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Racial Differences in Tobacco Use and Risk Factors Among Young Adults: Roles of Expectancies and Emotion Regulation

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RACIAL DIFFERENCES IN TOBACCO USE AND RISK FACTORS AMONG YOUNG ADULTS: ROLES OF EXPECTANCIES AND EMOTION REGULATION

by

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ABSTRACT

RACIAL DIFFERENCES IN TOBACCO USE AND RISK FACTORS AMONG YOUNG ADULTS: ROLES OF EXPECTANCIES AND EMOTION REGULATION

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African Americans experience higher mortality from lung cancer and other smoking-related diseases than Caucasian Americans (Kochanek et al., 2016) despite engaging in cigarette and e-cigarette use significantly less or at comparable rates to other racial groups (CDC, 2015; Schoeborn, 2013). During adolescence, smoking prevalence is lower among African Americans than Caucasian Americans, but there is a "cross-over effect" whereby smoking rates become similar later in adulthood (Belgrave et al, 2010). The mechanisms driving this effect are poorly understood. Thus, examining motivating factors for tobacco use, such as outcome expectancies and emotion regulation, may be especially illuminating for young adult African Americans and Caucasian Americans.

Outcome expectancies are robust correlates of many tobacco behaviors including cigarette smoking initiation (Doran, Schweizer, & Myers, 2011), smoking maintenance (Juliano & Brandon, 2004), e-cigarette initiation (e.g., Hendricks et al., 2015), and switching from combustible cigarettes to e-cigarettes (Harrell et al., 2015). Emotion regulation is associated with cigarette smoking recency (Adams et al. 2012) and affect-regulatory smoking expectancies (Johnson et al. 2008). However, there is little research examining how tobacco use and these risk factors associated with tobacco use vary by racial/ethnic group.

The proposed project involved secondary analyses of a dataset funded by the National Cancer Institute that includes students from a Historically Black College or University (HBCU)

and a community college. Questions regarding tobacco use, outcome expectancies, and emotion dysregulation were included.

African Americans reported lower e-cigarette use. However, they did not report higher little cigar use than Caucasian Americans. As expected, current e-cigarette users reported significantly higher positive reinforcement, negative reinforcement, and weight control beliefs, while non-users reported higher negative consequences about e-cigarette use. Caucasian Americans had significantly higher negative consequences and positive reinforcement outcome expectancies, as well as higher DERS goals, strategies, and nonacceptance scores than African Americans which was partially in line with hypothesis. Difficulties in goal setting and higher impulsivity were significant predictors of past-six-month cigar use. Lastly, there was a significant mediation between race and current e-cigarette use via outcome expectancies. Findings indicate that culturally specific interventions for e-cigarette prevention and cessation may be helpful.

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

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CHAPTER I

INTRODUCTION

Tobacco smoking remains a major public health concern in the United States. Cigarette smoking is the most preventable cause of death in the United States, as it accounts for approximately one-fifth of annual deaths in the United States (United States Department of Health and Human Services, 2014). Smoking accounts for 6% to 18% of health care expenditures across different states in the United States (Ekpu & Brown, 2015). Despite this public health concern, approximately 40 million adults smoke cigarettes (Center for Disease Control and Prevention, 2017).

Across several health domains, individuals who identify as Black or African American experience significantly worse health compared to individuals who identify as Caucasian. (Williams, Priest, & Anderson, 2016). Racial health disparities start even before birth (Lu & Halfon, 2003) and extend throughout childhood (Caprio et al., 2008), adulthood (McClellan et al., 2006), and older adulthood (Pappas, Queen, Hadden, & Fisher, 1993). Of note, socioeconomic status (SES), which has been defined as a "complex and multi-dimensional concept comprising a range of factors encompassing economic resources, power and/or prestige" is often promoted as one reason for such health disparities (Braveman et al., 2005, p. 2879).

In line with the research associated with racial health disparities, African Americans have higher death rates from lung cancer and other smoking-related diseases than do Caucasian Americans despite lower or similar rates of use across tobacco products (Haiman et al. 2006; Harper et al. 2007). Further, tobacco use is a significant contributor to the three primary causes of mortality among the African American community (viz., cancer, stroke, and heart disease; Benowitz, 1998; Kochanek et al., 2016; Heron, 2013). Diabetes is the fifth leading

cause of death among African Americans and the risk of developing diabetes is 30–40% higher for cigarette smokers than non-smokers (Heron, 2016; DHHS, 2014). Generally, "upstream" causes of disparities, like poverty and limited health care access, have been a focus on the reduction of disparities (Franks & Fiscella, 2008). Other "downstream" approaches involving better patient-provider interactions and increasing patient participation in health-care decisions have been examined as other ways to combat health disparities (Franks & Fiscella, 2008). However, racial health disparities typically persist amongst all levels of SES (Braveman, Cubbin, et al. 2010; Williams, Mohammed, et al. 2010). Given these findings, it is clear there is a need for more targeted interventions to reduce tobacco use within this vulnerable population.

The purpose of this study is to compare prevalence rates and differences in motivating factors of tobacco use between African Americans and Caucasian Americans. Specifically, this study sought to examine whether risk factors, like emotion regulation and outcome expectancies, may explain differences in tobacco product use. Ideally, this will provide more culturally relevant information regarding tobacco initiation and risk factors to help inform public policy or interventions to address these issues.

Tobacco Prevalence and Initiation Rates

Cigarettes. In 2017, approximately 14 of every 100 U.S. adults aged 18 years or older (14.0%) smoked cigarettes, defined as users who have smoked more than 100 cigarettes in their lifetime (USDHHS, 2014). Of note, current smoking, defined as individuals who have smoked more than 100 cigarettes in their lifetime and reported smoking "every day" or "some days," has declined from 20.9% in 2005 to 14.0% in 2017, and the percentage of ever smokers who have quit has increased from 50.8% in 2005 to 59.0% in 2016 (Center for Disease Control, CDC, 2018). An estimated 9 out of 10 of these cigarette smokers initially tried smoking by age 18, and

virtually all initially engaged in smoking by age 26 (USDHHS, 2012, 2014). Although adolescent smoking in the United States has decreased dramatically since 2011, the likelihood of young adult, defined as adults aged 18 to 26, smoking initiation has increased (Terry-McElrath & O'Malley, 2015). Indeed, nicotine initiation in young adulthood is now more likely than in adolescence (Cantrell et al., 2018; Perry, et al., 2018). Due to the later initial onset of cigarette use among most 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. An enhanced understanding of pathways to cigarette initiation is needed to create relevant programs to prevent use. One of these pathways is e-cigarette use, as e-cigarette use is associated with the use of other tobacco products like cigarettes (NASEM, 2018).

E-cigarette Use. E-cigarette use is particularly high among young adults, with 13.6% of individuals aged 18 to 24 in 2014 currently using e-cigarettes and one-third having tried an e-cigarette at least once (USDHHS, 2016). Young adult is defined as age 18 to 24 due to the heightened risk of prolonged use after initiation before age 25, and the prevalence of e-cigarette use in this population as well (Schoenborn & Gindi, 2015; USDHHS, 2012). Although more current data on young adult usage is lacking, high school student current (past-month) usage grew rapidly in 2018, increasing 77.8% (from 11 to 20.8%) from 2017-2018 as assessed by the National Youth Tobacco Survey (Gentzke et al., 2019). Another national survey, Monitoring the Future (MTF), found that the increases from 2017 to 2018 in vaping nicotine among 12th graders were the largest ever recorded for any substance in the 44 years that MTF has tracked adolescent drug use (Johnston et al., 2019). A meta-analysis of nine longitudinal studies examining adolescents and young adults aged 18 to 30 concluded that probabilities of cigarette initiation were 30.4% for e-cigarette users and 7.9% for non-users (Soneji et al., 2017). Prior e-cigarette

use among high school students was associated with 4 times the odds of ever cigarette use compared to non-users in a longitudinal study (Berry et al. 2019). Further, e-cigarette use is associated with an increased willingness to smoke (Wills et al., 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. Due to the relative novelty of e-cigarettes, there have been few longitudinal studies determining their long-term health effects.

African American Tobacco Use. Compared to Caucasian Americans, African Americans have a different smoking initiation and cessation process. During early adolescence, the prevalence of smoking is lower among African Americans than Caucasian Americans, but smoking initiation rises in late adolescence and early adulthood (Freedman, Nelson, Feldman, 2012; Kandel, Schaffran, Hu, & Thomas, 2011). There is what is dubbed the "cross-over effect" in which African Americans engage in greater onset of cigarette use in their 20's and 30's, and Caucasian Americans engage in greater cessation during this same period, which ultimately causes the prevalence of African American smoking to equal that of Caucasian Americans (Belgrave et al., 2010; Kandel, Schaffran, Hu, & Thomas, 2011; Chen & Jacobson, 2012; Moon-Howard, 2003). In samples, African Americans have later ages of onset, both for age of first cigarette (16.9 vs. 15.6) and age of daily smoking (21.6 vs. 18.9) than those of Caucasian Americans (Roberts et al., 2016). Among late-onset smokers, defined as those who began smoking after age 18, African American smokers had lower quitting rates than Caucasian Americans (33.3% vs. 57.2%; Roberts et al., 2016).

Regarding alternative (non-cigarette) tobacco products, African Americans are also less likely to report ever-use of e-cigarettes compared to Caucasian Americans and Hispanics (Webb

Hooper & Kolar, 2016). However, among African American high school students, cigars are the most used tobacco product (8.8 percent; Arrazola, 2015). For African American adults, the lifetime prevalence of little cigar/cigarillo use is estimated to be 27.4%, with current use estimated at 6.3% (Nyman et al., 2016). Such findings indicate racial differences in types of tobacco products used. However, given the noted information regarding racial health disparities, determining risk factors and pathways to initiate any type of tobacco use is important to prevent such health concerns and address these disparities. As a result, this study sought to examine a young adult African American population, to examine motivating factors influencing use at this pivotal age.

Pathways to Tobacco Smoking

Outcome Expectancies. An outcome expectancy is a construct that originated from social cognitive theory (Bandura, 1977; Bandura, 1986). Social cognitive theory suggests that there are negative and positive consequences that one expects or believes to result from engaging in a behavior (Bandura, 1977; Bandura, 1986). Brandon and Baker (1991) assessed smoking expectancies using a survey of college students. Brandon and Baker have identified four distinct categories of smoking outcome expectancies: negative consequences (e.g., Smoking is taking years off my life), positive reinforcement/sensory satisfaction (e.g., Cigarettes taste good), negative reinforcement/negative affect reduction (e.g., When I am angry a cigarette can calm me down), and appetite/weight control (e.g., Cigarettes help me control my weight). Negative consequences focus on the negative health effects associated with smoking, positive reinforcement focuses on the positive feelings that an individual might receive from smoking, negative affect reduction focuses on the ability of cigarettes to reduce negative emotions, and

appetite-weight control focuses on the ability of e-cigarettes to reduce hunger or maintain an individual's weight (Brandon & Baker, 1991).

Outcome expectancies are indicators of tobacco behaviors including cigarette-smoking initiation (Chassin, Presson, Sherman, & Edwards, 1991; Doran, Schweizer, & Myers, 2011) and smoking maintenance (Brandon & Baker, 1991; Juliano & Brandon, 2004). Outcome expectancies for cigarettes 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). Endorsement of positive smoking outcome expectancies has been associated with a greater risk for cigarette dependence and smoking relapse (Herd, Borland, & Hyland, 2009; Pang, Khoddam, Guillot, & Leventhal, 2014). This may be due to individuals being motivated to continue smoking to obtain the anticipated positive outcomes they believe smoking will provide (Aguirre et al., 2016). Affect reduction outcome expectancies predict future smoking behavior of occasional and daily smokers after college (Wetter et al., 2004). In summary, smoking outcome expectancies robustly predict smoking behaviors.

There have been racial correlates with outcome expectancies such that, Non-Hispanic African Americans report less strong weight control outcome expectancies than Non-Hispanic Caucasian Americans, but do not differ on other smoking outcome expectancies (Sánchez-Johnsen, Ahluwalia, & Fitzgibbon, 2006; Sánchez-Johnsen, Carpentier, & King, 2011; Sánchez-Johnsen, Spring, Sommerfeld, & Fitzgibbon, 2005). African Americans have weaker expectancies regarding the impact of withdrawal effects on cessation (Hendricks et al., 2013). They also have weaker expectancies regarding how effective formal smoking cessation programs are in helping with smoking cessation. This may indicate that cessation programs that address

these concerns may prove to be more useful in engaging smokers in cessation (Hendricks et al., 2013).

E-cigarette Outcome Expectancies. So far, research regarding e-cigarette outcome expectancies is 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 among a sample of e-cigarette users (Morean & L'Insalata, 2017). Another model, proposed by Pokhrel and colleagues (2014) examined e-cigarette expectancies among a sample of college students and identified three additional positive expectancies: social enhancement, affect regulation, and positive sensory experiences (Pokhrel, Little, Fagan, Muranaka, & Herzog, 2014). Further results of this study indicated that higher positive expectancies were associated with a greater chance of current e-cigarette use, defined as past 30-day use. Soule and colleagues (2017) examined positive outcome expectancies among current e-cigarette users. The results of their study found seven different categories (i.e., therapeutic/affect regulation, high/euphoria, sensation enjoyment, perceived health effects, benefits of decreased cigarette use, convenience, and social impacts).

