participants and Procedure

Survey portion. All 1319 participants were recruited from 7 different college campuses across the United States to take an online survey. These schools were East Tennessee State

University ($n=382$, 29%), James Madison University ($n=126$, 9.6%), Rowan University ($n=75$, 57%), Saint Louis University ($n=358$, 27.1%), Sam Houston State University ($n=170$, 12.9%), MI Univ of Science and Technology ($n=71$, 5.4%), and Trinity College ($n=137$, 10.4%). In order to be eligible, participants had to be between 18-24 years old and enrolled as an undergraduate student. Participants reported on their gender as follows: 68% female, 30% male, and 1% other. Race/ethnicity was reported as follows: <1% American Indian, 7.9% Asian, 9.2% Black/African American, 74.7% Caucasian, 3.8% multiracial and 3.6% other. With respect to class year, 50% of students were freshmen, 24% sophomores, 15% juniors, 9% seniors and the remaining percentage were students on their fifth or fifth plus year. Refer to Table 1 for more information about the sample's demographic characteristics.

Participants were recruited through classroom presentations, flyers around campus, and social media advertisement postings. The online survey was administered through Qualtrics and was designed to take between 30 and 60 minutes. Participants who wished to take part in a focus group provided their contact information at the end of the survey (to preserve anonymity, participants provided this information through a separate survey that was not linked to their responses). Students who completed the survey portion of the study received course credit, extra credit, or were entered into a drawing for a \$50 Amazon gift card if they were not eligible for either course/extra credit.

Focus group portion. In addition to the survey, we conducted five focus groups. Participants were recruited through flyers, class visits, e-mail announcements to the campus, and an additional section on the survey that asked whether or not they would be interested in leaving their information for us to reach out to them about a focus group opportunity. We recruited a total of 42 participants. Of the participants, 67% were female. In terms of class year, 7% were

first years, 26% were sophomores, 19% were juniors, and 48% were seniors. Ethnicity of participants were as followed: <1% American Indian, 7.9% Asian, 9.2% Black/African American, 74.7% Caucasian, 3.6% other, and lastly, 3.8% multiracial. Of the focus group participants, 83% reported using ENDS, and 60% reported using ENDS in the past 30 days. Refer to table 2 for more information on the focus group demographics. The focus groups were led by two undergraduate moderators with training in focus group facilitation and were comprised of 6-10 participants per group. We asked each participant to fill out a preliminary survey that gave a sense for participants' past experience with ENDS devices and their demographic information. After obtaining written consent, each participant received a 10\$ gift card to an on-campus coffee shop and were assigned a number to be referenced as to maintain anonymity. Each focus group lasted between 30-60 minutes and we followed a script to maintain structure (See Appendix A).

Survey Measures

Cigarette and E-cigarette Use. Questions about cigarette and e-cigarettes use were taken from the Project Marketing and Promotions Across College in Texas (M-PACT) survey (Hinds et al., 2016). Relevant questions included questions about Electronic Nicotine Delivery System (ENDS) use such as “Have you ever used an ENDS product (i.e., vape pens, e-cigarettes, e-hookah) as intended (i.e., with nicotine cartridges and/or e-liquids/e-juice), even one or two puffs?” [yes/no]. If students responded “yes” we asked several follow-up questions, namely: “How old were you the first time you used an ENDS product, (i.e., e-cigarette, vape pen, pod device, or e-hookah), as intended (i.e., with nicotine cartridges and/or e-liquid/e-juice) even one or two puffs?” and “During the past 30 days, have you used any ENDS product (i.e., an e-

cigarette, vape pen, pod device, e-hookah), even one or two puffs, as intended (i.e., with nicotine cartridges and/or e-liquid/e-juice)?". The reliability for the items was excellent ($\alpha = .93$).

Motives for ENDS use. We assessed motives for ENDS use with three separate questions. The first question assessed why participants first used ENDS (if they endorsed in ENDS at some point in their life): "I tried Electronic Nicotine Delivery System (ENDS) products (i.e. e-cigarettes, vape pens, JUUL, or e-hookah) as intended because..." There were 18 possible responses including "I was curious about them", "I liked the way it looked when I used ENDS products", and "I found using ENDS products satisfying". Participants were required to check all responses that pertained to them. The second question inquired about reasons for ENDS use (*I use ENDS products as intended because...*) and was only given to participants who reported ENDS use in the past 30 days. There were 16 possible reasons for the use of ENDS products that participants were required to check if it pertained to them. Possible reasons included "ENDS products don't smell", "It seems less harmful to my health than regular cigarettes", and "I can use ENDS products in places where cigarette smoking is not allowed". The third question assessed the level of agreement of those who had used ENDS in the past 30 days on 10 statements regarding reasons why students endorse ENDS (How much do you agree or disagree with the following statements? "ENDS products..."). Some of the statements were as follows: "help me stay slim", "help when I am feeling stressed", and "help me concentrate". For the purpose of this study, I focused on the number of students who reported using ENDS products for the purpose of helping them concentrate.

Attitudes about e-cigarettes. We assessed participants' attitudes and their perceived risks and benefits of ENDS using Copeland et al.'s (2016) 30-item Risk and Benefits Scale (RABE). Students rated 16 potential risks and 14 potential benefits and indicated their agreement

on a scale that was modified from 1-7 point likert scale to 1-5 point likert scale (1 = *strongly disagree*; 2 = *slightly disagree*; 3 = *neither agree or disagree*; 4 = *slightly agree*; 5 = *strongly agree*). Examples of risk statements that we asked students to assess their agreement on included “nicotine is addictive, regardless of whether ingested through e-cigarettes or regular cigarettes”, “children and pets will become seriously ill if they drink or touch e-cigarette fluids”, and “vaping (smoking e-cigarettes) can lead to smoking more cigarettes”. Examples of benefit statements that we asked students to assess their agreement on included “e-cigarettes can be used anywhere, even indoors”, “e-cigarettes are safe, it’s tobacco - not nicotine - that makes regular cigarettes dangerous”, and “e-cigarettes are an effective way to quit smoking regular cigarettes”. The reliabilities for the 16-item and 14-item subscale, respectively were good ($\alpha = .88$ for both risks and benefits).

Impulsivity. We assessed impulsivity using the 30-item Barratt Impulsiveness Scale (Patton et al., 1995). Students assessed a number of statements using a scale from 1-4 (1 = *rarely/never*; 2 = *occasionally*; 3 = *often*; 4 = *almost always*). Students assessed statements using this scale. Assessments pertained to statements such as: “I do things without thinking”, “I make up my mind quickly”, and “I get easily bored when solving thought problems”. We averaged the responses together and reversed scored responses where higher ratings indicated less impulsiveness such as “I am a careful thinker”, “I am self-controlled”, and “I plan tasks carefully” so that higher scores indicated higher impulsivity. The reliability for the 30-items was good ($\alpha = .85$).

