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## Trauma Survivors and Perceptions of Tobacco-Related Health Risks

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Trauma Survivors and Perceptions of Tobacco-Related Health Risks

by

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Bachelor of Science

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Trauma Survivors and Perceptions of Tobacco-Related Health Risks  
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## Abstract

Title: Trauma Survivors and Perceptions of Tobacco-Related Health Risks

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Given the established relationship between trauma and tobacco use, the increased use of Electronic Nicotine Delivery Systems (ENDS), and the research identifying numerous health risks to users of ENDS, examining the relationship between trauma and the use of these products is critical. This study examined trauma survivors' health risk perceptions of ENDS use on their smoking and vaping behaviors.

A total of 126 trauma survivors were included in the study and ranged in age from 18-64 years and were primarily male. In this study's sample, the majority of participants were "current dual users" of both cigarettes and ENDS products ( $n = 96, 76.2\%$ ). The results of this study indicated that a proportion of participants endorsed experiencing all ten traumatic events ( $n = 41; 32.5\%$ ), and most reported experiencing more than seven events ( $M = 7.24; SD = 2.78$ ). Of the trauma variables assessed, those who experienced more trauma were more likely to be current dual users than participants with exposure to less trauma. Current dual users in the sample were also more likely to have higher health risk perceptions than participants in the other smoking/vaping groups. The finding that trauma survivors continue to concurrently use ENDS and cigarettes despite their awareness of the perceived increased health risks, suggests that other factors beyond perceptions of

health risk may drive their smoking and vaping behaviors. Most trauma survivors also endorsed smoking ( $n = 98$ ; 77.8%) and vaping to cope with their trauma(s) ( $n = 84$ , 66.7%). Additionally, 63.5% of trauma survivors reported that they ‘agreed’ or ‘strongly agreed’ that ENDS use is an effective smoking cessation method ( $n = 80$ ). Interventions that promote more adaptive coping to replace smoking and vaping in this high-risk population are warranted.

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## **Chapter 1**

### **Review of the Literature**

#### **Trauma's Clinical Presentation**

A traumatic event is best described as “exposure to actual or threatened death, serious injury, or sexual violence,” by either direct exposure or indirect exposure (American Psychiatric Association, 2013, p. 271). Among the large group of individuals who have experienced trauma, the types of trauma included disasters, accidents or fires, physical or sexual assault, combat or warzone exposure, death of a family member or close friend due to violence, and the witnessing of physical or sexual assault (Kilpatrick et al., 2013). However, trauma is the perception of risk or harm, and is not measured by the severity of the event but the perception of it.

In clinical settings, trauma can present as various concerns including the individual feeling stressed, intrusive symptoms such as flashbacks, nightmares, and distress at reminders; it also presents through avoidance symptoms including avoidance of reminders or thoughts related to the traumatic event, detachment, and restricted range of affect. Furthermore, arousal symptoms encompassing sleep problems, difficulties with concentration, and hypervigilance are also related to traumatic experiences (Kelley et al., 2009). In cases of individuals endorsing many of these symptoms, a diagnosis of posttraumatic stress disorder (PTSD) may be given.

## **Prevalence of Trauma**

It has been estimated that as many as 89.7% of people in the United States have experienced at least one traumatic event in their lifetime (Kilpatrick et al., 2013). Therefore, trauma is prevalent and occurs across many various demographic groups. In particular, racial and ethnic differences have been noted with regards to traumatic experiences and the development of PTSD. Roberts et al. (2011) found that Asian Americans had a lower risk of exposure to any traumatic event, and a lower risk of developing PTSD once they were exposed in comparison to Caucasians. Furthermore, African Americans had lower rates of exposure to any traumatic event; however, once exposed to a traumatic event, their risk of developing PTSD was slightly higher than that of Caucasians. Hispanics and African Americans had significantly higher exposure to child maltreatment compared to Caucasians. Roberts et al. (2011) stated that this discrepancy was primarily explained by the increased rates of witnessing domestic violence among African Americans. In comparison to Caucasians, all other racial and ethnic minority groups were found to be treated for their PTSD symptoms at a lower rate, whether through a medical provider, a counselor, or a hospital (Roberts et al., 2011).

## **Trauma and Adverse Childhood Experiences**

Trauma has also been studied in the context of adverse childhood experiences (ACEs). ACEs can be defined as potentially traumatic events that can have lasting negative effects on health and well-being (Boullier & Blair, 2018).

ACEs include maltreatment, various forms of abuse, neglect, and living in an environment that is harmful to a child's development (e.g., domestic violence, substance use in the home). As Kalmakis and Chandler (2015) discussed in their review of ACEs and health, ACEs are significantly associated with negative health consequences in adulthood. In particular, many studies have found that the more adverse experiences a child encountered, the greater the effect on physical health, psychiatric health, and behavior in adulthood (Dube et al., 2010; Felitti et al., 1998; Ford et al., 2011; Jun et al., 2008). Specifically, trauma has been linked to disordered affect regulation (i.e., depression, anxiety, difficulty controlling anger) in addition to negative health outcomes (Bremner, 2003; Cicchetti et al., 2010; De Bellis & Kuchibhatla, 2006).

### **Trauma and Health Outcomes**

The link between trauma and negative health outcomes has been demonstrated to be dose-dependent, with a greater number of traumas being associated with a greater risk for negative health outcomes and behaviors, including smoking, alcoholism, drug abuse, physical inactivity, and suicide attempts (Felitti et al., 1998). Furthermore, children who experience a greater number of adverse events tend to live in stressful home environments (Boullier & Blair, 2018). Boullier & Blair (2018) reviewed results from the original CDC-Kaiser ACE study as well as subsequent studies that utilized the ACE Study Questionnaire (which includes items from the Conflicts Tactics Scale and the Wyatt), the Family Health History Questionnaire, and the Health Appraisal Questionnaire, to assess the

outcomes of adverse life events experienced during childhood across multiple domains. This review summarized that those children who were exposed to adverse life events were found to be more likely to develop behaviors that were harmful to their health as adolescents and adults, including smoking, drinking, or antisocial behavior.

As Boullier and Blair (2018) posit, engaging in harmful behaviors such as these has been shown to increase one's risk of developing cancer, as well as cardiovascular, lung, and liver diseases. In fact, children who had four or more adverse experiences demonstrated almost three times the rate of poor health compared to those with no adverse experiences in childhood (Boullier & Blair, 2018). Similarly, Kalmakis and Chandler (2015) systematically reviewed 42 studies from 2008 to 2013 that examined ACEs and health outcomes in adults. These findings indicated that numerous adverse physical outcomes were associated with ACEs, including cardiovascular disease, chronic lung disease, headaches, autoimmune disease, obesity, and sleep disturbances.

### ***Trauma and Health Outcomes Model***

Lovallo (2013) has provided a model to conceptualize the relationships between trauma and poor health outcomes. This model states that both exaggerated and diminished stress reactivities indicated system dysregulation with negative health implications (Carroll et al., 2009; Lovallo, 2011). To test this proposed model, Dich et al. (2015) examined whether the experience of stressful events and circumstances (SEC) during childhood and adolescence moderated the effect of

SECs on physiological dysregulation (i.e., allostatic load) in middle adulthood. Their sample consisted of 3,639 Danish men and 1,670 women who self-reported their experience of SECs. Physiological outcomes were measured using cardiovascular, immune, and metabolic parameters and biomarkers, including systolic and diastolic blood pressure (SBP, DBP), HDL cholesterol, and glycated hemoglobin (HbA<sub>1c</sub>). A cumulative index of physiological dysregulation (AL) was also measured via a number of biomarkers with a possible range from zero to eight, with a higher number indicating greater physiological dysregulation. Men with SECs in childhood/adolescence and in early and middle adulthood both independently predicted physiological dysfunction in later adulthood (Dich et al., 2015). These findings provide evidence that early experiences such as traumas have an effect on one's brain during development, especially those areas specific to coping and emotional responses. These changes may make an individual more sensitive to life stressors and less able to adapt or cope with them.

### ***Reducing Negative Health Outcomes***

Previous studies have found that continuous adult support in childhood is one of the most important factors in a child's development, as it affects their stress response, and could reduce the impact of childhood adversity on mental well-being and health behaviors (Bellis et al., 2017; Champagne et al., 2008; Davidson & McEwen, 2012; Fisher et al., 2006). The presence of protective factors, including adult support, may help explain why previous trauma does not always lead to long-



term negative effects. Risk factors and protective factors associated with trauma will be discussed later on in this review.

### ***Disclosure of Trauma***

Disclosures of trauma have been studied in terms of positive and negative social reactions by others, and how these may impact the survivor's recovery and mental health outcomes. The majority of studies on disclosure reactions have been in the context of sexual assault, and among sexual abuse victims. Littleton (2010), for example, found that social support following disclosure of women's sexual assault was positively related to the victim's self-appraisal and one's sense of worth. Additionally, negative disclosure reactions predicted disengagement, a form of maladaptive coping, which includes avoidant coping and ruminative thoughts and behaviors.

Similar negative outcomes were found in another study on disclosure of sexual victimization in women, wherein negative social reactions that attempted to control the survivor's decisions, such as telling others of the survivor's experience without permission, were associated with increased depression, anxiety, and posttraumatic stress symptoms as well as lower perceptions of reassurance of worth from others (Orchowski, Untied, & Gidycz, 2013). Relatedly, several studies have found that social reactions that are controlling or infantilizing were positively correlated to PTSD and problem drinking (Hakimi et al., 2018; Peter-Hagene & Ullman, 2014). In addition, negative social reactions to disclosure of sexual assault were correlated with greater symptoms of PTSD and the use of maladaptive coping

skills, including substance use in several studies (Brooks et al., 2019; Ullman & Peter-Hagene, 2014).

### **Prevalence of Combustible Tobacco and ENDS Use Within the U.S. General Population**

Results of the National Health Survey (2018) indicated that of the tobacco users ages 18 and older who completed the survey, approximately 14.0% endorsed cigarette smoking, or roughly 34.1 million individuals within the United States alone. The CDC (2019a) found that 15.3% of U.S. adult males and 12.7% of U.S. adult females smoked cigarettes. Rates for cigarette smoking were highest among people identifying as Lesbian, Gay, or Bisexual (19.2%), American Indian/Alaska Natives, Non-Hispanic individuals (20.9%), and among individuals aged 45 to 64 years (17.0%). Furthermore, individuals who obtained their GED also had higher rates for cigarette smoking (35.3%). Those who were divorced, separated, or widowed (19.0%), and individuals with an income of less than \$35,000 were also found to have high rates of smoking (21.4%) (CDC, 2019a; Cornelius et al., 2019).

Cigarettes capture only a subsection of tobacco use. ENDS produce an inhaled aerosol instead of smoke and provide an alternative to cigarettes as a means of nicotine delivery. This aerosolized mixture is the product of a solution that can contain various concentrations of nicotine, as well as chemical flavors (Section on Tobacco Control, 2015). It should be noted that the terms, “vaping”, “e-cigarettes”, and “ENDS” will be used interchangeably throughout this review.

Over time, vaping has become increasingly popular, with the current and past use of ENDS having increased in the majority of countries (Chapman & Wu, 2014). Lifetime use has been found to be higher among adults in the U.S. aged 20 to 28 years, which includes college students, with rates ranging from 4.9% to 7.0%. More broadly, rates of ENDS use among U.S. adults ages 18 and older is 0.6% to 6.2%. The ratio of male to female ENDS users is equal across the lifespan, and those of lower SES were found to try e-cigarettes more than those of higher SES. Findings for ENDS use across racial and ethnic groups have been mixed in the U.S. and for samples outside of the U.S.; a larger sample size is likely needed to capture the difference in ENDS use across ethnic and racial groups (Chapman & Wu, 2014).

### **Negative Health Outcomes of ENDS**

In recent years, the use of cigarettes has decreased, while ENDS use has increased globally, despite the health risks associated with these products (Cantrell et al., 2018; Jamal et al., 2016; Yoong et al., 2018). Adverse health consequences associated with ENDS are largely due to their harmful contents, including toxins and chemicals in the aerosol which are carcinogenic in nature and can cause cancer (CDC, 2019b). Further health risks include short-term cardiovascular and respiratory health effects. In one study, for example, vapers demonstrated a significant increase in reactive oxygen as well as decreased levels of antioxidants and nitric acid 30 minutes after ENDS use (Carnevale et al., 2016). Another study found that ENDS users demonstrated a statistically significant increase in levels of

low-density lipoproteins and an increased shift in cardiac autonomic balance towards parasympathetic dominance than those who did not use ENDS (Moheimani et al., 2017). These collective findings indicate that ENDS products promote oxidative stress and decrease endothelial function, which are associated with cardiovascular diseases including chronic heart failure, diabetes, and hypertension (Rush, Denniss, & Graham, 2005).

Pulmonary functioning has also been studied in the context of ENDS use. In one study, ENDS users showed increased peripheral airflow resistance and respiratory resistance, and reduction in exhaled nitric acid within 5 minutes after use (Vardavas et al., 2012). In another study, both healthy controls and asthmatic patients had increased airflow resistance (Kotoulas et al., 2020) after vaping. Additionally, pulmonary function was reduced in asthmatic patients who vaped. McConnell et al. (2017) found a significant positive association between 12-month ENDS use and rates of chronic bronchitis. These studies indicated a direct relationship between ENDS use and reduced pulmonary functioning in individuals.

In addition to physical health concerns, the behavioral effects of vaping have also been examined. Soneji et al. (2017) found that vaping may initiate cognitive, psychological, and behavioral processes that increase the risk of smoking. This is hypothesized to be due to creating positive expectancies about smoking, increasing affiliation with peers who smoke, and the mimicking of behavioral activities such as hand to mouth movements.

## **Perception of Risk for Negative Health Outcomes**

In the literature, heightened risk perceptions have been linked to lower rates of smoking (Gerking & Khaddaria, 2012; Viscusi & Hakes, 2008). In youth, greater perceptions of risk have been associated with lower rates of cigarette smoking (Gerking & Khaddaria, 2012; Jacobson et al., 2014). The increase in ENDS use in recent years has suggested that individuals are engaging in the use of such products due to the perception that they are safer than regular cigarettes (Grana et al., 2014; McKeganey et al., 2018). In a study that examined the perceptions of vaping and smoking among 50 ENDS users by qualitative interviews, reasons for ENDS products being perceived as a safer alternative included that vaping was not banned in all public spaces like cigarettes, and that ENDS did not contain certain harmful chemicals like tar found in cigarettes (McKeganey et al., 2018). This study also found that a majority of participants initially used ENDS products due to their beliefs that they were a safer alternative to smoking.

Experimental studies have attempted to capture the direct impact of information about the effects of ENDS use on health-risk perceptions. Participants who were presented with a message of scientific uncertainty of the risk involved with using ENDS products viewed vaping as less risky than those who viewed a control message (Pepper et al., 2019). In a longitudinal study of 5,482 college students and their risk perceptions, it was found that low perceptions of harmfulness to health and low perceived addictiveness predicted e-cigarette

initiation among non-smoking college students (Cooper et al., 2018). However, among current smokers in this sample, these risk perceptions did not predict e-cigarette initiation. Cooper et al. (2018) hypothesized that these group differences may exist because current smokers likely already exhibit effects of nicotine dependence, which may outweigh other risk factors such as risk perceptions of e-cigarette use (Moran et al., 2004).

### ***Precaution Adoption Process Model***

Another aspect of risk perception to consider is based on the Precaution Adoption Process Model (Weinstein, 1988). This model posits that risk perception is a multi-dimensional construct comprised of three components: perceived vulnerability, optimistic bias, and precaution effectiveness (Borrelli et al., 2010; Weinstein, 1988). Perceived vulnerability is defined by Borrelli et al. (2010) as the degree to which an individual feels personally vulnerable to the health effects of their risky behavior. Among individuals with cancer, for example, high levels of perceived vulnerability are associated with greater motivation to quit smoking (Schnoll et al., 2004). Optimistic bias refers to when an individual believes inaccurately that they are at a lower risk than their counterparts (Borrelli et al., 2010). Smokers have been found to underestimate the strength of their dependence and related problems and overestimate the efficacy of preventative health strategies to contrast the negative effects of smoking (Masiero et al., 2015). The third component of risk perception is precaution effectiveness, which is the degree to

which a person believes that engaging in precautionary behavior (quitting smoking) will result in health benefits for doing so (Borrelli et al., 2010).

