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The Association Between Emotional Competencies and E-Cigarette Susceptibility

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THE ASSOCIATION BETWEEN EMOTIONAL COMPETENCIES

AND E-CIGARETTE SUSCEPTIBILITY

by

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ABSTRACT

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The prevalence of e-cigarette use in young adults rose dramatically in the United States over the past decade. Nonetheless, our understanding of the motives that make young adults more susceptible to e-cigarette use remains limited. Risk factors associated with susceptibility to combustible cigarettes suggest that negative affect reduction outcome expectancies are positively associated with cigarette susceptibility in this age group. Further, emotion competencies, such as emotion regulation difficulties, distress tolerance, and positive and negative urgency have been positively associated with both susceptibility and negative affect reduction expectancies. Determining the role of negative affect reduction outcome expectancies on e-cigarette use requires further research and investigation to clarify the relationship between these emotional competencies and e-cigarette susceptibility.

Participants were undergraduate students who completed measures on e-cigarette use and susceptibility, e-cigarette outcome expectancies, emotion dysregulation, anxiety sensitivity, distress tolerance, and urgency. In contrast to our hypotheses, a multivariate analysis of variance failed to find differences between individuals who engaged in e-cigarettes and those that did not in regards to emotion regulation, distress tolerance or positive or negative urgency. Results of two separate analyses of covariance indicated that individuals who engaged in e-cigarette use e-cigarettes did not have higher smoking negative affect reduction outcome expectancies or cigarette susceptibility. Negative affect reduction outcome expectancies did not mediate the

relationship between these emotional difficulties and e-cigarette susceptibility. Further, negative affect reduction outcome expectancies did not mediate the relationship between these emotional difficulties and e-cigarette susceptibility. However, path analysis indicated two significant direct pathways from negative urgency and emotion dysregulation to e-cigarette susceptibility. The results indicate that emotional competencies, particularly negative urgency and emotion dysregulation, may be important factors to examine for interventions to reduce substance use susceptibility in the young adult population. Interventions should focus on building emotion regulation skills and emotion coping skills to decrease negative urgency. Future research should aim to expand the research by replicating longitudinally and in more diverse samples.

This thesis is dedicated to the concept that our
greatest works are created by persistence.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

Cigarette smoking is the leading preventable cause of death in the United States, accounting for 480,000 deaths every year, which is one-fifth of the annual total deaths in the United States (United States Department of Health and Human Services (USDHHS, 2014). Despite this, an estimated 40 million adults in the United States currently smoke cigarettes (Center for Disease Control and Prevention, 2016). An estimated 9 out of 10 of these cigarette smokers initially tried smoking by age 18, and 99% first tried smoking by age 26 (USDHHS, 2012, 2014). Due to the early initial onset of cigarette use among the clear majority of current smokers, focusing on young adult smoking is vital to preventing high rates of cigarette use among older adults, and thus preventing death associated with cigarette use. Adolescent and young adult cigarette smoking have been associated with negative outcomes, including reduction in lung growth and function, respiratory and non-respiratory deficiencies, nicotine addiction, and increased risk of other drug use (USDHHS, 2012). Enhanced understanding of pathways to cigarette initiation is needed to create relevant programs to prevent use. It is also pertinent to examine the aspects that may be contributing to e-cigarette use. E-cigarette use is associated the use of other tobacco products like cigarettes (USDHHS, 2016). But due to the relative novelty of e-cigarettes, there have been few longitudinal studies determining their long-term effects on health. Further, e-cigarette use is associated with an increased willingness to smoke (Wills et al., 2016). As a result, determining the pathways to e-cigarette use is also necessary in order to create more specialized prevention programs geared to e-cigarette use.

To capture the underlying mechanisms behind smoking initiation, this study focused on young adults. The purpose of this study was to examine the mediational role of smoking

outcome expectancies on the relationship between different emotion competencies and e-cigarette susceptibility in young adults. We focused on several concepts that have received attention in the literature: emotion regulation, distress tolerance, positive urgency, and negative urgency. While these concepts have been examined in prior literature regarding smoking behavior and beliefs (Johnson et al., 2008; Leyro, Zvolensky, Vujanovic, & Bernstein, 2008; Spillane, Combs, Kahler, & Smith, 2013), this study contributes to the research by expanding on these concepts' unique effect on e-cigarette susceptibility, or willingness to smoke, in a young adult population, where research regarding these associations is lacking. The study sought to provide an understanding of how these emotional competencies, mediated by outcome expectancies, effect e-cigarette susceptibility in this population.

Pathways to Cigarette Smoking

Researchers define susceptibility to smoking as the lack of a firm decision not to smoke (Pierce, Choi, Gilpin, Farkas, & Merritt, 1996). Pierce and colleagues created an initial measure that determined which individuals who had never used tobacco products, were "cognitively predisposed" to begin smoking in the future (Pierce et al., 1996, para. 4). Baseline smoking susceptibility is a significant predictor of future smoking experimentation among adolescents (Pierce et al., 1996; Spelman et al., 2009).

Negative affect may make an individual more susceptible to initiate smoking. Adolescents who had high rates of depressive and anxiety symptoms are twice as likely to be cigarette smokers (Patton et al., 1996). Depression and internalizing symptomatology seem to be particularly important as almost half (45.1%) of adults with an affect disorder and over a third (35.6%) of adults with an anxiety disorder are smokers (Lawrence, Mitrou, & Zubrick, 2009). Psychological distress is strongly associated with depressive and anxiety disorders and those

with high psychological distress are more than twice as likely to be current smokers than individuals with low psychological distress (Lawrence, Mitrou, & Zubrick, 2011). Depressive and anxiety disorders involve a combination of increased negative affect and decreased positive affect (Stanton & Watson, 2014). Thus, it is possible that negative and positive affect play a role in smoking initiation. Kassel and colleagues describe depression and anxiety as manifestations of negative affect, indicating that maladaptive fluctuations in negative and positive affect might play a role in an individual's smoking behaviors (Kassel, Stroud, & Paronis, 2003). Further, an individual's ability to regulate their affect or their beliefs about how they can properly regulate their affect might play a role in whether they are likely to use cigarettes in the future.

Outcome Expectancies

Beliefs about the outcomes of smoking are referred to by psychologists as smoking outcome expectancies. Some early research regards outcome expectancies as "a person's estimate that a given behavior will lead to certain outcomes" (Bandura, 1977, p. 193). Maddux (1999) further defines outcome expectancy as "a belief that a specific behavior may lead to a specific outcome in a specific situation" (p. 22). Outcome expectancies, specifically mood-related outcome expectancies, have been widely researched in the context of smoking. Brandon and Baker (1991) assessed smoking expectancies using a survey of college students. Factor analysis identified four categories of smoking outcome expectancies: negative consequences (e.g., Smoking is taking years off of my life), positive reinforcement/sensory satisfaction (e.g., Cigarettes taste good), negative reinforcement/negative affect reduction (e.g., When I'm angry a cigarette can calm me down), and appetite/weight control (e.g., Cigarettes help me control my weight). Negative Consequences focuses on the negative health effects associated with smoking and is associated with a reduced likelihood of smoking. In contrast, the remaining three factors

are associated with increased risk of smoking. Positive Reinforcement focuses on the positive feelings that an individual might receive from smoking. Negative Reinforcement focuses on the ability of cigarettes to reduce negative emotions. Appetite-weight control focuses on the ability of e-cigarettes to reduce hunger or maintain an individual's weight (Brandon & Baker, 1991). Outcome expectancies for cigarettes, specifically those focusing on negative affect reduction, are associated with increased smoking susceptibility and nicotine dependence, and less likelihood of smoking cessation (Dalton, Sargent, Beach, Bernhardt, & Stevens, 1999; Kristjansson et al., 2011). Adolescents who believe regular cigarette smoking is an appropriate method to reduce negative affect are more likely to initiate cigarette smoking in the future (Stevens, Colwell, Smith, Robinson, & McMillan, 2005). Affect reduction outcome expectancies predicts future smoking behavior of occasional and daily smokers after college (Wetter et al., 2004). In summary, smoking outcome expectancies, specifically regarding negative affect reduction, robustly predict smoking initiation in these age groups.

Emotion Regulation

Emotion regulation involves classifying and assimilating affective information from the social environment while managing emotional responses (e.g., facial expressions) to help achieve both social and intrapersonal goals (Zeman, Cassano, Perry-Parrish, & Stegall, 2006). Individuals can use emotion regulation consciously or unconsciously and use it to modify either an emotion-arousing situation or their response to it (Diamond & Aspinwall, 2003). Emotions are described as "multi-componential processes" (Gross, 2002, p. 282) that change over time. That is, emotions are defined by their intensity and fluctuations, and the regulation of these emotion dynamics is central to emotion regulation. In other words, emotion regulation focuses on modifying the situation eliciting the emotional reaction or modifying an individual's reaction

to the situation. Examples of emotion regulation strategies are cognitive reappraisal, acceptance, problem-solving, rumination, suppression, avoidance, and worry (Aldao & Nolen-Hoeksema, 2012). Specific dimensions of emotion dysregulation were also found by Gratz and Roemer (2004) using common factor analysis: Nonacceptance of Negative Emotional Responses, , Goal-Directed Behavior When Distressed, Impulsive Behaviors When Distressed, Limited Access to Effective Emotion Regulation Strategies, Lack of Emotional Clarity, and Lack of Emotional Awareness. It is possible that smokers use smoking as an emotion regulation strategy to modify their own emotion arousing situations or their reactions to it.

The negative affect model of tobacco use indicates that the inclination to experience negative affect in combination with deficits in emotion regulation contributes to cessation difficulties (Baker, Piper, McCarthy, Majeskie, & Fiore, 2004). Smokers who refrain from smoking self-report increased negative affective symptoms, such as anxiety and anger (Piper & Curtin, 2006). Most importantly, this negative affect increase has been shown to not be a result of the increase in the actual intensity of the negative emotional responses, but rather a more sensitive response to the negative affect (Piper & Curtin, 2006). In other words, individuals are experiencing the same intensity of negative affect, but they are more sensitive to the emergence of that negative affect. Therefore, it is possible that smoking is used as an emotional coping strategy to cope with stressors that elicit negative affect. This model suggests that individuals who have difficulty regulating their emotions are more likely to believe that smoking will help them alleviate their negative affect.

The transdiagnostic vulnerability framework (Leventhal & Zvolensky, 2015) further specifies that biobehavioral traits reflecting maladaptive coping responses to emotional states enable the relation between emotion difficulties (e.g., distress tolerance, anhedonia, and anxiety

sensitivity) to smoking. The model solely focuses on reactive transdiagnostic vulnerabilities, which are maladaptive responses to emotional stimuli. These maladaptive vulnerabilities are defined as either enhancing or diminishing normative responses to affective stimulants in the environment and an individual's own affect. Leventhal and Zvolensky (2015) specify that the smoking literature has found that smoking is associated with three affective-regulation constructs, namely: pleasure/positive affect enhancement, anxiety reduction, and distress termination. Therefore, the transdiagnostic emotional vulnerabilities in the theory are derived from measures that reliably and validly align with the constructs, anhedonia (e.g. loss or lack of pleasure), anxiety sensitivity (e.g. fear of anxiety-related sensations), and distress tolerance (e.g. ability to cope with emotionally-stressing events). The theory proposes that there is variation in smoking patterns among individuals with diagnosed psychological disorders, indicating that while some individuals can effectively cope with their emotional states without resorting to smoking, others may have more difficulty due to higher reactive vulnerabilities, like the ones described. The theory suggests that individuals who have emotional regulation deficits are less likely to successfully stop smoking. However, the theory is more focused on clinically significant emotional difficulties, which may not be generalizable to other populations.

There are various links between emotion regulation, perceived social consequences of smoking, and smoking susceptibility (Trinidad, Unger, Chou, & Anderson Johnson, 2004). Trinidad and colleagues examined the association between general emotional intelligence, adolescent cigarette smoking, and perceived social outcomes about smoking in young adolescents. The results suggest that high emotional intelligence was related to an increased perception of the negative social consequences of smoking, increased perceived ability to refuse a cigarette offer, and lower susceptibility to initiate smoking within the next year. While the

study examined general emotional intelligence, their global measure of emotional intelligence includes a subscale dedicated to emotion management, as well as two subscales that measure how well an adolescent can identify emotions and understand their own emotions. The concept of identifying emotions, understanding them, and regulating them is consistent with the definition by Zeman and colleagues (2006). Further, Gratz and Roemer (2004) incorporate these concepts in their conceptualization of emotion regulation.

Johnson and colleagues (2008) specifically examined the association between emotion regulation and negative affect reduction outcome expectancies, in contrast to Trinidad and colleagues (2004) who focused solely on social expectancies. In Johnson et al. (2008) 202 current cigarette smokers completed measures of negative affect, emotion regulation, smoking dependence, and smoking outcome expectancies. Results indicated that emotion dysregulation positively predicted negative affect reduction outcome expectancies. Specifically, smokers who had increased difficulty regulating emotions were more likely to believe that smoking helped them regulate their negative affect. The findings from these studies indicate preliminary support for the association between emotion regulation and outcome expectancies, and emotion regulation and susceptibility. However, since psychological distress and negative affect are known to affect smoking behavior and outcome expectancies, understanding how they affect emotion competencies like distress tolerance, described as an individual's ability to handle negative psychological states, to develop appropriate intervention modalities (e.g., Brown et al., 2008). The identification and management of internal triggers like anxiety and stress are highlighted by the treatment interventions described by Brown and colleagues (2008), which focus on the role that emotional competencies might have on smoking behavior.

Distress Tolerance

Research regarding distress tolerance has focused on smoking cessation where negative affective states are induced by withdrawal (Brown, Lejuez, Kahler, Strong, & Zvolensky, 2005). Early theories of distress tolerance and addictive behaviors have proposed that individuals who have less distress tolerance, or lower persistence, are likely to be motivated to use drugs because of the instant reinforcing that it provides (Quinn, Brandon, & Copeland, 1996). More recent research defines distress tolerance as the capacity to "experience and withstand negative psychological states" (Simons & Gaher, 2005, pg. 2). The construct encompasses an individual's expectations and evaluations of their experiences that provoke negative emotions. Simons and Gaher (2005) propose that individuals with low distress tolerance are more likely to report their distress as more unbearable, or that they cannot handle feeling distressed. Distress tolerance also affects an individual's perception of their reactions to distress, often making them feel ashamed and perceiving their coping strategies to be inferior (Simons & Gaher, 2005). Due to these negative perceptions of their reactions to distress, individuals attempt to avoid negative emotions and use rapid means to deescalate any negative emotion they do feel (Simons & Gaher, 2005). Finally, if they are unable to properly avoid or deescalate the negative emotions, individuals become consumed with the negative emotions, thus becoming distressed (Simons & Gaher, 2005). Research on distress tolerance has focused on how the construct contributes to the development of several negative internal experiences (e.g., negative emotions, negative bodily sensations; Leyro, Zvolensky, & Bernstein, 2010).