ADHD. We assessed ADHD symptom severity using the 18-item Adults ADHD Self-Report Scale (ASRS) (Gray, 2014). Students reported their symptom severity on a scale from 1-5 (1 = *Never*; 2 = *Rarely*; 3 = *Sometimes*; 4 = *Often*; 5 = *Very often*). Relevant questions about

ADHD symptoms included “how often do you have trouble wrapping up the final details of a project, once the challenging parts have been done?”, “How often do you have difficulty getting things in order when you have to do a task that requires organization?” and “When you have a task that requires a lot of thought, how often do you avoid or delay getting started?”. Response choices were averaged together so that higher scores indicated greater severity of ADHD symptoms. The reliability for the 18-items was excellent ($\alpha = .91$).

Qualitative Analysis

Focus group measures. Focus group questions inquired about participants’ attitudes and motives about ENDS products and how those attitudes/motives have changed in different circumstances and through the influences of news/media, social acceptance/peer circles, and economic participant’s knowledge of news and media pertaining to ENDS products. For the purpose of the study, we focused on the analysis of the following questions:

1. What have you heard in recent news articles about vaping?
 - o To what extent does that information affect your opinion on vaping?
 - o To what extent does it affect your decision to vape/not vape?
2. What do you still want to know about vaping? What would be helpful to know in order to decide whether to try it, to continue, or to stop?

Qualitative Data Analysis

The focus group audio was recorded with digital recorders and first transcribed through Trint. A research assistant reviewed and edited all of the transcripts so that they matched the audio file. The transcriptions were analyzed using Thematic Analysis (TA), an analytic strategy described by Braun & Clark (2006) that aims to recognize and then disclose patterns within the captured data set. I worked towards discovering how participants’ attitudes regarding vaping and their vaping behaviors and tendencies had changed based on what they had heard about vaping in

recent news. I also aimed to expand my understanding on how people's motives influence patterns of their use and vaping behavior. We utilized a more inductive and data-driven TA approach, where we will take patterns we observe and use them to draw on generalizations regarding vaping behaviors and attitudes.

Results

E-cigarette Use in Survey Sample

In a sample of 1315 participants, 56.5% reported using ENDS devices at one point or another in their lifetime. Among the 56.6% of those who reported ENDS use ever, 52.7% reported endorsement of ENDS in the past 30 days. In the same sample, when asked about cigarette, cigar, or cigarillo use in the past 30 days, 3.7% reported everyday use, 22.0% reported use on some days, and 74.4% reported no use at all.

Tests of Acquired Preparedness

I conducted mediational analyses using the PROCESS macro version 3.4 for SPSS (Hayes, 2013) to test the indirect effect of impulsivity on the frequency of two separate, but similar outcomes: quantity/frequency of past 30-day ENDS and level of e-cigarette dependence. The independent variable was impulsivity. The two mediating variables were perceived risks and perceived benefits. The statistical covariates were gender and Greek life involvement. These covariates were included because preliminary correlational analyses showed that they were two demographic variables significantly associated with ENDS outcomes.

E-cigarette quantity/frequency. To test my first hypothesis that impulsivity would be indirectly related to ENDS quantity/frequency through perceived risks and benefits, I conducted a mediational analysis in two steps. In the first step, I examined associations between impulsivity and the covariates, gender and Greek involvement, on the outcomes of perceived risks and

benefits, respectively. The models predicting perceived benefits ($R^2=.081$) and risks ($R^2=.064$), respectively, were significant (both $p<.001$). There was a significant positive association between impulsivity and the perceived benefits (standardized coefficient=.175, $p<.001$) and a significant inverse association between impulsivity and perceived risks (standardized coefficient=-.189, $p<.001$). Greek-life involvement was not a significant predictor of participants' perceived benefits or perceived risks of e-cigarette use. There were, however, significant associations between sex and perceived benefits (standardized coefficient=-.211) and between sex and perceived risks (standardized coefficient=.156). Because males were coded as 1 and females as 2, the coefficients suggest that males perceived more benefits and fewer risks compared to females.

In the second step of the mediational analysis, the composite ENDS quantity/frequency variable was regressed onto the independent variable (impulsivity), the hypothesized mediators (perceived risks and benefits), and the covariates (gender, Greek involvement). The model predicting ENDS quantity/frequency was significant ($R^2=.20$, $p<.001$). I found partial support for my first hypothesis. There was an indirect effect of impulsivity through perceived benefits [indirect effect= .4852, $SE (.13)$, 95% CIs [.2422, .7643], but not through perceived risks [indirect effect= -.0808, $SE (.06)$, 95% CIs [-.2137, .0183]. Figure 2 shows the test of the acquired preparedness model, with solid lines indicating significant paths.

E-cigarette dependence. To test a second outcome relevant to my first hypothesis, I conducted another mediational analysis to determine if impulsivity was indirectly related to ENDS dependence through perceived risks and benefits. In the first step, I examined associations between impulsivity and the covariates, gender and Greek involvement, on the outcomes of perceived risks and benefits, respectively. The models predicting perceived benefits ($R^2=.10$) and

risks ($R^2=.08$), respectively, were significant (both $p<.001$). There was a significant positive association between impulsivity and the perceived benefits (standardized coefficient=.173, $p<.001$) and a significant inverse association between impulsivity and perceived risks (standardized coefficient=-.182, $p<.001$). Greek-life involvement was not a significant predictor of participants' perceived benefits or perceived risks of e-cigarette use. There were, however, significant associations between sex and perceived benefits (standardized coefficient= -.247) and between sex and perceived risks (standardized coefficient=.156). Because males were coded as 1 and females as 2, the coefficients suggest that males perceived more benefits and fewer risks compared to females.

In the second step of the mediational analysis, the composite ENDS dependence variable was regressed onto the independent variable (impulsivity), the hypothesized mediators (perceived risks and benefits), and the covariates (gender, Greek involvement). The model predicting ENDS dependence was significant ($R^2=.1608$, $p<.001$). Again, I found partial support for my first hypothesis. There was an indirect effect of impulsivity through perceived benefits [indirect effect= .1082, $SE (.032)$, 95% CIs [.0518, .1769], but not through perceived risks [indirect effect= -.0218, $SE (.018)$, 95% CIs [-.0634, .0092]. Figure 1 shows the test of the acquired preparedness model, with solid lines indicating significant paths.

ADHD Symptoms and Concentration Motives for ENDS

To test my second hypothesis that ADHD symptom severity would be positively associated with using ENDS to concentrate, I ran a correlational analysis. I did not find support for my second hypothesis, as the two variables were not correlated ($r = .00$, $p = .97$). Exploratory analyses, however, showed that ADHD symptoms were correlated with quantity/frequency of ENDS use ($r =.38$, $p<.01$) and ENDS dependence ($r =.33$, $p<.01$).

Effects of Media on Participants' ENDS Use

In addition to my two hypotheses, I explored the following research question: How have recent media reports of ENDS-related illnesses affected students' attitudes and behaviors around ENDS? To answer this question, I conducted a thematic analysis using data from the five focus groups.