### ***Risk Perceptions in Medical Patients***

Borelli et al. (2010) examined perceptions of risk among 237 medically ill non-treatment-seeking smokers, greater than 18 years of age, who received home care services for an acute or chronic illness. Measures utilized included the Smoking Decisional Balance Scale, Medical Outcomes Study-Short Form General Health Survey (SF-12) to measure quality of life, the Perceived Stress Scale (PSS), and several other scales and screeners. Borrelli et al. (2010) found that optimistic bias and precaution effectiveness were the two constructs that interacted with medical illness and predicted smoking cessation (Borrelli et al, 2010). Current versus future risk perceptions were also found to be important factors, given that each was associated with different stages of change and smoking cessation outcomes. Moreover, greater optimistic bias predicted a lower likelihood of cessation while precaution effectiveness predicted a greater likelihood of smoking cessation among those with smoking-related illness. However, even with high perceived vulnerability, individuals who did not perceive benefits of health behavior change could develop heightened anxiety and fatalism and were less motivated to change their smoking habits (Schnoll et al., 2002).

Health risk perceptions among pregnant women who use tobacco and ENDS products during pregnancy have also been examined (Bhandari et al., 2018). Self-reports of a sample of 409 pregnant women indicated that 11.9% currently

used ENDS and 26.5% currently used tobacco. Most of the ENDS users within this study used these products as a means of smoking cessation, despite the lack of evidence regarding the effectiveness of ENDS use for smoking cessation among pregnant women (Siu & U.S. Preventive Services Task Force, 2015). In a related study, greater perceptions of risk were reported by some women during pregnancy, with ENDS being viewed as unsafe, possibly harmful to the baby, and equally as harmful as cigarettes (Kahr et al., 2015). In another study, however, ENDS users and nonusers both attributed lower levels of risk to ENDS use when compared to cigarettes during pregnancy (Bhandari et al., 2018). Those in this study also reported a lesser understanding of most of the health risks associated with smoking and ENDS use. Collectively, these studies demonstrate that the tendency for individuals to view ENDS use as potentially less harmful than smoking may increase their likelihood of engaging in the use of such products.

**Risk Perceptions and Vaping-Associated Lung Injuries.** Given the September 2019 U.S. outbreak of e-cigarette, or vaping-associated lung injuries (EVALI), perceptions of the risk of e-cigarettes increased by 16% among US adults (Dave et al., 2020). However, once the Center for Disease Control (CDC) emphasized the role of THC in e-cigarette products specifically, it was found that risk perceptions related to e-cigarette use partially decreased. Such results indicate that the risk perceptions of ENDS products are modifiable, especially due to national attention given to the use of these products. At this point in time, however,



combustible cigarettes continue to be viewed as more detrimental to physical health than ENDS.

### **ENDS and Smoking Cessation**

ENDS use has been marketed as a method to assist with smoking cessation. Given the role of ENDS in smoking cessation, study findings have been mixed as to whether ENDS products are beneficial to the population or harmful. Reduction in smoking must be weighed against the rise in U.S. youth who have used ENDS in the past 30 days (2.7% in 2011 to 47.3% in 2013; Glasser et al., 2016; Yoong et al., 2018). Some studies have suggested that ENDS help a modest number of smokers to quit smoking and may provide greater benefits to the public's health that outweigh the risks of youth becoming smokers as a result of ENDS use (Warner & Mendez, 2018). Using their dynamic quantitative model that tracks the U.S. adult population's smoking status and smoking-related deaths over time, Warner and Mendez (2018) found that the benefit of e-cigarettes to help smokers quit is greater than the risks involved with youth using these products. Specifically, life-years saved by additional vaping-induced smoking cessation exceeded life-years lost by vaping-induced smoking initiation by three-quarters. The gains of years lived exceeded losses by a factor of 13.7. These findings, however, do not fully address the crisis that is occurring with youth and their initiation of ENDS use.

As several studies have found, daily ENDS use is uncommon among adult smokers in the United States (Choi & Chen Sankey, 2020; Dai & Leventhal, 2019; Mirbolouk et al., 2016). ENDS products are used primarily by current smokers,

followed by former smokers and then never smokers (Glasser et al., 2016). One study reported that recent quitters of smoking (less than one year) were four times more likely to be daily ENDS users than current smokers (13% versus 3.5%; Delnevo et al., 2016). Moreover, smokers who reported ENDS use had nearly twice the adjusted odds of making a quit attempt as those who did not use ENDS products (Weaver et al., 2018). Those who were daily smokers at baseline in this study, who then reported daily ENDS use (53.8%) or non-daily ENDS use (53.2%), reported a quit attempt. Interestingly, only non-daily ENDS users were significantly more likely than non-users of ENDS to report a quit attempt (Weaver et al., 2018). However, long-term abstinence was found to be greater for non-ENDS users. The overall findings of this study demonstrated that regardless of frequency or duration of ENDS use, device type, quitting as a reason for use, or the presence of e-liquid flavoring, ENDS users had lower long-term smoking abstinence rates than non-ENDS users. Therefore, although use of ENDS as a means of cessation may be successful in promoting quitting, it may not promote smoking abstinence in the long-term.

Smoking cessation facilitated by ENDS use has been compared to other empirically supported cessation methods. In a well-known randomized trial of 886 participants, smoking cessation rates were compared between participants who were assigned to an e-cigarette group and used e-cigarettes to assist with quitting smoking, versus a nicotine replacement group who used Nicotine Replacement Therapy (NRT) to stop smoking (Hajek et al., 2019). E-cigarettes were found to be

more effective for smoking cessation than NRT at weeks one and four following participants' quit dates. Quit rates were significantly higher (18%) for the e-cigarette group than the NRT group (9.9%). Participants in the e-cigarette group also reported greater reduction in tobacco withdrawal symptoms, including less severe urges to smoke, as well as smaller increases in irritability, feelings of restlessness, and inability to concentrate compared to those in the NRT group. Despite the short-term effectiveness of e-cigarettes for smoking cessation, 80% of participants in the e-cigarette group were still utilizing e-cigarettes and 9% in the NRT group were still using NRT one-year following cessation. Therefore, a significant percentage of participants continued to use ENDS despite no longer smoking, which suggested continued dependence on nicotine despite treatment. (Hajek et al., 2019).

The Surgeon General's report on smoking cessation also advocates for more research to further evaluate the efficacy of ENDS as a method of smoking cessation (Adams, 2020). At this time, there is insufficient evidence for providers to recommend ENDS as a smoking cessation approach to their patients. Instead, proven treatments for smoking cessation are recommended, which include counseling and FDA-approved medications. To ensure a greater likelihood for success in smoking cessation, it is suggested that these methods be paired with interventions at both the clinical and health systems levels.

## **Trauma and Smoking**

The relationship between trauma exposure and health-risk behaviors, such as smoking, has been extensively studied. ACEs, as a measurement of trauma, further illustrate the relationship between trauma and tobacco use. ACEs have been associated with increased odds of current smokeless tobacco use after adjusting for confounding variables among a large sample of U.S. adults, who were primarily non-Latino white women (Alcala et al., 2016). However, when all types of ACEs were included in the same model, no single type of ACE was associated with increased odds of current smokeless tobacco use. It appears that ACEs co-occur and are interrelated phenomena. When assessed across studies, almost all ACE measures were associated with increased odds ratios for current and lifetime cigarette smoking (Alcala et al., 2016; Ford et al., 2011; Strine et al., 2012; Vander Weg, 2011). The utilization of large samples across seven states among these several studies indicates a clear link between tobacco use and ACEs.

Other variables that have been examined in the context of smoking and ACEs include sociodemographic characteristics, parental smoking during childhood, and alcohol use in the past month (Strine et al., 2012). Findings demonstrated the odds of smoking in adulthood were at least 1.4 times greater for women who experienced emotional abuse, physical abuse, neglect, or had experienced parental separation or divorce than women with no ACEs. In comparison to women, men in this study were found to have significantly higher rates of current adult smoking when there was a history of emotional neglect,

physical abuse, living with a family member who abused substances, parental separation or divorce, and having an incarcerated family member (Strine et al., 2012).

### ***Sex Differences within Trauma and Smoking***

Strine et al. (2012) also studied the sex differences of smoking patterns and behavior among those with trauma backgrounds and those without. For both men and women, negative affect, including depression, was related to smoking behaviors; however, this relationship was more statistically significant for women (Strine et al., 2012). Furthermore, women have been found to utilize more passive styles of responding to threats and reacting to distressing events when compared to men who may use more adaptive ways of coping (Compas et al., 1988). Strine et al. (2012) utilized these prior findings as a hypothesis for why negative affect was more significant for women than for men.

In a longitudinal study utilizing a sample of 288 female veterans receiving treatment for trauma-related symptoms, self-reports of more symptoms of negative affect (i.e., anger/irritability, depression, and anxious arousal) were associated with higher rates of smoking (Helstrom et al., 2008). Trauma-specific symptoms were measured using the Trauma Symptom Inventory, a 100-item self-report inventory. The results indicated that trauma-specific symptoms including avoidance, dissociation, and intrusive experiences, were also associated with higher rates of smoking in this sample; longitudinally, however, only the direct relationship

between negative affect and smoking remained significant. Decreases in trauma-specific symptoms were also found to be linked with decreases in smoking.

Of note is that the interaction between time and negative affect revealed that smoking decreased much more quickly over time among women with higher negative affect scores than those with lower negative affect scores. Helstrom et al. (2008) hypothesized that women who began the study with lower negative affect scores likely had better developed coping skills that were utilized over time compared to those with higher negative affect scores. In addition, they hypothesized that women with higher negative affect scores had greater room for improvement over time and showed greater reduction in smoking by learning alternative strategies for coping.

### ***Sleep in the Context of Trauma and Smoking***

Sleep difficulties have also been investigated as a possible mediating factor linking exposure to ACEs and smoking. This relationship was examined in a longitudinal study of a sample of 505 smoking and non-smoking African American men aged 19 to 22 years, selected from eleven rural counties in South Georgia. Exposure to ACEs and sleep were conducted at baseline, and smoking behaviors were assessed at baseline, one- and- a- half years later at time two, and one-year following time two (Oshri et al., 2017). Childhood adversity was measured using the Adverse Childhood Experiences Questionnaire (ACE-Q), a self-report measure of the number and type of adversities experienced prior to the age of 18. Results indicated that exposure to childhood adversity was associated with men's self-

reported difficulties with falling asleep, sleep inadequacy, and poor quality of sleep. In addition, this study found that insufficient amounts of sleep during a 4-week period contributed to an increase in the frequency of young African American men's smoking behavior.

In order to address the link between sleep and smoking, Oshri et al. (2017) examined the factor of Delayed Reward Discounting (DRD). DRD refers to one's preference for proximate, smaller rewards compared to delayed but larger rewards. In the context of this study, DRD was utilized to assess one's valuing of immediate versus delayed rewards associated with smoking. Males and females who were smokers high in DRD exhibited a preference for the immediate rewards of smoking, while minimizing its future health consequences (Ohmura et al., 2016). Sleep inadequacy, which is negatively impacted by adverse childhood experiences, was found to increase smoking behaviors via increases in Delayed Reward Discounting (DRD) (Oshri et al., 2017). Therefore, these findings suggest a link between sleep inadequacy and increased smoking behaviors, mediated by perceptions of immediate vs. delayed rewards in men with adverse childhood experiences.

### ***Trauma's Neurocognitive Changes and Smoking***

Studies have suggested that exposure to adverse experiences in childhood could also potentiate somatic and neurocognitive alterations related to behaviors, including smoking (Ford et al., 2011; Pechtel & Pizzagalli, 2011). More specifically, "sensitive periods" during childhood and the timing of early life stress

(ELS) may affect specific areas of the brain undergoing growth spurts (Pechtel & Pizzagalli, 2011; Teicher et al., 2006). These include alterations in the hypothalamic-pituitary-adrenal (HPA) axis, as well as reduced hippocampal and gray matter volume of the left primary and secondary visual cortex due to repeated episodes of early childhood sexual abuse (Teicher, 2005; Teicher et al., 2006; Tomoda et al., 2005). PTSD and other clinical disorders as well as ELS have also been linked to smaller hippocampal volume (De Bellis et al., 2009; Vythilingam et al., 2002).

The findings regarding changes in brain structures are relevant, given the high comorbidity between nicotine dependence and PTSD (Breslau et al, 2004). Smoking initiation in those with PTSD may be due to a relapse of fear within the hippocampus and amygdala in those who have experienced a traumatic event (Kutlu et al., 2016b). The hippocampus is one of several brain structures involved in fear learning, as well as the relapse of the fear response over time. Additionally, alterations of the HPA axis secondary to stress and trauma have been associated with decreased resistance to smoking and an increase in reward from smoking. In a study which induced stress in its participants, increased HPA axis reactivity, tobacco craving, negative emotion, and physiologic reactivity were reported which resulted in participants being less able to resist smoking (McKee et al., 2011). Participants also smoked more intensely (e.g., increased puffs, shorter inter-puff interval, and greater peak puff velocity) and reported greater smoking satisfaction.



These results suggest that if stress is reduced or effectively managed, smoking outcomes may be improved.

### ***Type of Trauma Experienced and Smoking***

Research has also focused on how the type of abuse may impact smoking behaviors later on in life. Individuals with a history of trauma, specifically severe childhood abuse, were up to four times as likely to smoke cigarettes as adults as compared to those who did not experience this form of trauma (Spratt et al., 2009). Childhood physical abuse has also been linked to both a higher risk of smoking in young adulthood as well as partner violence (Kristman-Valente et al., 2016). These findings suggest a clear link between early trauma and later smoking behaviors. The timing of certain types of trauma endured has also been found to influence tobacco use. Physical abuse prior to the age of 18 has been found to significantly increase the odds of developing a Tobacco Use Disorder, particularly for males (Meyers et al., 2018). In addition, across race, ethnicity, and gender, childhood sexual abuse and parental violence were both found to increase one's risk of developing a Tobacco Use Disorder.

In a large, prospective longitudinal Australian birth cohort study (N = 7,223), individuals who experienced penetrative sexual abuse (more severe abuse) were found to be at a greater risk for nicotine dependence than those with less severe forms of abuse (Al Mamun et al., 2007). Similarly, Jun et al. (2008) conducted a study specifically examining the severity, accumulation, and timing of traumas and their relationship to smoking. Their sample consisted of data from the

Nurses' Health Study (NHS) II, an ongoing prospective study of female nurses between the ages of 25 and 42 years that started in 1989. Of the 68,505 women who completed the questionnaire, the developmental periods of childhood (up to age 11) and adolescence (11-17 years) were chosen to assess trauma histories. Physical abuse was measured using questions from the Revised Conflict Tactics Scale, which queried about types of physical abuse and frequency. Sexual abuse was inquired via questions from a national telephone survey in 1995. The results of this study found a strong, graded association between severity of child physical abuse and risk for early smoking initiation in females. Moreover, exposure to multiple forms of abuse were associated with the greatest risk for smoking behavior in both developmental periods. The finding that cumulative exposure to sexual and physical abuse had the strongest impact on smoking behaviors has been supported by other studies as well (Nichols & Harlow, 2004).