Distress tolerance brings forth the notion that is not only the severity of the nicotine withdrawal during a cessation attempt that affects whether an individual's attempt is successful, but also how some individuals respond to the discomfort or distress that occurs because of the

withdrawal symptoms. Simons and Gaher (2005) describe distress tolerance as multidimensional in nature. Specifically, distress tolerance includes individuals' "expectation of and experience with negative emotions" (p. 2) including their ability to tolerate, assess the emotional situation as acceptable, and regulate their emotions. Further, how much attention is focused on the negative emotion and how much it interferes with functioning also are integrated into this concept.

Evidence suggests that the large majority of individuals attempting to stop smoking typically lapse within the 1st or 2nd week after quitting (Doherty, Kinnunen, Militello, & Garvey, 1995; Hajek, 1991). Prior research has indicated that these individuals that may not be successful at smoking cessation have an increased risk of experiencing negative affect during the cessation attempt (Brown et al., 2005; Kenford et al., 2002). Therefore, if an individual is more capable of properly tolerating their negative affect, they may be more capable of having a successful cessation attempt.

Brown, Kahler, and Strong (2002) examined physical and psychological distress in current smokers. Participants were grouped by cessation duration as current smokers who never had a previous quit attempt longer than 24 hours (i.e., immediate relapsers) and smokers with at least one sustained quit attempt of three months or longer (i.e., delayed relapsers). Participants were exposed to psychological and physical stressors to invoke distress on a day in which all participants came to the session and smoked their usual amount (i.e., *smoking* day) and a day in which they did not smoke (i.e., *abstinence* day). Individuals who had never had a quit attempt last longer than 24 hours reported significantly higher reactivity to stress, greater levels of negative affect, and increased motivation to smoke after 12 hours of nicotine deprivation. Immediate relapsers were likely to react to quitting smoking by experiencing more negative affect and increased urgency to smoke (Brown et al., 2002). The negative internal states due to

these reactions may explain their failure to abstain from smoking for long periods of time. These results indicate that distress tolerance may inhibit smoking cessation. However, it is also important to determine whether distress tolerance plays a role in smoking susceptibility or maintenance. Specifically, since distress tolerance is an individual's ability to handle negative states, it is important to determine its role in smoking and outcome expectancies due to the relevant literature indicating that negative affective states have an effect on these concepts.

While the large majority of the research focuses on the role that distress tolerance has on smoking maintenance and cessation, there are a few preliminary studies that have attempted to understand its effect on cigarette outcome expectancies and susceptibility. Lower distress tolerance may maintain smoking behavior through stronger negative affect reduction outcome expectancies (Leyro, Zvolensky, Vujanovic, & Bernstein, 2008). However, these studies operationalized distress tolerance as the ability to tolerate physically uncomfortable situations, a concept similar to anxiety sensitivity, or fear of anxiety or arousal-related situations (McNally, 1989; 2002). Indeed, when anxiety sensitivity is included in the model, physical distress tolerance is no longer significant. Affective distress tolerance, or tolerance to emotional distress, may be more appropriate. Zvolensky and colleagues (2009) reported that affective distress tolerance is associated with both negative affect reduction expectancies and coping motives among adult marijuana users. These effects were significant even when controlling for demographics, cigarette smoking rate, and alcohol use. Notably, this finding was significant even while examined with anxiety sensitivity in the analyses. This indicates that affective distress tolerance and anxiety sensitivity may explain different mechanisms in comparison to physical distress tolerance. Notably, only smokers have been examined in the prior studies; this study

seeks to expand the literature by examining a general population to determine whether these associations are consistent.

Due to the associations found between emotion regulation and anxiety sensitivity and e-cigarette outcome expectancies and susceptibility, it is important to determine whether distress tolerance is also associated with both smoking outcome expectancies and smoking susceptibility. Individual coping responses to negative affect, as operationalized by constructs like emotion regulation, anxiety sensitivity, and distress tolerance, are important to examine due to their potential to act as a bridge between negative affect and smoking behaviors.

Urgency

Urgency is conceptualized as a component of impulsivity. That is further broken down into negative urgency and positive urgency. Negative urgency is the tendency to commit rash action in response to intense negative affect (Whiteside & Lynam, 2001) and positive urgency is the tendency to commit rash action in response to intense positive emotions (Cyders et al., 2007). Negative urgency significantly predicts cigarette smoking status (Lee, Peters, Adams, Milich, & Lynam, 2015). Positive urgency is also positively associated with nicotine dependence and tobacco craving (Billieux, Van der Linden, & Ceschi, 2007; Spillane, Smith, & Kahler, 2010). Determining whether positive and negative urgency also affect individual's outcome expectancies are relevant to determining whether they affect smoking initiation.

Among a population of daily cigarette smokers, both negative and positive urgency has been positively associated with nicotine dependence, and negative reinforcement and positive reinforcement outcome expectancies (Pang et al., 2014). The relationship between negative urgency and nicotine dependence has been shown to be significantly mediated by negative and positive reinforcement expectancies (Pang et al., 2014). These results were also consistent with

positive urgency, such that both negative and positive reinforcement expectancies mediated the relationship between positive urgency and nicotine dependence (Pang et al., 2014). However, when both negative urgency and positive urgency were included simultaneously as predictors of nicotine dependence, they were no longer significant predictors, indicating that both constructs may explain similar variance in the models. More research examining this notion is needed in order to gain a clearer understanding of how these two constructs interact to effect outcome expectancies and smoking behavior.

These findings were also replicated in another study such that, the relationship between positive urgency and smoking dependence was mediated by positive reinforcement smoking expectancies (Spillane, Combs, Kahler, & Smith, 2013). Notably, positive urgency explained 10.4% of the variance in nicotine dependence and negative urgency had an indirect effect on smoking dependence through negative affect reduction expectancies to smoking (Spillane et al., 2013). Further, 7.3% of the variance in affect regulation expectancies was explained by negative urgency, while affect reduction expectancies explained 15.2% of the variance in the level of nicotine dependence (Spillane et al., 2013). The results suggest that both positive and negative urgency are important factors for cigarette behavior, whether it be directly or indirectly. Since positive and negative urgency are actions in reaction to strong affect, they may be especially important to smoking given the important roles that positive and negative affect play in the initiation, maintenance, and cessation of smoking.

To the knowledge of the author, there have been no studies specifically examining negative and positive urgency and its effect on cigarette susceptibility. However, negative and greater urge to smoke to alleviate negative affect in abstaining smokers (Park et al., 2016). This effect was significant even controlling for anxiety, depression, tobacco dependence, and

sensation seeking (Park et al., 2016). These results suggest that negative urgency may uniquely affect smoking behaviors, beyond that of other emotional constructs like anxiety and depression. This study seeks to contribute to the literature by determining whether positive and negative urgency uniquely effect smoking susceptibility beyond that of other emotional competencies.

E-cigarettes

E-cigarette use prevalence is particularly high among young adults, with 5.1% of individuals aged 18 to 24 currently using e-cigarettes and 35.8.6% having tried an e-cigarette at least once (USDHHS, 2016). Although the long-term health impact of e-cigarette use remains controversial, exposure to carcinogens through e-cigarette liquids have been verified (Hess et al., 2017; Sleiman et al., 2016). Further, it is now known that e-cigarette use is associated with an increased likelihood to initiate the use of other tobacco products like cigarettes (Primack, Soneji, Stoolmiller, Fine, & Sargent, 2015; USDHHS, 2016). A meta-analysis of nine longitudinal studies examining adolescents and young adults concluded that probabilities of cigarette initiation for e-cigarette users were 30.4% and 7.9% for non-users (Soneji et al., 2017). Further, e-cigarette use is associated with an increased willingness to smoke (Wills et al., 2016). However, individuals with longer histories of e-cigarette use are less likely to be dual users and long-term e-cigarette use of 2 years has been associated with increased rates of quitting smoking (Harrell et al., 2015; Zhuang, Cummins, Y Sun, & Zhu, 2016). Generally, given that widespread e-cigarette use is a recent phenomenon, much more research has been conducted regarding the risk factors, motivations, and negative outcomes surrounding cigarette smoking. However, there has been relatively little research regarding the risk factors, motivation, and negative outcomes regarding e-cigarette vaping. In particular, there is little information about the mechanisms that drive e-cigarette users to start using cigarettes. Therefore, exploring the underlying mechanisms

behind the initial onset of e-cigarette use, initial cigarette use among e-cigarette users, and the risk factors associated with use are necessary.

E-cigarette outcome expectancies. So far, research regarding e-cigarette outcome expectancies has been consistent with smoking outcome expectancies in regard to the four categories (e.g., negative consequences, positive reinforcement/sensory satisfaction, negative reinforcement/negative affect reduction, and appetite/weight control) of cigarette smoking outcome expectancies also being confirmed with factor analysis with e-cigarette users (Morean & L'Insalata, 2017). Both cigarette and e-cigarette outcome expectancies were significantly associated with each other. The average shared variance across the four categories was 17.4% in a total sample that included cigarette only smokers, e-cigarette-only vapers, cigarette and e-cigarette dual users, and nonsmokers. Notably, the shared variance between the two types of outcome expectancies among dual users was 21.4%. These results are indicative of the notion that these two types of outcome expectancies, while similar in some aspects, are distinctive. As a result, it is important to examine e-cigarette outcome expectancies as well as cigarette outcome expectancies together, to determine whether the effects of emotion regulation, distress tolerance, and urgency can be replicated across both types of outcome expectancies.

Recent research suggests that cigarette and e-cigarette expectancies function similarly. Miller, Pike, Stacy, Xie, and Ames (2017) examined the effect of negative affect and negative reinforcement cigarette and e-cigarette outcome expectancies on regular and e-cigarette use. The relationship between negative affect and smoking and vaping experimentation, frequency and willingness are mediated by negative reinforcement outcome expectancies. These results imply that both cigarette and e-cigarette outcome expectancies may work similarly in regard to their effect on their respective product. However, it should be cautioned that more research is needed

to determine whether these two types of outcome expectancies provide the same type of effect on their respective products.

Outcome expectancies of e-cigarettes, cigarettes, and nicotine replacement therapies (NRT) were compared in a sample of e-cigarette users to determine why individuals use e-cigarettes over other tobacco products. In general, e-cigarette users believe that e-cigarettes are less addictive than cigarettes, but more than NRT (Harrell, Marquinez, et al., 2015). They also believe that e-cigarettes cause less withdrawal and are more socially acceptable than cigarettes, taste better, are more satisfying, cost less, have lower health risks, and produce less negative physical feelings than both cigarettes and NRTs (Harrell, Marquinez, et al., 2015). However, cigarettes were rated as more effective in negative affect reduction, stress reduction, weight control, and stimulation in comparison to e-cigarettes (Harrell, Marquinez, et al., 2015). Further, higher e-cigarette expectancies for stress and craving reduction, as well as satisfaction were associated with an increase chance of dual use (Harrell, Simmons, et al., 2015). These findings suggest that e-cigarettes and cigarettes may be associated with unique outcome expectancies, which in turn affect whether individuals use these products. As a result, examining these expectancies would be beneficial to help determine whether initiation and susceptibility vary by whether an individual uses e-cigarettes, cigarettes, or a combination of both.

Outcome expectancies have also been associated with e-cigarette use and susceptibility in young adults (Pokhrel, Little, Fagan, Muranaka, & Herzog, 2014). Adolescents who have used an e-cigarette at least once are more likely to perceive them as less harmful than cigarettes (Ambrose et al., 2014). Additionally, positive e-cigarette affect regulation expectancies are associated with higher rates of use and, among those who have never used, higher intentions to use e-cigarettes in the future (Pokhrel et al., 2014). This relationship is possibly due to either

high rates of negative emotions or difficulties in regulating negative emotions, but this has not yet been examined. These correlations between outcome expectancies and adolescent vaping behaviors highlight the importance of understanding young adult beliefs about the outcomes of e-cigarette use to enhance interventions focused on prevention or treatment.

Present Study

No prior studies to date have examined the association between emotional competencies and e-cigarette outcome expectancies. Further, there is a lack of research regarding direct associations between emotional competencies and e-cigarette susceptibility. Therefore, the purpose of this study was to determine differences in emotional competencies between young adults who have used e-cigarettes and young adults who have not used e-cigarettes. Further, this study compared ever-users and never-users on their differences in cigarette negative affect reduction outcome expectancies and cigarette susceptibility. The present study also seeks to examine the mediational effect of e-cigarette outcome expectancies on the relation between these emotional competencies and e-cigarette susceptibility. There is preliminary research supporting associations between negative affect and emotional competencies, such as emotion regulation, distress tolerance, and positive and negative urgency and smoking outcome expectancies (e.g., Johnson et al., 2008; Kristjansson et al., 2011; Spillane et al., 2013; Zvolensky et al., 2009). Outcome expectancies for cigarettes, specifically those focusing on negative affect reduction, have also been associated with increased smoking susceptibility and nicotine dependence, and less likelihood of smoking cessation (Dalton, Sargent, Beach, Bernhardt, & Stevens, 1999; Kristjansson et al., 2011). However, most of this research does not address e-cigarette use. Therefore, this study sought to determine whether negative affect reduction outcome expectancies could mediate the associations between emotional competencies and e-cigarette

susceptibility given its robust associations with both constructs. Further, there does not appear to be research examining positive and negative urgency as risk factors for cigarette or e-cigarette initiation. Therefore, the present study sought to integrate these associations to examine their overall impact on cigarette and e-cigarette use and susceptibility.

Consistent with other e-cigarette research, this study also wishes to focus on a young adult population, aged 18 to 24, due to the heightened risk of prolonged use after initiation before age 25 (USDHHS, 2012), significant health factors associated with young adult smoking (e.g., reduced lung function, USDHHS, 2012) and the prevalence of e-cigarette use in this population as well (Schoenborn & Gindi, 2015).   In summary, the current study will examine the following hypotheses:

Hypothesis 1: College students who have used e-cigarettes will have larger negative affect reduction outcome expectancies than those who have never used e-cigarettes.

Hypothesis 2: College students who have used e-cigarettes will have higher emotion dysregulation, distress tolerance, and urgency than those who never used e-cigarettes.

Hypothesis 3a: Ever-users will have higher cigarette susceptibility than never-users.

Hypothesis 3b: Ever-users will have higher cigarette negative affect reduction outcome expectancies than never-users.