Themes and Subthemes. The main themes were as followed (1) Information Heard in Media, (2) Media Impact on Vaping Habits/Behavior, and lastly, (3) Further Unknown Information. Within those three main categories, subcategories were created to organize the recurring statements within each theme.

Information heard in media. Within Information Heard in Media, 3 subthemes were identified. The subthemes were as followed: Lung injuries/Deaths, Bootleg Cartridges/products and Unreliable Media Reports. Participants expressed similarities in hearing about hazardous vaping related lung disease and death in statements such as “people are getting lung infections and some people are dying” and “Yeah, I mean, there's a lot of cases of kids going to the hospital because of like breathing problems. And they think there's a big correlation between that and JUULING and like the acid in the JUUL or whatever is like bubbling like kids, lungs and stuff. Yeah. Just that it's really bad for you”. Participants also overlapped in hearing information about bootleg cartridges or products. Statements that captured this shared exposure of knowledge regarding bootleg cartridges/products included “and I know for a fact it's not the JUUL that's killing people. It's actually the THC cartridges for like those types of devices usually like cut up and mixed up by a dealer from like the actual legal stuff, or, I'm not totally sure how it's created, but I think it's like vitamin E” and “what I read is that it's like dab pen cartridges that are made at home and like sold illegally”. There was also overlapping reports of participants expressing

unreliability or skepticism in the news reports that they had heard. These statements included “I feel like it's just like. It's all like the vaping companies and just all the news I hear feels like really broad. Like, let's say it'll target like the JUUL or something but like that person has also done like weed patterns and stuff like that. So it feels like it's hard to find like what the sources of some of these people's health problems. So I think just like more information would be helpful instead of like grouping like all like vape pens under one company or whatever” and “I feel like it's just like. It's all like the vaping companies and just all the news I hear feels like really broad. Like, let's say it'll target like the JUUL or something but like that person has also done like weed patterns and stuff like that. So it feels like it's hard to find like what the sources of some of these people's health problems. So I think just like more information would be helpful instead of like grouping like all like vape pens under one company or whatever”. These statements demonstrated clear support of the three subthemes in that they depicted common expressions of hearing reports of lung/injury death, hearing about bootleg cartridges, and expressions of skepticism.

Media impact on vaping habits/behavior. Within Media Impact on Vaping Habits/Behavior, 2 subthemes were identified. The subthemes were as followed: Noticing physical effects and Gave me a reason to cut down/quit. Participants expressed a lot of similarities in how media coverage gave them a reason to stop endorsing ENDS as frequently if ever again. This was noted in phrases such as “I’ve wanted to quit for a while and it was kind of a reason for me to” and “I definitely wouldn’t buy pods on my own anymore like I might have used to, but I would maybe use someone else’s but not that frequently”. Similarly, many participants expressed overlapping feelings regarding the evident physical effects they were experiencing because of their ENDS device. Phrases that captured this subtheme included “I

would always rip the JUUL in bed and I would realize it then when laying down, it would be harder to breathe” and “I know like a lot of athletes who JUUL a lot say it's like harder like they get out of breath quicker than when they weren't JUULing”. These responses demonstrated a clear impact of media on overall usage and a clear impact of ENDS use and evident physical effects.

Further unknown information. Within Further Unknown Information, 2 subthemes were identified: Long-Term Effects and Unknown Components of Cartridges. Participants expressed similar uncertainty and desire for knowing the long-term health effects of ENDS use in statements such as “the uncertainty of the effects of the JUUL just made me nervous” and “I mean, I think since there were like you were saying like there's clear evidence that smoking causes cancer, but like there isn't any for JUUL yet, so I think a lot of people disregard like even though they hear, oh, it's bad for you. Like a lot of people don't care. Like, I didn't care because, like, there wasn't you know what I mean, there was no conclusive evidence that it cost anything”. Participants also expressed recurring uncertainty regarding the components of ENDS cartridges in statements such as “I've also been curious, like just thinking about how JUUL were regulated by the FDA when they initially came out. What is the process of seeing what's in them and long-term effects and how long did it actually need to get tested for?” and “So you're kind of just like, oh, that can't happen to me. And I think, like, again, without like knowing exactly what is in like all of these products, I think that's like hard to be like what's the evidence?”. These responses demonstrated a clear concern in the unknown effects of both vaping and the components that go into ENDS cartridges.

Discussion

The present study explored how personality and media exposure affect expectancies about ENDS use and how those perceptions were associated with patterns of ENDS use and dependence. Specifically, we addressed gaps in existing ENDS research by applying the acquired preparedness model to explore possible connections among personality, perceived risks and benefits of e-cigarettes, and e-cigarette frequency/e-cigarette dependence. We predicted that students who scored higher in impulsivity would perceive fewer risks and more benefits of ENDS and, in turn, will be more likely to use ENDS products. We also explored whether students who scored higher in ADHD symptoms were more likely to report using ENDS as a means to concentrate. Finally, in light of the recent media coverage regarding the negative health effects of vaping, we aimed to understand what students were learning from the media and how that information affected their willingness to use ENDS. All of the above information will be instrumental in informing interventions to prevent and reduce ENDS in college students.

Acquired preparedness model

In our application of the acquired preparedness model (APM), we found partial support for the first hypothesis. In support of my hypothesis and the APM, perceived benefits mediated the relation between impulsivity and e-cigarette frequency. In other words, students who were more impulsive perceived more benefits associated with ENDS and, in turn, were more likely to report ENDS use. Perceived risks, on the other hand, did not mediate the association between impulsivity and ENDS use, although students higher in impulsivity perceived fewer risks associated with ENDS. We found a similar pattern for e-cigarette dependence, where students higher in impulsivity reported more perceived benefits and, in turn, higher rates of ENDS dependence.

There were several other associations of note in the APM analysis. Although Greek-life involvement was not associated with perceived risks and benefits, it was associated with more frequent ENDS and likelihood of dependence. Further, male participants reported more perceived benefits, fewer perceived risks, and higher overall rates of ENDS use and dependence. These findings suggest that these two subpopulations of students are at higher risk for ENDS and its negative effects and may be targets for prevention or intervention efforts. The results of the present study indicating a significant positive association between impulsivity and e-cigarette use/dependence through perceived benefits, but not perceived risks have partially replicated past literature. Copeland et al.'s (2017) findings were moderately consistent with the present study in that they reported evidence of a significant association between e-cigarette use and perceived benefits in a sample of 734 college students. However, unlike the present study which compared impulsivity measures as a mediator of students' perceived risks and benefits of e-cigarettes, Copeland et al. (2017) compared different smoking statuses as a mediator instead. Smoking statuses were operationalized by the following labels: 'e-cigarette users' were current daily users of e-cigarettes, 'conventional smokers' were daily traditional cigarette users, and 'dual users' "were individuals who used both e-cigarettes and traditional cigarettes daily" (Copeland et al., 2017, 32). When comparing the different smoking status groups' perceptions of risk, there were no significant differences, suggesting, as our study does, that perceptions of benefits are more influential in differentiating people based on smoking status.