Trauma and smoking behaviors have also been linked in the context of child physical abuse (Kristman-Valente et al., 2016). To investigate this association, a sample of 699 fifth graders who were recruited from elementary schools in high-crime neighborhoods in Seattle were followed longitudinally until the age of 33. Childhood physical abuse was reported by 17% of the sample, and partner violence victimization was reported by 21-36% of the sample between the ages of 24-33 years. Smoking, partner violence, and other risk behaviors were assessed by yearly self-reports from age 10 through the age of 16, again at age 18, and then every three years until age 33. Physical abuse was measured using five items from the 28-item

Childhood Trauma Questionnaire – Short Form (CTQ-SF); partner violence was assessed using the Revised Conflict Tactics Scale (CTS2). Results supported a common-cause hypothesis, as child physical abuse (CPA) significantly predicted both partner violence and higher risk of smoking behavior at age 24, controlling for depression and alcohol dependency as risk factors. Kristman-Valente et al. (2016) also found that CPA helped explain the relationship between interpersonal violence and smoking across multiple developmental periods. When controlling for potential common causes, the association between partner violence victimization and smoking was particularly salient during young adulthood. Furthermore, higher risk smoking behaviors at 24 years old, when controlling for problematic alcohol use, uniquely predicted an increase of risk for partner violence when transitioning from young adulthood to adulthood for both sexes (Kristman-Valente et al., 2016). These results suggest that early trauma, specifically CPA, is related to smoking behaviors and may also put individuals at risk for experiencing partner violence later in life.

### ***Impulsivity and Smoking***

Similar to the findings on early physical abuse, research with maltreated children shows a propensity for the development of impulsive personality traits, which are also associated with smoking later on in life (Gagnon et al., 2013; Oshri et al., 2018). For example, Morris et al. (2020) found that individuals who met probable criteria for PTSD reported more symptoms of problematic substance use (e.g., alcohol and cannabis use), and displayed trait and choice-based impulsivity at higher levels as compared to those with trauma histories not meeting criteria for

PTSD. These findings are similar to those of Oshri et al. (2018) wherein components of impulsivity related to emotion regulation reflected neurocognitive mediators linking ACEs and substance use in adulthood. This study utilized a sample of 1,011 U.S. adults recruited from Amazon's Mechanical Turk (M-Turk) Web-based data collection platform. The Adverse Childhood Experiences instrument was used to measure child abuse and neglect, and substance use was measured via the Alcohol Use Disorder Identification Test. Delayed reward discounting was assessed with the Monetary-Choice Questionnaire, and the UPPS scale was utilized to measure the facets of impulsivity similarly to Shin et al.'s (2019) study mentioned later in this review.

The results indicated that a history of child abuse and neglect was significantly associated with negative urgency, positive urgency, and sensation seeking (components of impulsivity). Positive urgency can be defined as engaging in impulsive behaviors as a result of experiencing positive affect rather than negative affect as seen in negative urgency. Furthermore, child abuse and neglect, as well as cigarette use, were indirectly associated via negative urgency. These findings are consistent with those reported from other studies (Gagnon et al., 2013; Morris et al., 2020; Oshri et al., 2018) and provide additional support for the role of impulsivity in increasing vulnerability to later substance use. This study was limited, however, by its reliance on self-report measures and the need for archival records of childhood adversity and impulsivity to validate the current findings. In

addition, other potential mediating factors such as lifestyle or behaviors between generations were not examined.

### ***Internalizing Behaviors and Smoking***

Internalizing behaviors have also been considered as a mediating factor that could explain the relationship between child maltreatment and smoking. In fact, Lewis et al. (2011) reported that a history of maltreatment by the age of 12 was significantly related to internalizing behaviors at age 14, which in turn were related to adolescent smoking at age 16. In this study of 522 adolescents who experienced maltreatment or were at risk of maltreatment, 19% of maltreated adolescents and 7% of non-maltreated adolescents in the sample reported having smoked in the last 30 days. The rate of smoking for maltreated teens was also considerably higher than the nationally reported rate of 12% for 10<sup>th</sup> graders. More importantly, the direct effect of childhood maltreatment on smoking behaviors was significantly reduced after accounting for internalizing problems. These findings suggest that internalizing problems resulting from a history of maltreatment in childhood account for a significant portion of adolescent smoking among those who have been maltreated as children. Strine et al. (2012) have similarly shown that the relationship between emotional abuse and smoking in adulthood was mediated through psychological distress.

### **Trauma and ENDS Use**

Though the literature on trauma and its relationship to ENDS use is still growing, early findings highlight the need to further explore the contribution of

trauma to tobacco-related outcomes. Only recently have studies examined the association between adverse childhood experiences (ACEs) and vaping. For example, Williams and colleagues (2020) investigated the early initiation of vaping in a sample of 5,464 middle schoolers residing in Nevada in relation to early trauma. In this study, vaping behaviors were assessed using the Youth Risk Behavior Survey (YRBS) including questions specific to electronic vapor products (EVP) use such as lifetime use, use over the last month, early initiation of vaping, and if EVPs have ever been tried by the individual. The YBRS also included six lifetime ACE questions including physical abuse, verbal abuse, forced sex, household domestic violence, household mental illness, and household substance abuse. Results indicated that 5.1% of middle school students reported initiating EVP use before age 11, and 40.2% of early initiators reported EVP use in the past 30 days. The authors found a strong, graded relationship between cumulative ACE exposure and early initiation of EVP use. These findings were consistent with previous studies that youth with a high exposure to ACEs were more likely to report that they initiated substance use to cope with problems (Rothman et al., 2008). It has not been determined whether or not youth and adults engage in ENDS use as a means of coping with stressors related to trauma.

### ***Childhood Maltreatment and ENDS Use***

Shin et al. (2019) also examined the relationship between child maltreatment (CM), a particular facet of trauma, and e-cigarette use among young adults. In this study, a community sample of 208 young adults aged 18 to 21 years

was assessed via self-report of childhood maltreatment, impulsivity, and tobacco use. CM was measured utilizing the Child Trauma Questionnaire (CTQ), which assesses five subtypes of maltreatment: physical, sexual, and emotional abuse, as well as emotional and physical neglect. The short version of the Urgency, Premeditation, Perseverance, and Sensation Seeking (UPPS) Impulsive Behavior scale was utilized to measure impulsivity. Tobacco use and e-cigarette use were measured with standard epidemiological questions measuring current and past use. Results showed that CM was significantly associated with lifetime e-cigarette use, when controlling for demographic characteristics (i.e., age, sex, race/ethnicity, income) of the participants.

### ***Impulsivity and ENDS Use***

Impulsivity has also been longitudinally associated with e-cigarette use and positively associated with frequency of e-cigarette use in young adulthood (Doran & Tully, 2018). Impulsivity within the context of negative urgency (NU) was explored as a potential factor that may facilitate this relationship. Negative urgency in the context of the UPPS measure was defined as “the tendency to engage in impulsive behaviors under conditions of negative affect, perhaps in order to alleviate negative emotions, despite the potentially harmful longer-term consequences” (Whiteside et al., 2005, p. 561). Results showed that negative urgency was significantly related to CM, as well as the consumption of cigarettes, hookahs, and nicotine dependence (Doran & Tully, 2018; Kale et al., 2018; Oshri et al., 2018). The strengths of this study included its utilization of a community-based

sample, as well as the assessment of several types of childhood maltreatment. Furthermore, impulsivity was examined within several domains in order to gain more nuanced information on its relationship with CM and e-cigarette use. Limitations of the study included its reliance on self-report measures for CM and e-cigarette use, as well as its cross-sectional design such that temporal directionality between the three variables of interest could not be determined. Although multiple dimensions of impulsivity were examined, certain aspects including delay discounting were not accounted for. Other domains within impulsivity may play a role in the relationship between CM, impulsivity, and e-cigarette use (Shin et al., 2019) and should be further explored.

## **Psychosocial Protective and Risk Factors of Trauma**

### ***Risk Factors for Trauma and its Effects***

Numerous factors have been identified that may increase one's risk of experiencing one or more traumatic events in their lifetime. Given the extensive literature linking trauma and smoking, consideration of what may put individuals at risk for trauma is important to better understanding this connection. Trauma risk factors include low levels of income or low socioeconomic status, low educational level, and family factors such as high family conflict and low family cohesion (Berger & Waldfogel, 2011; Brattström et al., 2015; Drake & Jonson-Reid, 2013; Stith et al., 2009). In a Swedish case study including 7,382 trauma cases, lower socioeconomic status (SES), lower level of education, substance abuse, mental disorders, and somatic diagnoses were all found to be independent risk factors for



becoming a trauma victim (Brattström et al., 2015). Trauma was defined as a serious injury which could be related to traffic accidents, falls, assault, self-inflicted, and other.

Risk factors may also vary depending on the type of trauma. Child physical abuse risk factors include proximal variables in mothers such as mothers' dysphoria, stress, high reactivity (i.e., impulsivity, high negative affect and autonomic nervous system arousal), high-risk parenting (i.e., harsh discipline strategies, verbal aggression), and children's behavioral problems (e.g., socialized aggression, attention deficits) (Black et al., 2001). The most prominent risk factors for child sexual abuse (CSA) were identified in a large-scale review of 72 studies that examined risk factors for CSA victimization (Assink et al., 2019). Study criteria consisted of articles published in peer-reviewed journals between 1980 and 2017 with a mean participant age of 18.58 years, nontreatment studies, Western-based studies (e.g., United States, New Zealand, Canada), and studies that reported on at least one association between CSA victimization and a factor preceding the victimization, or a factor which could be reasonably assumed to precede the victimization based on the information described in the primary study.

Risk factors with the largest effect size included prior victimization of the child and/or family members, including prior CSA victimization of the child or their siblings, prior victimization of the child other than child abuse, prior or simultaneous types of child abuse occurring in the child's home, and a parental history of child abuse victimization. Other child sexual abuse risk factors included

parenting problems, witnessing intimate partner violence, social isolation, being of female gender, and having a non-nuclear family structure (e.g., having a stepfather; Assink et al., 2019).

### ***Protective Factors for Trauma and its Effects***

Protective factors may help buffer the effects of trauma such as increased threat processing or psychopathology (McLaughlin & Lambert, 2017). Protective factors for trauma in childhood include caregiver support and sensitivity to reward (i.e., sensitivity to positive and rewarding stimuli at neural and behavioral levels). Bellis et al. (2017) also found that continuous adult support in childhood could reduce the impact of childhood adversity on mental well-being via increasing resilience and the adoption of health-harming behaviors such as smoking.

Resilience is a protective factor that has been studied extensively in the context of trauma, although multiple measures of resilience have been used. Goldstein et al. (2013) examined the relationship between resilience and childhood trauma in participants aged 18-25 emerging out of the child welfare system. In this study, the Childhood Trauma Questionnaire – Short Form (CTQ-SF), a 28-item self-report questionnaire, was utilized in addition to the Connor Davidson Resilience Scale (CD-RISC). Resilience was defined by the (CD-RISC) as “the personal qualities that enable an individual to thrive in the face of adversity” (p.76). This measure includes external indicators of resilience, as well as multiple dimensions of internal resilience (e.g., personal competence, acceptance of change, sense of social support, tolerance of negative affect, and spiritual faith).

Results indicated that greater internal resilience was associated with involvement in religious and community affairs, as well as greater parental monitoring (Goldstein et al., 2013). Resilience was also directly associated with smoking outcomes including past year smoking and smoking dependency, as well as symptoms of depression. The authors hypothesized that having a history of adversity may have contributed to difficulties with finding effective ways to cope and manage stress, resulting in lower resiliency scores. Having greater internal resilience was associated with greater involvement in both the community and local churches, and increased caregiver monitoring which may have provided such individuals with additional support in the form of external resilience following their traumatic experience(s). Therefore, these results highlight the need for stress management strategies following trauma and external supports as means to decrease the likelihood that these individuals turn towards smoking to cope.

### **Protective and Risk Factors of Smoking and ENDS Use**

#### ***Demographic Risk and Protective Factors***

Given the increasing utilization of ENDS products in the United States and its associated health concerns, the identification of both risk and protective factors regarding ENDS use is essential to identify individuals who are at the greatest risk for using such products and in need of intervention. One of the risk factors associated with ENDS use is being a younger age (i.e., high school and college aged individuals). In a study by Jaber et al. (2018) of the American Heart Association Tobacco Regulation and Addiction Center, data was utilized from the

National Health and Nutrition Examination Survey (NHANES) conducted in 2013-2014. All e-cigarette users in NHANES who denied a history of cigarette use were less than 40 years old (Jaber et al., 2018). Younger age of e-cigarette users has been indicated in a number of other studies as well (Coleman et al., 2017; Kasza et al., 2017).

Rates of ENDS use have also been found to differ based on gender. For college students, being male is a risk factor, as males have had higher rates of use or are predicted to be more likely to use (Littlefield et al., 2015; Omoike & Johnson, 2020). Being female was identified as a protective factor against ENDS use in this study. Omoike and Johnson (2020) hypothesized that these gender differences may be due to the tendency for higher risk taking seen in males (Martins et al., 2004). Additionally, the National Adult Tobacco Survey found that with the age group of adults 25 years and older, significantly more males reported ever use of ENDS (18.3%), current use (6.6%), and frequent use (1.5%) of ENDS products than women (14.7%, 5.0%, and 1.0%, respectively) (USDHHS, 2016).

In terms of race and ethnicity, the literature supports higher rates of ENDS use among Hispanic and non-Hispanic white individuals in comparison to African American or Black individuals, as well as Asians (Coleman et al., 2017; King et al., 2015; Schoenborn & Gindi, 2015; USDHHS, 2016). Therefore, identifying as Hispanic or non-Hispanic white may be risk factors for ENDS use. Despite some literature on the relationship between race and ethnicity and ENDS use, this research is still in its infancy and additional work is needed to determine the

reasons for and rates of ENDS use within different cultures and sociodemographic groups (Bold, Krishnan-Saran, & Stoney, 2018).

Other risk factors of tobacco use have been examined primarily in youth and young adults. Stone et al. (2012) conducted a literature review and found that those with a lower education (i.e., were not attending college) smoked more than those who were attending college. In addition, those involved with peer use of tobacco were more likely to transition to regular smoking as young adults.

### ***Psychosocial Risk and Protective Factors***

Several other psychosocial risk factors have been associated with smoking and vaping behaviors. In particular, a positive relationship has been observed between ENDS use and having friends or family members who vape (Choi & Forster, 2013; Coleman et al., 2017). Pepper et al. (2014) also found that the initiation of ENDS use for those who had previously tried or used e-cigarettes was due to a friend or family member offering, giving, or using ENDS products.

Having a history of mental illness (HMI) was found to be related to smoking and vaping in college students in New Zealand (Wamamili et al., 2021). In this study, students with an HMI were significantly more likely than students without an HMI or any other major medical condition, to report ever or current smoking or vaping. These results are consistent with previous studies supporting the relationship between an HMI and higher rates of ENDS use in U.S. college students (Grant, 2019; Hefner, 2019), as well as in the U.S. general population (Cummins et al., 2014; Obisesan et al., 2019). Specifically, Obisesan et al. (2019)

found in their cross-sectional study review of the Behavioral Risk Factor Surveillance System database in 2016-2017 that ENDS users had higher odds of reporting a history of a clinical diagnosis of depression compared to those who were never ENDS users.

Considering many mental health disorders, Spears et al. (2019) found the following were associated with a higher likelihood of current and lifetime ENDS use: bipolar disorder (49.0% lifetime, 25.4% current use), mood disorder (47.7% lifetime, 26.3% current use), schizoaffective disorder (39.6% lifetime, 24.4% current use), anxiety disorder (37.8% lifetime, 19.1% current use), and depression (35.1% lifetime, 17.5% current use). Among these mental disorders, risk was the highest for bipolar disorder and mood disorders. In a related cross-sectional study that used the Tobacco Products and Risk Perceptions Survey, the number of self-reported mental health condition (MHC) diagnoses was found to be associated with a higher likelihood of ENDS use (Spears et al., 2017). Additionally, MHC status was most strongly linked to a greater likelihood of lifetime ENDS use among past smokers, who indicated higher ENDS use when attempting to quit smoking. For those who reported never using ENDS products, those with MHC indicated a greater likelihood of trying ENDS in the future.