Hypothesis 4: The relation between emotional competencies (emotion regulation, urgency) and e-cigarette susceptibility will be mediated by negative affect reduction outcome expectancies. Depicted in figure 1.
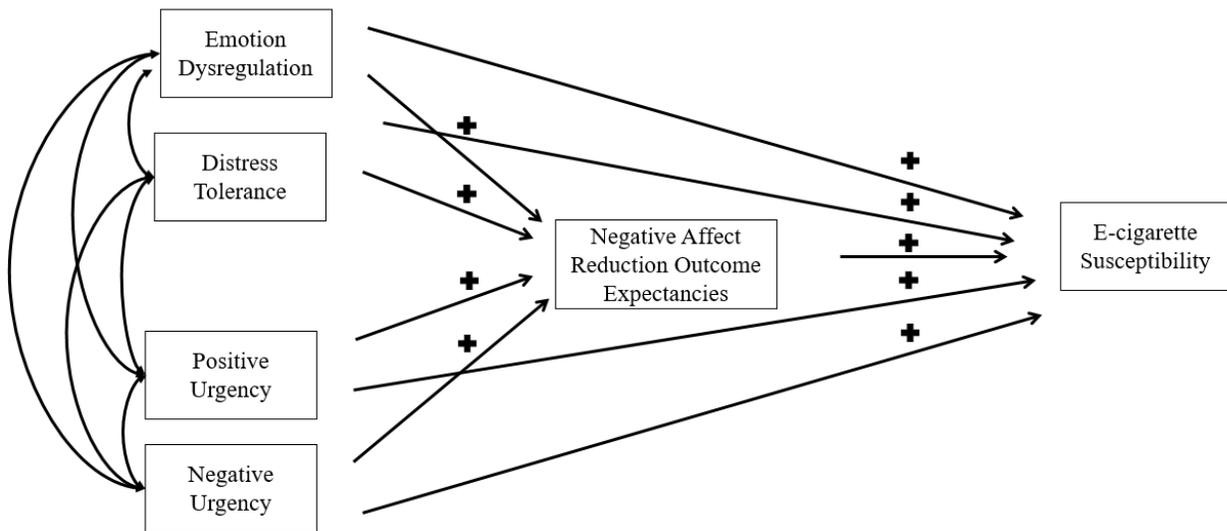
Figure 1. Path model of emotion regulation (ER) and distress tolerance (DTS), positive urgency (PU), and negative urgency (NU) as the predictor variables, negative affect reduction outcome expectancies as the mediator, and e-cigarette susceptibility as the outcome variable.

CHAPTER II

METHOD

Power analysis

To determine the minimum sample size needed for a power level of .80 (Cohen, 1992), a power analysis was conducted. The statistical power analysis software program, G*Power 3.1 was used to determine the necessary sample size (Faul, Erdfelder, Lang, & Buchner, 2007). Relevant cigarette research examining the association between emotion regulation, distress tolerance, positive and negative urgency and outcome expectancies have found R^2 values of .10, .12, .14 and .19 respectively (Johnson et al., 2008; Spillane et al., 2013). These values were converted into Cohen's f values, yielding small to medium effect sizes (f^2 =.23, .16, .13, .11). An exact effect size was used from the mean of the four effect sizes from the prior two studies ($f^2 =$ .157). A power analysis was conducted for hypotheses 1 and 2. The power analysis for a Multivariate Analysis of Variance (MANOVA), with one independent variable and 5 dependent variables, indicated that with an alpha level of .05, the estimated sample size needed to accurately determine an effect of $f^2 = .157$ is a total sample size of 88 participants per cell, and 176 total participants. As a result, 88 participants per group (ever-users, never-users) were needed to conduct the planned MANOVA with five response variables for hypotheses 1 and 2. Ever-use, defined as engaging in e-cigarette use at least once in your lifetime, in our sample was 52.1%. Thus, the minimum sample size was 180, to ensure that at least 88 non-users were to be included. Another 18 participants were anticipated to be recruited after the minimum sample size to accommodate anticipated missing data and an attrition rate of 10%. This low rate of attrition was chosen due to the research participation system incentivizing full completion of the survey

with research credit, and penalizing incompletion with removal of research credit. Thus, the minimum sample size needed for hypothesis 1 and 2 was 198.

Another power estimate was conducted for the second proposed MANOVA, with one independent variable, and two response variables, that was used to examine hypothesis 3. The power analysis indicated to determine an exact effect size of .157, with an alpha level of .05, 66 participants per group (ever-user, never-user) were required. As a result, 132 participants were necessary to achieve power and another 18 participants were anticipated to be recruited to accommodate anticipated missing data and attrition rates of 10%. Thus, the minimum sample size to be needed for hypothesis 3 was 150.

The power estimate was also examined for its adequacy in the path model following guidelines from O'Rourke and Hatcher (2013), which indicate that the sample size provided is adequate for conducting the mediation path analysis. O'Rourke and Hatcher recommend aiming to detect a medium effect size and applying using the correct degrees of freedom, from using N-1, to determine the number of predictor variables in the path model. The recommended sample size for a path analysis, to detect a medium effect size, with six predictor variables is 100. Since the power analysis for the planned MANOVA for hypotheses 1 and 2 was more conservative than the one for the path analysis, this study sought to collect data from 198 participants to ensure 88 users and non-users were included in analyses.

Procedure

Prior to recruitment, this study was approved by the Old Dominion University College of Sciences Human Subjects Committee. As data were not collected from Eastern Virginia Medical School, IRB approval was not necessary. However, a letter detailing Dr. Harrell's (co-investigator) involvement in the process and analysis of the collected data was sent to the IRB

office. Participants reviewed the notification document and general information about the survey and eligibility criteria before beginning to answer questions. Those who consented reviewed a series of eligibility questions asking about cigarette and e-cigarette use. The individual measures were presented in the same order for all participants. Individuals who were users of cigarettes and e-cigarettes did not answer the respective susceptibility items for the tobacco product they do use. At the end of the survey, individuals were shown a message that debriefed them.

Outcome Measures

Cigarette use. Cigarette use was be measured using questions derived from the National Youth Tobacco Survey (NYTS, see Appendix A). There was one question with a dichotomous "Yes" or a "No" response: "Have you ever tried cigarette smoking, even one or two puffs?". There was one multiple choice answer inquiring about age and two, open, quantitative answers asking for specific age and number of days spent smoking that was used for the following questions "How old were you when you first tried cigarette smoking, even one or two puffs?", "How many cigarettes have you smoked in your entire life?", "During the past 30 days, on how many days did you smoke cigarettes?" Based on the prior research from Barrington-Trinis and colleagues (2015) and the U.S. Department of Health and Human Services (2016), "Never cigarette users" were be defined as participants who reported that they had never tried a cigarette. "Current cigarette users" were defined as participants who indicated use in the past 30 days. Internal consistency for the current study was $\alpha = .84$.

E-cigarette use. E-cigarette use was measured using questions derived from the National Youth Tobacco Survey (NYTS, see Appendix B). There is one question with a dichotomous with either a "Yes" or a "No" response: "Have you ever used an electronic cigarette or e-cigarette, even once or twice?" Participants also responded to the following questions to determine

specific age and days spent smoking, "How old were you when you first tried using an electronic cigarette or e-cigarette, even once or twice?", "During the past 30 days, on how many days did you use electronic cigarettes or e-cigarettes?". Based on the prior research from Barrington-Trinis and collogues (2015) and the U.S. Department of Health and Human Services (2016), "Never e-cigarette users" were defined as participants who reported that they had never tried an e-cigarette. "Current e-cigarette users" were defined as participants who indicated use in the past 30 days. The current study indicated an internal consistency of .95.

Cigarette and e-cigarette susceptibility. Cigarette susceptibility was determined by using the 3-item Susceptibility to Smoke Index (SSI; Pierce, Choi, Gilpin, Farkas, & Merritt, 1996; Pierce, Farkas, Evans, & Gilpin, 1995; see Appendix C) and subsequently evaluated by Strong and colleagues (2015). The three items used were: "Do you think you will smoke a cigarette in the next year?", "Do you think that in the future you might experiment with cigarettes?", and "If one of your best friends were to offer you a cigarette, would you smoke it?" Participants answered each item using a 4-point Likert scale ranging from (1= *definitely not* to 4= *definitely yes*). Participants who reported "probably not", "probably yes", or "definitely yes" to at least one of the four questions were considered "susceptible" (Pierce et al., 1995). Those who do not report either of those two responses and do not report "definitely not" to any of the questions were considered "not susceptible". The measure has shown predictive validity such that adolescent never smokers who were identified as susceptible were twice as likely to become established smokers four years later (Pierce et al., 1996). The index has shown some predictive validity, such that adolescents who were categorized as being susceptible to cigarette use at baseline were 63% more likely to experiment with cigarettes than committed never smokers (Nodora et al., 2014). Further, adolescents classified as susceptible were 2.42 times more likely

to become young adult smokers 6 years later (Strong et al., 2015). However, a thorough search of relevant literature was unable to find any previous data on reliability. Internal consistency for this measure from the current study was α = .84.

E-cigarette susceptibility was determined by using the Susceptibility to Smoke Index (SSI; Pierce, Choi, Gilpin, Farkas, & Merritt, 1996, see Appendix D). Susceptibility has been defined as the lack of a confirmed commitment not to smoke (Pierce et al., 1996). The measure was created to measure the risk of future cigarette use. However, the three items that make up the ESSI, were modified to determine e-cigarette susceptibility instead. This modification has been used in a prior study (Krishnan-Sarin, Morean, Camenga, Cavallo, & Kong, 2015). The three items used will be: "Do you think that in the future you might experiment with e-cigarettes?", "At any time during the next year do you think you will use an e-cigarette?" and "If one of your best friends were to offer you an e-cigarette, would you smoke it?" Response items ranged from *definitely not* to *definitely yes*. Per the prior study that used this modified measure, participants who reported anything other than "definitely not" to at least one of the three questions were considered to be susceptible (Krishnan-Sarin et al., 2015). Adolescents who responded positively to at least one item were more likely to engage in e-cigarette use 6 months later compared to those who were not susceptible (Bold, Kong, Cavallo, Camenga, & Krishnan-Sarin, 2016). Adolescents who indicated susceptibility on multiple items were four times more likely to subsequently initiate e-cigarette use (Bold et al., 2016). Internal consistency for this measure in the current study was α = .95.

Smoking Consequences Questionnaire. Smoking outcome expectancies were assessed using the 21-item Short Form Smoking Consequences Questionnaire (S-SCQ; Myers et al., 2003; see Appendix E), which was modified from the original 50- item measure and is highly

correlated with it ($r = .94$; Brandon & Baker, 1991). Participants rated each smoking

consequence item on the likelihood of its occurrence when they smoke (0 = *Completely unlikely*

to 9 = *Completely likely*). The S-SCQ is composed of four subscales which measure specific

dimensions of outcome expectancies: Negative Consequences (e.g., Smoking takes years off my

life), Positive Reinforcement (e.g. Cigarettes taste good), Negative Reinforcement (e.g., When

I'm angry a cigarette can calm me down), and Appetite/Weight Control (e.g., Smoking helps be

control my weight). The measure has shown adequate internal consistencies in both a young

adult population and an adolescent population, with alphas ranging from .79 to .95, with the

global score having an alpha of .93 in the young-adult population (Myers et al., 2003). The S-

SCQ full scale was highly correlated with the number of days smoking per month ($r = .46$, Myers

et al., 2003). The positive reinforcement, negative reinforcement and, appetite/weight control

subscales of the SCQ and S-SCQ were both concurrently correlated with number of days

smoking per month indicating concurrent validity (Positive Reinforcement: $r = .37$, Negative

Reinforcement: $r = .49$, Appetite/Weight Control: $r = .24$). The global S-SCQ score has also

demonstrated concurrent validity in an adolescent sample, correlating highly with the number of

cigarettes smoking in a day ($r = .32$), how many days an individual smoked per month ($r = .32$),

nicotine dependence ($r = .23$), and the number of quit attempts ($r = .28$). Myers and colleagues

(2003) also found that each individual subscale has shown concurrent validity, correlating highly

with the original SCQ. The global score correlated highly ($r = .94$) in a young adult sample and

the subscale correlations ranged from .79 to .99 in the same sample. Further, the original

measure has demonstrated the ability to differentiate between smoking groups, as higher scores

on the scale have been shown to be associated with current smokers and lower scores to be

associated with occasional smokers (Brandon & Baker, 1991). Specifically, daily smokers

reported significantly higher scores on both the positive and negative reinforcement scales than individuals who smoke every few days, weeks, or months, have quit smoking, have tried smoking at least once, and who have never smoked. For the current study, internal consistency for this measure was $\alpha = .97$.

Short Form Vaping Consequences Questionnaire. E-cigarette outcome expectancies was assessed using the 21-item Short Form Vaping Consequences Questionnaire (S-SVQ; Morean & L'Insalata, 2017; see Appendix F), which was modified from the 21-item Short Form Smoking Consequences Questionnaire (S-SCQ; Myers, McCarthy, MacPherson, & Brown, 2003). Participants rated each smoking consequence item on the likelihood of its occurrence when they smoke (0 = *Completely unlikely* to 9 = *Completely likely*). The S-SVQ is composed of four subscales which measure specific dimensions of outcome expectancies: Negative Consequences (e.g., Vaping takes years off my life), Positive Reinforcement (e.g., E-cigarettes taste good), Negative Reinforcement (e.g., When I'm angry an e-cigarette can calm me down), and Appetite/Weight Control (e.g., Vaping helps me control my weight). The measure has shown adequate internal consistencies in an adult population, with Cronbach's alphas for the four subscales ranging from .85 to .94 (Morean & L'Insalata, 2017). Increases in self-report of three of the four subscales, positive reinforcement ($\eta_p^2 = .02$), negative reinforcement ($\eta_p^2 = .02$), and appetite/weight control subscales ($\eta p^2 = .02$), were positively associated with more consistent e-cigarette use and each explained unique variance in the model. Increases in self-report of positive reinforcement ($\eta p^2 = .02$), negative reinforcement ($\eta p^2 = .08$), and appetite/weight control subscales ($\eta p^2 = .02$) were also associated with increases in e-cigarette dependence and each explained unique variance in the model. For the current study, internal consistency was $\alpha = .97$.

Emotional Measures

Positive and Negative Affect Schedule. Positive and negative affect was assessed using the 20-item Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988; see Appendix H). Participants rated the extent at which they were feeling different emotions in that moment on a 4-point Likert-type scale (1 = *Very Slightly or Not at All* to 5= *Extremely*). The PANAS is composed of two subscales with measure different affect states: Positive Affect and Negative Affect. Higher scores on each subscale suggest greater affect associated with the specific subscale. The measure displayed good internal consistencies for both subscales in a sample of college students, with alphas of α = .89 for Positive Affect and α= = .85 for Negative Affect (Watson et al., 1988). Good internal consistencies were also found in a separate sample of college students (Positive Affect = .89; Negative Affect =.85). The scale has shown construct validity, with the negative affect subscale correlating with the Beck Depression Inventory (BDI; r = 74), Hopkins Symptoms Checklist (HSCL; r = .65), and State Anxiety Scale (STAI; r = .51). The negative affect subscale was also correlated highly with measures of depression (Depression Anxiety and Stress Scales; DASS; r = .60), Anxiety (r = .60), and Stress in a non-clinical population (r = .67; Crawford & Henry, 2004). The positive subscale has been negatively associated with these same measures of depression (r = -.48), anxiety (r = -.30), and stress in a non-clinical population (r = -.37; Crawford & Henry, 2004). For the current study, internal consistencies were α = .90 for the positive subscale and α = .89 for the negative subscale.