The parameters of Copeland et al.'s (2017) study differed slightly from the present student, in that the sample size of 734 college students was relatively smaller than that of the current study. The measures of the study aligned with the present study in that students' perceived risks and benefits were assessed using the RABE. However, unlike the present study,

Copeland et al. (2017) did not measure impulsivity as a mediator for the perceived risks and benefits of e-cigarette use. Copeland et al. (2017) also did not look at the variable e-cigarette dependence, unlike the present study. However, even with these slight differences in parameters and mediational measures, the similar findings emphasize the robustness of the idea that for e-cigarette use in college students alone, perceptions of benefits dictate students' e-cigarette use but perceptions of risks do not.

We were also able to replicate aspects of Doran et al.'s (2013) study. Consistent with the APM, in a sample of 548 first year college students, Doran et al. (2013) found that those with higher impulsivity symptoms evidenced a greater chance of smoking initiation. This association, similar to the present study, was significantly mediated by positive expectancies, but not negative expectancies. It is important to note that Doran et al. (2013)'s findings differed from the present study in that these findings applied to combustible cigarette use as opposed to e-cigarette use. However, this difference suggests that these associations are robust across all nicotine products as opposed to just electronic cigarette use.

The current findings were not completely concordant with previous literature. In Vangness et al. (2005), the acquired preparedness model was used to examine the whether the effect of impulsivity on marijuana use could be explained by positive and/or negative marijuana expectancies. The study found that students who exhibited greater impulsivity held fewer negative expectancies, and, in turn, used marijuana more frequently. Unlike the present study, in this study it was negative expectancies that differentiated people who were more or less likely to use, as opposed to positive expectancies as found in the present study. There are a few differences in this study that could account for these contrasting findings. First, my study focused on a legal substance, while Vangness et al. (2005) focused on a substance that was illicit at the

time of publication. However, this difference in substance could indicate that certain personality proclivities might make people more attuned to the benefits or the risks of different substances differently. Another reason that might account for this difference is that people might have more experience with e-cigarette use as opposed to marijuana use, which is still an issue of legality in many states. Because of legality and the more restricted access of marijuana in comparison to e-cigarettes use, it could explain why negative expectations will more strongly dictate whether people are more or less likely to use them.

ADHD and Concentration Motives

ADHD symptom scores were not correlated with endorsement of ENDS for concentration; therefore, no support was found for the second hypothesis. The literature suggested a strong connection between ADHD/impulsivity and earlier combustible cigarette initiation and overall use (Goldenson et al., 2018). There were major gaps in the literature regarding the exact motives of ENDS use for individuals who score higher in ADHD symptoms. This association was not replicated in the survey portion of the current study. Perhaps individuals with ADHD symptoms are already being adequately treated through medication and other interventions and, therefore, do not feel the need to turn to ENDS for the sake of concentrating. Another explanation for this finding is that perhaps individuals who are using ENDS might not realize that they are endorsing them for the purpose of concentration.

Although my analysis of the focus group data did not focus on motives for ENDS use, the sentiment of the focus groups regarding use of ENDS was somewhat different from the survey data. Despite not knowing focus group participants' ADHD scores, participants in the focus groups routinely endorsed using ENDS for concentration. Specifically, endorsing ENDS use in academic settings was a common trend among participants' answers, particularly when doing

work in the library. Other participants who did not endorse in ENDS themselves still reported witnessing frequent ENDS use by peers in classroom and library settings. One major reason for this notable difference in reports between the focus groups reports and the survey results could be due to the differing samples of participants. Within the 42 focus group participants, the percentage of individuals who had ever tried ENDS was around 71%. The survey, on the other hand, captured a much wider spectrum of students from six other campuses, likely with more diverse experiences. The difference in sample size and diversity could account for the differences found in the reports of using ENDS to concentrate.

Effects of Media Coverage on Participants' ENDS Use

In exploring my research question regarding changes in vaping behavior due to media coverage, thematic analysis revealed a few apparent trends that stood out in the focus groups. Although very little literature has examined the impact that media coverage of vaping on individuals' vaping behavior, the current study shared some similar themes with the few studies that were apparent in the literature. The main theme we found that addressed my initial research question was that participants were hearing negative coverage on vaping in news reports which ultimately served as a reason for many to attempt or follow through with cessation. Wackowski et al.'s (2019) study found that exposure to mainly negative news coverage yielded a significant association with a likelihood for obtaining greater intentions to quit. Although the fundamental finding of this study appeared similar to that of that of the present study, it is important to note that the sample size, methodology and analysis were vastly different. Wackowski et al. (2019), had a much larger sample size of 876 young adults than the 42 participants we conversed with in our focus groups and used a survey and activity as their method unlike the focus group method we used. Despite these differences, it is still important to note that both studies aligned in that

they found the nature of media coverage to seemingly play a role in people's behaviors and attitudes towards vaping.

Limitations

With a self-reported survey, there is always the risk that participants could be untruthful in their responses, especially because we inquired about a behavior that was illegal for a sizeable percentage of participants. In addition, although we added a series of check questions to probe the attentiveness of the participants, there is still the chance that participants could have rushed through the answers and therefore inaccurately represented themselves. The survey was somewhat long (60 minutes), so participants also might have responded less accurately if they were fatigued.

In the focus groups, participants may have been reticent to be truthful about their views or behavior in a face-to-face discussion. While we found that many participants were incredibly willing to share and elaborate on their experiences, there were also many who did not share as openly as we would have hoped. A majority of focus group participants expressed some sort of opposition or negative outlook on ENDS use. Typically, people with this mindset seemed much more open and willing to talk about their opinions and experiences. In some of the focus groups there were noticeable undertones of negative judgements against about vaping. It is possible that these undertones led people who viewed ENDS more neutrally or even positively to talk less about their vaping experiences perhaps for fear of judgement. The size of the school could also have played a role in participants' unwillingness to share given that the chances of participants being acquainted or running into each other again were much higher than that of a larger school. The small nature of the college proposed a few more limitations. Trinity College is a liberal arts college with an undergraduate population of 2,182. Given that all the participants were Trinity

College students, and a large majority of them were white seniors, we are limited in our ability to generalize these results to wider and more diverse groups of students.

Implications

There are several implications that follow from our findings. First, our findings provide some preliminary guidance for college personnel and mental health practitioners on how to effectively intervene to help students quit vaping. Because our findings show that impulsive young adults are more vulnerable to higher perceptions of beneficial reinforcement, and because past findings show that impulsivity is associated with a stronger likelihood of smoking initiation (Doran et al., 2013), it is important to think about how in the future preventive measures could be taken to help keep these individuals from endorsing ENDS or helping to guide them in smoking cessation. Going forwards, intervention programs would be most effective if they focused on retraining the inflated perceptions of beneficial reinforcement that those with greater impulsivity have proven to display. If programs could help stabilize these perceptions that come with impulsive personality proclivities, individuals could be less inclined to engage in ENDS use. On the other end of the spectrum, because those scoring high in impulsiveness perceives less risk, it could be possible that these decreased perceptions of risk equate to these individuals' lack of awareness towards the potential dangers of their nicotine use. Preventative programs that target these individuals could benefit from focusing in on educating them about the potential dangers of engaging in ENDS to hopefully pragmatize their potential misinformed ideals about the negative impacts of nicotine endorsement.