E-cigarette users with a history of cigarette smoking believe that e-cigarettes are less addictive than cigarettes, but more than nicotine replacement therapy (NRT; Harrell, Marquinez, et al., 2015). Further, participants also believed that e-cigarettes cause less withdrawal, are more socially acceptable than cigarettes and have lower health risks than both cigarettes and NRTs. 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).

Such findings regarding e-cigarette outcome expectancies indicate that they involve beliefs about emotion regulatory processes and differ concerning cigarette outcome expectancies.

Outcome expectancies have also been associated with e-cigarette use and susceptibility in young adults (Pokhrel, Little, Fagan, Muranaka, & Herzog, 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.

Negative Affect. It is possible that negative affect plays a role in making individuals more susceptible to initiate smoking. A study of adolescents found that individuals who had depressive/ anxiety symptomology were twice as likely to be cigarette smokers (Patton et al., 1996). Further, due to nicotine's negatively reinforcing effects, individuals with depressive symptomology tend to be at a higher risk of cigarette smoking (Audrain-McGovern et al., 2012; Mathew et al., 2017)). Further, despite recent trends in US smoking rates, these declines are not seen among samples of individuals who have mood or anxiety disorders (Cook et al., 2014). However, given the increased information pertaining to negative affect and use, this study sought to examine the impact of regulating one's affect on tobacco use.

Emotion Regulation. Research has described emotion, or affect, not as a singular construct, but made of several separate aspects, like mood, initial emotional response intensity, and emotion regulation processes (Davidson et al., 2000). Emotions are described as "multi-

componential processes" (Gross, 2002, p. 282) that change over time. Early conceptualizations of emotion regulation focused on the ability to control both the emotional experience and expression, as well as reducing emotional arousal (Cortez & Bugental, 1994; Garner & Spears, 2000; Kopp, 1989; Zeman & Garber, 1996). However, later theory has suggested that deficiencies in the capacity to experience and differentiate the full range of emotions and respond spontaneously may prove to be similarly maladaptive as the ability to attend to and modulate strong negative emotions (Gross & Munoz, 1995; Paivio & Greenberg, 1998). Given these differences in the theory, Gratz and Romer (2002) examined different potential aspects of emotional regulation through an examination of theory and use of common factors analysis. Their conceptualization of emotion regulation involves (a) *awareness* and understanding of emotions (e.g., "I am attentive to my feelings"), (b) *acceptance* of emotions (e.g., "When I am upset, I feel bad for feeling that way"), (c) ability to control *impulsive behaviors* and behave in accordance with desired goals when experiencing negative emotions (e.g., "When I am upset, I lose control over my behaviors"), and (d) ability to use situationally appropriate emotion regulation *strategies* flexibly to modulate emotional responses as desired to meet individual goals and situational demands (e.g., "When I'm upset, it takes me a long time to feel better"). Two other dimensions, focusing on the *clarity* in which individuals know the emotion they are experiencing (e.g., "I have no idea how I am feeling") and their (f) ability to concentrate and accomplish *goals* when experiencing negative emotions were added after factor analysis. These six different conceptualizations were translated into six subscales (awareness, acceptance, impulse, strategies, clarity, and goals).

Smokers may use smoking as an emotion regulation strategy to modify their own emotion arousing situations or their reactions to it. Of note, Gratz and Romer's conceptualization

includes a component of impulsivity, specifically in response to negative emotions. Negative urgency, a component of impulsivity, is associated with cigarette smoking status (Lee, Peters, Adams, Milich, & Lynam, 2015). It is defined as the tendency to commit rash action in response to intense negative affect (Whiteside & Lynam, 2001).

Further, it has been argued that negative affect regulation is a primary motive for drug use in general. For example, 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 appear to be 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 these negative emotions. 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.

Overall, research indicates that difficulties with emotion regulation are positively associated with the following: past-hour cigarette smoking (Adams et al. 2012), affect-regulatory smoking expectancies (Johnson et al. 2008), and perceived barriers for quitting and certain reasons (motives) for smoking (e.g., stimulation, habitual, and sensorimotor reasons Gonzalez et al. 2008). Further, greater emotion regulation difficulties have been significantly associated with greater internal barriers to cessation and negative affect reduction smoking

motives (Johnson & McLeish, 2016). Deficits in emotion regulation have been noted to manifest as difficulty tolerating negative emotional states (Gratz & Tull 2010). Emotion dysregulation has also been associated with greater self-reported craving and attentional bias toward smoking-related cues, as well as earlier lapses after smoking cessation (Szasz et al. 2012; Farris et al. 2016). Of note, these studies have examined the association between cigarette behaviors and emotion regulation primarily among Caucasian American samples, with little work examining such associations with other tobacco use (e.g., e-cigarettes) or understanding the role of racial or ethnic factors.

Versella, Borges, Lin, and Leyro (2018) explored the association between internalizing symptoms and vulnerabilities in a sample of adult dual and e-cigarette only users with and without a prior history of cigarette use. Their study noted that e-cigarette only users without any history of cigarette use reported more stress and anxiety symptoms than e-cigarette users with a history of cigarette use. Further, it was reported that e-cigarette users without a history of cigarette use reported greater anxiety and emotion dysregulation than dual users of both tobacco products. These results suggest differences in emotion dysregulation depending on the type and history of tobacco products. Of note, this study was predominately Caucasian (80.3%), therefore there is difficulty determining the relevancy of such findings across more diverse subgroups, like African Americans. Further, this study does not include a subgroup of non-users in which to compare baseline stress, anxiety, and emotion dysregulation difficulties as a control. However, this study does provide unique information regarding differences in emotion regulation among different groups of tobacco users. Further, the in-depth examination of this study allows for an increased understanding of the effect of emotion dysregulation of different tobacco products.

Since the above research notes the importance of psychological distress and negative affect in smoking behavior and outcome expectancies, understanding how they affect emotion competencies are necessary 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. Further, research by Rogers and colleagues (2018) solidifies the importance of emotion regulation in cessation success. These authors examined the effects of emotion dysregulation in changes in tobacco withdrawal symptoms among cigarette smokers. Their study indicates that greater emotion dysregulation is associated with greater quit-day withdrawal symptoms, specifically indicating that emotion dysregulation is associated with more intense withdrawal on quit day. Such findings indicate that more concentrated efforts in emotion regulation skills may be beneficial to increase smoking cessation rates.

African American Emotional Coping

Concerning differences in emotion regulation and coping, literature has defined African Americans as using "Africultural" coping (Daly et al., 1995; Utsey, Adams, & Bolden, 2000). Africultural coping is defined as strategies used specifically by African Americans (Daly et al., 1995; Utsey, Adams, et al., 2000). These practices generally include avoidance and distraction from activating emotion, engaging in spiritual or religious activities, using spiritual objects, and connecting with others to deal with an identified problem. These types of culture-specific coping strategies have been examined and supported in the literature (i.e., Gaylord-Harden & Cunningham, 2009; Lewis-Coles & Constantine, 2006; Salloum & Lewis, 2010; Utsey, Bolden, Lanier, & Williams, 2007). Of note, gender differences amongst these coping strategies have not

been found and may not be a necessary demographic to consider for the current study (Constantine, Donnelly, Meyers, 2002; Lewis-Coles & Constantine, 2006).

It has been noted that African Americans use more emotion-focused and avoidant coping strategies, in comparison to problem-focused coping, than do Caucasian Americans (Plummer & Slane, 1996). Problem-focused coping is defined as an individual's focus on regulating the stressful situation in comparison to emotion-focused coping, which is defined as the regulation of one's emotional response instead (Utsey, Adams, & Bolden, 2000). Vassilliere, Holahan, & Holahan (2016) have also supported this assumption that African Americans use more emotion-focused coping strategies. Among an adult sample, these authors found that African Americans endorsed higher emotion-focused coping defined as a sum of different emotion coping aspects (i.e., focus on and venting of emotion, denial, and behavioral disengagement; Vassilliere, Holahan, & Holahan, 2016). Emotion suppression is also higher among African American samples in comparison to Caucasian American samples (Gross & John, 2003). These results have been replicated in other studies (Bautista, 2013; Lunsford et al., 2006).

Regarding stress, research with African American samples has also noted the significant impacts of perceived stress on nicotine dependence and cigarettes smoked per day (Hooper, Dietz, Wilson; 2016). Further, it has been indicated that symptoms of depression are greater among low-income African American smokers, compared to a comparable Caucasian sample (Hooper, Baker, &McNutt, 2014; Webb Hooper & Kolar, 2015). While depressive symptomology concerning tobacco use has been examined, distress and its impact on tobacco product use have also been examined in the literature.

High distress levels among African American smokers are associated with depressive symptomology and perceived stress as well (Berg et al., 2012). Concerning racial/ethnic

differences, psychological distress is positively associated with the odds of smoking and the number of cigarettes smoked per day, specifically for Caucasian American adults, but not African American or Hispanic adults. (Kiviniemi, Orom, & Giovino, 2007). Other research has failed to find the association between psychological distress and smoking behavior (Ellis, Orom, Giovino, & Kiviniemi, 2015). Of note, neither of these studies have examined psychological distress in relation to e-cigarette use. Further, these studies did not specifically determine the effect on how regulation of distress has influenced these results. To the knowledge of this author, there have been no studies looking at these regulation differences in relation to substance use, specifically e-cigarette use, except for work done by Hershberger, Conners, Um, and Cyders (2018). The authors examined the impact of impulsivity and e-cigarette attitudes on e-cigarette use in a sample of adults. Urgency, an impulsive trait defined as a tendency to commit rash action in response to intense affect, was related to increased e-cigarette attitudes. However, there was no significant association between impulsivity traits and e-cigarette use. Given this, assessing the degree to which conceptualizations of coping for both African American and Caucasian American tobacco users are associated with tobacco use can provide a framework to enact more culturally specific regulation strategies for prevention or during cessation. The above review provides information related to how depressive symptomology and distress relate to racial differences in tobacco product use. However, little research has determined the impact of regulating affect on tobacco use and initiation.

Present Study

Negative affect reduction has been noted as a motive for drug use, with little research examining how emotion regulation can impact drug initiation and beliefs (Baker, Piper, McCarthy, Majeskie, & Fiore, 2004). Further, culture-specific coping strategies focusing on avoidance and regulation of an individual's affect in comparison to the situation causing the affect are primary strategies for African Americans, while Caucasian Americans are more likely to engage in problem-focused strategies (Bautista, 2013; Jaser et al., 2012). Further, there is a lack of research regarding differences in emotion regulation across racial/ethnic groups and by tobacco product use. The purpose of this study is to compare prevalence rates of tobacco use between African American and Caucasian American samples from a Historically Black College or University (HBCU) and a Community College. This study seeks to examine differences in prevalence rates by type of product and to examine whether risk factors, like emotion regulation and outcome expectancies, differ within this sample. This study seeks to examine the mediational effect of emotion regulation on the relationship between race and e-cigarette/cigarette/little cigar use. This study also seeks to examine the mediational effect of outcome expectancies on the relationship between race and e-cigarette/cigarette/little cigar use. In summary, the current study examined the hypotheses described below. Hypotheses are further outlined in table 2.

Hypothesis 1a: African Americans across institutions would report lower 30-day e-cigarette use than Caucasian Americans.

Hypothesis 1b: African Americans across institutions would report higher past six-month little cigar use than Caucasian Americans.

Hypothesis 2a: Three e-cigarette outcome expectancy scales (negative reinforcement, positive reinforcement, appetite/weight control) would be higher in the e-cigarette user sample. Negative consequences outcome expectancies would be lower in the non-user sample.

Hypothesis 2b: All four e-cigarette outcome expectancy scales would be higher among the Caucasian American sample.

Hypotheses 2c: The relation between race (Caucasian/African American), and e-cigarette/cigarette/little cigar use, controlling for gender and age, would be mediated by e-cigarette outcome expectancies (negative reinforcement, positive reinforcement, appetite/weight control, negative consequences). Depicted in Figure 1.