Difficulties in Emotion Regulation Scale. Emotion regulation difficulties were assessed using the 36-item Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004; see Appendix I). Participants rated their emotion regulation difficulties on a 5-point Likert-type scale (1 = *Almost never* to 5= *Almost always*). The DERS is composed of six subscales

which measure specific dimensions of emotion regulation: Nonacceptance of Negative

Emotional Responses (e.g. "When I'm upset, I feel ashamed with myself for feeling that way"),

Goal- Directed Behavior When Distressed (e.g., "When I'm upset, I have difficulty getting work

done"), Impulsive Behaviors When Distressed (e.g., "When I'm upset, I have difficulty

controlling my behaviors"), Limited Access to Effective Emotion Regulation Strategies (e.g.,

"When I'm upset, I believe that I'll end up feeling very depressed"), Lack of Emotional Clarity

(e.g., "I have no idea how I am feeling"), and Lack of Emotional Awareness (e.g., "I pay

attention to how I feel"). Higher scores on the DERS measure suggest greater problems with

emotion regulation. The measure has displayed good test–retest reliability in a sample of college

students (ρ_t = .88; Gratz & Roemer, 2004). Further, the individual subtest test-retest reliabilities

ranged from ranged from r= .57 to r=.89 within the same sample (Gratz & Roemer, 2004). The

global DERS score has demonstrated high internal consistency and a Cronbach's alpha of .95 in

a clinical population, and .88 in cocaine-dependent individuals (Fowler et al., 2014; Fox,

Axelrod, Paliwal, Sleeper, & Sinha, 2007). The internal consistency for the global score was also

high in a non-clinical sample (α =.93), with internal consistencies for all the subscales reported

as .80 or higher (Gratz & Roemer, 2004). The measure has also demonstrated predictive validity

by correlating (r =.20 to .34) with measures that assess deliberate self-harm (Deliberate Self-

Harm Inventory, DSHI, Gratz, 2001) and childhood physical and sexual abuse (Abuse-

Perpetration Inventory, API; Gratz & Roemer, 2004). The measure displayed construct validity

in a non-clinical population by correlating with measures that assess emotional dysfunction

(Generalized Expectancy for Negative Mood Regulation Scale, NMR), emotional avoidance

(Acceptance and Action Questionnaire, AAQ), and expressive overcontrol (Emotion

Expressivity Scale, EES). The correlations between these other constructs of emotion regulation

ranged from *r*= .23 to *r*=.60 for the global score (Gratz & Roemer, 2004). Construct validity has

also been established in a clinical population, where the measure correlated highly with the AAQ

(*r* = .70), a measure that examines depression severity (*r* = .45, PHQ-Depression), anxiety

severity (*r* = .44, PHQ- Anxiety), and somatic complaint severity (*r* = .28, PHQ, Somatic; Fowler

et al., 2014).   For this study, the global score will be used for analysis. Reliability for this

measure in the current study was an internal consistency of α = .89.

Distress Tolerance Scale. Distress tolerance was assessed using the 16-item Distress

Tolerance Scale (DTS; Simons & Gaher, 2005). Participants rated how much they agreed with

specific statements regarding distress on a 5-point Likert type scale (1 = *Strongly disagree* to 5 =

Strongly Agree). The DTS is composed of four subscales which measure specific actions

regarding feeling distressed: Tolerance (e.g., "Feeling distressed or upset is unbearable to me"),

Appraisal (e.g., "I can tolerate feeling distressed or upset"), Absorption (e.g., "When I distressed

or upset, all I can think about is how bad I feel"), and Regulation (e.g., "I'll do anything to avoid

feeling distressed or upset"). Higher scores on the DTS measure indicate greater resilience to

distress. The scale has demonstrated relatively acceptable internal consistencies for both the

global score and subscales, ranging from α = .66 to α = .91 in a non-clinical population (Leyro,

Zvolensky, & Bernstein, 2010). Test-retest reliability was tested in a college sample over a six

month interval (*r* = .61, Simons & Gaher, 2005), indicating that the measure is reliable. The

initial validation of the DTS indicated that the global DTS score was negatively associated with

measures of affective distress (*r* = −.59) and dysregulation (*r* = −.51) and positively correlated

with positive affectivity (*r* = .26, Simons & Gaher, 2005). Based on the pattern of the

correlations, the scale has displayed evidence of good convergent and discriminant validity in

non-clinical populations (Simons & Gaher, 2005). Internal consistency for this measure in the current study was α = .92.

Impulsive Behavior Scale. Positive and negative urgency was assessed using two subscales from the 59-item UPPS-P Impulsive Behavior Scale (UPPS-P; Cyders et al., 2007; Whiteside & Lynam, 2001; see Appendix J). The positive urgency subscale consists of 14 items and the negative urgency scale consists of 12 items. Participants rated how much they agreed or disagreed with several statements pertaining to impulsivity on a 4-point Likert-type scale (0 = *Strongly Disagree* to 4 = *Strongly Agree*). The two subscales used for this study will be positive urgency (e.g., "When I am very happy, I can't seem to stop myself from doing things that can have bad consequences") and negative urgency (e.g., "When I feel bad, I will often do things I regret later to make myself feel better now"). Higher scores on these subscales suggested greater urgency related to positive and negative emotions. The UPPS-P has demonstrated excellent internal consistencies in both negative urgency (α =.86) and positive urgency (α =.94) in a college sample (Miller, Flory, Lynam, & Leukefeld, 2003; Whiteside & Lynam, 2001). The positive urgency scale has shown discriminant validity, differentiating between problem gamblers and non-gamblers, such that the measure was significantly correlated with problem gambling (*r* = .52; Cyders et al., 2007). The positive urgency scale has shown to have concurrent validity, correlating with risky behaviors like frequency of drunkenness (*r* = .24) and problem drinking (*r* = .27, Cyders et al., 2007). The negative urgency scale has shown construct validity, correlating with other measures of impulsivity, like sensation seeking (*r* = .36), lack of planning (*r* = .24), and lack of perseverance (*r* = .14; Spillane et al., 2013). The positive urgency scale has also shown construct validity, correlating with other measures of impulsivity, such as sensation seeking (*r* = .21), lack of planning (*r* = .24), and lack of perseverance (*r* = .23; Spillane et al.,

2013). Reliability for positive urgency subscale in the current study was an internal consistency of $\alpha = .91$. For the currently study, the negative urgency subscale had an internal consistency of $\alpha = .77$.

      Additional measures. Demographic information was collected from participants as well. Participants reported their gender, age, ethnicity, sexual identity, and current academic level in college. Demographics questions can be seen in Appendix K.

CHAPTER III

RESULTS

Participants

The sample was composed of students enrolled in psychology courses at Old Dominion University who participated through the Psychology Department's online research participation system (SONA). Individuals who were between the ages of 18 and 24 were eligible for the study, since the young adult age group was the focus of this study. The survey was administered to 329 individuals. Of the 329 participants who completed the initial demographics form to determine eligibility, 55 (16.7%) participants exceeded the age range specified and were disqualified from the study. Another 5 (1.5%) respondents failed to complete the survey in its entirety and were thus excluded. Further, 29 (10.7%) of participants failed one of the three attention checks placed throughout the survey, 16 (5.9%) failed two of the three attention checks, and 8 (3.0%) failed all three attention checks. Separate analyses were conducted with those who correctly answered all three attention checks (n=216) and with those who answered at least one attention check correctly (n=261). Based on prior research (e.g., United States Department of Health and Human Services, 2016), we anticipated a rate of 35.8% e-cigarette use, but the actual rate of ever-use was 52%. Sample ethnicity was comprised of mostly African Americans (36.6%) and Caucasians (35.2%). Additional descriptive statistics were reported in Table 1. Descriptive data shown to be significantly associated with outcome variables at $p = .1$ or less were included as covariates in analyses.

Data Approach

IBM SPSS Statistics Version 25.0 and IBM SPSS AMOS 25.0 were used to analyze the results of this present study. In order to examine Hypotheses 1 and 2, a one-way (E-cigarette

Table 1
Demographic Characteristics of Final Sample

Demographic	*n*	%
Ethnicity		
African American	79	36.6%
European American	76	35.2%
Asian American	16	7.4%
Latin American	14	6.5%
Multiethnic/Other	28	13.0%
American Indian	3	1.4%
Sexual Orientation		
Heterosexual	184	85.2%
Asexual	3	1.4%
Bisexual	22	10.2%
Gay/Lesbian	6	2.8%
Class Standing		
Freshman	61	28.2%
Sophomore	45	20.8%
Junior	69	27.8%
Senior	50	23.1%
Gender		
Female	176	79.6%
Male	43	19.9%
Transgender	1	.5%

Note. N = 216

user, Non-user) Multivariate Analysis of Variance (MANOVA) was be used to determine significant mean vector differences in negative affect reduction outcome expectancies, emotion dysregulation, anxiety sensitivity, distress tolerance, and positive and negative urgency between individuals who have used e-cigarettes and individuals who have not used e-cigarettes. A MANOVA is used when several correlated dependent variables are examined because it ensures that the relationships between the dependent variables are considered (Field, 2009). MANOVA also adjusts for the inflation of the likelihood of committing a Type 1 error due to testing multiple dependent variables (Maxwell & Delaney, 2004). To examine hypothesis 3, two one-way (Ever-User, Never-User) Analyses of Variance (ANOVA) were used to determine significant differences in cigarette negative affect reduction outcome expectancies and cigarette susceptibility between ever-users and never-users. For hypothesis 4, a path analysis was conducted among e-cigarette non-users to examine the mediated effects of negative affect reduction outcome expectancies on the relationships between: 1) emotion regulation and e-cigarette susceptibility; 2) distress tolerance and e-cigarette susceptibility; and 3) positive and negative urgency and e-cigarette susceptibility. The proposed path analysis is shown in figure 1. Individuals who are e-cigarette users were not included in analyses to explore e-cigarette susceptibility in non-users. While using a series of ordinary least squares (OLS) multiple regression analyses may be conducted to examine the proposed mediation model, these analyses suffer from multicollinearity issues, do not detect indirect variable effects, do not calculate parameter estimates simultaneously, and assume that independent variables are measured without error. Path analysis can address these shortcomings through the simultaneous testing of regression coefficients for the entire model (Mishra & Min, 2010).

Data screening

The current study was limited to individuals aged 18 to 24. Of the 329 participants who completed the initial demographics form to determine eligibility, 55 (16.7%) participants exceeded the age range specified and were disqualified from the study. Another 5 (1.5%) respondents failed to complete the survey in its entirety and completed less than 25% of the survey and were thus excluded. The results of the primary analyses were consistent with both samples except the loss of one direct path in the path model, distress tolerance to e-cigarette susceptibility], when those who failed at least one attention check were included in the model. For a more conservative examination of the data, only those who passed all three attention checks were included. Among the original 329 respondents, a total of 113 respondents were excluded from final analyses, leaving 216 (65.6%) participants included in final analyses.

Missing data and outliers

Once data were collected and inputted into SPSS, the data were cleaned. Data were examined to determine whether any items were mislabeled or mis-scaled. Measure items were reverse-coded appropriately to ensure that items were consistently scored in the same direction. To assess missing data, SPSS Missing Data Analysis was used. Once the extent of the missing data was calculated, Little's MCAR test was used to determine whether data are missing completely at random (Little, 1988). An SPSS missing values analysis revealed that less than 2% of data were missing for all variables. Data were indicated to be missing completely at random, per Little's MCAR test (chi-square $= 170.69$, $df = 164$, $p = .344$). Expectation Maximization was used on each of the outcome variables to correct for missing values, as data were found to be missing completely at random and the method is recommended since it yields

unbiased estimated population parameters, unlike more traditional missing data methods (Cox, McIntosh, Reason, & Terenzini, 2014).

Data were then assessed for univariate and multivariate outliers. Univariate outliers were assessed using box plots and examination of standard scores of the outcome variables. Univariate outliers were defined as those with standardized scores greater than 3.29 (p <.001, two tailed test, Tabachnick & Fidell, 2013). Two outliers were found for the Smoking Susceptibility Index (cigarette susceptibility measure). Outliers were resolved via winsorization, which is the process of assigning the highest extreme value that is not an outlier (Tabachnick & Fidell, 2013). These two outliers were winsorized from 9 to 8 and 8 to 7, which fell within the acceptable standardized range. One outlier was found for the UPPS Positive Scale (positive urgency measure). The outlier was winsorized from 21 to 26, which fell within the acceptable standardized range. Per suggestion by Tabachnick and Fidell (2013) multivariate normality was assessed by group, since multivariate grouped analyses (MANOVA) were performed. No cases exceeded Mahalanobis distance cutoff scores, indicating no multivariate outliers within the sample.

Statistical Assumptions

Per suggestion by Tabacnick and Fidell (2013) univariate normality was assessed by means of histograms, detrended normal q-q plots, skewness, and kurtosis. Variables were also assessed for normality prior to expectation maximization to ensure no bias from imputed data. Notably, univariate normality was assessed by group due to use of multivariate statistics. Analysis of the histograms for DERS (emotion dysregulation), DTS (distress tolerance), UPPS-Positive (positive urgency), UPPS-Negative (negative urgency), S-VCQ (e-cigarette negative affect reduction outcome expectancies), and SCQ (cigarette negative affect reduction outcome

expectancies) indicated a normal and unimodal distributions for all other variables. Detrended q-q- plots were also used to examine normality. There were no cases shown to be +/- 1.96 standard deviations away, indicating no significant deviations from normality (Garson, 2012).

Skewness critical values were defined as absolute value of 2, and kurtosis critical values were defined as exceeding the absolute value of 7 (Kim, 2013). The only variable for which skewness and/or kurtosis exceeded the critical values was the Smoking Susceptibility Index (cigarette susceptibility measure), which was found to be kurtoic for both groups (ever-users, never-users). Multivariate normality was assessed using Mahalanobis distance (Tabachnick and Fidell, 2013). The critical value for Mahalanobis distance with five variables is $\alpha = .001$ is $x^2 = 20.515$. No cases met this critical value, and no multivariate outliers were detected.