Overall, there has been little research on effective preventive measures targeting young adults looking to quit vaping. To that end, we asked some of our focus group participants about specific factors that might help in making a successful intervention program. Although few

participants had specific ideas, location and confidentiality came up as two important factors that might aid in effective intervention. Other ideas included addressing the physical symptoms that come when people go cold turkey and having more online resources available. Based on these reports, I would suggest the addition of intervention programs to college campuses that help tackle the motives behind people's ENDS use. In both focus groups and the survey, it was often reported that vaping was used for stress relief and relaxation. Given these reports, it would be important for intervention programs to focus in on these specific motives. An effective intervention program for students reporting ENDS endorsement for the sake of stress relief might focus on providing healthier alternative coping mechanisms for managing stress. A lot more research still needs to be done and more steps need to be taken to help aid in constructing programs that are appealing but more importantly effective for teaching people to alter their vaping habits.

Future Directions

A common theme that came up in the focus groups was the generally shared desire for more information regarding vaping. There is still a lot of information that people do not feel is readily available to them regarding components of pods and/or e-liquids. Although the CDC has worked extensively to disseminate information of the specific chemical components that may have been causing many of the lung diseases, there is a lot more that people still want to know. One common theme that came up was the long-term impacts of vaping. This could take a while to figure out considering that vaping is a generational fad, however, knowing these long-term effects could be crucial to altering people's vaping behaviors.

References

- Ayers, J. W., Leas, E. C., Allem, J. P., Benton, A., Dredze, M., Althouse, B. M., ... & Unger, J. B. (2017). Why do people use electronic nicotine delivery systems (electronic cigarettes)? A content analysis of Twitter, 2012-2015. *PloS one*, *12*(3).
- Berg C., Stratton E., Schauer G., Lewis M., Wang Y., Windle M., & Kegler M. (2015). Perceived harm, addictiveness, and social acceptability of tobacco products and marijuana among young adults: marijuana, hookah, and electronic cigarettes win. *Substance Use & Misuse*, *50*, 79–89.
- Bold, K. W., Kong, G., Camenga, D. R., Simon, P., Cavallo, D. A., Morean, M. E., & Krishnan-Sarin, S. (2018). Trajectories of e-cigarette and conventional cigarette use among youth. *Pediatrics*, *141*(1), e20171832.
- Braun, V. & Clarke, V. (2006). 'Using thematic analysis in psychology', *Qualitative Research in Psychology*, vol. 3, pp. 77–101.
- Cahn, Z., & Siegel, M. (2011). Electronic cigarettes as a harm reduction strategy for tobacco control: a step forward or a repeat of past mistakes? *Journal of public health policy*, *32*(1), 16-31.
- Chaffee, B. W., Watkins, S. L., & Glantz, S. A. (2018). Electronic cigarette use and progression from experimentation to established smoking. *Pediatrics*, *141*(4), e20173594.
- Chassin, L., Presson, C. C., Sherman, S. J., & Edwards, D. A. (1991). Four pathways to young-adult smoking status: Adolescent social-psychological antecedents in a midwestern community sample. *Health Psychology*, *10*(6), 409.
- Centers for Disease Control and Prevention. (2020). Electronic Cigarettes. Retrieved from https://www.cdc.gov/tobacco/basic_information/e-cigarettes/severe-lung-disease.html

- Copeland, A. L., & Brandon, T. H. (2000). Testing the causal role of expectancies in smoking motivation and behavior. *Addictive Behaviors, 25*, 445–449. doi:10.1016/S0306-4603(99)00003-9
- Courtney R. (2015). The health consequences of smoking—50 years of progress: a report of the surgeon general. *Drug Alcohol Rev. 34*, 694–695.
- Cullen, K. A., Ambrose, B. K., Gentzke, A. S., Apelberg, B. J., Jamal, A., & King, B. A. (2018). Notes from the field: use of electronic cigarettes and any tobacco product among middle and high school students—United States, 2011–2018. *Morbidity and Mortality Weekly Report, 67*(45), 1276.
- Doran, N., Khoddam, R., Sanders, P. E., Schweizer, C. A., Trim, R. S., & Myers, M. G. (2013). A prospective study of the acquired preparedness model: The effects of impulsivity and expectancies on smoking initiation in college students. *Psychology of Addictive Behaviors, 27*(3), 714.
- Dvorsky, M. R., & Langberg, J. M. (2019). Cigarette and e-cigarette use and social perceptions over the transition to college: The role of ADHD symptoms. *Psychology of Addictive Behaviors.*
- Etcheverry, P. E., & Agnew, C. R. (2008). Romantic partner and friend influences on young adult cigarette smoking: Comparing close others' smoking and injunctive norms over time. *Psychology of Addictive Behaviors, 22*(3), 313.
- Fadus, M. C., Smith, T. T., & Squeglia, L. M. (2019). The rise of e-cigarettes, pod mod devices, and JUUL among youth: Factors influencing use, health implications, and downstream effects. *Drug and Alcohol Dependence, 201*, 85-93.

- Goldenson, N. I., Khoddam, R., Stone, M. D., & Leventhal, A. M. (2018). Associations of ADHD symptoms with smoking and alternative tobacco product use initiation during adolescence. *Journal of pediatric psychology, 43*(6), 613-624.
- Grant, J. E., Lust, K., Fridberg, D. J., King, A. C., & Chamberlain, S. R. (2019). E-cigarette use (vaping) is associated with illicit drug use, mental health problems, and impulsivity in university students. *Annals of clinical psychiatry: official journal of the American Academy of Clinical Psychiatrists, 31*(1), 27.
- Gray, S., Woltering, S., Mawjee, K., & Tannock, R. (2014). The Adult ADHD Self-Report Scale (ASRS): utility in college students with attention-deficit/hyperactivity disorder. *PeerJ, 2*, e324.
- JUULPod, (2019). JUULPod, JUULPod Basics: FAQ. Accessed 2/10/20 Retrieved from: <https://support.juul.com/home/learn/faqs/juulpod-basics>Google Scholar
- Katz, S. J., Erkinnen, M., Lindgren, B., & Hatsukami, D. (2019). Beliefs about E-cigarettes: A Focus Group Study with college students. *American journal of health behavior, 43*(1), 76-87.
- Kennedy, D. P., Tucker, J. S., Pollard, M. S., Go, M. H., & Green Jr, H. D. (2011). Adolescent romantic relationships and change in smoking status. *Addictive behaviors, 36*(4), 320-326.
- Krishnan-Sarin, S., Jackson, A., Morean, M., Kong, G., Bold, K. W., Camenga, D. R., ... & Wu, R. (2019). E-cigarette devices used by high-school youth. *Drug and alcohol Dependence, 194*, 395-400.