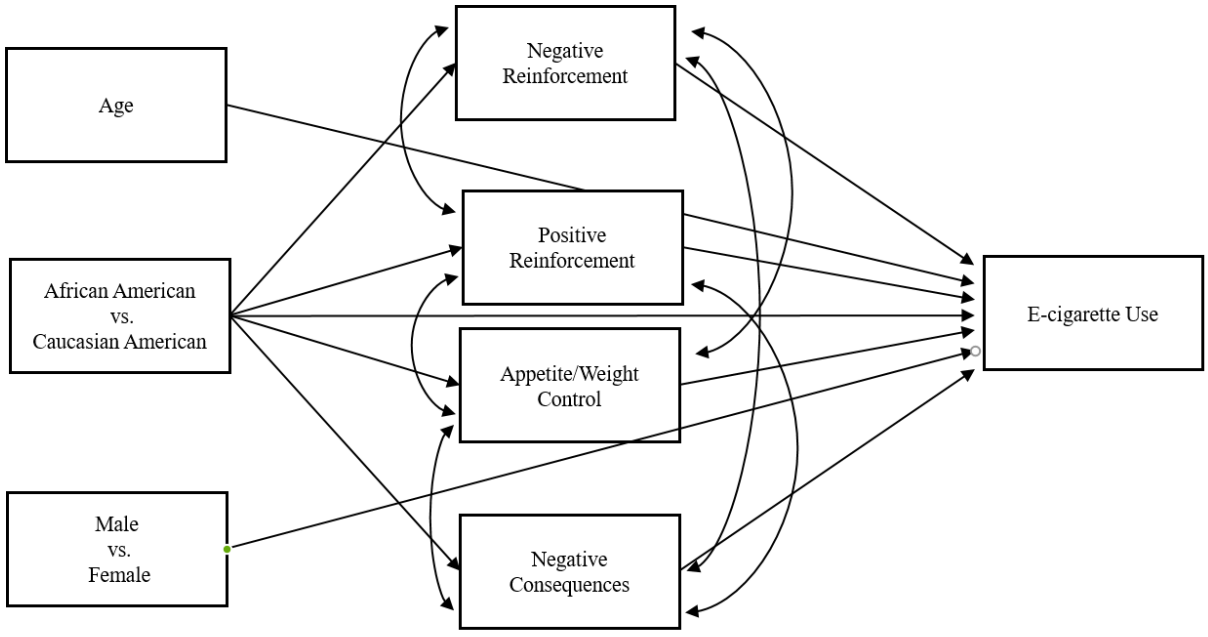
Hypothesis 3a: The Differences in Emotion Regulation Scale (DERS) Awareness, Clarity, and Non-acceptance subscales would be higher within the African American sample, and the Impulse, Goals, and Strategies subscales would be higher among the Caucasian American sample.

Hypotheses 3b: All DERS subscales (Awareness, Clarity, Goals, Impulse, Nonacceptance, Strategies) would be positively associated with both current e-cigarette use and cigarette/little cigar use.

Hypotheses 3c: Emotion regulation subscales (Awareness, Clarity, Goals, Impulse, Nonacceptance, Strategies) would mediate the relation between race (Caucasian/African American) and e-cigarette/cigarette/little cigar use, controlling for gender and age. Depicted in Figure 2.

Figure 1

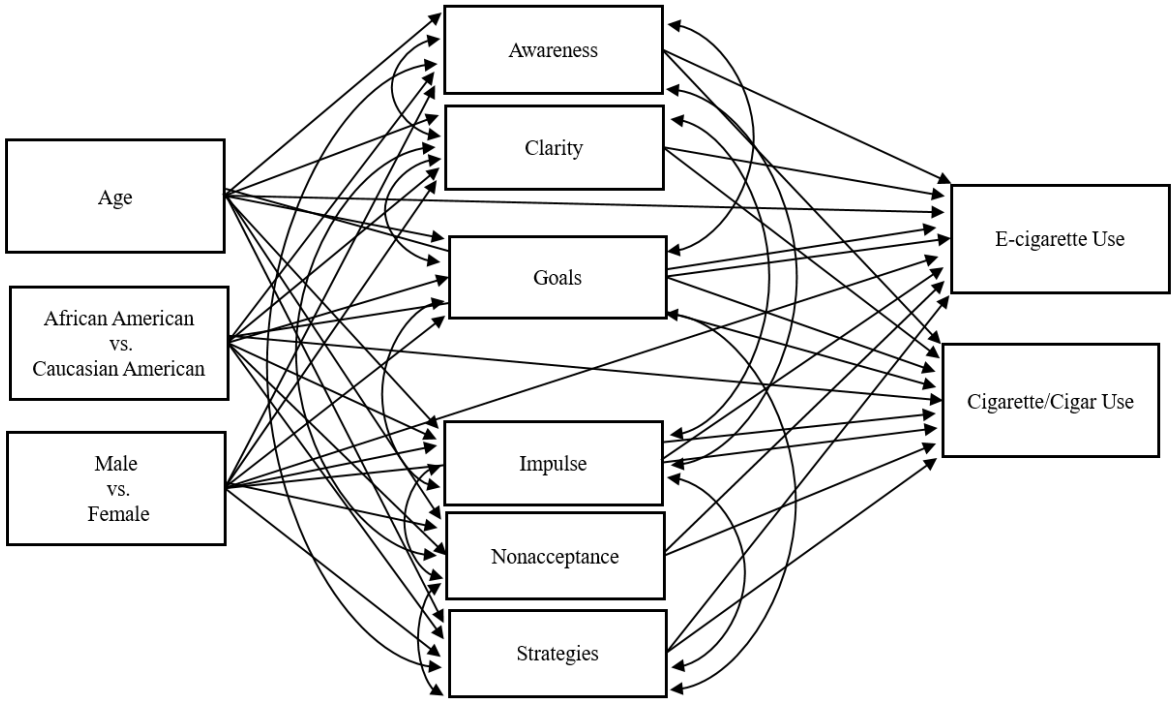
Proposed Path Analysis Depicting Associations Between Race, E-cigarette Outcome Expectancies, and E-cigarette Use



Note. Path analysis depicting race (Caucasian American as the reference group), age, and gender (Female as the reference group) as the exogenous variables, e-cigarette outcome expectancies (negative reinforcement, positive reinforcement, appetite/weight control, and negative consequences) as mediators and e-cigarette use as the endogenous variable.

Figure 2

Proposed Path Analysis Depicting Association Between Race, Emotion Regulation Difficulties, and Tobacco Use



Note. Path analysis depicting race (Caucasian American as the reference group), age, and gender (Female as the reference group as exogenous variables, DERS subscales (awareness, clarity, goals, impulse, nonacceptance) as the mediators, and e-cigarette use, and cigarette/cigar use as the endogenous variables.

CHAPTER II

METHOD

Participants

A pre-collected database, which consists of a convenience sample of adults, was utilized. This data were collected as part of a larger IRB-approved study that focused on creating a psychometrically valid instrument to measure e-cigarette attitudes. The sample was composed of students in the Hampton Roads area, specifically Tidewater Community College (TCC) and Norfolk State University (NSU). Eligibility criteria consisted of meeting the age range of 18-24, being a current college student, and identifying as Non-Hispanic Caucasian American or Non-Hispanic African American. The sample participants were recruited through current school emails, which were provided by the institution itself. Offices of Institutional Effectiveness provided all e-mail addresses for enrolled students ages 18-24. Data collection began in May of 2017 ended in September of 2017. For TCC, we e-mailed all enrolled students 18-24 years old (7,861) invitations to complete the survey. Of these students, 1,876 (23.9%) opened the invitation e-mail, 60 (0.07%) opted out, 873 (11.1%) clicked through to participate, 734 (9.3%) started the survey, and 571 (7.3%) completed the full survey. At Norfolk State University (NSU; a historically black university), we e-mailed 3,387 students. Of these students, 1,540 (45.5%) opened the invitation e-mail, 7 (0.02%) opted out, 1,011 (29.8%) clicked through to participate, 842 (24.9%) started the survey, and 627 (18.5%) completed the full survey, yielding a sample of 1570 that completed the survey and 1198 that completed the survey in its entirety. Individuals who did not identify as Non-Hispanic African American, Non-Hispanic Caucasian American, or identified as transgender were then removed from the total sample, yielding a final sample size of 1184. Demographic information for the final sample is included in tables 1 and 2.

Table 1

Demographic and Tobacco Prevalence Data of Participants

	African American (n=841)	Caucasian American (n=343)
Female	608 (72.3%)	230 (67.1%)
Male	233 (27.7%)	113 (32.9%)
Age (Mean)	20.04	20.43
TCC	179 (21.3%)	312 (91.0%)
NSU	662 (78.7%)	31 (9.0%)
Cigarette Ever-Use	22.9%	46.1%
Cigarette Past 6-month Use	5.6%	19.6%
Cigar Ever-Use	44.7%	39.3%
Cigar Past 6-month Use	19.4%	14.0%
Cigarette Current Use	4.2%	15.5%
E-cigarette Ever-Use	39.2%	56.2%
E-cigarette Past 6-month Use	14.3%	30.0%
E-cigarette Current Use	6.2%	20.9%

Note. N = 1184. The total size of the sample is 1570. The selected sample size of Non-Hispanic Caucasian Americans and African Americans was 1184.

Table 2

Demographic and Tobacco Prevalence Data of Participants by Institution

	TCC (*n*=491)	NSU (*n*=693)
Female	333 (67.8%)	505 (72.9%)
Male	158 (32.2%)	188 (27.1%)
Age (Mean)	20.55	19.86
Cigarette Ever-Use	39.9%	21.7%
Cigarette Past 6-month Use	15.9%	4.8%
Cigar Ever-Use	42.6%	47.2%
Cigar Past 6-month Use	14.9%	18.6%
Cigarette Current Use	12.6%	3.8%
E-cigarette Ever-Use	54.3%	41.1%
E-cigarette Past 6-month Use	24.8%	13.4%
E-cigarette Current Use	16.9%	5.9%

Note. N = 1184.

Measures

Demographic Variables. Demographic information was collected from participants. Information collected included each participant's age, gender, racial/ethnic background, and highest education level. Further, the school that each participant attended was collected as well. Race was assessed using a multiple-response question. Participants could select more than one ethnic/racial identity. Only individuals who solely identified as Non-Hispanic Caucasian American or Non-Hispanic African American were included in analyses. Individuals who identified as biracial were not included in analyses given that dichotomous examination of the sample allows for a clearer examination of proposed analyses. Non-Hispanic African American and Caucasian American participants were used for analyses, yielding 841 African American participants, and 343 Caucasian American participants. These questions are displayed in Appendix A.

Cigarette and Little cigar use. Cigarette and little cigar use were examined with questions derived from the National Youth Tobacco Survey (Office of Smoking and Health, 2018; NYTS, See Appendix A). Two questions examining ever-use were used. The questions, "Have you ever used a cigarette, even one or two puffs?" and "Have you ever used a little cigar or cigarillo, even one or two puffs?" had three responses (i.e., Yes, Yes in past 6 months, No). Items were created by the Office of Smoking and Health Epidemiology branch, with consultation from local, state, and federal representatives, including the FDA (Office of Smoking and Health, 2018).

The following question derived from the NYTS was also used to collect data regarding current use, "During the past 30 days, on how many days did you smoke cigarettes or little cigars?" (Office of Smoking and Health, 2018). Based on the prior research from the U.S.

Department of Health and Human Services (2016), individuals who had never used a cigarette were considered "Never cigarette/little cigar users". Individuals who had tried a cigarette or cigar at least once, but not within the past month were considered "ever" users, and individuals who had used a cigarette or cigar within the past month were considered "current" users. This same stratification was used for this study. The questions are displayed in Appendix B.

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 three responses (i.e., Yes, Yes in past 6 months, No): "Have you ever used (or tried) a vaping device (e.g., e-cigarettes, vapes, vape pens, tanks, etc.), even one or two puffs?". To determine the frequency of e-cigarette use, a question regarding 30-day use was also included (i.e., "During the past 30 days, on how many days did you use electronic cigarettes or e-cigarettes?"). Based on the prior research from 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. Items are displayed in Appendix C. Participants were provided with a definition of "vaping device" at the beginning of the survey. Vaping was defined as "electronic devices used to vaporize and inhale nicotine, such as electronic cigarettes, e-cigarettes, vapes, vape pens, mods, tanks, and e-hookah".

Difficulties in Emotion Regulation Scale. Emotion regulation was examined using the Difficulties in Emotion Regulation Scale-18, which is comprised of 18 items (DERS-18; Victor & Klonsky, 2016, see Appendix D). This measure was condensed from the 36-item original DERS measure, with the three items with the highest factor loading for each subscale included in the brief version (Gratz & Roemer, 2004; see Appendix I). Items were rated on a 5-point Likert-

type scale (1 = *Almost never* to 5= *Almost always*). The Difficulties in Emotion Regulation Scale consists of six subscales, all of which measure a unique aspect of emotion regulation according to Gratz and Romer's (2004) conceptualization. The six subscales are Nonacceptance of Negative Emotional Responses (e.g. "When I'm upset, I feel embarrassed for feeling that way"), Goal-Directed Behavior When Distressed (e.g., "When I'm upset I have difficulty focusing on other things"), Impulsive Behaviors When Distressed (e.g., "When I'm upset, I lose control over my behaviors"), Limited Access to Effective Emotion Regulation Strategies (e.g., "When I'm upset, I believe that I will remain that way for a long time"), Lack of Emotional Clarity (e.g., "I am confused about what I feel"), and Lack of Emotional Awareness (e.g., "I am attentive to my feelings"). Each subscale consists of three items. Greater problems with emotion regulation are indicated by higher scores on the measure. In the original study for the original measure, the measure displayed good test-retest reliability in a student sample (ρ_t = .88; Gratz & Roemer, 2004). Subscale test-retest reliabilities ranged from *r*= .57 to *r*=.89 as well (Gratz & Roemer, 2004). The measure has been shown to have high internal consistency in a non-clinical sample (α =.93, Gratz & Roemer, 2004). For the DERS-18, internal consistency was retained, with alphas ranging from .77 to .90 for the subscales, and an overall alpha of .91 for the global score (Victor & Klonsky, 2016). Correlations between the DERS and DERS-18 were high (.92 to .98), indicating concurrent validity. For this study, all subscales were used to examine the proposed hypotheses. Items are provided in Appendix D. Internal consistency for the awareness (α= .82), clarity (α= .81), goals (α= .88), impulse (α= .89), nonacceptance (α= .88), and strategies (α= .83) were appropriate.