After outlier examination and winsorization, kutosis for Smoking susceptibility index was decreased from 8.58 and 6.07 to 4.98 and 3.77. Smoking Susceptibility Index totals were also found to be positively skewed with values of 2.55 and 2.93, after removal of outliers, skewness remained at values of 2.25 and 2.51 and thus outliers were winsorized from analyses per statistical assumptions for Multivariate Analysis of Variance and Path Analysis (Tabachnick and Fidell, 2013; Field, 2009).

In order to assess potential confounding variables, chi square tests were used to examine distributions of demographic variables across e-cigarette use. Variables were collapsed across all groups that were too small (less than 5) for the chi-square test to run. For sexual orientation, there were two groups (heterosexual, sexual minority), for gender there were two groups (male and female; 1 transgendered individual was removed during these analyses). Religion was collapsed into two groups as well (Christian, Religious Minority). A variable was included as a covariate if the chi-square test was significant at an alpha level of 0.1. Racial categories were

collapsed into three groups: African American (n = 79), Caucasian (n = 76), and Other Racial

Minorities (n = 61) to ensure sufficient cell size of 5 participants per group for chi-square

analysis. Analysis indicated that race was a significant covariate, Chi-square (2) = 13.266, p =

.001. African Americans were less likely to engage in e-cigarette ever use. As age was not a

nominal variable,, the variable was assessed using a one-way ANOVA, M = 20.23., SD=.16 vs.

M=20.63, SD=.17, F (1, 214) = 3.29, p = .071. Individuals who are younger were more likely to

engage in e-cigarette ever use. No other demographic variables met criteria for inclusion. As a

result, age and race were added as covariates to the primary Analyses of Covariance

(ANCOVA). Chi-square results for covariates are included in Table 2. Primary analyses were

conducted with and without covariates included and results did not significantly differ. As a

result, this study reported results with covariate included for a more conservative examination of

the data.

Table 2
Chi-Square Tests of Covariates

Demographic	χ^2	p
Ethnicity	13.27	.001
Sexual Orientation	2.15	.143
Class Standing	3.51	.320
Gender	2.85	.240
Religion	1.25	.264
Country of Origin	2.52	.113

Note. N=216.

Primary Analyses

    Statistical assumptions for hypotheses 1 and 2. Assumptions for MANOVA were addressed before primary analysis. In order to ensure the appropriate use of a MANOVA and assess multicollinearity and singularity, outcome variables were expected to correlate, but not exceed $r < .90$ (Tabachnick & Fidell, 2013). Pearson correlations indicate that all outcome variables are moderately correlated. Since outcome variables are moderately correlated, a multivariate analysis was conducted (Tabachnick & Fidell, 2013). Correlations are displayed in Table 3. Initial analysis of frequency charts indicated that both groups (ever-user, never-user) had sufficient sample sizes in order to be included in the proposed MANOVA (ever-users = 115, never-users = 101). Of note, approximately 68.7% of the ever-users in this sample did not engage in current 30-day use. Multivariate normality was met, as each sample size was larger than 20, which ensured robustness to deviations of multivariate normality of the sampling distributions (Tachanick & Fidell, 2013). Further, the assumption of absence of outliers was met, as the two identified outliers were winsorized prior to primary data analysis. Sample variances for each dependent variable were compared across both groups. No dependent variable had a ratio of largest to smallest variance of 10:1 or higher, indicating preliminary robustness to homogeneity of variance (Tabachnick and Fidell, 2013). Levene's Test was also non-significant for all outcome variables, indicating homogeneity of variance. Box's *M* Test, used to further assess equality of covariance matrices, was not significant, $F (15, 172467) = 1.07, p = .378$, indicating this assumption was not violated. Significance was based on Pillai's Trace, as the statistic is robust to unequal cell size (Tabachnick & Fidell, 2013). Means and standard deviations of all independent, dependent, and demographic variables are included in Table 4 and 5.

Table 3
Summary of Correlations and Estimated Marginal Means: Type of E-cigarette Use

	1	2	3	4	5	E-cigarette Ever Use (n = 101)	No E-cigarette Use (n = 115)
						M (SD)	*M (SD)*
1. DERS	--	--	--	--	--	41.09 (1.27)	38.67 (1.37)
2. DTS	-.75**	--	--	--	--	52.63 (1.19)	51.93 (1.29)
3. UPPS-Positive	.46**	-.44**	--	--	--	17.31 (.57)	18.25 (.62)
4. UPPS-Negative	.64**	-.64**	.65**	--	--	36.25 (.69)	37.49 (.75)
5. S-SVQ-NAR	.28**	-.19*	.31**	.34**	--	11.63 (1.59)	10.69 (1.73)

Note. N =216. DERS = Difficulties in Emotion Regulation Scale; DTS = Distress Tolerance Scale; UPPS-Positive = UPPS-P Impulsive Behavior Scale; UPPS-P Negative = UPPS-P Impulsive Behavior Scale; S-SVQ-NAR= Short Form Vaping Consequences Questionnaire- Negative Affect Reduction.
*p < .01 **p <.001.

Table 4

Descriptive of Dependent Variables by Group (Ever-User, Never- User)

	E-cigarette Use		No E-cigarette Use	
	M (SD)	n	M (SD)	n
E-SSI	--	0	4.01 (1.63)	101
DERS	43.47 (11.48)	115	41.37 (12.80)	101
DTS	37.08 (12.26)	115	38.19 (13.13)	101
UPPS-Positive	41.83 (6.29)	115	42.66 (5.84)	101
UPPS-Negative	23.63 (7.30)	115	22.69 (7.39)	101
S-SVQ-NAR	11.62 (16.94)	115	10.75 (16.98)	101
SSI	3.34 (.82)	50	3.34 (.86)	80
S-SCQ-NAR	10.61 (16.37)	115	10.54 (16.10)	101

Note. E-SSI = Expanded Susceptibility to Smoke Index, scores range from 4-12; DERS = Difficulties in Emotion Regulation Scale, scores range from 17-85; DTS = Distress Tolerance Scale, scores range from 17-85; UPPS-Positive = UPPS-P Impulsive Behavior Scale, scores range from 12-60; UPPS-P Negative = UPPS-P Impulsive Behavior Scale, scores range from 12-60; S-SVQ-NAR = Short Form Vaping Consequences Questionnaire-Negative Affect Reduction, scores range from 7-70; SSI= Susceptibility to Smoke Index, scores range from 4 - 12; S-SCQ= Short Form Smoking Consequences Questionnaire- Negative Affect Reduction Outcome expectancies, scores range from 7-70.

Table 5
Demographic Characteristics of Ever-Users and Never-Users

Demographic	E-cigarette Use		No E-cigarette Use	
Ethnicity	*n*	*%*	*n*	*%*
African American	38	33.04%	45	44.6%
European/Caucasian	42	36.52%	31	30.6%
Asian American	9	7.82%	9	8.9%
Latino/a American	5	4.35%	7	6.9%
Middle Eastern	1	0.8%	2	1.9%
American Indian	2	1.7%	1	0.9%
Multiethnic/Other	18	15.65%	6	5.9%
Sexual Orientation				
Heterosexual	95	82.60%	90	89.1%
Asexual	1	0.87%	2	1.9%
Bisexual	15	13.04%	7	6.9%
Gay/Lesbian	4	3.48%	2	1.9%
Class Standing				
Freshman	37	32.17%	23	28.2%
Sophomore	21	18.26%	24	20.8%
Junior	29	25.21%	31	27.8%
Senior	28	24.34%	22	23.1%
Gender				
Female	87	75.65%	85	84.16%
Male	27	23.47%	16	26.73%
Transgender	1	0.87%		

Note. N = 216

Statistical analysis for Hypothesis 1 and 2. Hypothesis 1 and 2 examined group differences of e-cigarette use on emotion dysregulation, distress tolerance, positive and negative urgency, and negative affect reduction outcome expectancies. The grouping variable used for the MANOVA analysis was e-cigarette use. The outcome variables used were Difficulties in Emotion Regulation Scale (DERS), Distress Tolerance Scale (DTS), Urgency, Premeditation, Perseverance, Sensation Seeking, Positive Urgency, Impulsive Behavior Scale (UPPS Positive and Negative Subscale (positive and negative urgency measure), and Short Form Vaping Consequences Questionnaire Negative Affect Reduction S-VCQ-NAR scores (e-cigarette negative affect reduction outcome expectancies). One way between-groups MANOVA indicated no significant main effect of e-cigarette use on outcome variables, Pillai's Trace = .04, F (5, 216) = 1.40, p= .236, partial eta squared = .033. Estimated marginal means and univariate test results are displayed in Figure 2 and Table 6.

Statistical assumptions for hypothesis 3. Hypothesis 3a compared ever-users and never-users on susceptibility to cigarette smoking. Only those who had not smoked were asked these questions. Hypothesis 3b compared ever-users and never-users on negative affect reduction smoking outcome expectancies. Smoking Susceptibility Index (SSI, cigarette susceptibility measure) data from 80 never-users and 50 ever-users were collected. All participants answered the S-SCQ (n = 101) measure and a subset answered the SSI (n = 50) measure depending on their cigarette use. Significant correlations between dependent variables are a requirement for appropriate use of a MANOVA (Tabachnick and Fidell, 2013). Pearson's correlations between dependent variables indicate that SSI (cigarette susceptibility) and S-SCQ (cigarette negative affect reduction outcome expectancies) were not correlated, r = .14, p = .119. As a result, a MANOVA is not the appropriate analysis to use and two univariate ANOVAs were used to

assess hypothesis 3, comparing outcome scores among those who have used e-cigarettes and those who have not used e-cigarettes.

   Statistical analysis for hypothesis 3. Hypothesis 3 examined group differences of e-cigarette use on cigarette susceptibility and cigarette negative affect reduction outcome expectancies. Covariates included in analysis were race and age. Outcome variables used were SSI scores (cigarette susceptibility measure) and S-SCQ (smoking negative affect reduction outcome expectancies). A one-way between subject's ANCOVA indicated no significant main effect of e-cigarette use on cigarette susceptibility, $F(1, 126) = .02$, $p = .888$, partial eta squared = .000. A one way between-subjects ANCOVA indicated no significant main effect of e-cigarette use on S-SCQ scores, $F(1, 212) = .004$, $p = .951$, partial eta squared = .000. The estimated marginal means for this analysis are included in Figure 3.
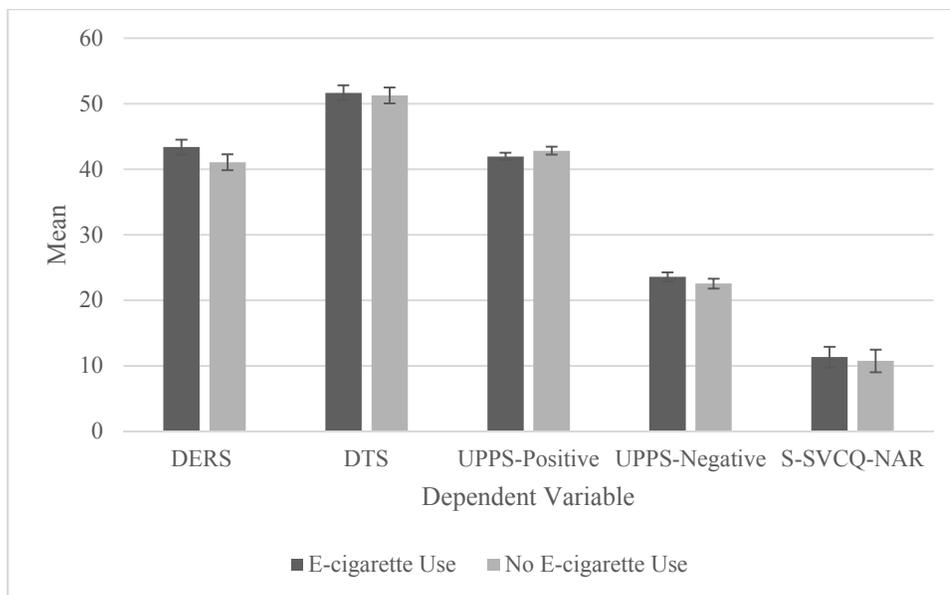
Figure 2. Estimated marginal means by type of e-cigarette use. DERS = Difficulties in Emotion Regulation Scale; DTS = Distress Tolerance Scale; UPPS-Positive = UPPS-P Impulsive Behavior Scale; UPPS-P Negative = UPPS-P Impulsive Behavior Scale; S-VCQ-NAR= Short Form Vaping Consequences Questionnaire- Negative Affect Reduction; SSI= Susceptibility to Smoke Index; S-SCQ= Short Form Smoking Consequences Questionnaire- Negative Affect Reduction Outcome expectancies.

Table 6

Univariate Analysis of Variance Tests by Group (Ever-User, Never-User)

	MS	*F*	*df$_1$*	*df$_2$*	*p*
DERS	300.67	1.64	1	212	.201
DTS	20.60	.13	1	212	.721
UPPS-Positive	41.30	1.10	1	212	.295
UPPS-Negative	79.15	1.43	1	212	.233
S-VCQ-NAR	45.70	.15	1	212	.691

Note. N = 216. DERS = Difficulties in Emotion Regulation Scale; DTS = Distress Tolerance Scale; UPPS-Positive = UPPS-P Impulsive Behavior Scale; UPPS-P Negative = UPPS-P Impulsive Behavior Scale; S-VCQ-NAR= Short Form Vaping Consequences Questionnaire- Negative Affect Reduction; Multivariate Analysis of Variance indicated no significant effect of e-cigarette use on dependent variables.

Table 7

Estimated Marginal Means: Type of E-cigarette Use

	E-cigarette Ever Use (n = 115)	*No E-cigarette Use (n=101)*
	M (SD)	*M (SD)*
SSI	13.58 (1.63)	13.27 (1.77)
S-SCQ	3.36 (0.13)	3.65 (0.109)

Note. SSI= Susceptibility to Smoke Index; S-SCQ= Short Form Smoking Consequences Questionnaire- Negative Affect Reduction Outcome expectancies.
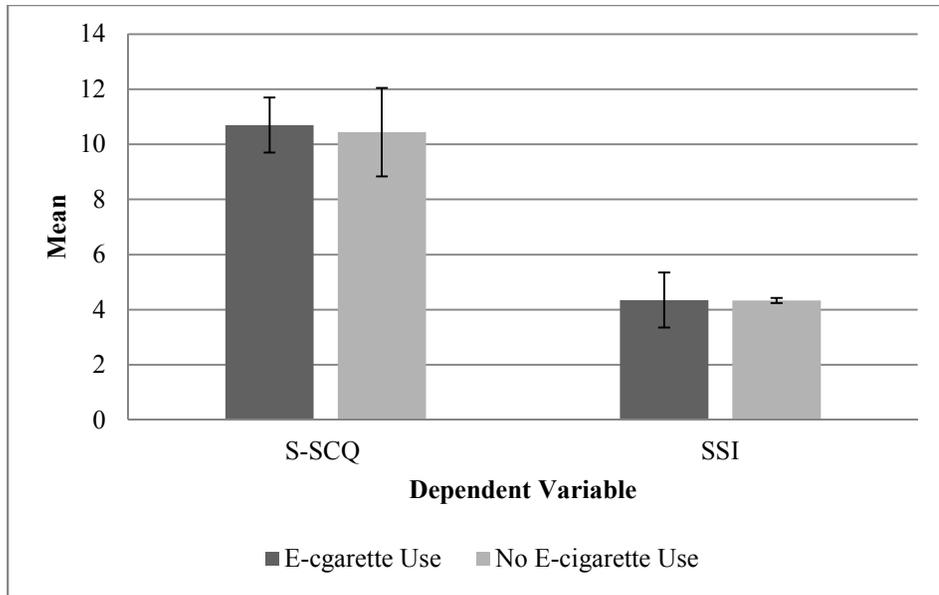
Figure 3. Estimated marginal means of dependent variables by e-cigarette use. SSI= Susceptibility to Smoke Index; S-SCQ= Short Form Smoking Consequences Questionnaire- Negative Affect Reduction Outcome expectancies.