- Kulik, M. C., Lisha, N. E., & Glantz, S. A. (2018). E-cigarettes associated with depressed smoking cessation: a cross-sectional study of 28 European Union countries. *American journal of preventive medicine, 54*(4), 603-609.
- Kollins, S. H., McClernon, F. J., & Fuemmeler, B. F. (2005). Association between smoking and attention-deficit/hyperactivity disorder symptoms in a population-based sample of young adults. *Archives of general psychiatry, 62*(10), 1142-1147.
- Leventhal, A. M., Strong, D. R., Kirkpatrick, M. G., Unger, J. B., Sussman, S., Riggs, N. R., & Audrain-McGovern, J. (2015). Association of electronic cigarette use with initiation of combustible tobacco product smoking in early adolescence. *Journal of the American Medical Association, 314*(7), 700–707. <http://dx.doi.org/10.1001/jama.2015.8950>.
- Leventhal AM, Stone MD, Rabi N, Barrington-Trimis J, Strong DR, Sussman S, Audrain-McGovern J, 2016. Association of e-cigarette vaping and progression to heavier patterns of cigarette smoking. *JAMA* 316, 1918.
- McCarthy, D. M., Kroll, L. S., & Smith, G. T. (2001). Integrating disinhibition and learning risk for alcohol use. *Experimental and Clinical Psychopharmacology, 9*, 389–398.
- McCarthy, D. M., Miller, T. I., Smith, G. T., & Smith, J. A. (2001). Disinhibition and expectancy in risk for alcohol use: Comparing black. and white college samples. *Journal of Studies on Alcohol, 62*, 313–321.
- McClernon, F. J., & Kollins, S. H. (2008). ADHD and Smoking: From genes to brain to behavior. *Annals of the New York Academy of Sciences, 1141*, 131–147.

- NIDA. (2019). Tobacco/Nicotine and Vaping. Retrieved from <https://www.drugabuse.gov/drugs-abuse/tobacconicotine-vaping> on 2020, May 13
- NIDA. (2020, January 8). Vaping Devices (Electronic Cigarettes). Retrieved from <https://www.drugabuse.gov/publications/drugfacts/vaping-devices-electronic-cigarettes> on 2020, May 13
- Perkins, K. A., Gerlach, D., Broge, M., Grobe, J. E., & Wilson, A. (2000). Greater sensitivity to subjective effects of nicotine in nonsmokers high in sensation seeking. *Experimental and Clinical Psychopharmacology*, 8(4), 462.
- Rodriguez, D., Tercyak, K. P., & Audrain-McGovern, J. (2008). Effects of inattention and hyperactivity/impulsivity symptoms on development of nicotine dependence from mid adolescence to young adulthood. *Journal of Pediatric Psychology*, 33(6), 563-575.
- Settles, R.F., Cyders, M.A., & Smith, G. (2010). Longitudinal validation of the acquired preparedness model of drinking risk. *Psychology of addictive behaviors: journal of the Society of Psychologists in Addictive Behaviors*, 24 (2), 198-208.
- Smith, G. T., & Anderson, K. G. (2001a). Adolescent risk for alcohol problems as acquired preparedness: A model and suggestions for inter- vention. In P. M. Monti, S. M. Colby & T. A. O’Leary (Eds.), *Adolescents, alcohol and substance abuse: Reaching teens through brief inter- ventions* (pp. 109–141). New York, NY: Guilford Press.
- Spindle T, Hiler M, Cooke M, Eissenberg T, Kendler K, Dick D, 2017. Electronic cigarette use and uptake of cigarette smoking: a longitudinal examination of u.s. College students. *Addict. Behav* 67, 66–72.
- Tan, A. S., Lee, C. J., Nagler, R. H., & Bigman, C. A. (2017). To vape or not to vape? Effects of exposure to conflicting news headlines on beliefs about harms and benefits of electronic

- cigarette use: Results from a randomized controlled experiment. *Preventive medicine*, 105, 97-103.
- Tercyak, K. P., Lerman, C., & Audrain, J. (2002). Association of attention-deficit/hyperactivity disorder symptoms with levels of cigarette smoking in a community sample of adolescents. *Journal of the American Academy of Child & Adolescent Psychiatry*, 41(7), 799-805.
- Trumbo, C. W., & Harper, R. (2013). Use and perception of electronic cigarettes among college students. *Journal of American College Health*, 61(3), 149-155.
- Vangness, L., Bry, B. H., & LaBouvie, E. W. (2005). Impulsivity, negative expectancies, and marijuana use: A test of the acquired preparedness model. *Addictive Behaviors*, 30, 1071–1076: doi 10.1016/j.add-beh.2004.1011.1003
- Wackowski, O. A., Sontag, J. M., & Hammond, D. (2019). Youth and young adult exposure to and perceptions of news media coverage about e-cigarettes in the United States, Canada and England. *Preventive Medicine*, 121, 7-10.
- Wackowski, O. A., Sontag, J. M., Singh, B., King, J., Lewis, M. J., Steinberg, M. B., & Delnevo, C. D. (2020). From the Deeming Rule to JUUL—US News Coverage of Electronic Cigarettes, 2015–2018. *Nicotine & Tobacco Research*.
- Wallace, L. N., & Roche, M. J. (2018). Vaping in context: Links among e-cigarette use, social status, and peer influence for college students. *Journal of Drug Education*, 48(1-2), 36-53.
- Wang M., Ho S., Leung L., & Lam T. (2016). Electronic cigarette use and respiratory symptoms in chinese adolescents in hong kong. *JAMA Pediatrics*, 170, 89–91.

Wilens, T. E., Vitulano, M., Upadhyaya, H., Adamson, J., Parcell, T., Westerberg, D., &

Biederman, J. (2008). Concordance between cigarette smoking and the modified

Fagerström Tolerance Questionnaire in controlled studies of ADHD. *American Journal*

on Addictions, 17(6), 491-496.

Zhu, S. H., Sun, J. Y., Bonnevie, E., Cummins, S. E., Gamst, A., Yin, L., & Lee, M. (2014). Four

hundred and sixty brands of e-cigarettes and counting: implications for product

regulation. *Tobacco control*, 23(suppl 3), iii3-iii9.