Short Form Vaping Consequences Questionnaire. E-cigarette beliefs were examined using the Short Form Vaping Consequences Questionnaire (S-SVQ; Morean & L'Insalata, 2017;

see Appendix F). This 21-item measure is an adaptation of the Short Form Smoking Consequences Questionnaire (S-VCQ; Myers, McCarthy, MacPherson, & Brown, 2003). Individuals rated each item based on their perception of the likelihood of its occurrence when they vape (0 = *Completely unlikely* to 9 = *Completely likely*). This measure is comprised of four specific subscales describing unique components of e-cigarette beliefs. Those subscales are Negative Consequences (e.g., Vaping takes years off my life; 4 items), Positive Reinforcement (e.g., E-cigarettes taste good; 5 items), Negative Reinforcement (e.g., When I am angry an e-cigarette can calm me down; 7 items), and Appetite/Weight Control (e.g., Vaping helps me control my weight; 5 items). Participants were given a definition of "vaping device" at the beginning of the survey to ensure that they understood the focus of this survey. The S-SVQ has internal consistencies for the four subscales ranging from .85 to .94 in an adult sample (Morean & L'Insalata, 2017). Additionally, internal consistencies were adequate in another adult sample (i.e., negative consequences, $\alpha = .86$; positive reinforcement, $\alpha = .88$; negative reinforcement, $\alpha. = 90$; appetite/weight control $\alpha. = 95$; Morean & L'Insalata, 2017). Further, subscales (positive reinforcement, negative reinforcement, and appetite/weight control) have been positively associated with consistent e-cigarette use (Morean & L'Insalata, 2017). Additionally, increases in self-report of positive reinforcement, negative reinforcement, and appetite/weight control subscales have been associated with increased e-cigarette dependence (Morean & L'Insalata, 2017). All four subscales were used in analyses. Items used are provided in Appendix E. Internal consistencies for the negative consequences ($\alpha= .87$), positive reinforcement ($\alpha= .90$), negative reinforcement ($\alpha= .95$), and appetite/weight control ($\alpha= .89$) scales were appropriate.

Procedure

Before recruitment, the study received approval from the appropriate Institutional Review Boards. Participants were recruited through their student emails. Students were required to confirm their status by using a school email to receive access to the survey. Participants reviewed general information about the study and completed informed consent. No attention checks were used in the survey and participants were compensated with a $10 Amazon gift card.

Data Analysis

IBM SPSS Statistics Version 25.0 and IBM SPSS AMOS 25.0 were used to analyze the results of this present study. Individuals who identify as Non-Hispanic African American and Non-Hispanic Caucasian American were included in analyses. Individuals who identify as biracial or Hispanic were not included in analyses as dichotomous responding allows for a clearer examination of the proposed paths. Only individuals who identified their gender as male or female were included in analyses, as dichotomous responding is necessary to determine the relationship between gender and the outcome variables. Further, there is an insufficient amount of data about other gender identities. The current study collected data from 5 individuals who identify as transgender.

To examine Hypotheses 1a and 1b, two univariate binary logistic regression analyses were used to test the contribution of race in determining the likelihood that a participant engaged in e-cigarette use or little cigar use. To determine the minimum sample size needed for hypotheses 1a, with a power level of .80, which is an adequate measure of power (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). Prior research reported an adjusted odds ratio of .46 for current e-cigarette use among African

Americans, with Caucasian Americans as the reference group (Webb Hooper & Kolar, 2016). These ratios were inputted into G*Power 3.1 to determine appropriate effect sizes for power analysis. For hypothesis 1a, the power analysis for a logistic regression examining current e-cigarette use, using an alpha level of .05, indicated a total sample size of 92 was needed. This required sample size was met. To determine the minimum sample size needed for hypotheses 1b, with a power level of .80, which is an adequate measure of power (Cohen, 1992), a power analysis was conducted. Prior research reported adjusted odds ratios of 1.48 for current cigar use, among African Americans with Caucasian Americans as the reference group (Cullen et al., 2011). For hypothesis 1b, the power analysis for logistic regression examining past six-month cigar use indicated a minimum sample size of 328. The study exceeded the anticipated sample size for hypotheses 1b.

To assess hypothesis 2a, a one-way Multivariate Analysis of Covariance (MANCOVA) was used to examine the impact of e-cigarette use on the four e-cigarette outcome expectancies. Power analysis for hypotheses 2a, using a Multivariate Analysis of Covariance (MANCOVA) examining the differences in outcome expectancies by e-cigarette use was conducted. Prior research has reported vaping frequency effect sizes of $\eta_p^2 = .02$ for positive reinforcement, negative reinforcement, and appetite weight/control subscales and $\eta_p^2 < .01$ for the negative consequence's subscale of the Short Form Vaping Consequences Questionnaire (S-VCQ) (Morean & L'Insalata, 2017). The $\eta_p^2 = .02$ effect size was used for power analysis as this effect was confirmed for three out of the four subscales being examined. This value was converted into a Cohen's f value of .143 through G*Power 3.1. The power analysis for a MANCOVA with four dependent variables (e-cigarette expectancies), two groups (e-cigarette user, non-user), and four

covariates (institution, date of survey completion, age, gender) with a power level of .80, and an alpha level of .05, and *f* of .143 indicated a necessary total sample size of 261.

Hypothesis 2b was examined using a one-way Multivariate Analysis of Covariance (MANCOVA) examining the effect of race on the four e-cigarette outcome expectancies. For hypothesis 2b, a power analysis using a Multivariate Analysis of Covariance (MANCOVA) examining the differences in outcome expectancies by race was conducted. Research examining racial differences in smoking outcome expectancies have not reported effect sizes (Sánchez-Johnsen, Ahluwalia, & Fitzgibbon, 2006; Sánchez-Johnsen, Carpentier, & King, 2011). Therefore, the power analysis was conducted using a standard medium effect size of *f*=.25 (Cohen, 1992). The power analysis for a MANCOVA with two groups (African American, Caucasian American), 4 dependent variables (e-cigarette expectancies), and four covariates (institution, date or survey completion, gender, age) with a power level of .80, and an alpha level of .05, and *f* of .25 indicated a necessary total sample size of 179.

For hypothesis 2c, a path analysis was conducted to examine the mediated effects of outcome expectancies on the relationship between race and cigarette/little cigar use and e-cigarette use. Weston and Gore (2006) provide a guideline for model identification, this was used to develop models for which model fit statistics can be used. Models can be just-identified, over-identified, or unidentified. Over-identified models have the necessary degrees of freedom to use model fit statistics (Weston & Gore, 2006). An overidentified model is a model in which the estimated parameters are less than the number of data points, defined as variances and covariances amongst all variables (Weston & Gore, 2006). There are 8 observed variables, or *p* variables, in this proposed path analysis, and using the formula provided by Weston and Gore (2006; p (p + 1)/2), there are 36 data points that encompass all possible variances and

covariances amongst the variables. A total of 16 parameters were estimated: 11 direct paths and 5 error variances. As a result, there are a total of 20 degrees of freedom remaining, indicating that this is an over-identified model and that fit statistics can be used. Overall, there are 5 endogenous variables, and 3 exogenous variables in the proposed model.

There are several different techniques used to identify the necessary sample size when conducting structural equation modeling techniques, such as path analyses. Guidelines to ensure a stable model include 1) a minimum sample size of 200 or 2) ensuring the ratio of sample size (*N*) to parameters estimated (*q*) be at least 10:1 (Kyriazos, 2018). Another technique is derived from guidelines from O'Rourke and Hatcher (2013), which was modified from Cohen's (1992) guide to determine sample size requirements. O'Rourke and Hatcher recommend 3) using the correct degrees of freedom (*N*-1) from the predictor variables and detecting a medium effect. Given these techniques and guidelines, the archival data used for this proposed analysis much exceeds 200, meeting the requirement for the first technique. For the second technique, the parameters (*q*) being estimated are 16, indicating a minimum sample size of 160 to comply with the 10:1 recommended ratio. The recommended sample size for the first path analysis incorporating outcome expectancies (Figure 1, Hypothesis 2c), to detect a medium effect size, with 7 predictor variables is 100. Given the required sample sizes noted above, the study proposed a minimum sample size of 200, as that sample size was the most conservative. This study exceeded the anticipated sample size for hypotheses 2c.

To examine hypothesis 3a, a Multivariate Analysis of Covariance (MANCOVA) examining the effect of race on the six DERS subscales was completed. For hypothesis 3a, a power analysis to determine the appropriate sample size for the MANCOVA examining mean differences in Difficulties in Emotion Regulation (DERS) subscales by race was conducted.

Based on theory and prior literature, we anticipated a standard medium effect size (Gratz & Roemer, 2004; Gross & John, 2003; Neumann et al., 2010; Ritschel et al., 2015). Therefore, the power analysis was conducted using a standard medium effect size of f=.25 (Cohen, 1992). The power analysis for a MANCOVA with two groups (African American, Caucasian American), 6 dependent variables (DERS subscales), and four covariates (institution, date of survey completion, gender, and age) with a power level of .80, and an alpha level of .05, and f of .25 indicated a necessary total sample size of 270.

Hypothesis 3b was examined using two univariate binary logistic regression analyses to test the contribution of DERS subscales in determining the likelihood that a participant engaged in e-cigarette use or little cigar/cigarette use. A power analysis was also conducted. Research examining DERS subscales and tobacco use had not provided effect sizes or regression coefficients to convert into effect sizes (Adams et al. 2012; Versella, 2018). Therefore, the power analysis was conducted using a standard medium effect size of f^2=.15 (Cohen, 1992). The power analysis for three binary logistic regressions with a power level of .80, and an alpha level of .05, and f^2 of .15 indicated a necessary total sample size of 98. This study met this requirement.

To assess hypothesis 3c, a path analysis was used to examine the mediational effect of outcome expectancies on the relationship between race and e-cigarette use. There are 11 variables, or p variables, in this proposed path analysis, and using Byrd's formula (p (p + 1)/2), there are 78 data points that encompass all possible variances in covariances amongst the variables. There was a total of 32 parameters that were estimated: 24 direct paths and 8 error terms for all endogenous, or dependent variables to assess how much variation in each variable was explained by the model. Overall, there are 8 endogenous variables and 3 exogenous

variables in the proposed model. As a result, there are a total of 46 degrees of freedom remaining, identifying the model as over-identified and indicating fit statistics can be used.

For the power analysis, a minimum sample size of 200 would also be necessary to meet the requirement of the first technique described for hypothesis 2c. For the second technique, the predictor variables (q) being estimated in the proposed analysis is 46, indicating a minimum sample size of 460 to comply with the 10:1 recommended ratio (Kyriazos, 2018). Given the O'Rourke and Hatcher guidelines (2013), the recommended sample size for the second path analysis incorporating e-cigarette outcome expectancies (Figure 2, Hypothesis 3c), to detect a medium effect size, with nine predictor variables is 107. Given these recommended sample sizes above, this study proposed a required sample size of 480, as this was the most conservative minimum sample size provided. This study exceeded the anticipated sample size and continued with planned analyses. Power analysis information is provided in Table 3.

Table 3

Depicting hypotheses, power analyses, and analyses for the proposed study

Hypothesis	Power Analysis	Significant Covariates	Statistical Analyses
Hypothesis 1a: African Americans across institutions would report lower e-cigarette use than Caucasian Americans.	α= .05 Power of .80. Effect size[1]: Odds ratio of .46 Total Sample Size: 68	Gender Institution Age Date of Survey Completion	Univariate Binary Logistic Regression
Hypothesis 1b: African Americans across institutions would report higher little cigar use than Caucasian Americans.	α= .05 Power of .80. Effect size[2]: Odds ratio of 1.02 and 1.46 Total Sample Size: 352	Institution	Univariate Binary Logistic Regression
Hypothesis 2a: All three positive e-cigarette outcome expectancy scales (negative reinforcement, positive reinforcement, appetite/weight control)) would be higher in the e-cigarette user sample. Negative consequences would be lower in the e-cigarette user sample.	α= .05 Power of .80. Effect size[3]: f = .143 Total Sample Size: 787	Gender Institution Age Date of Survey Completion	Analysis of Covariance
Hypothesis 2b: All four e-cigarette outcome expectancy scales, especially appetite/weight control, would be higher among the Caucasian American sample.	α = .05 Power of .80. Effect size[4]: f=.25 Total Sample Size: 128	Gender Institution Age Date of Survey Completion	Analysis of Covariance
Hypotheses 2c: The relation between race (Caucasian/African American), and e-cigarette/cigarette/little cigar use, controlling for gender and age, would be mediated by e-cigarette outcome expectancies (negative reinforcement, positive reinforcement, appetite/weight control, negative consequences). Depicted in Figure 1.	α = .05 Power of .80. Effect size[5, 6]: f = .25 Total Sample Size: 220	Gender Age	Path Analysis

Table 3 (Continued)

Hypothesis	Power Analysis	Significant Covariates	Statistical Analyses
Hypothesis 3a: The Differences in Emotion Regulation Scale (DERS) Awareness, Clarity, and Non-acceptance subscales would be higher within the African American sample, and the Impulse, Goals, and Strategies subscales would be higher among the Caucasian American sample.	α= .05 Power of .80. Effect size[4]: f=.25 Total Sample Size: 128	Gender Institution Age Date of Survey Completion	Analysis of Covariance
Hypotheses 3b: All DERS subscales would be positively associated with both current e-cigarette use and current cigarette/little cigar use.	α= .05 Power of .80. Effect size[4]: f^2 = .15 Total Sample Size: 128	Gender Institution Age Date of Survey Completion	Multiple Linear Regression
Hypotheses 3c: Emotion regulation subscales (Awareness, Clarity, Goals, Impulse, Nonacceptance, Strategies) would mediate the relation between race (Caucasian/African American) and e-cigarette/cigarette/little cigar use, controlling for gender and age. Depicted in Figure 2.	α= .05 Power of .80. Effect size[5,6]: f = .25 Total Sample Size: 480	Gender Age	Path Analysis

[1]Webb Hooper, M., & Kolar, S. (2016). Racial/ethnic differences in electronic cigarette use and reasons for use among current and former smokers: findings from a community-based sample. *International journal of environmental research and public health*, *13*(10), 1009.