### **COVID-19 and Vaping**

Considering the impact of COVID-19 on vaping, the virus has been found to attack the respiratory system and can cause minor to severe illness and death (World Health Organization, 2020). Therefore, recent research has examined the

behaviors of current vapers in the context of this global pandemic. Kale et al. (2021) conducted an analysis of cross-sectional data obtained from the baseline phase of an ongoing longitudinal online study of 2,994 adults in the United Kingdom about health behaviors during the COVID-19 pandemic (HEBECO study). Data was collected between April 30 and June 14, 2020, during the beginning of the COVID-19 lockdown.

The results indicated that half of current vapers changed their vaping consumption, with most stating an increase in vaping due to boredom or less restrictions given their staying at home. Of those that decreased their vaping usage, an association was found between a decrease in use and being a current smoker. Dual users were hypothesized to decrease vaping due to an increase in their cigarette smoking. One-third of current vapers reported an interest in quitting vaping; however, most reported other reasons for wanting to quit rather than due to COVID-19 specifically. Surprisingly, those who were diagnosed with or suspected of having COVID-19 had higher odds of reporting vaping more than usual. The strengths of Kale et al.'s (2021) study included utilizing data collected during the pandemic, rather than after the pandemic which reduces recall bias. Additionally, a variety of measures were used in data collection which addressed numerous potential confounders between vaping and diagnosed or suspected COVID-19. Limitations of this study included self-reports of possible COVID-19 rather than laboratory tests, and the failure to assess health risk behaviors such as mask

wearing, which could have provided further insight into participants' health risk perceptions of vaping.

In a similar study by Kalkhoran et al. (2021), a U.S. based, nationally representative sample of 1,227 adults who endorsed using e-cigarettes, combustible cigarettes, or both, completed a cross-sectional survey through the National Opinion Research Center's (NORC) AmeriSpeak Panel. Results of this study indicated that 41% of e-cigarette users reported no change in use due to COVID-19. Fifty-nine percent of past six-month e-cigarette users reported that their use "might increase" or would "definitely increase" their risk of COVID-19 or a more serious outcome. Thirty-three percent did not think vaping affected their risk. Therefore, despite the finding that more than half of users acknowledged an increased risk of COVID-19 and its related health consequences, the majority of participants endorsed no changes in their e-cigarette use. However, for those who had vaped since hearing about COVID-19, 41% reported trying to quit vaping because of COVID-19. The belief that vaping increased the risk of COVID-19 or more serious effects of COVID-19 was associated with a greater interest in either reducing or quitting e-cigarette use. An aspect of this study worth noting is that data was collected in August of 2020 when reported COVID-19 cases were lower. Further examination of the association between continued vaping and/or changes in vaping behaviors during a time when health risks are salient may serve as a litmus test for understanding how perceptions of risk affect behavioral change.



## **Trauma, Smoking, and ENDS Use**

Trauma and the use of either combustible cigarettes or ENDS products have been linked to multiple mediating factors which help to explain this relationship. Specific to smoking and trauma, studies have attempted to explain this association secondary to increased reactivity of the HPA axis, parental smoking during childhood, current alcohol use, negative affect such as depression, anger, and anxious arousal, impulsivity, and internalizing behaviors (Helstrom et al., 2008; Lewis et al., 2011; McKee et al., 2011; Morris et al., 2020; Oshri et al., 2017). Additionally, the type of abuse or trauma experienced, and the frequency or intensity of trauma have also been linked to smoking behaviors (Al Mamun et al., 2007). In women specifically, more passive styles of responding to stress and traumatic events were found to be related to smoking; in men, more ACEs and sleep inadequacy contributed to increased smoking via delayed reward discounting (Compas et al., 1988; Oshri et al., 2017; Strine et al., 2012).

Trauma and ENDS use have begun to be studied in order to determine if there are any specific mediating factors that explain this relationship as well. To date, studies have found that poor coping styles and impulsivity have partially explained the connection between trauma and ENDS use (Doran & Tully, 2018; Rothman et al., 2008; Shin et al., 2019; Williams et al., 2020). Health risk perceptions in trauma survivors have yet to be explored in the context of smoking and vaping. Type of trauma experienced, intensity and frequency of trauma, and

reactions to disclosure of trauma may also influence health risk perceptions and related health risk behaviors.

In terms of risk and protective factors that may overlap between trauma and either smoking or ENDS use, lower socioeconomic status and/or lower education level have been linked to both trauma and use of cigarettes or electronic cigarettes (Berger & Waldfogel, 2011; Brattström et al., 2015; Drake & Jonson-Reid, 2013; Stith et al., 2009; Stone et al., 2012). Also, having a history of mental disorders or current mental health concerns has been associated with both trauma and smoking and vaping (Brattström et al., 2015; Cummins et al., 2014; Grant, 2019; Hefner, 2019; Obisesan et al., 2019; Spears et al., 2019). Lastly, both trauma and smoking/vaping have been associated with a family history of trauma and victimization or a family history of cigarette/e-cigarette use, respectively (Assink et al., 2019; Pepper et al., 2014). Therefore, consideration of these collective factors may be helpful in better understanding the link between trauma and smoking/vaping.

## Chapter 2

### Study Rationale and Justification

Previous research has found that individuals who have experienced traumatic events such as physical abuse, emotional abuse, or physical neglect as children, may be at a particular risk for smoking in adulthood (Strine et al., 2012). Adults who experience more trauma-specific symptoms such as intrusive thoughts and avoidance have also demonstrated higher rates of smoking (Helstrom, Bell, & Pineles, 2008). The relationship between trauma and smoking has been consistent across gender and race as well (Helstrom et al., 2008; Oshri et al., 2017; Strine et al., 2012). More recent research has also indicated that those who have experienced early trauma or adverse childhood experiences (ACEs) have higher rates of ENDS use (Shin et al., 2019; Williams et al., 2020). Given that the rates of ENDS use are increasing (Chapman & Wu, 2014), the role of trauma in the development of this risky health habit warrants further consideration.

Despite the large body of research on the use of cigarettes and its relationship to trauma, observations of the association between trauma and ENDS use are in their infancy. Numerous variables such as impulsivity, resilience, poor coping, negative affect, internalizing behaviors, and increased reactivity of the HPA axis have been identified for their potential influence on smoking and ENDS use among trauma survivors (Helstrom et al., 2008; Lewis et al., 2011; McKee et al., 2011; Morris et al., 2020; Oshri et al., 2017). While health perceptions have been identified as contributing to smoking outcomes, this factor has not yet been

extensively examined in relation to vaping behaviors among high-risk groups such as those who have experienced trauma (Bhandari et al., 2018; Borrelli et al., 2010; Dixit et al., 2021). Studies that have examined health perceptions of vaping have been limited by their lack of diverse samples (e.g., utilizing a primarily Caucasian sample or only one gender per study), small sample size, use of convenience samples, and weak outcome measures that have not adequately captured perceptions of risk. Trauma-specific factors such as the severity and frequency of the trauma have also largely been ignored, and the trauma histories of participants in some studies have not been adequately reported.

The proposed study examined health risk perceptions associated with ENDS use among individuals who have a history of trauma. This study builds on the existing literature by examining the relationship between trauma-specific factors and health risk perceptions of combustible cigarettes and ENDS products that may impact smoking and vaping behaviors among this population. The findings from this study can be used to inform tailored messaging strategies and interventions that target cigarette and ENDS use among individuals who have experienced trauma.

## Chapter 3

### Study Objectives and Hypotheses

- Objective 1: To describe past and current rates of combustible cigarette, ENDS, and dual product (concurrent combustible cigarette and e-cigarette use) use among trauma survivors.

Hypothesis 1.1: The rates of combustible cigarette use, ENDS use, and dual use in trauma survivors will be comparable to those reported in studies of other at-risk groups employing a smoking/vaping sample.

- Objective 2: To examine health risk perceptions related to ENDS use among those with histories of trauma.

Hypothesis 2.1: Trauma survivors will perceive the use of ENDS as less harmful than combustible cigarettes.

Hypothesis 2.2: Trauma survivors will perceive ENDS use as an effective coping and stress reduction strategy.

Hypothesis 2.3: Trauma survivors will perceive ENDS use as an effective coping strategy during the COVID-19 pandemic.

Hypothesis 2.4: Trauma survivors will perceive ENDS use as an effective smoking cessation method.

Hypothesis 2.5: Trauma survivors will have comparable health risk perceptions about ENDS regardless of their smoking/ENDS

use status (i.e., Ever smokers vs. Ever ENDS users and Ever Dual Users).

- Objective 3: To determine the association between risk factors and health risk perceptions of ENDS use among trauma survivors. Factors to be examined include but are not limited to, demographic, psychosocial, and trauma-specific factors.

Hypothesis 3.1: Trauma survivors who are younger, male, and of lower income/educational levels will report lower health risk perceptions associated with ENDS use.

Hypothesis 3.2: Trauma survivors with a history of mental health or substance use problems, who reside with other smokers/vapers, and who have friends who smoke/vape, will report lower health risk perceptions associated with ENDS.

Hypothesis 3.3: Individuals who have experienced more trauma (endorsing three or more traumatic events on the BTQ) and more severe PTSD symptoms (as determined by higher PCL-5 scores) will endorse lower perceived health risks from ENDS use.

## **Chapter 4**

### **Methods**

#### **Participants and Recruitment**

Eligible participants were required to be: (1) at least 18 years of age or older, (2) have experienced at least one traumatic event in their lifetime, and (3) able to read and write English fluently as no translated versions of questions were able to be created for this study. Additionally, (4) current or past smokers of any combustible tobacco product (e.g., cigarettes, cigarillos, cigars, blunts, or any other tobacco product), current or past ENDS users (i.e., use electronic cigarettes, e-cigarettes, vapes, electronic hookahs (e-hookahs), hookah pens, vape pens, electronic pipes, or any other electronic vapor products), or dual users (i.e., concurrent present use of cigarettes/combustible tobacco products and ENDS, or current use of one product and past use of another product) were eligible to participate. Participants who used devices with or without nicotine were eligible to participate as well; those who only used devices that contain cannabis products (THC, CBD oil, etc.) were not eligible for this study. Participants were recruited through the internet via Facebook posts requesting for their voluntary participation in the anonymous survey for this study. Approval from the Florida Institute of Technology Institutional Review Board was obtained prior to the initiation of recruitment. All participants were asked to provide informed consent prior to their participation in this study's survey.

## **Data Collection Procedures**

Participants were provided a link to the survey on the informed consent form. Participants completed the survey on their personal electronic device (e.g., computer, phone, or tablet) individually. Information about this survey was distributed on the internet by websites such as Facebook, as well as an email containing information about the study and a link to the study. The online survey took participants approximately 15-20 minutes to complete. To start the survey, participants first were required to complete an informed consent, and reviewed the attached information describing the study. Participants first verified their eligibility by completing an initial set of questions provided in Appendix B. While taking the survey, participants could withdraw at any time. If a participant wanted to return to a previous question, they were able to return by using the “back” button embedded in the survey. Any participant could choose to decline a response to any of the survey questions. Data collected from the survey were input into a HIPAA-compliant database which de-identified personal information of all participants. Study participants were offered the option to enter a drawing for one of two \$50 gift cards at the end of the study.

## **Outcome Measures**

Participants accessed the survey located on the Qualtrics website. The data was collected and saved onto a secure server located at the Department of Psychology at Florida Institute of Technology. The primary components of the survey included (see Appendix B for the list of survey questions):



### ***Study Eligibility***

Participants' eligibility was determined by endorsing their age being 18 years or older, an ability to read English fluently, and endorsing one or more traumatic experiences. Participants who currently smoked/vaped or have smoked/vaped in the past with or without nicotine were eligible to participate; those who only used devices containing cannabis products (THC, CBD oil, etc.) were not eligible. Trauma experiences were assessed by items that came directly from the Brief Trauma Questionnaire (BTQ) developed by Schnurr et al. (1999), to gather information on the quantity and types of traumatic experiences endorsed by individuals (e.g., military trauma, serious accidents, childhood physical and sexual abuse).

### ***Demographics***

Demographic characteristics that were collected included age, gender identity, race, ethnicity, region, relationship status, income, education level, and sexual orientation.

### ***Psychosocial***

Both physical health and mental health status were determined through questions pertaining to previous or current medical and mental health diagnoses.

### ***Trauma Information and History***

Participants were asked about their past traumatic experiences at the beginning of the survey based on the 10-item Brief Trauma Questionnaire (BTQ) developed by Schnurr et al., (1999). These questions included the types of trauma

experienced by participants. The types of trauma covered in the survey consisted of military combat, serious car/work accidents, natural disasters, life-threatening illness, physical abuse, physical attacks, sexual assault and abuse, other situations involving serious injury, violent death of friend or family member, and witnessing a situation in which someone was either seriously injured or killed, or in which the individual themselves was fearful of being seriously injured or killed. Each type of trauma experienced was noted, and each endorsed trauma was assigned one point. Cumulative scores of three or more points indicated a higher intensity of trauma experienced by the individual.

The Posttraumatic Stress Disorder Checklist - Fifth Edition (PCL-5) developed by Blevins et al., (2015), was utilized to assess participants' experiences of trauma and symptoms of posttraumatic stress disorder (PTSD) based on DSM-5 criteria. This measure includes twenty items, to which the respondent answered how much they had been bothered by the symptom presented in each item on a Likert-type scale of 0-4 (with 0 indicating "not at all"; 1 indicating "A little bit"; 2 indicating "Moderately"; 3 indicating "Quite a bit"; and 4 indicating "Extremely") experienced within the past month. A total symptom severity score (range of 0-80) was obtained after summing the scores for the twenty items. Initial research indicates that a score cutoff between 31-33 is indicative of a probable PTSD diagnosis. More specifically, a provisional diagnosis of PTSD can be made by considering each DSM-5 criteria to be met when an item is rated as a 2 or higher, with one criterion from cluster B being met (which corresponds to items 1-5), one

from cluster C (items 6 and 7), two items from cluster D (items 8-14), and two items from cluster E (items 15-20).

It should be noted that it was not the goal of the study to determine the presence of PTSD, but rather to examine the effects of past trauma on an individual's functioning. For purposes of this study, the greater the score on this measure was indicative of greater negative impact on an individual's functioning and greater likelihood of meeting the criteria needed for a DSM-5 diagnosis of PTSD. Given that studies have demonstrated that individuals who are faced with negative responses following disclosure of their trauma experience report greater symptom severity, two items were also added to the survey to assess an additional risk factor that may be present for some trauma survivors (Hakimi et al., 2018; Littleton, 2010; Orchowski et al., 2013; Peter-Hagene & Ullman, 2014).

### ***Smoking Status and History***

Participants were asked about their current and past cigarette use. "Current Smokers" were defined as those who endorsed current smoking (have smoked cigarettes in the past 30 days) and had smoked at least 100 cigarettes in their lifetime (USDHHS, 2016). "Past smokers" were defined as those who have smoked at least 100 cigarettes in their lifetime, but do not currently smoke. "Ever smokers" were defined as those who currently smoke and those who may no longer smoke, but have smoked in the past (Current + Past Smokers). To assess the smoking behaviors of those around them, participants were asked whether their partner or spouse smokes ['Yes', 'No', and 'N/A (no spouse/partner)'], number of smokers

within their household, and number of close friends who smoke cigarettes.

Responses were categorized into 0 smokers, 1-2 smokers, and  $\geq 3$  smokers.

For purposes of the study, “Current dual users” were defined as those who currently smoke cigarettes and use ENDS concurrently. “Ever dual users” were defined as those who are “Current dual users,” as well as those who have ever smoked or used ENDS in the past. Participants who currently use either cigarettes or ENDS products and have used the other product (cigarettes or ENDS) in the past, even if not at the same time, were considered “Ever dual users.”