Table 1

Survey Group Demographics

	Frequency	Percentage (%)
Gender		
Male	400	30.3
Female	897	68.0
Other	11	.9
Race/Ethnicity		
American Indian/ Alaskan Native	3	.2
Asian	102	7.9
Black or African American	120	9.2
Caucasian (White)	964	74.2
Middle Eastern	13	1.0
Other	47	3.6
Multiracial	50	3.8
Class Year		
Freshman/ 1 st year	651	49.8
Sophomore/ 2 nd year	316	24.2

Junior/ 3 rd year	197	15.1
Senior/ 4 th year	121	9.3
Senior +/- 5 th year or more	23	1.8
Greek Membership		
No	1047	80.0
Yes	261	20.0
NCAA Student Athlete		
No	1189	90.9
Yes	119	9.1

Note. N = 1315

Table 2

Survey Group Frequencies by School

	<u>Frequency</u>	<u>Percentage (%)</u>
Eastern Tennessee State University	382	29.0
James Madison University	126	9.6
Missouri University of Science & Technology	71	5.4
Rowan University	75	5.7
Sam Houston State University	170	12.9
Saint Louis University	358	27.1
Trinity College	137	10.4
Total	1319	100

Table 3

Focus Group Demographics

	Frequency	Percentage (%)
Gender		
Male	14	33.3
Female	28	66.7
Race/Ethnicity		
Asian or Asian American	5	11.9
Black or African American	2	4.8
Caucasian	27	64.3
Hispanic or Latino	3	7.1
Other	5	11.9
Class Year		
First-year	3	7.1
Sophomore	11	26.2
Junior	8	19.0
Senior	20	47.6

N = 42

Table 4

Themes and Subthemes Related to Students' ENDS Knowledge and Media Exposure

Theme	Subtheme	<i>n</i>	Representative Quotations
Information heard in Media	Lung injuries/deaths	8	“People are getting lung infections and some people are dying.”
	Bootleg Cartridges/products	6	“There's so much fake news. But I've heard that it's the homemade weed cartridges, not the JUUL, that's putting kids in the hospitals. And also not the like, I guess, like, legal weed carts.”
	Unreliable Media Reports	3	“I just say you know you always have to be in control and you always have to look out for one another.” or “I encourage them to do it in moderation. And to make good decisions and look out for each other when they're out.”
Effects on Vaping Habits/Behavior	Noticing Physical effects	6	“I would always rip the JUUL in bed and I would realize it then when laying down, it would be harder to breathe.”
	Gave me a reason to quit/cut down	7	“I've been like trying to quit JUULing now too just because of all the news and everything”
Further Unknown Information	Long term- effects	4	“the uncertainty of the effects of the JUUL just made me nervous”

	<p>Unknown components of cartridges</p>	<p>1</p>	<p>“I’ve also been curious, like just thinking about how JUUL were regulated by the FDA when they initially came out. What is the process of seeing what’s in them and long-term effects and how long did it actually need to get tested for?” and “So you’re kind of just like, oh, that can’t happen to me. And I think, like, again, without like knowing exactly what is in like all of these products, I think that’s like hard to be like what’s the evidence?”</p>
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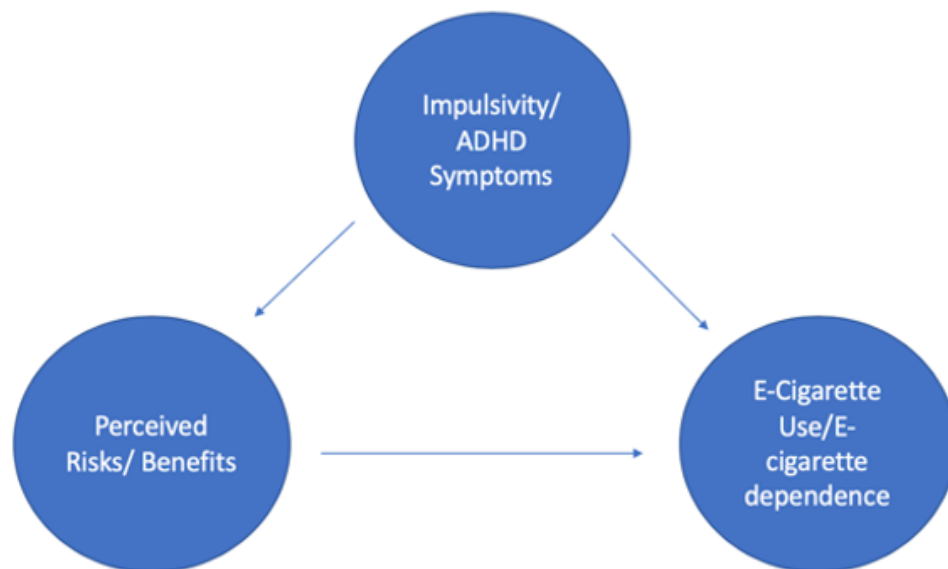


Figure 1. The acquired preparedness model for perceived risks and benefits of e-cigarette use and dependence (Settles et al., 2010).

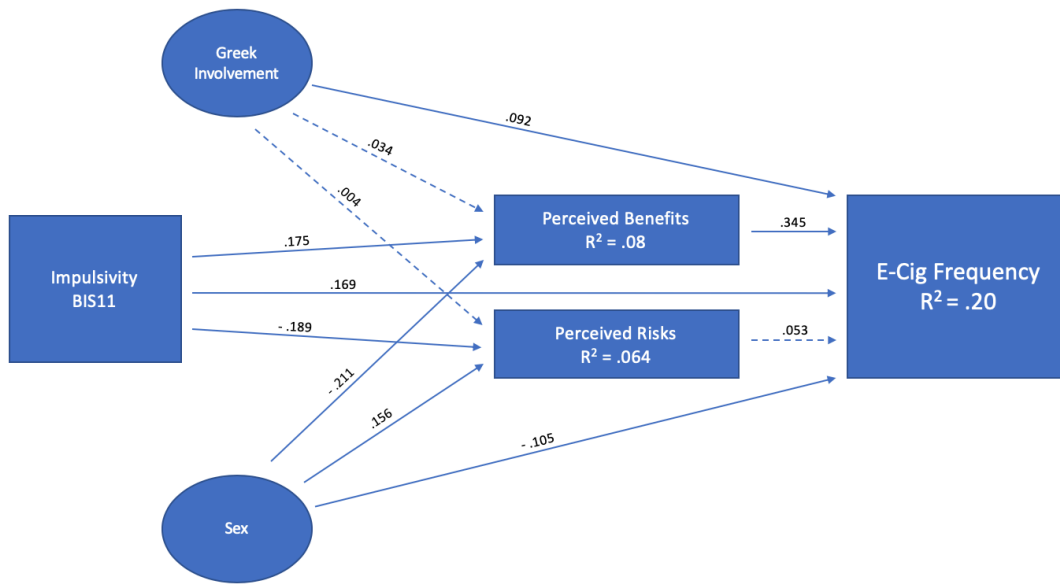


Figure 2. Test of acquired preparedness model for e-cigarette frequency. $p < .01$ for all solid lines.