Statistical assumptions for hypothesis 4. As missing data were inputted using expectation maximization, the path analysis could proceed without preliminary corrections or missing data analysis in the AMOS software. The proposed path model is recursive and just identified, indicating that the number of path coefficients to be estimated is equal to the number of known associations between variables (Tabachnick and Fidell, 2013). Therefore, model fit could not be identified, as the model perfectly fits the data since the number of known parameters is equal to the number of parameters being estimated in the model (Field, 2009). However, specific hypotheses about the paths produced could be analyzed clearly, as was the focus of this hypothesis. For the subset of the sample used for the path analysis, multivariate normality was violated; as a result, bootstrapping was used, as the method does not assume multivariate normality for analyses (Preacher & Hayes, 2008). Correlations of all variables are included in Table 8.

Statistical analysis for hypothesis 4. It was predicted that individuals who have used e-cigarettes would have higher emotion dysregulation, distress tolerance, positive urgency, negative urgency, and negative affect reduction outcome expectancies than those who have not used e-cigarettes. It was also expected that e-cigarettes users would have higher smoking susceptibility and cigarette negative affect reduction outcome expectancies than non-users. Lastly, it was anticipated that the relationships between emotional competencies (emotion regulation, distress tolerance, and urgency) and e-cigarette susceptibility will be mediated by negative affect reduction outcome expectancies.

Hypothesis 4 examined a proposed model in which the relation between emotional competencies (emotion regulation, distress tolerance, urgency) and e-cigarette susceptibility is mediated by negative affect reduction outcome expectancies. The proposed model is depicted in

Figure 1. In order to examine the direct and indirect effects needed to test mediation, a path

analysis was conducted. In order to examine mediation effects, the boostrapping procedure was

used and allowed for significance testing through use of a 95% confidence interval, i.e., the path

is significant if the 95% confidence interval does not contain zero (Preacher & Hayes, 2008).

Direct effects. Two significant direct effect pathways were detected within the proposed

model. UPPS- Negative Total (negative urgency measure) was significantly positively associated

with SSI scores (e-cigarette susceptibility measure). Further, DERS total (emotion dysregulation

measure) was significantly positively associated with SSI scores. Direct effects for all paths are

depicted in Figure 4.

Indirect effects. In order to examine mediation through indirect effects, bootstrapped

standard errors were used. Examination of bootstrapped confidence intervals indicated no

significant indirect effects.

Table 8
Summary of Correlations of E-cigarette Non-users in Path Analysis Variables

	1	2	3	4	5
1. DERS	--	--	--	--	--
2. DTS	-.81***	--	--	--	--
3. UPPS-Positive	-.45***	.44***	--	--	--
4. UPPS-Negative	-.71***	.66***	.62***	--	--
5. S-SVQ-NAR	.29**	.26**	.13	.28**	--
6. E-SSI	.29**	.13	.12	.08	.20*

Note. N =101. DERS = Difficulties in Emotion Regulation Scale; DTS = Distress Tolerance Scale; UPPS-Positive = UPPS-P Impulsive Behavior Scale; UPPS-P Negative = UPPS-P Impulsive Behavior Scale; S-SVQ-NAR= Short Form Vaping Consequences Questionnaire- Negative Affect Reduction.
p < .05, **p* <.01, ***p*<.001.
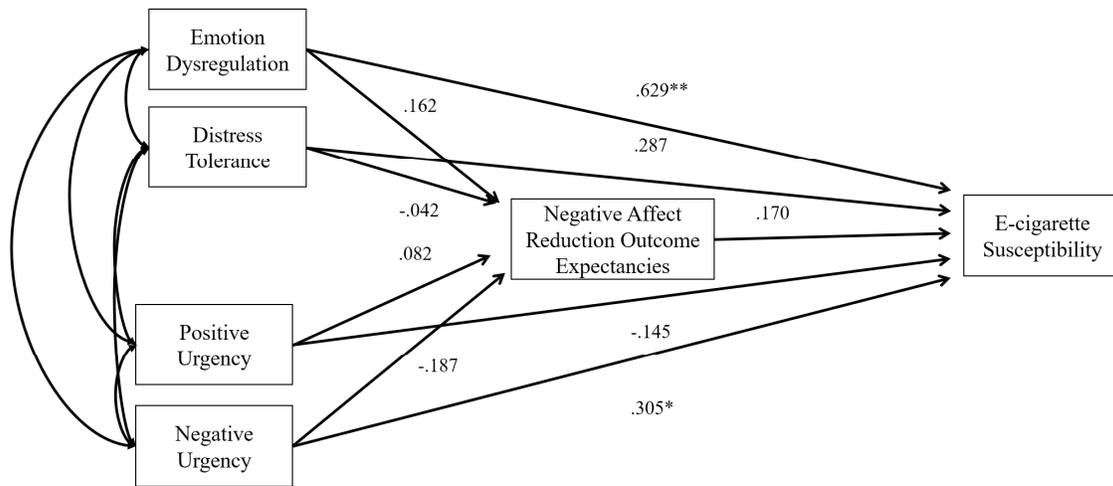
Figure 4. Results of the path model for hypothesis 4 with emotion dysregulation, distress tolerance, positive urgency, and negative urgency as the predictor variables, negative affect reduction outcome expectancies as a mediator, and e-cigarette susceptibility as the outcome variables. Standardized path coefficients shown, where *p <.05, **p <.01.

CHAPTER IV

DISCUSSION

Given research indicating the importance of emotional competencies (emotion

dysregulation, distress tolerance, urgency) and outcome expectancies on cigarette susceptibility

and behavior (Johnson et al., 2008; Kristjansson et al., 2011; Spillane et al., 2013; Zvolensky et

al., 2009), the current study examined the associations of e-cigarette use and outcome

expectancies competencies in a young adult population. It was hypothesized negative affect

reduction outcome expectancies would mediate the relationship between emotional competencies

and susceptibility. To date, previous literature regarding emotional competences and smoking

behaviors has focused solely on cigarette use/susceptibility, and no prior studies have examined

the association between emotional competencies and e-cigarette outcome expectancies. Further,

there is considerably less knowledge about the differences in emotional competencies, such as

distress tolerance, in e-cigarette users. The overall purpose of this research was to provide aid in

the conceptualization and treatment of e-cigarette use in the young adult population and inform

health interventions that focus on prevention. This research contributes to our understanding of

the emotional process that may contribute to e-cigarette use and susceptibility.

Hypothesis 1: E-cigarette Use and Negative Affect Reduction Outcome Expectancies

Based on previous research indicating that increased negative affect reduction outcome

expectancies are associated with future cigarette smoking behaviors and initiation (Dalton,

Sargent, Beach, Bernhardt, & Stevens, 1999; Kristjansson et al., 2011; Stevens, Colwell, Smith,

Robinson, & McMillan, 2005), it was expected that ever-users would have more negative affect

reduction outcome expectancies than non-users. Contrary to this hypothesis, there were no

significant differences between ever-users and never-users on negative affect reduction vaping expectancies.

The lack of disparities in outcome expectancies does not align with research suggesting that increased outcome expectancies are associated with future cigarette behaviors including: intention to smoke in the future, susceptibility to cigarette use, and initiation in a longitudinal study (Dalton, Sargent, Beach, Bernhardt, & Stevens, 1999; Kristjansson et al., 2011; Stevens, Colwell, Smith, Robinson, & McMillan, 2005). The prior mentioned studies focused on cigarette use and it possible that the underlying conceptualization of this research is not relevant to e-cigarette use. In general, e-cigarette users believe that e-cigarettes are less addictive and more socially acceptable than cigarettes (Harrell, Marquinez, et al., 2015). Cigarettes have also been found to be rated as more effective in negative affect reduction in comparison to e-cigarettes (Harrell, Marquinez, et al., 2015). Given this, it is possible that the underlying conceptualization and beliefs about e-cigarettes are different than cigarettes. However, this is inconsistent with work by Miller, Pike, Stacy, Xie, and Ames (2017) which suggests that both cigarette and e-cigarette outcome expectancies may work similarly in regard to their effect on their respective products. A more plausible conclusion is that studies done by Dalton and colleagues (1999) and Stevens and colleagues (2005) focused largely on adolescent samples, suggesting that that differences in populations may also explain the discrepancies between the current study and the aforementioned studies. Given this, it is difficult to gauge the appropriateness of this null finding. Lastly, a minority of participants self-identified as using e-cigarettes currently (30-day use). Consequently, the results are based largely off of individuals who have used e-cigarettes longer than a month ago, indicating that the results of this study may

not have be temporally appropriate to address the associations between emotional factors and e-cigarette use.

Hypothesis 2: E-cigarette Use and Emotional Competencies

Based on prior research with tobacco cigarettes, we hypothesized that individuals who engaged in e-cigarette use would have greater emotion dysregulation, negative urgency, and positive urgency, and lower distress tolerance. The unexpected lack of differences between e-cig user and non-users is inconsistent with other research indicating that e-cigarette users report more emotion dysregulation than non-users of tobacco products (Wills, Knight, Williams, Pagano, & Sargent, 2014). However, the sample from Wills and colleagues' (2014) was also comprised of adolescents, indicating that the results from this study may not be generalizable to this study's sample of young adults. Of note, Wills and colleagues examined emotion dysregulation differences between dual users, cigarette-only users, e-cigarette only users, and non-users of either tobacco product. Given this stratification, the current study differs in that all individuals who ever engaged in e-cigarette use were included regardless of their experiences with other tobacco products. This change in the definition of e-cigarette use may explain the difference in results. Further research should aim to determine whether exclusive ever-use of e-cigarettes is associated with different outcomes than those who have engaged in e-cigarette use regardless of other tobacco use.

There may also be factors pertaining to the current study that attributed to the lack of differences in emotion dysregulation between ever-users and never-users. . Based on prior research (e.g., United States Department of Health and Human Services, 2016), we anticipated a rate of 35.8% e-cigarette use, but the actual rate of ever-use was 53%. However, there were a small number of ever-users who currently use e-cigarettes (defined as recent 30-day use) in our

convenience sample of college students. Individuals who had ever tried an e-cigarette, at least once time in lifetime, were deemed ever-users for this study. In regard to 30-day use, the clear majority of ever-users did not engage in use within this time frame. Although this approach may be appropriate for an initial step to understanding use patterns in this population, e-cigarette ever-users may be qualitatively different from e-cigarette current users. It's possible that this study failed to accurately capture the true emotional capacities and outcome expectancies that occur during current e-cigarette use, where the effect of use on emotional capabilities and outcome expectancies may be most prominent.

Hypothesis 3: E-cigarette use and Beliefs about Cigarettes

Based upon prior research indicating that that e-cigarette use is associated with an increased likelihood to initiate the use of other tobacco products like cigarettes (Primack, Soneji, Stoolmiller, Fine, & Sargent, 2015; USDHHS, 2016), this study expected ever-users to have higher cigarette susceptibility than never-users. Unexpectedly, there was no difference between groups. Examination of data suggests limited variability in the in self-reported cigarette susceptibility for the entire sample. The lack of variability likely limited the ability to identify differences between groups. It is also possible that the lack of variability appropriately represents the experiences of cigarette use in this population. Further, a meta-analysis of nine longitudinal studies examining adolescents and young adults concluded that probabilities of cigarette initiation for e-cigarette users were 30.4% and 7.9% for non-users (Soneji et al., 2017). It's possible the current study's findings do not align with this literature, due to the small sample size of ever-users ($n = 50$) and non-users ($n = 80$). Further, the prior studies examined cigarette initiation, not cigarette susceptibility and therefore, this study provides unique information about cigarette susceptibility. Cigarette susceptibility involves a self-report of future use at a single

time point, where findings from Primack and colleagues (2015) examined the association between e-cigarette and cigarette use longitudinally Given this, perceptions of susceptibility may be difficult to determine given the fixed time point of this study.

Contrary to expectations, cigarette negative affect reduction outcome expectancies did not differ between ever-users and never-users. To the knowledge of this author, there have been no studies specifically comparing cigarette outcome expectancies in e-cigarette users and never-users. As a result, the lack of findings may indicate that beliefs about cigarettes and e-cigarettes are separate entities, which is consistent with the Morean and L'Insalata (2017) finding that the shared variance between cigarette and e-cigarette outcome expectancies, across the four subscales of negative affect reduction, positive reinforcement, negative reinforcement, and appetite/weight control, in a sample of e-cigarette users is only 17.4%. This indicates that e-cigarette and cigarette expectancies may be largely independent of each other. In contrast to the prior described study, the current study solely examined negative affect reduction outcome expectancies and focuses on differences in negative affect reduction outcome expectancies between e-cigarette-users and non-users. Given these large differences in study focus, it is difficult to determine whether the findings of the current study are consistent with relevant research. Further research should aim to examine other outcome expectancies to determine whether there is a similar pattern.

Hypothesis 4: Emotional Competencies, Outcome Expectancies, and Susceptibility

This study uniquely extended the literature by to assessing the association among e-cigarette susceptibility, emotion regulation, distress tolerance, positive urgency and negative urgency, and the mediational effect of outcome expectancies on these relations. Contrary to the hypothesis, negative effect reduction outcome expectancies did not mediate the relationship

between emotional competencies and e-cigarette susceptibility, and negative affect reduction outcome expectancies were not associated with e-cigarette susceptibility. Unexpectedly, S-VCQ-NAR (negative affect reduction outcome expectancies) was not associated with DERS (emotion regulation), DTS (distress tolerance), UPPS-P (positive urgency), or UPPS-N (negative urgency). This finding is inconsistent with literature that indicated that emotion dysregulation is positively associated with negative affect reduction outcome expectancies (Johnson et al., 2008). Of note, the sample from Johnson and colleagues (2008) consisted of current adult cigarette smokers, while the current study is examining this process in non-smokers. Such differences may indicate that the association between emotion dysregulation and negative affect reduction outcome expectancies is only relevant to current users, or that none of the emotional competencies included in this study uniquely impact negative affect reduction outcome expectancies.