[2] Cullen, J., Mowery, P., Delnevo, C., Allen, J. A., Sokol, N., Byron, M. J., & Thornton-Bullock, A. (2011). Seven-year patterns in US cigar use epidemiology among young adults aged 18-25 years: a focus on race/ethnicity and brand. *American journal of public health*, *101*(10), 1955–1962. doi:10.2105/AJPH.2011.300209

[3] Morean, M. E., & L'Insalata, A. (2017). The short form vaping consequences questionnaire: psychometric properties of a measure of vaping expectancies for use with adult e-cigarette users. *Nicotine & Tobacco Research, 19*, 215–221.doi:10.1093/ntr/ntw205

[4] Cohen, J. (1992). A power primer. *Psychological bulletin*, *112*(1), 155.

[5] Kyriazos, T. A. (2018). Applied psychometrics: Sample size and sample power considerations in factor analysis (EFA, CFA) and SEM in general. *Psychology*, *9*(08), 2207.

[6] O'Rourke, N., & Hatcher, L. (2013). A step-by-step approach to using SAS for factor analysis and structural equation modeling, Second Edition (2 edition). SAS Institute.

CHAPTER III

RESULTS

Data Cleaning

Prior to running the proposed data analyses, a preliminary examination of the data set was completed. Items within data were examined to ensure no mislabeling or mis-scaling occurred. Measure items were reverse coded appropriately to ensure that items were consistently scored in the same direction. The DERS Awareness subscale items 1, 4, and 6 were reverse coded from 1 (almost never) through 5 (almost always) to 1 (almost always) through 5 (almost never). An SPSS Missing Value Analysis was conducted, indicating missingness for all DERS items to be 22.6%, for expectancy items to range from 10.4% to 22.6%, for age to be .008%, for ever-use of cigarettes and cigars to be 4.1%, and ever-use of vaping to be 4.7%. Little's MCAR test indicated that data were missing completely at random, $\chi^2 = 668.90$, $df = 639$, $p = .200$. A comparison of missingness-subgroups indicated no significant mean differences among items. As a result, it was assumed the values were missing completely at random. Expectation-maximization imputation was used to address the missing data. A total of 37,803 out of 215,488 were inputted.

After data were examined for missingness, data were then examined for univariate and multivariate outliers. Box plots were used to assess univariate outliers, per the suggestion of Tabachnick and Fidell (2019). Outliers were identified for the DERS Awareness (n = 80, range= 15-13), Clarity (n = 67, range = 15-12), Goals (n = 69, range = 15-14), Impulse (n = 76, range= 15-11), and Strategies (n = 31, range= 15-14) subscales. No outliers were found in the nonacceptance subscale. No outliers were considered extreme outliers via boxplot interpretation. Outliers were also identified for the S-VCQ positive reinforcement expectancy subscale (n=31),

negative reinforcement expectancy subscale (n = 23) and the appetite/weight control expectancy subscale (n = 59). No outliers were identified for the negative consequence's subscale. Examination of data indicated that outliers were not due to errors in the data. Thus, all values were log-transformed to reduce the impact of outliers on analyses (Tabachnick & Fidell, 2019). Prior to log transformation, skewness for outcome variables ranged from .11 to 1.69 and kurtosis ranged from .32 to 2.72. After log transformation skewness for outcome variables ranged from .009 to .961 and kurtosis ranged from .20 to 1.10. Changes in skewness and kurtosis suggest that normality was more appropriate after log transformation. Descriptive information for study variables is included in table 4.

Multivariate outliers were assessed via Mahalanobis distance, which measures the distance of a case from the centroid of all other cases, where the centroid is the intersection of all variables included in the analysis (Tabachnick and Fidell, 2019). Log transformation was completed before the examination of multivariate outliers, as the test is sensitive to deviations from normality (Tabachnick & Fidell, 2019). The critical value for Mahalanobis distance with 11 variables at $\alpha = .001$ is $\chi 2 = 31.26$. 13 cases exceeded this critical value, indicating that they are multivariate outliers. After log transformation, outliers were still present. Since the inclusion of multivariate outliers could negatively impact normality, bootstrapping was used to account for non-normal data because it repeatedly re-samples from the dataset, randomly replacing data for each resampling, which yields multiple sampling estimates (Preacher & Hayes, 2008). These multiple estimates are used to create a distribution of the sampling estimates, which can be used to compare against the original dataset's estimates (Preacher & Hayes, 2008). Bootstrapping 5000 times is recommended for mediation analyses and therefore was used for all primary analyses to ensure consistency (Hayes, 2009).

Preliminary Analyses

After log transformation, normality was assessed. Recommendations to examine univariate normality include histograms, detrended normal q-q plots, skewness, kurtosis, and box plots (Tabachnick & Fidell, 2019). Analysis of the histograms for DERS subscales (awareness, clarity, goals, impulse, nonacceptance) and S-VCQ subscales (negative reinforcement, positive reinforcement, appetite/weight control, and negative consequences) concluded normal and unimodal distributions. Detrended q-q- plots were also used to examine normality, using the cut-off score of +/- 1.96 standard deviations, which indicates no significant deviations from normality (Garson, 2012). Examination of detrended q-q- plots reported no scores higher than the cut off for the DERS awareness, clarity, impulse, goals, nonacceptance, and strategies subscales, and S-VCQ negative consequences, positive reinforcement, negative reinforcement, and weight control subscales. Skewness and kurtosis were also examined. There were no scores that exceeded the critical values of 2 for skewness and 7 for kurtosis (Kim, 2013). Deviation from normality was found for DERS awareness, clarity, impulse, and strategies subscales as well as S-VCQ positive reinforcement, negative reinforcement, and weight control subscales with untransformed data. However, detrended q-q- plots did not deviate from normality after log transformation.

To assess potential confounding variables, chi-square tests were used to examine distributions of demographic variables across cigarette, cigar, and e-cigarette use. Covariate testing was also done for the DERS subscales and S-VCQ subscales. The demographic variables of gender, institution (community college versus HBCU), age, and date of survey completion were examined as possible covariates. The date of survey completion was calculated by using the date and time of the first survey response as a reference point and counting the hours and days

from this reference point for each participant. A variable was included as a covariate if the chi-square test was significant at an alpha level of 0.1. Analysis indicated that gender was a significant covariate, with males being more likely to engage in current cigarette and current e-cigarette use. Gender was also a significant covariate for DERS awareness and goals subscales. Covariate analysis also indicated that gender was a significant covariate for S-VCQ negative consequences and positive reinforcement scale. Results for gender are included in table 5.

Institution was a significant covariate with participants from TCC being more likely to engage in current use of cigarettes, current e-cigarette use, and past six-month cigar use. Institution was also a significant covariate for the DERS goals and nonacceptance subscale. Covariate analysis indicated that institution was also a significant covariate for S-VCQ negative consequences, positive reinforcement, and negative reinforcement subscales. Results are provided in table 6.

Age was examined using one-way Analysis of Variance tests for cigarette, e-cigarette, and cigar use, as age is a continuous factor. Age was a significant covariate for current cigarette use and current e-cigarette use. Current cigarette and e-cigarette users were older than non-users. Age was a significant covariate for the DERS awareness and clarity scales. Older students reported fewer difficulties in emotional awareness and clarity. Age was examined using linear regressions for DERS and S-VCQ subscales, as both the predictor and dependent variables are continuous. Age was also significant for the S-VCQ negative consequences, positive reinforcement, and negative reinforcement subscales. Older students reported stronger beliefs in positive reinforcement and negative reinforcement and stronger beliefs in negative consequences. The results are provided in Table 6.

The date of survey completion was examined using one-way Analysis of Variance (ANOVA) tests for cigarette, e-cigarette, and cigar use. Date of survey completion was a significant covariate with current cigarette users and e-cigarette users completing the study earlier than non-users. Covariate analysis of date of survey completion for DERS and S-VCQ subscales was completed via linear regressions. Analysis indicated date or survey completion was a significant covariate for DERS goals and nonacceptance subscales. Date from survey completion was also a significant covariate for the S-VCQ negative consequences, positive reinforcement, negative reinforcement, and weight control scales. Covariate analyses did not differ between transformed or untransformed data for any variables. The results are provided in Table 8.

Table 4

Descriptive Statistics of Study Variables

Variable	*M*	*SD*	s^2	Skewness	Kurtosis
DERS Awareness	0.80	0.19	.037	-0.11	-0.53
DERS: Clarity	0.75	0.18	.034	0.00	-0.68
DERS: Impulse	0.69	0.19	.039	0.47	-0.75
DERS: Goals	0.83	0.19	.038	-.34	-0.54
DERS: Strategies	0.73	0.19	.039	0.31	-0.79
DERS: Nonacceptance	0.73	0.21	.044	0.25	-0.99
S-VCQ: Negative Consequences	1.00	0.23	.054	-0.55	-0.90
S-VCQ: Positive Reinforcement	0.92	0.22	.047	0.45	-1.10
S-VCQ: Negative Consequences	1.05	0.22	.047	0.55	-1.04
S-VCQ: Appetite/Weight Control	0.85	0.18	.033	0.96	-0.19

Note. $N = 1184$.

Table 5

Covariate Analysis of Gender by Variable

Variable	$\chi 2$	df_1	N	p
Current Cigarette Use	**4.07**	**1**	**1182**	**.044**
Current Cigar Use	**20.63**	**1**	**1182**	**<.001**
Current E-cigarette Use	0.00	1	1182	.996
	F	df_1	df_2	p
S-VCQ: Negative Consequences	**23.85**	**1**	**1182**	**<.001**
S-VCQ: Positive Reinforcement	**6.02**	**1**	**1182**	**.014**
S-VCQ: Negative Reinforcement	0.03	1	1182	.971
S-VCQ: Weight Control	0.15	1	1182	.698
DERS: Awareness	**7.43**	**1**	**1182**	**.007**
DERS: Clarity	**2.66**	**1**	**1182**	**.103**
DERS: Impulse	0.01	1	1182	.913
DERS: Goals	**4.49**	**1**	**1182**	**.035**
DERS: Nonacceptance	0.00	1	1182	.925
DERS: Strategies	2.34	1	1182	.127

Note. N = 1184.

Table 6

Covariate Analysis of Institution by Variable

Variable	$\chi 2$	df_1	N	p
Current Cigarette Use	**32.90**	**1**	**1184**	**<.001**
Current Cigar Use	**37.00**	**1**	**1184**	**<.001**
Current E-cigarette Use	2.85	1	1184	.053
	F	df_1	df_2	p
S-VCQ: Negative Consequences	**10.30**	**1**	**1182**	**.001**
S-VCQ: Positive Reinforcement	**50.64**	**1**	**1182**	**<.001**
S-VCQ: Negative Reinforcement	**19.85**	**1**	**1182**	**<.001**
S-VCQ: Weight Control	2.62	1	1182	.106
DERS: Awareness	0.06	1	1182	.803
DERS: Clarity	0.82	1	1182	.366
DERS: Impulse	1.02	1	1182	.312
DERS: Goals	**5.52**	**1**	**1182**	**.019**
DERS: Nonacceptance	**19.30**	**1**	**1182**	**<.001**
DERS: Strategies	0.11	1	1182	.740

Note. N = 1184. Significant values are indicated in bold.

Table 7

Covariate Analysis of Age by Variable

Variable	F	df_1	df_2	p
Current Cigarette Use	**35.69**	**1**	**1182**	**<.001**
Current Cigar Use	0.48	1	1182	.490
Current E-cigarette Use	**5.35**	**1**	**1182**	**.021**
	F	df_1	df_2	p
S-VCQ: Negative Consequences	3.83	1	1182	.051
S-VCQ: Positive Reinforcement	**9.99**	**1**	**1182**	**.002**
S-VCQ: Negative Reinforcement	**5.49**	**1**	**1182**	**.019**
S-VCQ: Weight Control	2.46	1	1182	.117
DERS: Awareness	**8.68**	**1**	**1182**	**.003**
DERS: Clarity	**8.05**	**1**	**1182**	**.005**
DERS: Impulse	0.65	1	1182	.422
DERS: Goals	0.03	1	1182	.853
DERS: Nonacceptance	0.00	1	1182	.968
DERS: Strategies	1.10	1	1182	.294

Note. N = 1184. Significant values are indicated in bold.