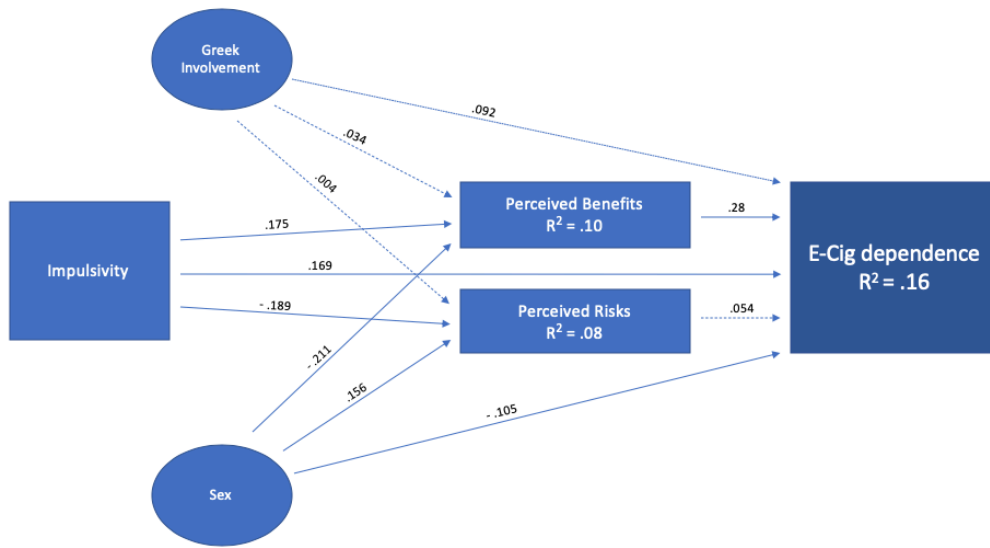


Figure 3. Test of acquired preparedness model for e-cigarette dependence. $p < .01$ for all solid lines.

Appendix A

E-Cigarette Focus Group Manual**Materials Needed:**

- Pizza
- Pens
- Nametags (used for number identification)
- Consent Forms
- Peter B's \$10 gift cards
- Pre-focus group survey
- Forms for participants to sign/confirm they received \$10 gift card

Arrival prior to participants at group location:

- Prepare/set up room
- Organize consent forms & pre-focus group questionnaires
 - Need 5-8 extra pens
- Prepare number identification badges

Introduction:

Welcome everyone! Thank you all for agreeing to be a part of today's focus group. We appreciate your willingness to participate. My name is XXX and along with XXX, we will be your moderators for this session. If you agree to participate, we ask that you read and sign the consent forms we will distribute in a moment. Additionally, we ask that you complete a brief questionnaire prior to the focus group. This session is expected to last about 60 minutes.

We have asked you to attend because you are a Trinity College student and have previously expressed interest in this study. We are conducting these focus groups to encourage discussion on a variety of topics relating to vaping/e-cigarettes and to find out more about the culture surrounding these topics on our own campus.

We are requesting your input and want you to share your honest and open thoughts with us. There are some basic guidelines to ensure the group runs smoothly:

1. First, we want to encourage participation from everyone. We value everyone's opinions and personal experiences; we want to hear a wide range of opinions. There are no right or wrong answers.
2. **Second, everything said in this room should stay in this room.** We want you to feel comfortable sharing your beliefs and experiences on issues that some may consider personal or sensitive. Please don't talk about what was said in the group with anyone else.
3. Lastly, this session will be audio recorded, so that we can better capture and analyze the responses. However, your identity will remain anonymous and your responses will only be linked to the numbers on your ID badges. If any names are used, they will be removed in the transcription of the audio file.

*****Distribute informed consent forms and pre-group questionnaire.*****

Opening Question:

Before we begin recording, let's go around the room and introduce ourselves by first name.

START RECORDING

Introductory question (ice breaker)

(ask all to share) Describe your first encounter with vaping (if you haven't used personally, or don't wish to disclose, you can simply tell us about the first time you became aware of the behavior).

Focus Group Questions:

The next set of questions focuses on your knowledge and beliefs about e-cigarettes

1. **What have you heard in recent news articles about vaping?**
 - **To what extent does that information affect your opinion on vaping?**
 - **To what extent does it affect your decision to vape/not vape?**
2. **What do you still want to know about vaping? What would be helpful to know in order to decide whether to try it, to continue, or to stop?**
3. **To what extent does the cost of the vaping affect your attitudes about, or willingness to vape?**

The next set of questions focuses on why you use e-cigarettes. *If you haven't used or don't wish to discuss your use, you can simply share your observations of others.*

1. **How would you describe your e-cigarette/vaping use, in terms of how much, how often, and the device(s) you use?**
 - **Do you own any vaping devices? Can you tell me about them and when you first got them? (Krishnan-Sarin et al., 2019)**
 - **Where (what locations) do you vape?**
2. **To what extent do you use vaping to:**
 - **Complete academic assignments? (if yes...)**
 - **Are there types of assignments that you find yourself vaping more for?**
 - **If yes, how has it influenced your attention / ability to focus?**
 - **Physical competition/Athletics**
 - **Leisure time**
 - **Change your mood?**
 - **Do you typically use it when you are feeling one certain mood?**
 - **Do you use it to achieve certain moods?**
 - **Avoid smoking regular cigarettes?**

- When you are socializing/hanging out with friends? (see Follow-Up Relationship Questions below for Carolyn)
3. **Have you ever been offered an e-cigarette by a friend? Have you ever felt pressured to use? (see Wallace and Roche, 2018)**
 4. **How have the following people reacted to your e-cigarette use?**
 - **Friends? (Urman et al., 2019)**
 - **Roommates?**
 - **Significant others? (Kennedy, Tucker, Pollard et al., 2011)**
 - **Family?**
 - **If you have never vaped, how do you think the groups above would react?**
 - **Would / have the groups influenced your vaping usage? How?**
 5. **How do your attitudes about vaping or your willingness to vape change depending on whom you are with? (Etcheverry & Agnew, 2008)**
 - **To what extent do you find your social circle influencing your vaping behaviors/attitudes?**
 - **How do people in your social circle respond to yours or others' vaping habits?**
 - **Have you ever changed your vaping habits in response to feedback from family, friends, etc.?**

Perceived self-efficacy

6. How long do you expect to vape?
7. Have you ever tried to change how often you vape? How did it go?
 - Have you observed others trying to make changes in this behavior? How did it go?
 - How confident are you that you could quit if you wanted to?

Wrap-up question

1. What else would you like to tell us that we haven't yet addressed?

Closing:

Thank you for participating! Your input is valued tremendously. Please get a \$10 Peter B's card and be sure to sign a form indicating you have received the card.

Feel free to take handouts with information on frequently asked questions pertaining to vaping/e-cigarettes.

If you have any remaining questions regarding the research, please do not hesitate to ask the moderators. You may also contact the Principal Investigator, Professor Laura Holt. Thank you again, we hope you found it interesting to be a part of this group discussion.

Debrief:

- Summary/Wrap-up by moderators after participants exit
- Stop audio recorder
- Collect all consent forms/questionnaires/notes
- Upload audio file to computer in LSC 117