From the proposed path analysis, DERS (emotion dysregulation) and UPPS-Negative (negative urgency) were positively associated with E-SSI (e-cigarette susceptibility). To the knowledge of the author, no studies have specifically examined both negative urgency and emotion regulation and its effect on e-cigarette susceptibility. However, in a longitudinal study, negative urgency has been shown to significantly predict cigarette smoking status (Lee, Peters, Adams, Milich, & Lynam, 2015). Of note, individuals with increased negative urgency are also more likely to engage in other, more risky behaviors, as evidenced by negative urgency predicting externalizing behaviors like, aggression, illegal drug use, drinking problems, and conduct-disordered behaviors in college students (Settles et al., 2012). It is possible that individuals with increased negative urgency may use externalizing behaviors to regulate their negative affect and further research should seek to determine whether this increased

susceptibility, as a result of negative urgency, is associated with e-cigarette use. Other research examining urgency with e-cigarette use found no significant direct paths between urgency and use (Hershberger, Connors, Um, & Cyders, 2018), indicating that further research is necessary to determine the longitudinal association between urgency, susceptibility, and use. Of note, Hershberger and colleagues (2018) examined a total urgency construct, which included both negative and positive urgency, while the current study found significant associations with negative urgency. It is possible that negative urgency in particular may be a driving factor for e-cigarette use and susceptibility. Further, the results from the current study suggest that that individuals who are more emotionally dysregulated are more susceptible to e-cigarette use. These results are consistent with literature examining cigarette susceptibility (Trinidad, Unger, Chou, & Anderson Johnson, 2004). Further research should seek to determine causality between these two constructs through longitudinal or experimental research.

Limitations

There are several limitations to the present study. First and foremost, this is a cross-sectional study and cannot be used to determine causality. Second, the sample size was relatively small, which may have limited our ability to find relevant associations. Specifically, e-cigarette users who had not engaged in cigarette use were a small subset of this study. This study was relatively racially and ethnically diverse but lacked significant diversity in regard to other dimensions of diversity, such as gender identity, sexual orientation, and religious identity. Further, while the young adult population was the primary focus of this study, this study and its results may not be generalizable to other samples. Future research should aim to determine consistency in results with larger, more diverse populations. Future research should also determine whether these effects vary by demographic group as well. Given that the large

majority of ever-users were not engaged in e-cigarette use in the past 30-days, it is possible that

the length of time since engagement of e-cigarette use is a confounding factor in this current

study. More research should to replicate the findings of this study in a sample with more frequent

e-cigarette use.

CHAPTER IV

CONCLUSION

Future Directions

The results of this study suggest that e-cigarette use ever-use is prominent among young adults, with a prevalence rate of 52%, which is considerably higher than the ever-use rate from other recent research (i.e., 35.8%; United States Department of Health and Human Services, 2016). The findings from this study suggest that emotion competencies like emotion dysregulation and negative urgency may be risk factors for e-cigarette susceptibility. Future research should determine other relevant factors (e.g. increased negative affect, anxiety sensitivity) that may also increase one's susceptibility to engage in e-cigarette use. Future research should also assess these variables using a variety of research methods, including longitudinal, treatment studies, and ecological momentary assessment to determine the applicability of these findings. Both race/ethnicity and age were significant covariates in this study. Future research should also seek to examine these two demographics to determine whether they uniquely affect one's susceptibility to e-cigarette use or their beliefs about e-cigarettes. This study found two direct paths between negative urgency and emotion dysregulation and e-cigarette susceptibility. Future research should seek to replicate these findings and determine its generalizability to other populations. As a result, future research should seek to determine whether this is consistent in larger samples. Overall, these findings did not replicate the research found with cigarette smoking.

Clinical Implications

Given the results of the current study, programs focused on teaching emotion regulations skills may be beneficial to increase an individual's ability to withstand the negative affect

associated with smoking cessation. Notably, preventative programs focused on properly regulating negative affect may be helpful to combat potential susceptibility to engage in tobacco use in the future. This is especially relevant considering that increased impulsivity in response to negative affect (i.e., negative urgency) predicted increased e-cigarette susceptibility in this study, and emotions dysregulation predicted e-cigarette susceptibility as well. Future efforts should investigate age-specific programs to address emotion competencies in the young adult population, which could may reduce initial e-cigarette use in this population. However, encouraging smoking cessation through skill-building focused on emotion regulation and negative urgency should be a primary concern. Young adults are particularly vulnerable to prolonged tobacco use after initiation (USDHHS, 2012) and significant health consequences even in young adulthood (e.g, reduced lung function, USDHHS, 2012). Future research should aim to further investigate motivations to initiate and engage in e-cigarette use.

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APPENDIX A
CIGARETTE USE

1.   Have you ever tried cigarette smoking, even one or two puffs?

      Yes
      No

2.   How old were you when you first tried cigarette smoking, even one or two puffs?

      I have never smoked cigarettes, not even one or two puffs
      8 years old or younger
      9 years old
      10 years old
      11 years old
      12 years old
      13 years old
      14 years old
      15 years old
      16 years old
      17 years old
      18 years old
      19 years old
      20 years old
      21 years old
      22 years old
      23 years old
      24 years old
      25 years old

3.   About how many cigarettes have you smoked in your entire life?

      I have never smoked cigarettes, not even one or two puffs
      1 or more puffs but never a whole cigarette
      1 cigarette
      2 to 5 cigarettes
      6 to 15 cigarettes (about 1/2 a pack total)
      16 to 25 cigarettes (about 1 pack total)
      26 to 99 cigarettes (more than 1 pack, but less than 5 packs)
      100 or more cigarettes (5 or more packs)

4. During the past 30 days, on how many days did you smoke cigarettes?

      0 days
      1 or 2 days
      3 to 5 days

6 to 9 days
10 to 19 days
20 to 29 days
All 30 days

5.   During the past 30 days, on the days you smoked, about how many cigarettes did you smoke per day?

I did not smoke cigarettes during the past 30 days
Less than 1 cigarette per day
1 cigarette per day
2 to 5 cigarettes per day
6 to 10 cigarettes per day
11 to 20 cigarettes per day
More than 20 cigarettes per day

6.   When was the last time you smoked a cigarette, even one or two puffs? (PLEASE CHOOSE THE FIRST ANSWER THAT FITS)

I have never smoked cigarettes, not even one or two puffs
Earlier today
Not today but sometime during the past 7 days
Not during the past 7 days but sometime during the past 30 days
Not during the past 30 days but sometime during the past 6 months
Not during the past 6 months but sometime during the past year
1 to 4 years ago
5 or more years ago

7. On days that you can smoke freely, how soon after you wake up do you smoke your first cigarette of the day?

Within 5 minutes
From 6 to 15 minutes
From 16 to 30 minutes
From more than 30 minutes to an hour
From more than an hour to 2 hours
More than 2 hours

8. Which of the following most accurately describes how you feel about stopping smoking cigarettes?

I have no plans to stop smoking.
I do not plan to stop smoking, but I plan to reduce how much I smoke.
I plan to eventually stop smoking, but not in the next year.
I plan to stop smoking in the next year.
I plan to stop smoking in the next 6 months.

I plan to stop smoking in the next 30 days.

9. Have you ever used (or tried) a little cigar or cigarillo (such as "Black and Milds"), even one or two puffs?

No
Yes

10. How old were you when you first tried smoking little cigars or cigarillos, even one or two puffs?

I have never smoked little cigars or cigarillos, not even one or two puffs
8 years old or younger
9 years old
10 years old
11 years old
12 years old
13 years old
14 years old
15 years old
16 years old
17 years old
18 years old
19 years old
20 years old
21 years old
22 years old
23 years old
24 years old
25 years or older.

11. How many little cigars or cigarillos (such as "Black and Milds") have you smoked in your entire life?

I have never smoked little cigars, not even one or two puffs
1 or more puffs but never a whole little cigar
1 little cigar
2 to 3 little cigars (about 1/2 a pack total)
4 to 5 little cigars (about 1 pack total)
6 to 24 cigarettes (more than 1 pack, but less than 5 packs)

12. During the past 30 days, on how many days did you smoke little cigars or cigarillos?

0 days
1 or 2 days
3 to 5 days

6 to 9 days
10 to 19 days
20 to 29 days
All 30 days

13. During the past 30 days, on the days you smoked, about how many little cigars or cigarillos did you smoke per day?

    I did not smoke little cigars or cigarillos during the past 30 days
    Less than 1 little cigars per day
    1 cigarette per day
    2 to 5 little cigars per day
    6 to 10 little cigars per day
    11 to 20 little cigars per day
    More than 20 little cigars per day

14. When was the last time you smoked a little cigars, even one or two puffs? (PLEASE CHOOSE THE FIRST ANSWER THAT FITS)

    I have never smoked little cigars or cigarllos, not even one or two puffs
    Earlier today
    Not today but sometime during the past 7 days
    Not during the past 7 days but sometime during the past 30 days
    Not during the past 30 days but sometime during the past 6 months
    Not during the past 6 months but sometime during the past year
    1 to 4 years ago
    5 or more years ago

15. On days that you can smoke freely, how soon after you wake up do you smoke your first little cigar or cigarillo of the day?

    Within 5 minutes
    From 6 to 15 minutes
    From 16 to 30 minutes
    From more than 30 minutes to an hour
    From more than an hour to 2 hours
    More than 2 hours

16. Which of the following most accurately describes how you feel about stopping smoking little cigars or cigarillos?

    I have no plans to stop smoking.
    I do not plan to stop smoking, but I plan to reduce how much I smoke.
    I plan to eventually stop smoking, but not in the next year.
    I plan to stop smoking in the next year.
    I plan to stop smoking in the next 6 months.

I plan to stop smoking in the next 30 days.

17. Have you ever used (or tried) smokeless tobacco (such as dip, snus, or chew), even once?

No
Yes, but not in the past 6 months
Yes, in the past 6 months

18. Have you ever used (or tried) hookah (a water pipe used for smoking), even one or two puffs?

No
Yes, but not in the past 6 months
Yes, in the past 6 months

19. Have you ever used (or tried) a pipe (NOT a hookah or water pipe), even one or two puffs?
No
Yes, but not in the past 6 months
Yes, in the past 6 months

20. Have you ever used (or tried) a bidi or kretek ("clove cigarette"), even one or two puffs?

No
Yes, but not in the past 6 months
Yes, in the past 6 months

APPENDIX B
E-CIGARETTE USE

1. Have you ever used an electronic cigarette or e-cigarette, even one or two puffs?

      Yes
      No

2. How old were you when you first tried using an electronic cigarette or e-cigarette, even one or two puffs?

      I have never used electronic cigarettes or e-cigarettes
      8 years old or younger
      9 years old
      10 years old
      11 years old
      12 years old
      13 years old
      14 years old
      15 years old
      16 years old
      17 years old
      18 years old
      19 years old
      20 years old
      21 years old
      22 years old
      23 years old
      24 years old
      25 years or older

3. About how many times in your life do you think you have used a vaping device (e.g. electronic cigarette, vape, vape-pen, etc.)? [Assume that one "time" consists of around 15 puffs or lasts around 10 minutes]

      1-5
      6-15
      16-24
      25-49
      50-74
      75-100
      100-150
      Over 150

4. What type of device(s) have you used to vape? Check all that apply, even if *you only used once.

Disposable
Cartridge-based
Refillable tank system
JUUL
A dripping device (e.g., dripbox, squonk mod, bottom feeder mod)
Rebuildable Atomizer
Rebuildable Dripping Atomizer
Rebuildable Dripping Tank Atomizer
Other (please specify)

5. What is the vaping device you use (or have used) most often? (Check only one)

Disposable
Cartridge-based
Refillable tank system
A dripping device (e.g. dripbox, squonk mod, bottomfeeder mod)
Rebuildable Atomizer
Rebuildable Dripping Atomizer
Rebuildable Dripping Tank Atomizer
Other (please specify)

6. Where did the electronic cigarette (e.g., vape, e-cig, etc.) you first used (* or tried) come from?

A friend
A family member
A salesperson (free sample)
I ordered it online
I bought it from a gas station
I bought it from a mall kiosk or store
I bought it from a tobacco specialty store
Other (please specify)

7. During the past 30 days, on how many days did you use electronic cigarettes or e-cigarettes?

0 days
1 or 2 days
3 to 5 days
6 to 9 days
10 to 19 days
20 to 29 days
All 30 days

8. Which of the following statements best applies to your cigarette or electronic cigarette use?

A.   I have never tried cigarettes or electronic cigarettes

      B.   I have only tried cigarettes
      C.   I have only tried electronic cigarettes
      D.   I tried cigarettes before I ever tried electronic cigarettes
      E.   I tried electronic cigarettes before I ever tried cigarettes

9. What concentration or strength of nicotine have you ever used in the liquid or cartridge of a vaping device (e.g. e-cigarette, vape, vape-pen, tank, etc.)? [Check all that apply]

      I know it had nicotine, but I'm not sure how much
      I know it had something other than flavoring(s), propylene glycol (PG), and vegetable glycerin (VG), but not nicotine
      Nicotine-free: 0 mg
      Very Low: 1-3 mg
      Low: 4-8 mg
      Medium: 9-15 mg
      High: 16-24 mg
      Extra High: more than 24 mg
      I didn't know anything about the content of the liquid in at least one of the vaping devices I had used
      I didn't know anything about the content of the liquid in any of the vaping devices I had used

10. What substances have you ever used in a vaping device? [check * all that apply]

      Nicotine
      Cherry flavor
      Other Fruit flavor (Strawberry, grape, lemon, etc.)
      Butter flavor
      Other Cream flavor (Caramel, Vanilla, Chocolate, etc.)
      Tobacco flavor
      Menthol flavor
      Beverage flavor (Coffee, Tea, Soda)
      Alcoholic drink flavor (Mojito, Cognac, Wine, Beer, etc.)
      Other foods (Cupcakes, Muffins, etc.)
      Propylene Glycol (PG)
      Vegetable Glycerin (VG)
      Other (please specify)

11. In the past week, what substances have you used in a vaping device? [check * all that apply]

      Nicotine
      Cherry flavor
      Other Fruit flavor (Strawberry, grape, lemon, etc.)
      Butter flavor
      Other Cream flavor (Caramel, Vanilla, Chocolate, etc.)