Table 8

Covariate Analysis of Date of Survey Completion by Variable

Variable	*F*	df_1	df_2	p
Current Cigarette Use	**33.41**	**1**	**1182**	**<.001**
Current Cigar Use	2.69	1	1182	.101
Current E-cigarette Use	**35.49**	**1**	**1182**	**<.001**
	F	df_1	df_2	p
S-VCQ: Negative Consequences	**13.46**	**1**	**1182**	**<.001**
S-VCQ: Positive Reinforcement	**49.82**	**1**	**1182**	**<.001**
S-VCQ: Negative Reinforcement	**21.54**	**1**	**1182**	**<.001**
S-VCQ: Weight Control	**4.01**	**1**	**1182**	**.045**
DERS: Awareness	1.58	1	1182	.208
DERS: Clarity	0.23	1	1182	.630
DERS: Impulse	1.23	1	1182	.267
DERS: Goals	**5.71**	**1**	**1182**	**.017**
DERS: Nonacceptance	**17.9**	**1**	**1182**	**<.001**
DERS: Strategies	0.16	1	1182	.687

Note. N = 1184. Significant values are indicated in bold.

Primary Analyses

Hypothesis 1a. It was hypothesized via Hypothesis 1a that African Americans across institutions would report lower 30-day e-cigarette use than Caucasian Americans. Univariate binary logistic regression was used to test the contribution of race in predicting the likelihood that an individual is a current e-cigarette user, controlling for age, institution, gender, and institution.

Data were assessed to ensure proper coding of the dependent variable (e-cigarette use). Multicollinearity among the covariates was assessed, which was examined by correlations less than .80. Examination indicated the date of survey completion and institution were highly correlated (r= .964). To assess if the date of survey completion was an important covariate, separate analyses examined the impact of the date of survey completion within each institution. We found no significant association between the date of survey completion and any outcomes (i.e., use, outcome expectancies, DERS subscales) for NSU. For TCC, date of survey completion was associated with negative consequences expectancies ([B = -0.188, t(490) = -2.63, p= .009] and weight control ([B = -0.083, t(490) = -1.84, p= .067]. Therefore, the date from survey completion was removed to reduce redundancy.

Regression results are presented in Table 8. Block 1 (covariates) correctly classified 89.5% of participants (Nagelkerke R^2=.092). A significant predictor based on bootstrapped analyses was being female (OR= .445, 95% CI [.303, .654]). Attending TCC was also a significant predictor (OR = 3.02, 95% CI [2.02, 4.52]) Addition of racial identity (Block 2) explained an additional 3% of variance and indicated a significant improvement in the model, [χ^2 (1, N = 1184) = 18.057, p< .001]. Based on bootstrapped analyses and controlling for gender and institution, identifying as African American decreased the risk of having current e-cigarette use

(*OR*= 0.34, 95% CI [0.20, 0.57]). Hypothesis 1a was supported. Regression results are displayed in Table 9.

Hypothesis 1b. It was hypothesized that African Americans across institutions would report higher little cigar use than Caucasian Americans. Univariate binary logistic regression was used to assess the contribution of race in determining the likelihood that a participant would engage in little cigar use, controlling for the institution.

Regression results are presented in Table 9. Block 1 (covariates) correctly classified 82.9% of participants (Nagelkerke R^2=.004). Institution did not significantly predict past six-month cigar use (*OR*= .7645*,* 95% CI [.56, 1.05]). Addition of racial identity (Block 2) explained an additional 2% of variance and indicated a nonsignificant improvement in the model, [χ^2 (1, *N*= 1184) = 1.409, *p*=.235]. Examination of bootstrapped analyses indicated that race was not a significant predictor of past 6-month cigar use (*OR*= 1.32*,* 95% CI [.84, 2.07]). Hypothesis 1b was not supported. The results of this hypothesis are provided in Table 10.

Table 9

Logistic Regression of Race on Current E-cigarette Use

Model 1: Covariates								Model 2: Race							
Block 1:						95% CI for OR		**Block 1:**						95% CI for OR	
	B	*SE*	*Wald*	*p*	*OR*	*LL*	*UL*		*B*	*SE*	*Wald*	*p*	*OR*	*LL*	*UL*
Institution	1.11	0.21	28.94	<.001	3.02	2.02	4.52	Institution	0.40	0.28	2.01	0.15	1.49	0.87	2.56
Gender	0.81	0.20	17.02	<.001	0.45	0.30	0.65	Gender	-0.81	0.20	16.52	<.001	0.45	0.30	0.66
Age	0.61	0.06	1.24	0.27	1.06	0.95	1.19	Age	0.08	0.06	1.88	0.17	1.08	0.97	1.20
Nagelkerke R^2															.092
								Block 2:							
								Race	-1.08	0.26	16.78	<.001	0.34	0.20	0.57
Nagelkerke R^2															.126

Note. B = unstandardized coefficient, SE = standard error, Wald = Wald χ^2, OR = odds ratio. Reference group for institution was NSU. Reference group for gender was Male. Reference group for race was Caucasian American.

Table 10

Logistic Regression of Race on Past Six-Month Cigar Use

Model 1: Covariates								**Model 2: Race**							
Block 1:						95% CI for OR		**Block 1:**						95% CI for OR	
	B	*S.E.*	*Wald*	*p*	*OR*	*LL*	*UL*		*B*	*S.E.*	*Wald*	*p*	*OR*	*LL*	*UL*
Institution	-0.27	0.16	2.84	.09	0.76	0.56	1.05	Institution	-0.113	0.21	0.31	0.58	0.89	0.60	1.33
Nagelkerke R^2															.004
								Block 2:							
								Race	0.27	0.23	1.405	0.24	1.32	0.84	2.07
Nagelkerke R^2															.006

Note. B = unstandardized coefficient, SE = standard error, Wald = Wald χ^2, OR = odds ratio. Reference group for institution was NSU.

Hypothesis 2a. Hypotheses 2a hypothesized that all four e-cigarette outcome expectancies (negative reinforcement, positive reinforcement, appetite/weight control, negative consequences) would be higher in the e-cigarette user sample. Covariates included in the analysis were institution, age, and gender. Outcome variables were S-SVQ subscales (i.e., negative reinforcement, positive reinforcement, appetite/weight control, negative consequences).

Since all outcome variables are moderately correlated, a multivariate analysis of covariance was conducted (MANCOVA, Tabachnick & Fidell, 2019). A MANCOVA is used when several correlated dependent variables are examined because it ensures that the relationships between the dependent variables are considered (Field, 2009). MANCOVA also adjusts for the inflation of the likelihood of committing a Type 1 error due to testing multiple dependent variables (Maxwell & Delaney, 2004). 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, 2019). The assumption of the absence of univariate outliers was met, as data were transformed before primary data analysis. However, multivariate outliers were included in analyses, and Box's M Test, used to further assess equality of covariance matrices, was significant, $F(10, 200921) = 7.941$, $p < .001$, indicating this assumption was violated. Violations of this assumption indicate that the estimate of error variance may be misleading. As a result, the results of this analysis should be interpreted with caution. Violation of this assumption may be due to non-normality, but the test is also noted to be stricter on larger sample sizes (Tabachnick & Fidell, 2019). Significance was based on Pillai's Trace, as the statistic is robust to unequal cell size and is recommended for use when Box's M test is significant (Tabachnick &

Fidell, 2019). Bootstrapping, with 5000 iterations, was used to make the analysis robust to the non-normality of the data.

Bootstrapped analysis of one-way between-groups MANCOVA indicated a significant main effect of gender (Pillai's Trace = .02, $F(4, 1179) = 7.14$, $p < .001$, partial $\eta^2 = .02$) and institution (Pillai's Trace = .04, $F(4, 1179) = 11.24$, $p < .001$, partial $\eta^2 = .04$). There was a main effect of e-cigarette use on expectancies, Pillai's Trace = .146, $F(4, 1179) = 50.46$, $p < .001$, partial $\eta^2 = .146$. Univariate results indicated a significant main effect of e-cigarette use on negative consequences subscale, $F(1, 1179) = 6.60$, $p = .010$, positive reinforcement subscale $F(1, 1179) = 155.16$, $p < .001$, negative reinforcement subscale $F(1, 1179) = 90.86$, $p < .001$, and appetite/weight control subscale $F(1, 1179) = 16.71$, $p < .001$. Follow-up pairwise comparisons based off marginal means indicated that current e-cigarette users reported significantly higher positive reinforcement (1.14 vs. .89), negative reinforcement (1.23 vs. 1.03), and weight control beliefs (.91 vs. 84). Non-users reported significantly higher negative consequences about e-cigarette use (1.01 v. 95). Please see table 11 for estimated marginal means and table 12 for univariate results. Hypothesis 2a was supported for all 4 subscales.

Hypothesis 2b. Hypothesis 2b was examined using a 2 x 4 Multivariate Analysis of Covariance (MANCOVA) examining the effect of race on the four e-cigarette outcome expectancies. The MANCOVA included one independent variable (African American, Caucasian American), 4 dependent variables (four e-cigarette expectancies), and three covariates (institution, age, gender).

A MANCOVA was selected to control possible confounding variables via the inclusion of covariates. No dependent variable had a ratio of largest to smallest variance of 10:1 or higher, indicating preliminary robustness to the homogeneity of variance (Tabachnick and Fidell, 2019).

The assumption of the absence of univariate outliers was met, as data were transformed before primary data analysis. Box's M Test, used to further assess equality of covariance matrices, was significant, $F(10, 20066655) = 13.867$, $p < .001$, indicating this assumption was violated. Violations of this assumption indicate that the estimate of error variance may be misleading. As a result, the results of this analysis should be interpreted with caution. Significance was based on Pillai's Trace, as the statistic is robust to unequal cell size and is recommended for use when Box's M test is significant (Tabachnick & Fidell, 2019). Bootstrapping, with 5000 iterations, was used to make the analysis robust to non-normality of the data.

One way between-groups MANCOVA indicated a significant main effect of gender, Pillai's Trace = .031, multivariate $F(4, 1179) = 9.28$, $p < .001$, partial $\eta^2 = .031$ and institution, Pillai's Trace = .011, multivariate $F(4, 1179) = 3.29$, $p < .011$, partial $\eta^2 = .011$. There was also a main effect of e-cigarette use on outcome variables, Pillai's Trace = .02, multivariate $F(4, 1179) = 5.34$, $p < .001$, partial $\eta^2 = .018$. Univariate results indicated a significant main effect of race on the negative consequences subscale, $F(1, 1179) = 8.35$, $p = .004$, positive reinforcement subscale $F(1, 1179) = 11.27$, $p = .001$. There was no significant effect of race on the negative reinforcement and appetite/weight control subscale. Follow-up pairwise comparisons based on marginal means indicated that Caucasian Americans had significantly higher negative consequences (1.04 vs. .99), positive reinforcement (.96 vs. .90), than African Americans. Please see table 13 for estimated marginal means and table 14 for a summary of univariate results. Results with transformed and untransformed data were the same. Hypothesis 2b was supported for 2 out of 4 expectancies.

Table 11

Estimated Marginal Means of S-VCQ Subscales: Type of Current E-cigarette Use

	Current E-cigarette Ever Use	No Current E-cigarette Use
	M (SD)	*M (SD)*
Negative Consequences	0.95 (.021)	1.01 (.007)
Positive Reinforcement	1.14 (.018)	0.89 (.006)
Negative reinforcement	1.23 (.019)	1.03 (.006)
Appetite/Weight-Control	0.91 (.017)	0.84 (.006)

Note. N =1184. Subscales from the Short Form Vaping Consequences Questionnaire (S-VCQ) are displayed.

Table 12

Univariate Analysis of Variance Tests of S-VCQ Subscales by Group (Current-User, Non-Current User)

	MS	*F*	df_1	df_2	*p*	partial η^2
Negative Consequences	0.34	6.60	1	1179	.010	.006
Positive Reinforcement	6.17	155.15	1	1179	<.001	.116
Negative Reinforcement	3.94	90.86	1	1179	<.001	.072
Weight Control	0.55	16.71	1	1179	<.001	.014

Note. N = 1184. Subscales from the Short Form Vaping Consequences Questionnaire(S-VCQ) are displayed.

Table 13

Estimated Marginal Means of S-VCQ: Race

	African American	Caucasian American
	M (SD)	*M (SD)*
Negative Consequences	0.99 (.009)	1.04 (.015)
Positive Reinforcement	0.90 (.008)	0.96 (.014)
Negative reinforcement	1.04 (.008)	1.07 (.014)
Appetite/Weight-Control	0.84 (.007)	0.86 (.012)

Note. N = 1184. Subscales from the Short Form Vaping Consequences Questionnaire (S-VCQ) are displayed.

Table 14

Univariate Analysis of Variance Tests of S-VCQ Subscales by Group (Black, White)

	MS	*F*	df_1	df_2	*p*	partial η^2
Negative Consequences	0.44	8.35	1	1179	.004	.007
Positive Reinforcement	0.50	11.27	1	1179	.001	.009
Negative Reinforcement	0.16	3.44	1	1179	.06	.003
Weight Control	0.05	1.44	1	1179	.230	.001

Note. N =1184. Subscales from the Short Form Vaping Consequences Questionnaire(S-VCQ) are displayed.