### ***Vaping Status and History***

Information about current and past vaping habits was obtained from participants. “Current ENDS users” were defined as those who have used an ENDS product with or without nicotine in the past 30 days. “Past ENDS users” were defined as those who do not currently use ENDS products but have used an ENDS product with or without nicotine at least once in their lifetime. “Ever ENDS users” were defined as those who currently use ENDS products, as well as those who have used an ENDS product in the past (Current ENDS + Past ENDS user).

To assess the ENDS use of those around them, participants were asked about the number of ENDS users they resided with and friends who used ENDS, which were categorized into 0 vapers, 1-2 vapers,  $\geq 3$  vapers. Participants were also asked to complete questions regarding whether their spouse/partner currently uses e-cigarettes/vapes. Responses were ‘Yes’, ‘No’, and ‘N/A (No spouse/partner)’ for this question.

### ***Perceptions of Health Risks Associated with ENDS***

Study participants were asked about their perceptions of harm associated with ENDS. These eight items were adapted from the co-investigator's previous smoking research (Tyc, Lensing, Vukadinovich, & Hovell, 2013) for this current study. Items included "Using electronic vapor products will lead to serious health problems in the long-term," with response options of 'Strongly Agree', 'Agree', 'Disagree', and 'Strongly Disagree'. Each of these items were scored on a scale of 0-3 (with 3 corresponding to 'Strongly Agree', and 0 corresponding to 'Strongly Disagree'). Perceptions of ENDS use relative to smoking cigarettes were also assessed by items including "E-cigarettes/electronic vapor products are a safer alternative to combustible cigarettes," consisting of the responses 'Strongly Agree' (score of 0), 'Agree' (score of 1), 'Disagree' (score of 2) and 'Strongly Disagree' (score of 3) and "Do you believe that breathing vapors from e-cigarettes is less harmful, equally as harmful, or more harmful than breathing cigarette smoke?" consisting of the responses 'Less Harmful' (score of 0), 'As harmful' (score of 1), 'More Harmful' (score of 2), respectively. Scores across items were then summed to provide an overall score of health risk perceptions, ranging from 0 to 31. Higher scores indicated greater health risk perceptions regarding ENDS products.

### ***Reasons for Smoking and ENDS Use***

Participants were asked about whether their smoking and vaping behaviors are utilized as ways to cope with stress. Participants were also asked about whether smoking and vaping assists them in coping with their experienced past trauma(s).

Each question contained the response options of ‘Yes’, ‘No’, and ‘N/A (I do not smoke/I do not vape)’. One point was assigned for each ‘Yes’ response, with a range of scores from 0-2. A score of 0 indicated that the individual did not endorse smoking or ENDS use as a coping mechanism, whereas a score of 2 indicated that the individual utilized smoking and/or ENDS as means to cope with their trauma(s).

Furthermore, participants were asked about their smoking and vaping behaviors in response to the COVID-19 pandemic. These two items were summed up to form a total score for COVID-19 Smoking Behaviors, with a range of 0-4 points. When asked if smoking has been used as a coping skill during the pandemic, one point was assigned for ‘Yes’ and zero points for a response of ‘No.’ Participants were also asked how COVID-19 has affected their smoking, with responses of ‘I have smoked significantly more since the COVID-19 pandemic’ (3 points), ‘I began smoking during the COVID-19 pandemic’ (2 points), ‘I have smoked the same as before the COVID-19 pandemic’ (1 point), and ‘I have smoked less since the COVID-19 pandemic’ (0 points).

### ***Smoking Cessation***

Two final items on the survey provided information about the individual’s perceptions of utilizing ENDS products as a method to assist with smoking cessation. Response options were ‘Strongly Agree’ (score of 3), ‘Agree’ (score of 2), ‘Disagree’ (score of 1), and ‘Strongly Disagree’ (score of 0). These scores were summed with a total score ranging from 0-6, to represent the degree to which an

individual viewed ENDS use as an effective method for smoking cessation. Higher scores therefore represented a greater expectancy for ENDS products to help in smoking cessation.

## Chapter 5

### Research Design and Data Analysis

This study utilized a cross-sectional design. Data were collected via an online survey, which was published through Qualtrics, an online software program. The survey was available through the Florida Institute of Technology's partnership with Qualtrics and was kept on the Qualtrics website.

Descriptive statistics including means, standard deviations, and frequencies, were calculated for participant demographics and the primary outcomes (rates of tobacco/ENDS use/dual use, health risk perceptions of ENDS products and tobacco use). The differences in health risk perceptions between the groups based on smoking/ENDS use status were evaluated using Mann-Whitney tests. Chi Square tests of independence were used to examine the association between groups for categorical variables. Data were analyzed through the Statistical Package for the Social Sciences (SPSS), version 25.0. All analyses were considered significant at the  $p < .05$  level.



## Chapter 6

### Results

#### Participants

##### *Demographic variables*

A total of 195 individuals agreed to participate in the study. Of those who agreed to participate, two had not endorsed one or more traumatic experiences, and one was not a current or past smoker or vaper. Those who responded to less than 70% of survey items were removed for data analyses. Several duplicate responses were also noted, and these were also removed to ensure the accuracy of the study data. The final sample was comprised of 126 participants primarily 25-34 years of age ( $n = 67$ ; 53.2%, age range 18-64 years), including 62 men (49.2%, age range: 18-64 years), 53 women (42.1%, age range: 18-64 years), two individuals who identified as gender fluid (1.6%, age range: 18-64 years), six individuals who identified as a transwoman (4.8%, age range: 18-64 years), two individuals who identified as a transman (1.6%, age range: 18-64 years), and one individual who did not disclose their gender (0.8%, age range: 18-64 years). The majority of participants identified as White/Caucasian ( $n = 93$ ; 73.8%) and Hispanic/Latino ( $n = 88$ ; 69.8%). 74.6% of participants endorsed being from an urban area ( $n = 94$ ) in the Southern U.S. ( $n = 76$ , 60.3%). Overall, most participants either endorsed a high school diploma as their highest level of education completed ( $n = 39$ ; 31.0%), or a technical degree or certificate ( $n = 38$ ; 30.2%), and most participants were full-

time employees ( $n = 89$ ; 70.6%). See Table 1 for additional demographic information.

### ***Psychosocial variables***

Psychosocial variables of participants included that the majority endorsed being in a relationship ( $n = 65$ ; 51.6%) and that they lived with their romantic partner ( $n = 64$ ; 50.8%). Of those who endorsed being in a relationship, approximately half reported being married to their partner ( $n = 33$ ; 26.2%). The remainder reported they were not married to their partner ( $n = 32$ ; 25.4%). Furthermore, most participants identified their sexual orientation as heterosexual ( $n = 97$ ; 77.0%). Regarding their mental health status, 59.5% of participants endorsed having more than one mental health condition ( $n = 75$ ), with a mean of 2 mental health diagnoses. 80.2% of participants also were found to endorse having one or more medical conditions ( $n = 101$ ), with the majority endorsing one medical condition ( $n = 68$ ; 54.0%). The most common medical conditions were gastrointestinal disorders ( $n = 25$ ; 19.8%) and chronic pain ( $n = 23$ ; 18.3%). See Table 1 for additional psychosocial information, Table 3 for mental health conditions of trauma survivors, and Table 4 for medical diagnoses and conditions of trauma survivors.

### ***Trauma Variables***

Trauma outcomes reported by participants demonstrated that 96% experienced a high intensity of trauma ( $n = 121$ ), which was determined by endorsing three or more traumatic events (a score of 3 or more) on the Brief

Trauma Questionnaire (BTQ). Total scores on the BTQ were generally high among participants (range 2-10 traumatic events), with 32.5% endorsing all ten types of traumas (a score of 10;  $n = 41$ ). The most frequent traumas endorsed were having a close family member or friend that died violently ( $n = 126$ ; 100.0%), witnessing a situation in which someone was seriously injured or killed, or a situation in which the individual worried someone would be seriously injured or killed ( $n = 126$ ; 100.0%), and having been attacked, beaten, or mugged, by anyone, including friends, family, or strangers ( $n = 89$ ; 70.6%). Furthermore, participants were allowed to express their experiences at the end of the survey. This item captured several different forms of trauma, including emotional and physical abuse by a significant other, being diagnosed and treated for cancer, and being attacked with severe injuries while also witnessing the brutal attack of a family member.

The Posttraumatic Stress Disorder Checklist - Fifth Edition (PCL-5) is an additional trauma measure that assesses individuals' experiences of trauma and symptoms of posttraumatic stress disorder (PTSD) based on DSM-5 criteria. Scores of 31 and higher are considered to be indicative of trauma having a greater negative impact on an individual's functioning and a greater likelihood of meeting DSM-5 criteria for PTSD. Therefore, participants were grouped into those with lower negative impact following their trauma(s) (scores from 0-30 on the PCL-5), and those with higher negative impact due to their trauma(s) (scores of 31 and above on the PCL-5). In this sample, 80.2% of participants had a high score (score of  $> 30$ )

on the PCL-5 ( $n = 101$ ). See Table 1 for more information on PCL-5 scores across groups.

Trauma disclosure frequencies and reactions to individuals' disclosure were also collected in this sample. Regarding trauma disclosures, most participants did disclose their trauma to someone after it happened ( $n = 105$ ; 83.3%). Others reacted to participants' trauma in one of three ways: they were supportive ( $n = 42$ ; 33.3%), they were blaming/rejecting ( $n = 42$ ; 33.3%), or they were neutral ( $n = 16$ ; 12.7%).

### ***Smoking and Vaping Variables***

In this study sample, it was found that 0.8% were 'past smokers' ( $n = 1$ ), 3.2% were 'past vapers' ( $n = 4$ ), and 2.4% were 'past dual users' ( $n = 3$ ). Regarding current use, 3.2% were 'current smokers' ( $n = 4$ ), 0.8% were 'current vapers' ( $n = 1$ ), and 76.2% were 'current dual users' ( $n = 96$ ). Those who did not fall into these groups were combined into the 'ever dual user' group, (e.g., those who were past dual users and also were current smokers) ( $n = 17$ ; 13.5%). Of those who reported being a 'current vaper' or 'dual user', 68.3% reported that their e-liquid does not contain nicotine ( $n = 86$ ), while 18.3% agreed it contains nicotine ( $n = 23$ ), and fewer were not sure (13.5%,  $n = 17$ ). Moreover, of those who endorsed being a 'current vaper' or 'dual user,' most endorsed that they have used an ENDS product to inhale other products such as CBD oil ( $n = 97$ ; 77.0%). Reasons provided for utilizing ENDS products were primarily to quit using other tobacco products ( $n = 42$ ; 33.3%), because they can be used where other tobacco products cannot ( $n = 34$ ; 27.0%), and because a friend or family member used them ( $n = 31$ ; 24.6%). The

last item of the survey allowed participants to share their thoughts. This item captured some additional reasons for vaping, such as fewer effects on one's health (e.g., not as out of breath, not coughing as much), the view that it is less harmful to those around the vaper, and that it is used as an attempt to keep busy and distract one's mind. Refer to Table 1 for demographic and psychosocial variables for smoking and vaping status, and Table 2 for descriptive data regarding trauma survivors' reasons for utilizing ENDS products.

***Hypothesis 1.1 The rates of combustible cigarette use, ENDS use, and dual use in trauma survivors will be comparable to those reported in studies of other at-risk groups employing a smoking/vaping sample.***

To investigate the hypothesis that the rates of product use in trauma survivors was similar to those reported in a high-risk comparison sample, percentages of participants who smoked and vaped were computed and compared to the proportion of individuals who smoked and vaped in a recent New Zealand study (Wamamili et al., 2021). Wamamili et al.'s (2021) study included a large sample of college students of a similar age to the majority of the current study's sample (18-25 years) and who reported one or more mental health conditions; the groups of trauma survivors in the current sample, and those with one or more mental health conditions in Wamamili et al.'s (2021) sample, are individuals who are at a greater risk for smoking and vaping behaviors. This study was selected for comparison as no other study was found to specifically compare past and present smoking and vaping behaviors across trauma survivors.

Results from the comparison study by Wamamili et al. (2021) demonstrated that 15.1% of the sample were current smokers ( $n = 36$ ), and 9.2% were current vapers ( $n = 22$ ). Results from a chi-square goodness of fit test indicated that there was no significant difference in the proportion of current smokers identified in the present sample (3.2%) as compared with the value of 15.1% that was obtained in the comparison study,  $\chi^2(1, n = 1,293) = 3.01, p = .08$  (Wamamili et al., 2021). However, a chi-square goodness of fit test indicated a significantly lower proportion of current vapers identified in the present sample (0.8%) as compared with the value of 9.2% that was obtained in the comparison study,  $\chi^2(1, n = 1,293) = 28.79, p < .001$ . As a result, Hypothesis 1.1 was partially supported.

***Hypothesis 2.1 Trauma survivors will perceive the use of ENDS as less harmful than combustible cigarettes.***

To investigate the hypothesis that trauma survivors would perceive the use of ENDS as less harmful than combustible cigarettes, percentages of participants who perceived ENDS as less harmful, as harmful, or more harmful than cigarettes were computed. Participants were asked to respond to three statements: “E-cigarettes/electronic vapor products are a safer alternative to combustible cigarettes,” on a four-point scale from “Strongly Agree” to “Strongly Disagree,” “Do you believe that breathing vapors from e-cigarettes is less harmful, equally as harmful, or more harmful than breathing cigarette smoke,” and “Use of e-cigarettes/electronic vapor products is/would be \_\_\_ (less harmful, as harmful, or

more harmful),” which both utilized a three-point scale from “Less Harmful” to “More Harmful.”

Results showed that almost half of participants reported that they ‘agree’ or ‘strongly agree’ that ENDS products are safer than combustible cigarettes ( $n = 57$ ; 45.2%). Similarly, 45.2% of the sample reported that breathing in the vapor of ENDS products was ‘less harmful’ than breathing cigarette smoke ( $n = 57$ ). By comparison, 46.0% of participants rated breathing vapors from e-cigarettes ‘as harmful’ as the risks of breathing in cigarette smoke ( $n = 58$ ). The use of ENDS products was rated ‘as harmful’ as cigarettes by close to 56% of the sample ( $n = 70$ ; 55.6%). Therefore, Hypothesis 2.1 was partially supported.

***Hypothesis 2.2 Trauma survivors will perceive ENDS use as an effective coping and stress reduction strategy.***

To investigate the hypothesis that trauma survivors would perceive ENDS use as an effective coping and stress reduction strategy, percentages of participants who responded affirmatively to selected survey items were reported. Coping perceptions were determined by responses of ‘yes’ the items “Do you vape/use cigarettes to manage/cope with stress?” and “Do you vape/use e-cigarettes to manage/cope with the trauma(s) you have experienced?” as well as identical items for smoking. Close to 82% ( $n = 103$ ; 81.7%) reported that they smoked to manage stress ( $n = 103$ ) and 76.2% ( $n = 96$ ) vaped for the same reason. Comparatively, most trauma survivors also endorsed smoking and vaping to cope with their trauma(s), respectively ( $n = 98$ ; 77.8%;  $n = 84$ ; 66.7%). Hypothesis 2.2 was supported.

***Hypothesis 2.3 Trauma survivors will perceive ENDS use as an effective coping strategy during the COVID-19 pandemic.***

To investigate the hypothesis that trauma survivors would perceive ENDS use as an effective coping strategy during the COVID-19 pandemic, percentages of participants who responded to selected survey items were computed. COVID-19 coping perceptions were determined by the items "Did you smoke to manage/cope with stress during the COVID-19 pandemic?" and "Did you vape to manage/cope with stress during the COVID-19 pandemic?" Most trauma survivors ( $n = 93$ ; 73.8%) reported that they smoked and/or vaped to manage their stress during the pandemic, supporting Hypothesis 2.3.