Tobacco flavor
Menthol flavor
Beverage flavor (Coffee, Tea, Soda, etc.)
Alcoholic Drink flavor (Mojito, Cognac, Wine, Beer, etc.)
Other foods (Cupcakes, Muffins, etc.)
Propylene Glycol (PG)
Vegetable Glycerin (VG)
Other (please specify)

12. On days that you can use your vaping device (e.g. e-cigarette, vape, vape-pen, tank, etc.) freely, how soon after you wake up do you first use your vaping device?

Within 5 minutes
From 6-15 minutes
From 16 to 30 minutes
From 31 minutes to an hour
From an hour to 2 hours
More than 2 hours

13. Which of the following most accurately describes how you feel about stopping the use of your vaping device (e.g., e-cigarette, vape, vape-pen, tank, etc.)?

I have no plans to stop using them.
I do not plan to stop using them, but I plan to reduce how much I use them.
I plan to eventually stop using them, but not in the next year.
I plan to stop using them in the next year.
I plan to stop using them in the next 6 months.
I plan to stop using them in the next 30 days.

APPENDIX C
CIGARETTE SUSCEPTIBILITY

1. Do you think you will smoke a cigarette in the <u>next year</u>? Would you say. . .

    Definitely yes,.............................. 1
    Probably yes,................................ 2
    Probably not, or............................ 3
    Definitely not? 4

2. Do you think that in the future you might experiment with cigarettes?
    Would you say . . .

    Definitely yes,.............................. 1
    Probably yes,................................ 2
    Probably not, or............................ 3
    Definitely not? 4

3. If one of your best friends were to offer you a cigarette, would you smoke it?
    Would you say . . .

    Definitely yes,.............................. 1
    Probably yes,................................ 2
    Probably not, or............................ 3
    Definitely not? 4

APPENDIX D
E-CIGARETTE SUSCEPTIBILITY

1. "Do you think that in the future you might experiment with e-cigarettes?"

Definitely yes,..............................	1
Probably yes,...............................	2
Probably not, or...........................	3
Definitely not?	4

2. "At any time during the next year do you think you will use an e-cigarette?"

Definitely yes,.............................	1
Probably yes,...............................	2
Probably not, or...........................	3
Definitely not?	4

3. "If one of your best friends were to offer you an e-cigarette, would you smoke it?"

Definitely yes,.............................	1
Probably yes,...............................	2
Probably not, or...........................	3
Definitely not?	4

SMOKING CONSEQUENCES QUESTIONNAIRE

Below is a list of statements about smoking. Each statement contains a possible consequence of smoking. For each of the statements below, please rate how LIKELY or UNLIKELY you believe each consequence is for you when you smoke. If you have never smoked, you are to answer according to your personal beliefs about the consequences when smoking, regardless of what other people might think.
If the consequence seems UNLIKELY to you, circle a number from 0 to 4. If the consequence seems LIKELY to you, circle a number from 5 to 9. That is, if you believe that a consequence would never happen, circle 0; if you believe a consequence would happen every time you smoke, circle 9. Use the guide below to aid you further. For example, if a consequence seems completely likely to you, you would circle 9. If it seems a little unlikely to you, you would circle 4.
Please circle your answer to each question using the scale below.

<-----------------------------UNLIKELY-----------------------------> <-------------------------------LIKELY----------------------------->

	Completely Unlikely	Extremely Unlikely	Very Unlikely	Somewhat Unlikely	A Little Unlikely	A Little Likely	Somewhat Likely	Very Likely	Extremely Likely	Completely Likely
	0	1	2	3	4	5	6	7	8	9
1. Cigarettes taste good.										
2. Smoking controls my appetite.										
3. Cigarettes help me deal with anxiety or worry.										
4. I enjoy the taste sensations while smoking.										
5. Smoking helps me deal with depression.										
6. Cigarettes keep me from overeating.										

7. Cigarettes help me deal with anger.									
8. When I smoke the taste is pleasant.									
9. I will enjoy the flavor of a cigarette.									
10. I will enjoy feeling a cigarette on my tongue and lips.									
11. By smoking I risk heart disease and lung cancer.									
12. Cigarettes help me reduce or handle tension.									
13. Smoking helps me control my weight.									
14. When I'm upset with someone, a cigarette helps me cope.									
15. The more I smoke, the more I risk my health.									
16. Cigarettes keep me from eating more than I should.									
17. Smoking keeps my weight down.									
18. Smoking is hazardous to my health.									
19. Smoking calms me down when I feel nervous.									
20. When I'm angry a cigarette can calm me down.									

21. Smoking is taking years off my life.										

SHORT FORM VAPING CONEQUENCES QUESTIONNAIRE

Below is a list of statements about vaping. Each statement contains a possible consequence of smoking. For each of the statements below, please rate how LIKELY or UNLIKELY you believe each consequence is for you when you vape. If you have never vaped, you are to answer according to your personal beliefs about the consequences when smoking, regardless of what other people might think.
If the consequence seems UNLIKELY to you, circle a number from 0 to 4. If the consequence seems LIKELY to you, circle a number from 5 to 9. That is, if you believe that a consequence would never happen, circle 0; if you believe a consequence would happen every time you smoke, circle 9. Use the guide below to aid you further. For example, if a consequence seems completely likely to you, you would circle 9. If it seems a little unlikely to you, you would circle 4. Please circle your answer to each question using the scale below.

	Completely Unlikely	Extremely Unlikely	Very Unlikely	Somewhat Unlikely	A Little Unlikely	A Little Likely	Somewhat Likely	Very Likely	Extremely Likely	Completely Likely
	0	1	2	3	4	5	6	7	8	9
1. (E-) cigarettes taste good.										
2. Vaping controls my appetite.										
3. (E-) cigarettes help me deal with anxiety or worry.										
4. I enjoy the taste sensations while vaping.										
5. Vaping helps me deal with depression.										
6. E-cigarettes keep me from overeating.										

7. (E-) Cigarettes help me deal with anger.										
8. When I vape the taste is pleasant.										
9. I will enjoy the flavor of an (E-) cigarette.										
10. I will enjoy feeling a (E-) cigarette on my tongue and lips.										
11. By vaping I risk heart disease and lung cancer.										
12. (E-) Cigarettes help me reduce or handle tension.										
13. Vaping helps me control my weight.										
14. When I'm upset with someone, an (E-) cigarette helps me cope.										
15. The more I vape, the more I risk my health.										
16. E-cigarettes keep me from eating more than I should.										
17. Vaping keeps my weight down.										

18. Vaping is hazardous to my health.									
19. Vaping calms me down when I feel nervous.									
20. When I'm angry an (E-) cigarette can calm me down.									
21. Vaping is taking years off my life.									

APPENDIX G
POSITIVE AND NEGATIVE AFFECT SCHEDULE QUESTIONNARE (PANAS)

This scale consists of a number of words that describe different feelings and emotions. Read each item and then list the number from the scale below next to each word. **Indicate to what extent you feel this way right now, that is, at the present moment**

1	2	3	4	5
Very Slightly or Not at All	A Little	Moderately	Quite a Bit	Extremely

_____ 1. Interested   _____ 11. Irritable

_____ 2. Distressed   _____ 12. Alert

_____ 3. Excited   _____ 13. Ashamed

_____ 4. Upset   _____ 14. Inspired

_____ 5. Strong   _____ 15. Nervous

_____ 6. Guilty   _____ 16. Determined

_____ 7. Scared   _____ 17. Attentive

_____ 8. Hostile   _____ 18. Jittery

_____ 9. Enthusiastic   _____ 19. Active

_____ 10. Proud   _____ 20. Afraid

APPENDIX H
DIFFICULTIES IN EMOTION REGULATION SCALE

Response categories:

1	2	3	4	5
Almost Never	Sometimes	About Half the Time	Most of the Time	Almost Always
(0-10%)	(11-35%)	(36-65%)	(66-90%)	(91-100%)

1. _____ I pay attention to how I feel.
2. _____ I have no idea how I am feeling.
3. _____ I have difficulty making sense out of my feelings.
4. _____ I am attentive to my feelings.
5. _____ I am confused about how I feel.
6. _____ When I'm upset, I acknowledge my emotions.
7. _____ When I'm upset, I become embarrassed for feeling that way.
8. _____ When I'm upset, I have difficulty getting work done.
9. _____ When I'm upset, I become out of control.
10. _____ When I'm upset, I believe that I will remain that way for a long time.
11. _____ When I'm upset, I believe that I'll end up feeling very depressed.
12. _____ When I'm upset, I have difficulty focusing on other things.
13. _____ When I'm upset, I feel ashamed with myself for feeling that way.
14. _____ When I'm upset, I feel guilty for feeling that way.
15. _____ When I'm upset, I have difficulty concentrating.
16. _____ When I'm upset, I have difficulty controlling my behaviors.
17. _____ When I'm upset, I believe that wallowing in it is all I can do.
18. _____ When I'm upset, I lose control over my behaviors.

APPENDIX I
DISTRESS TOLERANCE SCALE

Instructions: Use the 5-point scale below to answer the following questions.

	Strongly agree	Mildly agree	Agree and disagree equally	Mildly disagree	Strongly disagree
1. Feeling distress or upset is unbearable to me.	1	2	3	4	5
2. When I feel distressed or upset, all I can think about is how bad I feel.	1	2	3	4	5
3. I can't handle feeling distressed or upset.	1	2	3	4	5
4. My feelings of distress are so intense that they completely take over.	1	2	3	4	5
5. There's nothing worse than feeling distressed or upset.	1	2	3	4	5
6. I can tolerate being distressed or upset as well as most people.	1	2	3	4	5
7. My feelings of distress or being upset are not acceptable.	1	2	3	4	5
8. I'll do anything to avoid feeling distressed or upset.	1	2	3	4	5
9. Other people seem to be able to tolerate feeling distressed or upset better than I can.	1	2	3	4	5
10. Being distressed or upset is always a major ordeal for me.	1	2	3	4	5
11. I am ashamed of myself when I feel distressed or upset.	1	2	3	4	5
12. My feelings of distress or being upset scare me.	1	2	3	4	5
13. I'll do anything to stop feeling distressed or upset.	1	2	3	4	5
14. When I feel distressed or upset, I must do something about it immediately.	1	2	3	4	5

15. When I feel distressed or upset, I cannot help but concentrate on how bad the distress actually feels.	1	2	3	4	5

APPENDIX J
UPPS-P

Below are a number of statements that describe ways in which people act and think. For each statement, please indicate how much you agree or disagree with the statement. If you **Agree Strongly** click **1**, if you **Agree Somewhat** click **2**, if you **Disagree somewhat** click **3**, and if you **Disagree Strongly** click **4**. Be sure to indicate your agreement or disagreement for every statement below.

1. I have trouble controlling my impulses.	1	2	3	4
2. When I am very happy, I can't seem to stop myself from doing things that can have bad consequences.	1	2	3	4
3. I have trouble resisting my cravings (for food, cigarettes, etc.).	1	2	3	4
4. When I am in great mood, I tend to get into situations that could cause me problems.	1	2	3	4
5. I often get involved in things I later wish I could get out of.	1	2	3	4
6. When I am very happy, I tend to do things that may cause problems in my life.	1	2	3	4
7. When I feel bad, I will often do things I later regret in order to make myself feel better now.	1	2	3	4
8. I tend to lose control when I am in a great mood.	1	2	3	4
9. Sometimes when I feel bad, I can't seem to stop what I am doing even though it is making me feel worse.	1	2	3	4
10. When I am really ecstatic, I tend to get out of control.	1	2	3	4
11. When I am upset I often act without thinking.	1	2	3	4
12. Others would say I make bad choices when I am extremely happy about something.	1	2	3	4
13. When I feel rejected, I will often say things that I later regret.	1	2	3	4
14. Others are shocked or worried about the things I do when I am feeling very excited.	1	2	3	4
15. I would like to learn to fly an airplane.	1	2	3	4
16. It is hard for me to resist acting on my feelings.	1	2	3	4
17. When I get really happy about something, I tendto do things that can have bad consequences.	1	2	3	4
18. I often make matters worse because I act without thinking when I am upset	1	2	3	4
19. When I am really excited, I tend not to think of the consequences of my actions.	1	2	3	4
20. In the heat of an argument, I will often say things that I later regret.	1	2	3	4
21. I tend to act without thinking when I am really excited.	1	2	3	4
22. I always keep my feelings under control.	1	2	3	4
23. When I am really happy, I often find myself in situations that I normally wouldn't be comfortable with.	1	2	3	4
24. When I am very happy, I feel like it is ok to give in to cravings or overindulge.	1	2	3	4
25. Sometimes I do impulsive things that I later regret.	1	2	3	4

APPENDIX K
DEMOGRAPHIC QUESTIONNAIRE

Please answer all questions and clearly indicate your answer.
1) What is your age in years? _____

2) How do you identify your gender?
   ____Female
   ____ Male
   ____Transgender, Transsexual or Intersex
   ____Other: _____
3) In what country were you born? _____

4) Which of the following best describes your racial or ethnic background? (Please select all that apply):
___ African American
___ Asian American (Please specify: _____)
___ European American
___ Latino/a American (Please specify: _____)
___ Middle Eastern American (Please specify: _____)
___ Native American/American Indian or Alaskan Native
___ Other (Please specify: _____)
5) How do you identify in terms of your sexual orientation?
___Asexual: I am not sexually attracted to either men or women
___Bisexual: I am sexually attracted to both men and women
___Gay/Lesbian: I am sexually attracted only to same-sex individuals
___Heterosexual: I am sexually attracted to only opposite-sex individuals
___Other: _____
6) How do you identify your religious affiliation?
___ Buddhist
___Christian: ____
___Islamic
___Jewish
___Pagan
___Agnostic
___Atheist
___Other
7) What is your current standing in college? (please select one):
___ Freshman
___ Sophomore
___ Junior
___ Senior
___ Graduate
___ Unsure

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RESEARCH INTERESTS

• Emotional Regulatory Processes

• Health-Risk Behaviors

Selected Publications and Poster Presentations

Brockenberry, L., Harrell, P.T., Will, K.E., Brandon, T. (2018, February) Facets of Emotion Dysregulation and E-cigarette Use in a College Sample. Poster Accepted for the presentation at the Society for Research on Nicotine and Tobacco Conference, Baltimore, M.D.

Harrell, P.T., Brandon, T.H., Will, K.E., & **Brockenberry, L.** (2018, February). Dripping technology use among young adult e-cigarette users. Society for Research on Nicotine & Tobacco, Baltimore, MD, USA.

Harrell, P.T**.**, Brandon, T.H., Will, K.E., & **Brockenberry, L.** (2018, April). Dripping technology use among young adult e-cigarette users. Reduce Tobacco Use Conference, Norfolk, VA.

Brockenberry, L., Harrell, P.T., Will, K.E., Brandon, T. (2017, November). Emotion Regulation Difficulties and E-cigarette Susceptibility. Virginia Youth Tobacco Project Meeting, Richmond, VA.