Hypothesis 2c. Hypothesis 2c proposed that the relation between race (Caucasian/African American), and e-cigarette use, controlling for gender and age, would be mediated by e-cigarette outcome expectancies (negative reinforcement, positive reinforcement, appetite/weight control, negative consequences). For hypothesis 2c, a path analysis was conducted to examine the mediated effects of outcome expectancies on the relationship between race and e-cigarette use. The proposed path analysis is shown in Figure 1. To examine mediation effects, the bootstrapping procedure was used and allowed for significance testing using a 95% confidence interval (Preacher & Hayes, 2008). The significance of the total indirect effect was confirmed if the respective 95% bias-corrected confidence interval did not contain zero (Preacher, Rucker, & Hayes, 2007). Correlations of all variables are provided in Table 15. Correlations of outcome variables for sample from TCC are included in Table 16.

Direct Effects. Nine significant pathways were detected within the proposed model. Two direct effects were found. Race was also significantly associated with current e-cigarette use, controlling for gender and age. Gender was significantly associated with current e-cigarette use, controlling for age and race. Race was significantly associated with the negative reinforcement, positive reinforcement, and negative consequences expectancy subscales. The weight control, negative reinforcement, positive reinforcement, and negative consequences expectancy subscales were all significantly associated with current e-cigarette use, controlling for race. Please see Figure 3 for significant model paths.

Indirect Effects. Specific unstandardized indirect effects and their confidence intervals were estimated using an AMOS user-defined estimand. Specific directs are defined as the product of two unstandardized paths that link the endogenous variables (*X)* to the endogenous variable (*Y*) via the mediator (Preacher and Hayes, 2008). Thus, the syntax for the user-defined

estimand calculated the product of the two unstandardized paths that link race to e-cigarette use for each mediator (appetite/weight control, negative reinforcement, positive reinforcement, and negative consequences). Examination of user-defined estimands indicated a significant specific indirect effect for negative consequences, β = .009, p<.001, 95% CI [.005, .017]. A specific indirect effect for positive reinforcement was also found, β = -.044, p<.001, 95% CI [-.065, -.029]. The calculated specific indirect effect for negative reinforcement was also significant, β = -.013, p=.001, 95% CI [-.027, .005]. Lastly, the appetite/weight control specific indirect effect was also significant, β = .006, p=.033, 95% CI [.001, .015). Indirect effects were tested using bootstrapped bias-corrected confidence intervals. There was a total indirect effect of race on current e-cigarette use via outcome expectancies, β = -.062 with 95% BC CI [-.036, -.090]. The results for the total indirect effect are depicted in Table 17.

Fit. Fit statistics were used to determine whether the model appropriately fits the data. Typically, three different goodness-of-fit statistics are provided for over-identified path analyses. (O'Rourke et al., 2013). First, the chi-square fit test was used because it allows for examination of whether the proposed model holds exactly in the population from which the data were taken. Given this, a non-significant test would suggest that the proposed model fits the data well but does not specifically define whether the proposed model is the correct one (Kline, 2011). The chi-square was significant, (χ2=2036.60, df= 17), p < .001, indicating that the proposed model does not fit the data well. However, it should be noted that the chi-square fit test is strongly affected by sample size and at large enough sample sizes (e.g., over 300) may reject virtually all models (Bentler & Bennett, 1980).

The Root Mean Square Error of Approximation (RMSEA) was used as a fit statistic, specifically to determine how well the proposed model fits the data. The RMSEA is a badness-

of-fit statistic, where zero, instead of 1.0 indicates the best fit (Kline, 2011). RMSEA values of less than .055 suggest small error and if the confidence intervals regarding the value are within good (.09 ≥ RMSEA CI_{95} ≥ .00) to ideal parameters (.054 ≥ RMSEA CI_{95} ≥.000), then there is more confidence that the data fit the model effectively. RMSEA values for the model were .317, indicating poor model fit.

Finally, the last goodness-of-fit index to be examined was the Goodness of Fit Index (GFI, Kline, 2011, 2013). This is an absolute fit index that examines the proportion of covariances in the sample data are explained by the proposed model (Kline, 2011). GFI examined whether the proposed model fits compared to no model at all. GFI values range from 0 to 1.0, with 1.0 indicating the best fit. GFI for the proposed model was .707, indicating poor fit. This hypothesis regarding an indirect effect of race on use was supported. Examination of model fit indices indicate that the demographic variables of race, gender, and age, as well as the outcome expectancies do not fully explain e-cigarette use.

Table 15

Correlations of Hypothesis 2C Path Analysis Variables

Variable	1	2	3	4	5	6	7
1. Age	-	-	-	-	-	-	-
2. African American	-.098**	-	-	-	-	-	-
3. Female	-.031	.052	-	-	-	-	-
4. Negative Reinforcement	.068*	-.122***	-.001	-	-	-	-
5. Positive Reinforcement	.092**	-.203***	-.071*	.752***	-	-	-
6. Appetite/Weight Control	.046	-.056	.011	.712***	.605***	-	-
7. Negative Consequences	.057	-.119**	.141***	.246***	.149***	.319***	-
8. E-cigarette Use	.067**	-.219***	-.132*	.282***	.370***	.123***	-.072**

Note. *p< .05, **p<.01, ***p<.001

Table 16

Correlations of Hypothesis 2C Path Analysis Variables for TCC sample

Variable	1	2	3	4	5	6	7
1. Age	-	-	-	-	-	-	-
2. African American	.078	-	-	-	-	-	-
3. Female	-.048	.042	-	-	-	-	-
4. Negative Reinforcement	.059	-.092*	-.002	-	-	-	-
5. Positive Reinforcement	.087	-.131**	-.072	.732***	-	-	-
6. Appetite/ Weight Control	.093*	-.037	.020	.590***	.494***	-	-
7. Negative Consequences	-.037	-.096*	.153**	.074	-.029	.225***	-
7. E-cigarette Use	.038	-.150**	-.166***	.336***	.412***	.087	-.200***

Note. *p< .05, **p<.01, ***p<.001.

Table 17

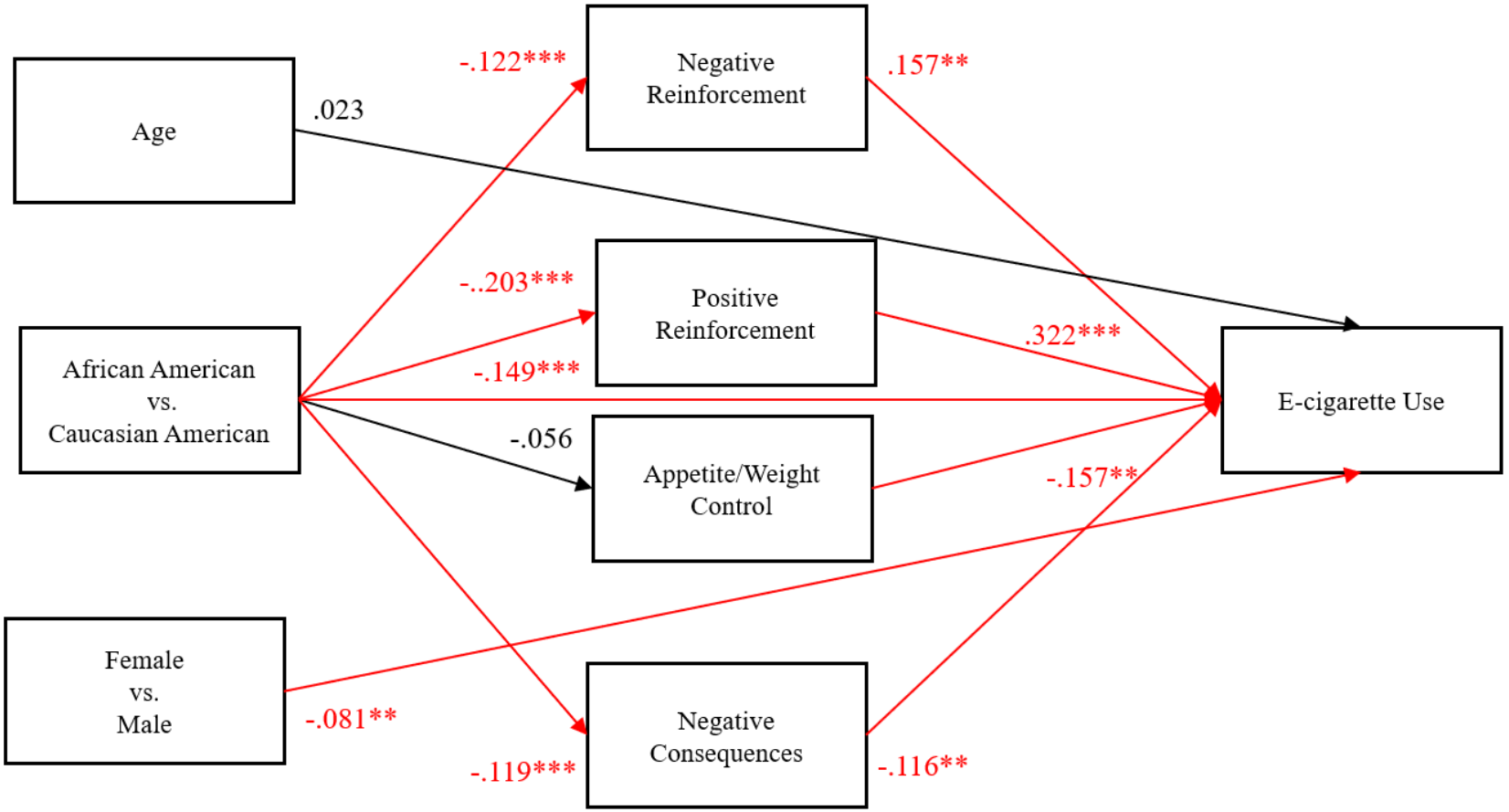
Indirect Effect of Race on Current E-Cigarette Use via Outcome Expectancies

E-cigarette Use	β	*SE*	95% CI
Total Standardized Effect	-.210	0.03	[-0.274, -0.150]
Total Standardized Indirect	-.060	0.32	[-0.090, -0.036]
Total Standardized Direct Effect	-.145	0.01	[-0.209, -0.090]
Total Effect	-.144	0.02	[-0.192, -0.100]
Total Indirect Effect	-.042	0.01	[0.063, -0.024]
Total Direct Effect	-.101	0.02	[-0.144, -0.059]

Note. N=1182.

Figure 3

Path Analysis Model of Associations Between Race, E-cigarette Outcome Expectancies, and Tobacco Use



Note. Path analysis depicting race (Caucasian American as the reference group), age, and gender (Female as the reference group) as the exogenous variables, e-cigarette outcome expectancies (negative reinforcement, positive reinforcement, appetite/weight control, and negative consequences) as mediators and e-cigarette use as the endogenous variable. Significant paths displayed in red. *p< .05, **p<.01, ***p<.001

Hypothesis 3a. It was hypothesized that the Differences in Emotion Regulation Scale (DERS) Awareness, Clarity, and Non-acceptance subscales would be higher within the African American sample, and the Impulse, Goals, and Strategies subscales would be higher among the Caucasian American sample**.** To examine hypothesis 3a, a 2 x 6 Multivariate Analysis of Covariance (MANCOVA) examining the effect of race on the six DERS subscales was conducted.

A MANCOVA was selected since all variables are moderately correlated (Tabachnick & Fidell, 2019). Sample variances for each dependent variable were compared across both groups. No dependent variable had a ratio of largest to the smallest variance of 10:1 or higher, indicating preliminary robustness to the homogeneity of variance (Tabachnick and Fidell, 2019). The assumption of the absence of univariate outliers was met, as data were transformed before primary data analysis. However, multivariate outliers were included and Box's M Test, used to further assess equality of covariance matrices, was significant, $F(21, 1678191.23) = 117.63$, $p < .001$, indicating this assumption was violated. Violations of this assumption indicate that the estimate of error variance may be misleading. Therefore, the results of this analysis should be interpreted with caution. Levene's test was also significant for the DERS strategies subscale, which indicates that the assumption of homogeneity of variance was violated for the outcome variable, $F(1, 1182) = 7.51$, $p = .006$. Significance was based on Pillai's Trace, as the statistic is robust to unequal cell size and is recommended for use when Box's M test is significant (Tabachnick & Fidell, 2019). Bootstrapping, with 5000 iterations, was used to make the analysis robust to non-normality of the data.

One way between-groups MANCOVA indicated a significant main effect of gender, Pillai's Trace = .017, multivariate $F(6, 1174) = 3.30$, $p = .003$, partial $\eta^2 = .017$ and age, Pillai's

Trace = .015, multivariate $F(6, 1174) = 3.05$, p=.006, partial η^2 = .009., on outcome variables. There was also a significant main effect of race on outcome variables, Pillai's Trace = .032, multivariate $F(6, 1174) = 6.00$, p< .001, partial η^2 = .032. Univariate results indicated a significant main effect of race on the goals subscale, $F(1, 1179) = 16.37$, p< .001, strategies subscale, $F(1, 1179) = 4.93$, p= .027, and nonacceptance subscale, $F(1, 1179) = 10.24$, p=.001. There was no significant effect of race on awareness, clarity, or impulse, subscales. Follow-up pairwise comparisons based on marginal means indicated that Caucasian Americans had significantly higher scores on the DERS goal (.880 vs. .814), strategies (.752 vs. .716), and nonacceptance subscales (.772 vs. .716) than African Americans. Please see table 18 for estimated marginal means and table 19 for a summary of univariate results. Results with transformed and untransformed data were the same. This hypothesis was supported for 2 out of the 6 DERS subscales.