***Hypothesis 2.4 Trauma survivors will perceive ENDS use as an effective smoking cessation method.***

To investigate the hypothesis that trauma survivors would perceive ENDS use as an effective smoking cessation method, percentages of participants who responded 'agree' and 'strongly agree' to selected survey items were reported. Smoking cessation perceptions were determined by the items "E-cigarettes/electronic vapor products could help me/others quit smoking regular cigarettes" (i.e., are an effective method of smoking cessation), and "E-cigarettes/electronic vapor products could help me/others reduce the number of cigarettes smoked." Close to 64% (63.5%;  $n = 80$ ) reported that they 'agreed' or 'strongly agreed' that ENDS use is an effective smoking cessation method, supporting Hypothesis 2.4.



***Hypothesis 2.5 Trauma Survivors will have comparable health risk perceptions about ENDS regardless of their smoking/ENDS use status (i.e., Current Dual Users versus All Other Smokers/ Vapers).***

To investigate the hypothesis that trauma survivors would have comparable health risk perceptions about ENDS regardless of their smoking/ENDS use status, a non-parametric Mann-Whitney U test was conducted because the assumption of normality was violated. For the analysis, the health risk perceptions of Current Dual Users were compared to all other smoking/vaping groups combined (Past Smokers, Past Vapers, Current Smokers, Current Vapers, Past Dual Users, and Ever Dual Users). This comparison was used because of the limited number of participants identified in each of these groups, and because participants in the dual use group currently used both smoking and vaping products. In contrast, participants in the other groups only used a single product either currently or in the past, or were previously a dual user and now use either ENDS products or cigarettes. Total risk perception scores of current dual users ( $Md = 23, n = 96$ ) were significantly higher than all other smokers and vapers combined ( $Md = 21.5, n = 30$ ),  $U = 1,784.50, z = 1.98, p = .048, r = .18$ . Hypothesis 2.5 was not supported, as Current Dual Users were more likely to endorse higher health risk perceptions regarding ENDS than other smoking/vaping groups.

***Hypothesis 3.1 Trauma survivors who are younger, male, and of lower income/educational levels will report lower health risk perceptions associated with ENDS use.***

To investigate the association between demographic variables and health risk perceptions associated with ENDS use, chi-square tests for independence (with Yates' Continuity Correction) were conducted. Participants were categorized into Low health risk perceptions and High health risk perceptions groups based on a median split of the health risk perception scores ( $Md = 22$ ). Participants with scores of  $\leq 22$  were categorized in the Low health risk group ( $n = 56$ ) and those with scores of 23 and higher were categorized in the High health risk group ( $n = 70$ ). All demographic variables in these analyses were dichotomized as well; education was categorized as having a technical degree/certificate and below ( $n = 89, 70.6\%$ ), and associate degree and above ( $n = 37, 29.4\%$ ), as most of the sample were in the lower educational groups. Income was categorized as those earning \$59,000 or under ( $n = 84, 66.7\%$ ), and those earning \$60,000 and above ( $n = 42, 33.3\%$ ). Age was separated into two groups via a median split; those in the young age group were 18-34 years old ( $n = 81, 64.3\%$ ) and those in the older age group were 35-64 years old ( $n = 45, 35.7\%$ ). Gender was dichotomized by including those who identified as female, transwomen, gender fluid or other in the female group ( $n = 62, 49.2\%$ ), and those who identified as male, transmen, and two-spirit in the male group ( $n = 64, 50.8\%$ ).

Of the variables assessed, age was significantly associated with health risk perceptions, with trauma survivors in the younger age group (18-34 years) being more likely to report higher health risk perceptions than older participants,  $\chi^2(1, n = 126) = 5.915, p = .015, phi = -.233$ . However, trauma survivors' gender,  $\chi^2(1, n = 126) = .543, p = .461, phi = -.082$ , income level,  $\chi^2(1, n = 126) = .197, p = .657, phi = .056$ , and education level,  $\chi^2(1, n = 126) = .138, p = .710, phi = .051$ , were not significantly associated with their health risk perceptions. Hypothesis 3.1 was partially supported.

Exploratory analyses were conducted to examine the association between smoking/vaping status (current dual users versus all other smokers/vapers) and the demographic variables. Of the demographic variables assessed, smoking/vaping status was significantly associated with ethnicity, employment status, education status and income. Current dual use was significantly more likely among those who identified as Hispanic/Latino,  $\chi^2(1, n = 126) = 22.69, p < .001, phi = .445$ , those who were employed part-time or full-time  $\chi^2(1, n = 126) = 9.71, p = .059, phi = -.304$ , and those with a Technical Degree/Certificate or less education  $\chi^2(1, n = 126) = 12.45, p < .001, phi = -.335$ . Participants with an income of \$60,000 or more were also more likely to be dual users than those who earned \$59,000 or below,  $\chi^2(1, n = 126) = 3.99, p = .046, phi = .198$ .

***Hypothesis 3.2 Trauma survivors with a history of mental health or substance use problems, who reside with other smokers/vapers, and who have friends who smoke/vape, will report lower health risk perceptions associated with ENDS.***

To investigate the relationship between psychosocial factors and health risk perceptions related to ENDS use, chi-square tests for independence (with Yates' Continuity Correction) were utilized. The Low and High health risk perception groups were defined based on a median split of the health perception scores of the sample as described in Hypothesis 3.1. All psychosocial variables were also dichotomized by the endorsement of one or more smokers in the home, vapers in the home, friends who vape, and one or more mental health conditions or substance use problems versus none reported. Significant associations were found between higher health risk perceptions of trauma survivors and residing with vapers in the home,  $\chi^2(1, n = 126) = 10.74, p = .001, phi = .311$ , residing with smokers,  $\chi^2(1, n = 126) = 4.75, p = .029, phi = .213$ , and having friends who vape,  $\chi^2(1, n = 126) = 6.73, p = .009, phi = .255$ . However, having a history of mental health or substance use problems,  $\chi^2(1, n = 126) = 6.17, p = .013, phi = -.245$ , was significantly associated with having lower health risk perceptions. Having friends who smoke,  $\chi^2(1, n = 126) = 1.69, p = .194, phi = .141$ , was not significantly associated with health risk perceptions of trauma survivors. (See Table 1). As a result, Hypothesis 3.2 was partially supported.

Of the psychosocial variables assessed, smoking/vaping status of trauma survivors was significantly associated with residing with other smokers and vapers

and having close friends who smoke or vape. Current dual users were significantly more likely to reside with smokers  $\chi^2(1, n = 126) = 41.69, p < .001, phi = .598$ , to reside with vapers,  $\chi^2(1, n = 126) = 26.36, p < .001, phi = .480$ , have close friends who smoke,  $\chi^2(1, n = 126) = 4.44, p = .035, phi = .217$ , and close friends who vape,  $\chi^2(1, n = 126) = 7.43, p = .006, phi = .270$ , than those in the other smoking and vaping groups. (See Table 1).

***Hypothesis 3.3 Individuals who have experienced more trauma (endorsing three or more traumatic events on the BTQ) and more severe PTSD symptoms (as determined by higher PCL-5 scores) will endorse lower perceived health risks from ENDS use.***

Chi-square tests of independence (with Yates' Continuity Correction) were conducted to investigate the association between trauma-specific factors and health risk perceptions associated with ENDS use. The Low and High health risk perception groups were defined based on a median split of the health perception scores of the sample as described in Hypothesis 3.1. A review of the distribution of BTQ scores indicated that a good proportion of participants endorsed experiencing all ten traumatic events ( $n = 41; 32.5\%$ ), and most reported experiencing more than seven events ( $M = 7.24; SD = 2.78$ ). Therefore, participants who reported eight or more traumatic events were categorized as the High BTQ group ( $n = 73; 57.9\%$ ), and those who endorsed seven or fewer traumatic events were categorized as the Low BTQ group ( $n = 53; 42.1\%$ ). Results indicated that BTQ scores were not

significantly associated with health risk perceptions,  $\chi^2(1, n = 126) = .118, p = .732, phi = .047$ .

Participants were also categorized into groups based on their PCL-5 scores using the cutoff score for probable PTSD referenced in the literature. Those who scored  $\leq 30$  on PTSD symptom severity comprised the Lower negative impact group ( $n = 25$ ; 19.8%), and those with scores of 31 and higher were included in the Higher negative impact group ( $n = 101$ ; 80.2%). Results indicated that PCL-5 scores were not significantly associated with health risk perceptions,  $\chi^2(1, n = 126) = .019, p = .891, phi = -.033$ . Hypothesis 3.3 was not supported.

An exploratory analysis was also conducted to examine the association between trauma-related factors (BTQ and PCL-5 scores) and smoking/vaping status. BTQ scores were significantly associated with current smoking/vaping status. Participants with high scores on the BTQ were more likely to be in the current dual user group,  $\chi^2(1, n = 126) = 29.79, p < .001, phi = .505$  than in the combined smokers group. Results indicated that scores on the PCL-5 were not significantly associated with smoking/vaping status,  $\chi^2(1, n = 126) = 3.46, p = .063, phi = .189$ . (See Table 1).

## Chapter 7

### Discussion

The literature has examined the association between trauma and smoking extensively to determine what may explain this relationship. As many as 89.7% of people in the United States have experienced one or more traumatic events in their lifetime, further indicating a need to understand this relationship given the high frequency of trauma across the general population (Kilpatrick et al., 2013). Moreover, vaping is continuing to increase in U.S. adults aged 20 to 28 years (Chapman & Wu, 2014). Among the current sample, only 3.2% were current smokers ( $n = 4$ ), less than 1% were exclusively vapers, and approximately 76% were current dual users. When comparing rates of product use in our study to those obtained in a comparable study of at-risk college students with one or more mental health conditions (Wamamili et al., 2021), the rates of smokers and vapers in our sample were similar to or higher than those reported for that sample. Our study sample also had a high intensity of trauma and PTSD symptoms, which could account for slightly higher rates. The high rates of current dual product use in this sample suggest that ENDS use is a concerning behavioral health problem among trauma survivors.

The current study was the first to examine health risk perceptions of smoking and ENDS use in the context of trauma, including the frequency of trauma and posttraumatic reactions. This sample of trauma survivors consisted of those who have experienced a high intensity of trauma, as indicated by three or more

items on the BTQ. Approximately one-third of participants endorsed all ten traumatic events on the BTQ. As discussed in the literature, having more than three traumas on the BTQ is associated with a greater intensity of trauma. Furthermore, 69% of individuals in our study met the criteria for provisional PTSD on the PCL-5 measure. The majority of the sample experienced numerous traumas, likely contributing to a more significant negative impact on their functioning.

Like previous studies, our sample demonstrated that individuals who have experienced a high number of traumatic events or adverse childhood experiences were more likely to be current dual users, and at greater risk for nicotine dependence (Al Mamun et al., 2007; Ford et al., 2011; Jun et al., 2008; Nichols & Harlow, 2004; Spratt et al., 2009; Williams et al., 2020). However, there was no significant association between those who met the provisional criteria for PTSD and smoking/vaping status as reported in other studies (Hruska et al., 2014). It is important to recognize that not all people who experience traumatic events develop symptoms of PTSD. A number of factors may impact each individual's response to trauma such as coping style, type and frequency of social support, and cognitive style/expectancies, and many of these same factors may also influence decisions to smoke and vape. Therefore, the relationship between PTSD symptoms and smoking/vaping is a complex one and may be impacted by a number of mediating variables that were not assessed in the current study. It should be noted that the majority of the sample was composed of dual users with the remainder of the sample being single product users who engaged in dual use or single product use in



the past. Future studies that employ a larger sample size that can compare current dual users to those who have never vaped or smoked may help to better examine the relationship between smoking/vaping status and trauma.

When examining health risk perceptions, current dual users in the sample had significantly higher health risk perceptions than participants in the other combined smoking/vaping groups. These results were surprising given the typically inverse relationship between product use and perceived risk. In addition, there was no significant association found between trauma measures (the BTQ and PCL-5) and health risk perceptions. These findings may be due, in part, to the lack of sensitivity of the health risk perception measure and/or the cumulative health perception score to detect differences between high and low trauma participants. Despite the lack of findings on the overall scores of the health risk measures, inspection of individual items on this measure indicated that over half of the sample agreed that ENDS use was “as harmful” as cigarettes. While risk perception can be assessed in various ways (i.e., perceptions of personal vulnerability, relative risk, general risk, etc.), it may be that some dimensions of perceived risk (as assessed by items on our measure) may be more salient when assessing perceptions of risk in the context of trauma. Alternatively, the finding that trauma survivors continue to concurrently use ENDS and smoke cigarettes, despite awareness of their heightened health risks, suggests that other factors besides perceptions of health risk may drive their smoking and vaping behaviors.

This study also examined several risk factors associated with health risk perceptions related to ENDS use. In contrast to previous findings (Cooper et al., 2018), younger participants in the study were more likely to have higher health risk perceptions associated with ENDS use and were also more likely to be current dual users than older participants. Social influences were also important in determining smoking/vaping status and health risk perceptions. Interestingly, participants who resided with other vapers or smokers in the home, and those who had close friends who vaped, were more likely to perceive ENDS as being more harmful to their health. Current dual product use was also more likely among participants who resided with other vapers and smokers, and who had friends who smoked and vaped. These findings suggest that young adults and individuals whose social network consists of smokers and vapers should be targeted for interventions that reduce their use of ENDS products and other tobacco products. Messaging that capitalizes on the already increased health risk perceptions of dual product users to motivate behavior change should be encouraged as well.

As demonstrated in our review of the existing literature on trauma, numerous factors associated with trauma that may affect health risk perceptions were not captured within this study. These variables include impulsivity and internalizing behaviors, which have been associated with smoking in trauma survivors (Lewis et al., 2011; Strine et al., 2012). Future research should examine the impact of these additional factors and their mediational role in the relationship between trauma and health risk perceptions. For many negative health behaviors,

their usefulness in coping and immediate stress reduction outweighs the health risks, even if perceived as high by trauma survivors. In fact, results from our study indicated that between 76-82% of the sample reported smoking and/or vaping to manage their stress, and more than half of trauma survivors reported utilizing smoking and vaping behaviors as a means to cope with their traumas. Similarly, approximately three-quarters of individuals endorsed smoking and vaping more to cope with the COVID-19 pandemic. Therefore, more effective stress reduction, anxiety management techniques, and promotion of healthy coping strategies should be incorporated into prevention and intervention approaches aimed at vaping reduction and smoking cessation in this at-risk population.

In addition to stress reduction, most trauma survivors in our study reported utilizing ENDS products as means of smoking cessation. Psychoeducation about the lack of definitive evidence regarding ENDS as a cessation tool should be provided, and smokers and vapers should be encouraged to instead utilize behavioral strategies and seek FDA-approved pharmacological cessation methods. Working within a trauma-informed care context, both behavioral and medical providers who work with patients who have experienced trauma should employ trauma-sensitive practices when addressing negative coping behaviors such as smoking and vaping. Patients should be aware that their adverse health behaviors may be related to their previous traumatic experiences (i.e., the patient who begins smoking or vaping to cope with her anxiety related to an abusive partner) and

offered brief interventions that address their trauma symptoms, in addition to smoking cessation, to achieve optimal health and behavioral outcomes.

Of note is that approximately half of our sample experienced responses to their trauma disclosures as blaming or rejecting which speaks to another important issue; it is vital for trauma survivors to receive support from others when they disclose what has happened to them. Families should be encouraged to practice open communication and support of one another, given the findings that adverse reactions to disclosure can increase PTSD symptoms and the use of maladaptive coping skills such as substance use and smoking (Brooks et al., 2019; Ullman & Peter-Hagene, 2014). Even when these negative health risk behaviors are already occurring, providing psychoeducation as well as new and more adaptive coping skills to replace these can assist trauma survivors in improving both their trauma symptoms and physical health.

## Chapter 8

### Limitations of Study and Directions for Future Research

There are several limitations inherent in the current study, constraining the certainty of the conclusions drawn. First, the self-reported validity of vaping habits has not yet been determined despite the validity of self-reported smoking behaviors found in previous research (Ellis et al., 2020; Wong et al., 2012). Moreover, the participants enrolled in this study were those 18 years or older; these criteria excluded younger participants among whom ENDS use is continuing to rise and who may provide insight into the health risk perceptions of the younger generation (Glasser et al., 2020). This exploratory study was conducted with a convenience sample, and therefore future studies capturing the experiences of youth trauma survivors is also warranted. The sample size was also limited, despite surpassing our targeted number of participants. Given that this study was advertised as being related to trauma, perhaps individuals were hesitant to complete the survey; this could be associated with a desire to avoid discussing one's previous traumas.

Furthermore, given the study's cross-sectional design, the directionality of the relationship between the participants' psychosocial and trauma histories and their health risk perceptions of smoking and ENDS could not be established. Future studies with a longitudinal design may assist in determining the directionality of the above relationships. Also inherent to the cross-sectional design of this study is the notion that results may not be generalizable to past or future populations of trauma survivors and their perceptions of smoking and ENDS use.

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## **Appendix A: Letter of Information and Informed Consent**

### **Primary Investigator:**

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**Please read this consent document carefully before you decide to participate in this study.**

### **Purpose of the Study**

This study is being conducted to learn more about whether adults who are 18 years or older, who have experienced trauma, utilize cigarettes and/or electronic nicotine delivery system (ENDS) devices such as e-cigarettes. Furthermore, this study will look at their perceptions of health risks associated with the use of cigarettes or ENDS products. ENDS products are battery-operated devices that are like a cigarette, but do not involve the burning of tobacco. They are also referred to as e-cigarettes, vape pens, e-cigars, e-cigs, vapes, and various other names. If you do not use ENDS, we will ask for your opinions about them. This information will be used to design future interventions to help adults with trauma histories learn ways to prevent smoking and the use of ENDS products.

### **Eligibility**

In order to participate, you must be 18 years of age or older, have experienced at least one traumatic event in your lifetime, and be able to read and write in English fluently. In addition, you must be a current/past smoker of any combustible tobacco product (i.e., cigarettes, cigarillos, cigars, blunts, bidis, or any other tobacco product), and/or a current/past ENDS user. Participants who use ENDS devices with or without nicotine are eligible to participate; those who only use ENDS devices containing cannabis products (e.g., THC, CBD oil, etc.) are not eligible for this study.)

### **Procedures of the Study**

If you are eligible to participate in the study, you will be asked to complete an online survey. The survey will consist of questions regarding your past and current smoking and vaping behaviors, your perceptions of health risks related to these products, your past experiences of trauma, and your medical and mental health history. You will be able to change any of your responses by selecting the “Back”

button to return to the previous page. We estimate that the questionnaire will take approximately 20 minutes to complete.

### **Potential Risks and Benefits**

The risks of participating in this study are minimal. However, you will be asked about your past experiences of trauma and your smoking and vaping behaviors which you may find stressful. You may choose not to respond to any question that makes you uncomfortable and are free to discontinue your participation at any point during the study. While unlikely, there is a risk of loss of privacy. We will keep your study information private and confidential and all data will be de-identified and kept in a database that only researchers have access to. There will be no direct benefits to you by taking part in this study. However, the information obtained from this study may be used to help other smokers and vapers in the future.

### **Compensation**

At the end of the survey, you will be provided the option to enter your email address to be entered into a drawing to win one of two \$50 Amazon gift cards.

### **Discontinuation of the Study**

Participation in this study is **voluntary**. You are under no obligation to participate in this study, and you are free to withdraw from the study at any time without consequences to you. There is no penalty for not participating. You may refuse to answer any questions that we ask you. If you decide to withdraw from the study, the information provided by you will not be retained.

### **Confidentiality**

All responses obtained from you will be kept confidential. No identifying information will be collected during this survey. All data collected will be entered into a HIPAA-compliant database and stored on a password-protected server located in the Department of Psychology at Florida Institute of Technology. Only authorized researchers will have access to this information.

### **Information about Participating as a Study Subject**

Any questions about study participation may be directed to Alyssa A. Barsky (Principle Investigator) via email ([abarsky2018@my.fit.edu](mailto:abarsky2018@my.fit.edu)).

This study has been reviewed and approved by the Institutional Review Board. If you have any ethical questions or concerns about the study, these may be directed to:

Dr. Jignya Patel, Chair for the Institutional Review Board  
Institutional Review Board Office, School of Psychology  
150 W University Blvd

Melbourne, Florida, 32901  
(P): 321-674-7347  
(E): FIT\_IRB@fit.edu

### **Consent**

***In order to keep your information confidential, your name or signature is not required. Please indicate your choice below. Should you choose to participate, you will be directed automatically to the survey.***

- I have read the information presented above about a study being conducted by Alyssa Barsky (Principle Investigator) of the School of Psychology at Florida Institute of Technology. I am 18 years or older, and I understand that I may withdraw from the study at any time. I agree to participate in this study.
- I have read the information presented about this study and I do not wish to participate.

## Appendix B: Survey

You are invited to participate in this study that asks about your tobacco use, use of e-cigarettes, your attitudes towards smoking/vaping, your perceptions of harm regarding tobacco and/or e-cigarette use, and traumatic events you have experienced. Thank you very much for your time and support.

### Qualifying Information:

*In order to determine your eligibility to participate, please answer the following questions:*

1. **Are you 18 years of age or older?**
  - Yes
  - No (*will be routed to end of survey*)
  
2. **Are you able to read and write English fluently?**
  - Yes
  - No (*will be routed to end of survey*)
  
3. **Have you smoked at least 100 cigarettes (including cigarillos, cigars, blunts, biddies, or any other tobacco products) in your lifetime? 1 pack = 20 cigarettes; thus 5 packs = 100 Cigarettes**
  - Yes
  - No
  
4. **Have you ever used an electronic nicotine delivery system (ENDS) product (including electronic cigarettes, e-cigarettes, e-cigs, vapes, e-hookahs, hookah pens, or vape pens) even once in your lifetime?**

**(Note: If have only used ENDS devices containing cannabis products, please select 'No.')**

  - Yes
  - No
  
5. **Did you answer 'Yes' to either of the questions above?**
  - Yes
  - No (*will be routed to end of survey*)
  
6. **Within the last 30 days, how often have you smoked cigarettes?**
  - Nearly Every Day
  - Some Days
  - I have not smoked any cigarette product within the last 30 days

**7. Within the last 30 days, how often have you used an electronic nicotine delivery system (ENDS) product?**

- Nearly Every Day
- Some Days
- I have not used any ENDS product within the last 30 days

**8. Do you intend to use e-cigarettes/vapes within the next 6 months? (*only smokers who do not currently vape will get this question*).**

- Yes
- No

**The following questions ask about events that may be extraordinarily stressful or disturbing for almost everyone.** Please select “yes” or “no” to report what has happened to you.

**If you answer “Yes” for an event**, please answer any additional questions that follow it to report: (1) whether you thought your life was in danger or you might be seriously injured; and (2) whether you were seriously injured.

**9. Have you ever served in a war zone, or have you ever served in a noncombat job that exposed you to war-related casualties (for example, as a medic or on graves registration duty)?**

- Yes
- No

**9a. If the event happened, did you think your life was in danger or you might be seriously injured?**

- Yes
- No

**9b. If the event happened, were you seriously injured?**

- Yes
- No

**10. Have you even been in a serious car accident, or a serious accident at work or somewhere else?**

- Yes
- No

**10a. If the event happened, did you think your life was in danger or you might be seriously injured?**

- Yes
- No

**10b. If the event happened, were you seriously injured?**

- Yes
- No

**11. Have you ever been in a major natural or technological disaster, such as a fire, tornado, hurricane, flood, earthquake, or chemical spill?**

- Yes
- No

**11a. If the event happened, did you think your life was in danger or you might be seriously injured?**

- Yes
- No

**11b. If the event happened, were you seriously injured?**

- Yes
- No

**12. Have you ever had a life-threatening illness such as cancer, a heart attack, leukemia, AIDS, multiple sclerosis, etc.?**

- Yes
- No

**12a. If the event happened, did you think your life was in danger or you might be seriously injured?**

- Yes
- No

**13. Before age 18, were you ever physically punished or beaten by a parent, caretaker, or teacher so that: you were very frightened; or you thought that you would be injured; or you received bruises, cuts, welts, lumps, or other injuries?**

- Yes
- No

**13a. If the event happened, did you think your life was in danger or you might be seriously injured?**

- Yes
- No

**13b. If the event happened, were you seriously injured?**

- Yes
- No



**14. Not including any punishments or beatings you already reported in Question 5, have you ever been attacked, beaten, or mugged by anyone, including friends, family members or strangers?**

- Yes
- No

**14a. If the event happened, did you think your life was in danger or you might be seriously injured?**

- Yes
- No

**14b. If the event happened, were you seriously injured?**

- Yes
- No

**15. Has anyone ever made or pressured you into having some type of unwanted sexual contact? Note: By sexual contact we mean any contact between some else and your private parts or between you and someone else's private parts.**

- Yes
- No

**15a. If the event happened, did you think your life was in danger or you might be seriously injured?**

- Yes
- No

**15b. If the event happened, were you seriously injured?**

- Yes
- No

**16. Have you ever been in any other situation in which you were seriously injured, or have you ever been in any other situation in which you feared you might be seriously injured or killed?**

- Yes
- No

**16a. If the event happened, were you seriously injured?**

- Yes
- No

**17. Has a close family member or friend died violently, for example, in a serious car crash, mugging, or attack?**

- Yes

- No

**17a. If the event happened, were you seriously injured?**

- Yes
- No

**18. Have you ever witnessed a situation in which someone was seriously injured or killed, or have you ever witnessed a situation in which you feared someone would be seriously injured or killed? Note: Do not answer “yes” for any event you already reported in the above questions.**

- Yes
- No

**19. Select 'Yes' if:**

**(1) You answered 'yes' to any of the traumatic experiences asked about previously,**  
**(2) and if applicable, felt your life was in danger or you might be seriously injured.**

- Yes
- No (*will be routed to end of survey*)

## **Demographics**

**20. What is your current age?**

- 18-24 years old
- 25-34 years old
- 35-44 years old
- 45-54 years old
- 55-64 years old
- 65-74 years old
- 75 years or older

**21. What sexual orientation do you identify with?**

- Heterosexual (i.e., attracted to other sex)
- Homosexual (i.e., attracted to same sex)
- Bisexual
- Asexual
- Pansexual
- Other: \_\_\_\_\_

**22. What gender do you identify with?**

- Female
- Male
- Transwoman (MTF)

- Transman (FTM)
- Gender Fluid
- Two-spirit
- Other: \_\_\_\_\_

**23. What is your race?**

- White/Caucasian
- Black/African American
- Asian
- American Indian/Alaskan Native
- Hawaiian Native/Other Pacific Islander
- Biracial/Multiracial
- Other: \_\_\_\_\_

**24. What is your ethnicity?**

- Hispanic/Latino
- Non-Hispanic/Latino

**25. How would you describe the region you currently live in?**

- Urban/City
- Rural/Country

**26. What geographic region do you currently reside in?**

- **Northeast:** Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, and Pennsylvania.
- **Midwest:** Ohio, Indiana, Illinois, Michigan, Wisconsin, Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, and Kansas.
- **South:** Delaware, Maryland, District of Columbia, Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida, Kentucky, Tennessee, Alabama, Mississippi, Arkansas, Louisiana, Oklahoma, and Texas.
- **West:** Montana, Idaho, Wyoming, Colorado, New Mexico, Arizona, Utah, Nevada, Washington, Oregon, California, Alaska, and Hawaii.

**27. What is your current relationship status?**

- Single
- In a relationship
- Married
- Divorced
- Widowed

**28. Are you currently living with your partner?**

- Yes
- No
- N/A (No spouse / partner)

**29. What is your highest level of education completed?**

- I did not graduate high school
- High school diploma/GED
- Technical Degree/Certificate
- Associate's Degree
- Bachelor's Degree
- Master's Degree
- Doctoral Degree

**30. What is your approximate individual total annual income (before taxes)?**

- \$0-\$19,000
- \$20,000-\$39,000
- \$40,000-\$59,000
- \$60,000-\$79,000
- \$80,000-\$99,000
- \$100,000-\$119,000
- \$120,000 and over

**31. What is your occupational status?**

- Employed full-time
- Employed part-time
- On disability
- Retired
- Unemployed
- Student

**Psychosocial**

**32. Has a doctor, nurse, or other health professional EVER told you that you have any of the following chronic medical health conditions? (*Please select all that apply*).**

- Asthma
- Cancer
- Chronic bronchitis, emphysema, chronic obstructive pulmonary disorder (COPD) or other chronic pulmonary disorder
- Chronic fatigue syndrome
- Chronic Pain
- Diabetes
- Gastrointestinal (GI) disorder (e.g., Crohn's disease, ulcerative colitis, irritable bowel syndrome, or bowel incontinence).
- Heart Disease (e.g., heart attack, congestive heart failure, angina, etc.)

- HIV Disease (AIDS)
- Hypertension (high blood pressure)
- Kidney Disease
- Multiple Sclerosis
- Stroke
- Traumatic brain injury or other brain-related injury
- Any physical disability (e.g., quadriplegia, paraplegia, amputation, etc.)
- Other: \_\_\_\_\_
- I have never been informed that I have a chronic medical health condition

**33. Have you ever been informed by a health professional that you have any of the following mental health conditions? (Please select all that apply).**

- Adjustment Disorder
- Anxiety
- Bipolar Disorder (including mania)
- Depression (including dysthymia)
- Obsessive Compulsive Disorder
- Post-Traumatic Stress Disorder
- Personality Disorder
- Schizophrenia
- Sleep disorder (e.g., insomnia)
- Developmental Disability (ADHD, Learning Disorder, Autism Spectrum Disorder, etc.)
- Neurocognitive Disorder (Alzheimer's, Traumatic Brain Injury, etc.)
- Alcohol abuse
- Drug abuse
- Other: \_\_\_\_\_
- I have never been informed that I have a mental health condition

**Trauma Specifics and History**

*Below is a list of problems that people sometimes have in response to a very stressful experience. Please read each problem carefully and then select one of the responses to indicate how much you have been bothered by that problem **in the past month.***

**In the past month, how much were you bothered by:**

**34. Repeated, disturbing, and unwanted memories of the stressful experience?**

- Not at all (0)
- A little bit (1)

- Moderately (2)
- Quite a bit (3)
- Extremely (4)

**35. Repeated, disturbing dreams of the stressful experience?**

- Not at all (0)
- A little bit (1)
- Moderately (2)
- Quite a bit (3)
- Extremely (4)

**36. Suddenly feeling or acting as if the stressful experience were actually happening again (as if you were actually back there reliving it)?**

- Not at all (0)
- A little bit (1)
- Moderately (2)
- Quite a bit (3)
- Extremely (4)

**37. Feeling very upset when something reminded you of the stressful experience?**

- Not at all (0)
- A little bit (1)
- Moderately (2)
- Quite a bit (3)
- Extremely (4)

**38. Having strong physical reactions when something reminded you of the stressful experience (for example, heart pounding, trouble breathing, sweating)?**

- Not at all (0)
- A little bit (1)
- Moderately (2)
- Quite a bit (3)
- Extremely (4)

**39. Avoiding memories, thoughts, or feelings related to the stressful experience?**

- Not at all (0)
- A little bit (1)
- Moderately (2)
- Quite a bit (3)
- Extremely (4)

**40. Avoiding external reminders of the stressful experience (for example, people, places, conversations, activities, objects, or situations)?**

- Not at all (0)
- A little bit (1)
- Moderately (2)
- Quite a bit (3)
- Extremely (4)

**41. Trouble remembering important parts of the stressful experience?**

- Not at all (0)
- A little bit (1)
- Moderately (2)
- Quite a bit (3)
- Extremely (4)

**42. Having strong negative beliefs about yourself, other people, or the world (for example, having thoughts such as: I am bad, there is something seriously wrong with me, no one can be trusted, the world is completely dangerous)?**

- Not at all (0)
- A little bit (1)
- Moderately (2)
- Quite a bit (3)
- Extremely (4)

**43. Blaming yourself or someone else for the stressful experience or what happened after it?**

- Not at all (0)
- A little bit (1)
- Moderately (2)
- Quite a bit (3)
- Extremely (4)

**44. Having strong negative feelings such as fear, horror, anger, guilt or shame?**

- Not at all (0)
- A little bit (1)
- Moderately (2)
- Quite a bit (3)
- Extremely (4)

**45. Loss of interest in activities that you used to enjoy?**

- Not at all (0)
- A little bit (1)

- Moderately (2)
- Quite a bit (3)
- Extremely (4)

**46. Feeling distant or cut off from other people?**

- Not at all (0)
- A little bit (1)
- Moderately (2)
- Quite a bit (3)
- Extremely (4)

**47. Trouble experiencing positive feelings (for example, being unable to feel happiness or have loving feelings for people close to you)?**

- Not at all (0)
- A little bit (1)
- Moderately (2)
- Quite a bit (3)
- Extremely (4)

**48. Irritable behavior, angry outbursts, or acting aggressively?**

- Not at all (0)
- A little bit (1)
- Moderately (2)
- Quite a bit (3)
- Extremely (4)

**49. Taking too many risks or doing things that could cause you harm?**

- Not at all (0)
- A little bit (1)
- Moderately (2)
- Quite a bit (3)
- Extremely (4)

**50. Being “superalert” or watchful or on guard?**

- Not at all (0)
- A little bit (1)
- Moderately (2)
- Quite a bit (3)
- Extremely (4)

**51. Feeling jumpy or easily startled?**

- Not at all (0)
- A little bit (1)
- Moderately (2)



- Quite a bit (3)
- Extremely (4)

**52. Having difficulty concentrating?**

- Not at all (0)
- A little bit (1)
- Moderately (2)
- Quite a bit (3)
- Extremely (4)

**53. Trouble falling or staying asleep?**

- Not at all (0)
- A little bit (1)
- Moderately (2)
- Quite a bit (3)
- Extremely (4)

*Note: continue with the rest of this survey.*

**54. Did you disclose your trauma to anyone after it happened?**

- Yes
- No

**55. How did the person/people you disclosed to react?**

- They were supportive
- They were blaming/rejecting
- Neutral
- N/A; I did not disclose

**Smoking Status and History**

**56. How many of individuals residing in your current home smoke cigarettes (excluding yourself)?**

- 0 smokers
- 1-2 smokers
- 3 or more smokers

**57. Does your spouse/partner currently smoke cigarettes?**

- Yes
- No
- N/A (No spouse / partner)

**58. How many of your close friends currently smoke cigarettes?**

- 0

- 1 - 2
- 3 or more

*(The following questions will be directed only to past or current cigarette smokers.)*

**59. Do you feel that you smoke to manage/cope with stress?**

- Yes
- No
- N/A, I do not smoke

**60. Did you smoke to manage/cope with stress during the COVID-19 pandemic?**

- Yes
- No

**61. How has COVID-19 affected your smoking?:**

- I have smoked significantly more since the COVID-19 pandemic
- I have smoked the same as before COVID-19 pandemic
- I have smoked less since the COVID-19 pandemic
- I began smoking during the COVID-19 pandemic

**62. Do you smoke to manage/cope with the trauma(s) you have experienced?**

- Yes
- No
- N/A, I do not smoke

**Vaping Status and History**

*(Directed to past and current vapers only)*

**63. If you use or have ever used e-cigarettes/vaping products, how much nicotine is typically in your e-liquid?**

- None, my e-cigarettes/vaping product does not contain any nicotine
- My e-cigarette/vaping product contains nicotine; Nicotine amount:  
\_\_\_\_\_
- Not sure

**64. Have you ever used an e-cigarette/vaping product to inhale other substances, such as CBD oil, alcohol, etc.?**

- Yes
- No

**65. What are the reasons you have used e-cigarettes/vaped? (Please select all that apply).**

- Friend or family member used them
- Help with quitting other tobacco products, such as cigarettes
- E-cigarettes/vaping products cost less than other tobacco products, such as cigarettes
- E-cigarettes/vaping products are easier to get than other tobacco products, such as cigarettes
- Famous people on TV or in movies use e-cigarettes/vaping products
- E-cigarettes/vaping products are less harmful than other forms of tobacco, such as cigarettes
- E-cigarettes/vaping products are available in flavors, such as mint, candy, fruit, or chocolate
- E-cigarettes/vaping products can be used in areas where other products, such as cigarettes, are not allowed
- E-cigarettes/vaping products do not leave a bad smell or taste like cigarettes
- It is more socially acceptable to use e-cigarettes/vaping products in my environment
- Some other reason: \_\_\_\_\_

**66. How many vapers currently live in your household?**

- 0 vapers
- 1-2 vapers
- 3 or more vapers

**67. Does your spouse/partner currently use e-cigarettes/vape?**

- Yes
- No
- N/A (No spouse / partner)

**68. How many of your close friends currently vape/use electronic cigarettes?**

- 0
- 1 - 2
- 3 or more

**69. Do you vape/ use e-cigarettes to manage/cope with stress?**

- Yes
- No
- N/A, I do not vape or use e-cigarettes

**70. Do you vape/ use e-cigarettes to manage/cope with the trauma(s) you have experienced?**

- Yes
- No
- N/A, I do not vape or use e-cigarettes

**71. Did you vape to manage/cope with stress during the COVID-19 pandemic?**

- Yes
- No

**72. How has COVID-19 affected your vaping?**

- I have vaped significantly more since the COVID-19 pandemic
- I began vaping during the COVID-19 pandemic
- I have vaped the same as before since the COVID-19 pandemic
- I have vaped less since the COVID-19 pandemic

### **Perceptions of Health Risks Associated with ENDS**

*Regardless of whether you vape, smoke, or use both, please complete the following items:*

**73. Using e-cigarettes/electronic vapor products is harmful to one's health.**

- Strongly Agree (3)
- Agree (2)
- Disagree (1)
- Strongly Disagree (0)

**74. Using e-cigarettes/electronic vapor products will lead to serious health problems in the short-term.**

- Strongly Agree (3)
- Agree (2)
- Disagree (1)
- Strongly Disagree (0)

**75. Using e-cigarettes/electronic vapor products will lead to serious health problems in the long-term.**

- Strongly Agree (3)
- Agree (2)
- Disagree (1)
- Strongly Disagree (0)

**76. E-cigarettes/electronic vapor products are a safer alternative to combustible cigarettes.**

- Strongly Agree (0)
- Agree (1)
- Disagree (2)
- Strongly Disagree (3)

**77. Do you believe that breathing vapors from e-cigarettes is less harmful,**

**equally as harmful, or more harmful than breathing cigarette smoke?**

- Less harmful (0)
- As harmful (1)
- More harmful (2)

**78. Inhaling vapor from e-cigarettes/electronic vapor can harm one's health.**

- Strongly Agree (3)
- Agree (2)
- Disagree (1)
- Strongly Disagree (0)

**79. Use of e-cigarettes/ electronic vapor products is/would be:**

- Less harmful than regular cigarettes (0)
- As harmful as regular cigarettes (1)
- More harmful than regular cigarettes (2)

**80. One should worry about using e-cigarettes or electronic vapor products because of possible health risks.**

- Strongly Agree (3)
- Agree (2)
- Disagree (1)
- Strongly Disagree (0)

**81. Use of e-cigarettes/electronic vapor products is relatively safe**

- Strongly Disagree (3)
- Disagree (2)
- Agree (1)
- Strongly Agree (0)

**82. A person's risk of becoming ill from use of e-cigarettes/electronic vapor products is low**

- Strongly Disagree (3)
- Disagree (2)
- Agree (1)
- Strongly Agree (0)

**83. The benefits of using e-cigarettes/electronic vapor products far outweigh the risks**

- Strongly Disagree (3)
- Disagree (2)
- Agree (1)
- Strongly Agree (0)

## Smoking Cessation

**84. E-cigarettes/electronic vapor products could help me/others quit smoking regular cigarettes (i.e., are an effective method of smoking cessation).**

- Strongly Agree (3)
- Agree (2)
- Disagree (1)
- Strongly Disagree (0)

**85. E-cigarettes/electronic vapor products could help me/others reduce the number of cigarettes smoked.**

- Strongly Agree (3)
- Agree (2)
- Disagree (1)
- Strongly Disagree (0)

## Additional Quantitative Question

**86. Is there anything else you wanted to share about your trauma or vaping experiences? (Note: this question is optional).**

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If you would like to be entered into a drawing to win one of two \$50 gift cards, please provide your email address below:

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Thank you. This completes the survey.

Table 1

*Health Risk Perceptions and Smoking/Vaping Status Across Demographic, Psychosocial, and Trauma-Based Factors*

Variable	Low Health Risk Perceptions (n = 56) n (%)	High Health Risk Perceptions (n = 70) n (%)	$\chi^2$	Current Dual Users (n = 96) n (%)	All Other Smokers/Vapers (n = 30) n (%)	$\chi^2$
<b>Demographic Variables</b>						
Age			3.40			.009
Younger (18-34 years)	42 (56.8%)	38 (74.5%)		61 (63.5%)	20 (66.7%)	
Older (35-64 years)	32 (43.2%)	13 (25.5%)		35 (36.5%)	10 (33.3%)	
Gender			.543			2.45
Male	31 (55.4%)	33 (47.1%)		53 (55.2%)	11 (36.7%)	
Female	25 (44.6%)	37 (52.9%)		43 (44.8%)	19 (63.3%)	
Race			.115			.094
White/Caucasian	40 (71.4%)	53 (75.7%)		72 (75.0%)	21 (70.0%)	
Other	16 (28.6%)	17 (24.3%)		24 (25.0%)	9 (30.0%)	
Ethnicity			.000			22.69**
Non-Hispanic	17 (30.4%)	21 (30.0%)		18 (18.8%)	20 (66.7%)	
Hispanic/Latino	39 (69.6%)	49 (70.0%)		78 (81.3%)	10 (33.3%)	
Employment			.066			9.71*
Full-time & Part-Time	47 (83.9%)	61 (87.1%)		88 (91.7%)	20 (66.7%)	
Disability, Unemployed, Retired, or Student	9 (16.1%)	9 (12.9%)		8 (8.3%)	10 (33.3%)	
Education			.138			13.25**
Technical Degree/Certificate and Below	41 (73.2%)	48 (68.6%)		76 (79.2%)	13 (43.3%)	
Associate degree and Above	15 (26.8%)	22 (31.4%)		20 (20.8%)	17 (56.7%)	
Income (Household)			.197			3.99*
\$0-\$59,000	39 (69.6%)	45 (64.3%)		59 (61.5%)	25 (83.3%)	
\$60,000 and over	17 (30.4%)	25 (35.7%)		37 (38.5%)	5 (16.7%)	
Relationship Status			1.68			.184
Single, Divorced, or Widowed	23 (41.1%)	38 (54.3%)		48 (50.0%)	13 (43.3%)	
In a Relationship or Married	33 (58.9%)	32 (45.7%)		48 (50.0%)	17 (56.7%)	
<b>Psychosocial Variables</b>						
Smokers in Home			4.75*			41.69**
0 smokers	18 (32.1%)	10 (14.3%)		8 (8.3%)	20 (66.7%)	
1 or more smokers	38 (67.9%)	60 (85.7%)		88 (91.7%)	10 (33.3%)	
Vapers in Home			10.74*			26.36**
0 vapers	20 (35.7%)	7 (10.0%)		10 (10.4%)	17 (56.7%)	
1 or more vapers	36 (64.3%)	63 (90.0%)		86 (89.6%)	13 (43.3%)	
Close friends smoke			1.69			4.44*
0 smokers	9 (16.1%)	5 (7.1%)		7 (7.3%)	7 (23.3%)	
1 or more smokers	47 (83.9%)	65 (92.9%)		89 (92.7%)	23 (76.7%)	
Close friends vape			6.73*			7.43*
0 vapers	13 (23.2%)	4 (5.7%)		8 (8.3%)	9 (30.0%)	
1 or more vapers	43 (76.8%)	66 (94.3%)		88 (91.7%)	21 (70.0%)	
<b>Trauma Variables</b>						
BTQ Scores			.118			33.85**
High (8 or higher)	31 (55.4%)	42 (60.0%)		69 (71.9%)	4 (13.3%)	
Low (7 or lower)	25 (44.6%)	28 (40.0%)		27 (28.1%)	26 (86.7%)	
PCL-5 Scores			.390			3.46
High (31 or above)	43 (76.8%)	58 (82.9%)		81 (84.4%)	20 (66.7%)	
Low (30 or below)	13 (23.2%)	12 (17.1%)		15 (15.6%)	10 (33.3%)	

\* $p < .05$ , \*\* $p < .00$

Table 2

*Frequencies for Reasons for Using ENDS Products Among Trauma Survivors*

Vaping variable	Total Sample ( <i>N</i> = 126) <i>n</i> (%)
Try to quit using other tobacco products	42 (33.3%)
Can be used where tobacco products can't	34 (27.0%)
Friend or family member used them	31 (24.6%)
Easier to get than other tobacco products	30 (23.8%)
Available in flavors	26 (20.6%)
Cost less than other tobacco products	23 (18.3%)
Do not leave a bad smell or taste like cigarettes	23 (18.3%)
More socially acceptable to vape	21 (16.7%)
Famous People Use Them	20 (15.9%)
Less harmful than other tobacco products	17 (13.5%)
Used them for some other reason	1 (0.8%)

*Note.* The characteristic percentages may not add up to 100.0 due to participants endorsing more than one item.



Table 3

*Frequencies for Mental Health Conditions in Trauma Survivors*

Variable	Total Sample ( $N = 139$ ) $n$ (%)
Adjustment Disorders	17 (13.5%)
Anxiety	44 (34.9%)
Bipolar Disorder (including mania)	16 (12.7%)
Depression (including dysthymia)	29 (23.0%)
Obsessive Compulsive Disorder	22 (17.5%)
Posttraumatic Stress Disorder	23 (18.3%)
Personality Disorder	15 (11.9%)
Schizophrenia	21 (16.7%)
Sleep Disorder (e.g., insomnia)	20 (15.9%)
Developmental Disability (e.g., ADHD, Autism Spectrum Disorder)	13 (10.3%)
Neurocognitive Disorder (e.g., Alzheimer's Disease)	6 (4.8%)
Alcohol Abuse	11 (8.7%)
Drug Abuse	7 (5.6%)
Other Mental Health Condition	4 (3.2%)
No Mental Health Condition	16 (12.7%)

*Note.* The characteristic percentages may not add up to 100.0 due to participants endorsing more than one item.

Table 4

*Frequencies for Medical Conditions in Trauma Survivors*

Variable	Total Sample ( <i>N</i> = 126) <i>n</i> (%)
Asthma	21 (16.7%)
Cancer	11 (8.7%)
Pulmonary Disorder (e.g., Chronic bronchitis, emphysema, COPD)	15 (11.9%)
Chronic Fatigue Syndrome	12 (9.5%)
Chronic Pain	23 (18.3%)
Diabetes	17 (13.5%)
Gastrointestinal (GI) Disorder (e.g., Crohn's disease, irritable bowel syndrome)	25 (19.8%)
Heart Disease (e.g., Heart attack, Angina)	12 (9.5%)
HIV Disease (AIDS)	6 (4.8%)
Hypertension	8 (6.3%)
Kidney Disease	14 (11.1%)
Multiple Sclerosis (MS)	5 (4.0%)
Stroke	10 (7.9%)
Traumatic Brain Injury or other brain-related injury	11 (8.7%)
Physical Disability (e.g., paraplegia, amputation)	4 (3.2%)
Other Medical Condition	4 (3.2%)
No Medical Condition	31 (24.6%)

*Note.* The characteristic percentages may not add up to 100.0 due to participants endorsing more than one item.