Hypothesis 3b. Hypothesis 3b, which examined the association between the six DERS subscales and e-cigarette and cigarette/little cigar use, was conducted through the use of three univariate binary logistic regression analyses to test the contribution of DERS subscales in determining the likelihood that a participant would engage in e-cigarette use, little cigar, or cigarette use. The variables (e-cigarette use, little cigar, and cigarette use) are discrete, so it was deemed that using logistic regression would be most appropriate as it allows for direction, form, and strength of the relationships between a continuous/categorical and dichotomous variable to be illustrated (Creswell, 2005).

Data were assessed to ensure proper coding of the dependent variables. For the logistic regression examining the association between the DERs subscales and current e-cigarette use, Block 1 (covariates) correctly classified 89.5% of participants (Nagelkerke R^2=.092).

Bootstrapped analyses indicated that gender significantly predicted current e-cigarette use (*OR*=.445 95% CI [.30, .65]). Institution (*OR*= 3.02, 95% CI [2.02, 4.52.]) also significantly predicted current e-cigarette use. The addition of the six DERS subscales (Block 2) explained an additional 5.3% of the variance and indicated a significant improvement in the model, [χ^2 (6, *N*= 1184) = 32.17 *p*<.001]. The examination of bootstrapped analyses indicated non-significant results for all the DERS predictors.

For the logistic regression examining the association between DERS subscales and current cigarette use, Block 1 (covariates) correctly classified 92.6% of participants (Nagelkerke R^2=.082). Institution (*OR*= 3.33, 95% CI [2.06, 5.39]) and age (*OR*=1.16, 95% CI [1.02, 1.31]) significantly predicted current cigarette use. The addition of the six DERS subscales (Block 2) explained an additional 2.9% of the variance and indicated a significant improvement in the model, [χ^2 (6, *N*= 1184) = 14.820 *p*=.022]. The examination of bootstrapped analyses indicated non-significant results for the DERS predictors.

For the logistic regression examining the association between DERS subscales and little cigar use, Block 1 (covariates) correctly classified 82.9% of participants (Nagelkerke R^2=.004). No covariates were significant predictors of past 6-month cigar use. The addition of the six DERS subscales (Block 2) explained an additional 5.4% of the variance and indicated a significant improvement in the model, [χ^2 (6, *N*= 1184) = 39.22, *p*<.001]. Difficulties in goal setting was a significant predictor of past 6-month cigar use (*OR*= 4.78, 95% CI [1.44, 15.82]). Impulse was also a significant predictor of past-six-month cigar use (*OR*= 3.44, 95% CI [1.06, 11.18]), as well as difficulties with emotional awareness (*OR*= 3.90, 95% CI [1.57, 9.67]). This hypothesis was not supported for current e-cigarette and cigarette use. However, for past six-month cigar use, three out of the six DERs subscales supported the hypothesis.

Table 18

Estimated Marginal Means of DERs Subscale and Current: Race

	African American	Caucasian American
	M (SD)	*M (SD)*
Awareness	0.80 (.007)	0.79 (.013)
Clarity	0.75 (.007)	0.76 (.012)
Goals	0.81 (.007)	0.88 (.013).
Impulse	0.69 (.007)	0.69 (.013)
Nonacceptance	0.72 (.007)	0.75 (.013)
Strategies	0.72 (.008)	0.77 (.014)

Note. N =1184. Subscales from the Difficulties in Emotion Regulation Scale (DERS) are displayed.

Table 19

Univariate Analysis of Variance Tests of DERS Subscales by Group (Black, White)

	MS	*F*	df_1	df_2	*p*	partial η^2
Awareness	0.014	0.379	1	1179	.538	.00
Clarity	0.013	0.403	1	1179	.526	.00
Goals	0.615	16.37	1	1179	<.001	.014
Impulse	0.002	0.061	1	1179	.804	.000
Strategies	0.199	4.93	1	1179	.027	.004
Nonacceptance	0.439	10.24	1	1179	.001	.009

Note. N =1184. Subscales from the Difficulties in Emotion Regulation Scale (DERS) are displayed.

Hypothesis 3c. Hypothesis 3c was also examined using path analysis. This path analysis was used to examine the mediation effect of outcome expectancies on the relationship between race and e-cigarette use. Correlations of variables are included in Table 20. Examinations of correlations for the TCC sample indicated differences from that of the combined sample. Correlations for the TCC sample are included in Table 21.

Direct Effects. There were significant effects detected. Race was significantly associated with DERS goals, nonacceptance, and strategies subscales. There was also a significant direct effect of race on current e-cigarette use, current cigarette use, and past 6-month cigar use, controlling for age and gender. Gender was associated with current e-cigarette use, controlling for race and age. Age was associated with current cigarette use, controlling for race and gender. There were significant effects of DERS awareness and goals on the past six-month cigar use, controlling for race. There were significant effects of DERS awareness and strategies on current e-cigarette use, controlling for race. Beta weights are provided in figure 4.

Indirect Effects. Specific unstandardized indirect effects were examined using SPSS AMOS user-defined estimand. Examination of user-defined estimands indicated one significant specific indirect effect for the impact of race on cigar use via DERS goals. Examination of user-defined estimands indicated a significant specific indirect effect for goals, $\beta = -.011$, $p=.005$, 95% CI [-.023, -.003]. Total indirect effects were tested using bootstrapped standard errors. Examination indicated a specific mediation between race and cigar use via DERS goals, but no other mediation effects.

Fit. Fit statistics were used to determine whether the model appropriately fits the data. First, the chi-square fit test was used because it allows for examination of whether the proposed model holds exactly in the population from which the data was taken. The chi-square was

significant, ($\chi 2$=3577.06, *df*= 33, *p*<.001, indicating that the proposed model does not fit the data well. The Root Mean Square Error of Approximation (RMSEA) was also be used as a fit statistic, specifically to determine how well the proposed model fits the data. RMSEA values of less than .055 suggest small error and if the confidence intervals regarding the value are within good (.09 ≥ RMSEA CI_{95} ≥ .00) to ideal parameters (.054 ≥ RMSEA CI_{95} ≥.000), then there is more confidence that the data fits the model effectively. RMSEA values for the model were .301, indicating poor model fit. Finally, the last goodness-of-fit index to be examined will be the Goodness of Fit Index (GFI, Kline, 2011, 2013). GFI values range from 0 to 1.0, with 1.0 indicating the best fit. GFI for the proposed model was .599, indicating poor fit. The hypothesis that race would indirectly effect tobacco use through outcome expectancies was supported. Model fit analyses suggest that the combination of demographics factors, as well as DERS subscales, does not completely explain e-cigarette use behavior. A summary of the results is provided in Table 22.

Table 20

Correlations of Hypothesis 3C Path Analysis Variables

Variable	1	2	3	4	5	6	7	8	9	10	11
1. Age	-	-	-	-	-	-	-	-	-	-	-
2. African American	-.098**	-	-	-	-	-	-	-	-	-	-
3. Female	-.031	.052	-	-	-	-	-	-	-	-	-
4. Awareness	-.085**	.013	-.079**	-	-	-	-	-	-	-	-
5. Clarity	-.082**	-.036	.047	.141***	-	-	-	-	-	-	-
6. Goals	.005	-.132**	.061*	-.105***	.496***	-	-	-	-	-	-
7. Impulse	-.023	-.021	-.003	.082**	.491***	.585***	-	-	-	-	-
8. Strategies	-.031	-.059*	.044	.083**	.613***	.667***	.744***	-	-	-	-
9. Nonacceptance	-.001	-.153**	.003	.093**	.560***	.572***	.595***	.687***	-	-	-
10. E-cigarette Use	.067*	-.219***	-.132***	.065**	.097**	.121***	.121***	.139***	.125***	-	-
11. Cigar Use	-.020	.057*	.000	.078**	.095**	.149***	.128***	.131***	.084**	.241***	-
12. Cigarette Use	.097**	-.195***	-.06*	.025	.073*	.093**	.074*	.090**	.098**	.334**	.282***

Note. *p< .05, **p<.01, ***p<.001

Table 21

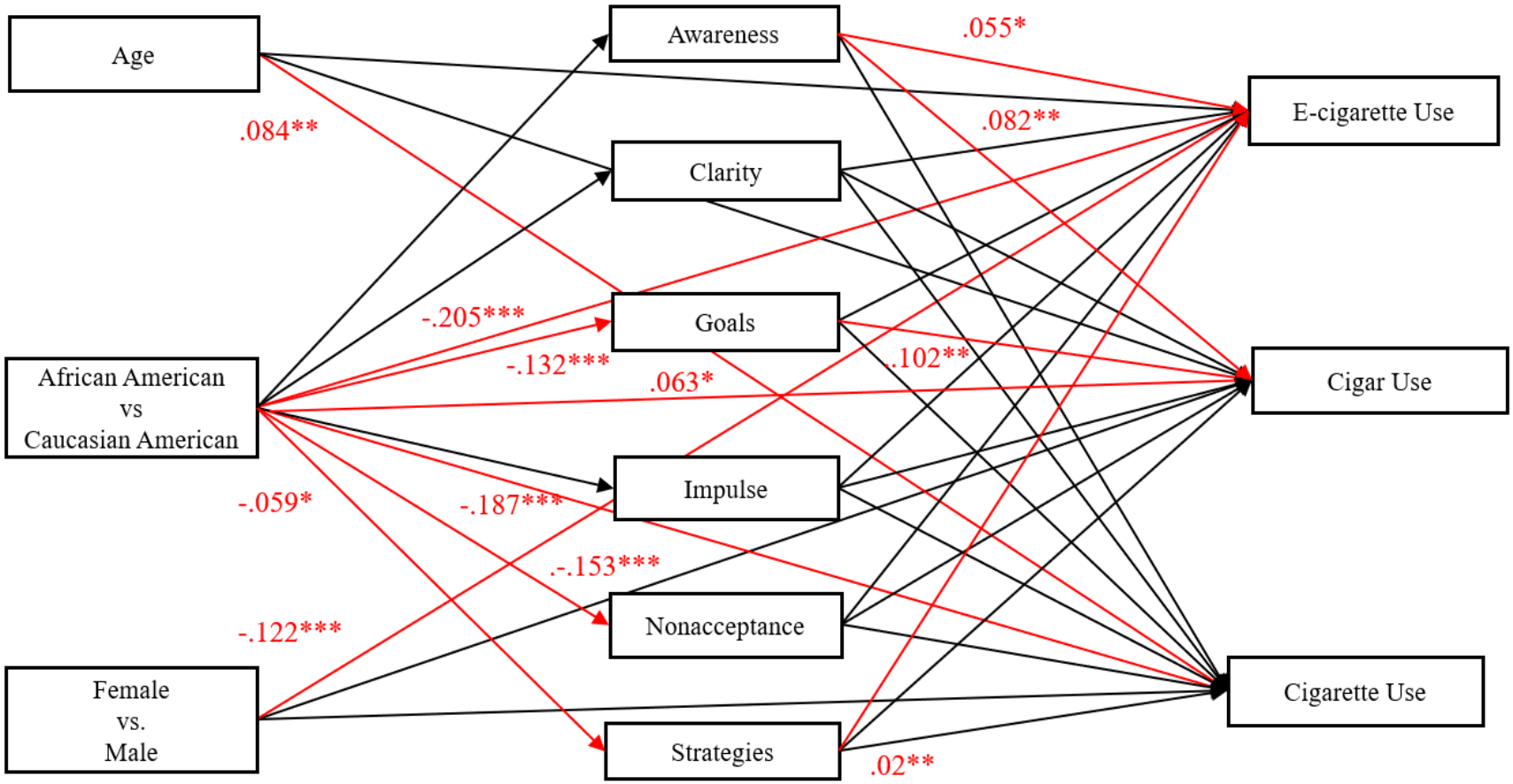
Correlations of Hypothesis 3C Path Analysis Variables for TCC sample

Variables	1	2	3	4	5	6	7	8	9	10	11
1. Age	-	-	-	-	-	-	-	-	-	-	-
2. African American	.078	-	-	-	-	-	-	-	-	-	-
3. Female	-.048	.042	-	-	-	-	-	-	-	-	-
4. DERS Awareness	-.083	.021	-.107*	-	-	-	-	-	-	-	-
5. DERS Clarity	-.145***	-.030	.078	.263***	-	-	-	-	-	-	-
6. DERS Goals	-.044	-.141***	.112*	-.012	.450***	-	-	-	-	-	-
7. DERS Impulse	.002	.030	.031	.127**	.432***	.566***	-	-	-	-	-
8. DERS Strategies	-.038	-.072	.095*	.148**	.576***	.639***	.686***	-	-	-	-
9. DERS Nonacceptance	-.013	-.120**	.071	.116*	.478***	.517***	.527***	.624***	-	-	-
10. E-cigarette Use	.038	-.150**	-.166***	.048	.070	.130**	.147**	.154**	.090*	-	-
11. Cigar Use	-.037	.064	-.043	.030	.030	.097*	.065	.075	.040	.270**	-
12. Cigarette Use	.095*	-.122**	-.027	.005	.035	.061	.080	.081	.065	.319**	.341**

Note. *p< .05, **p<.01, ***p<.001

Figure 4

Path Analysis Model of Associations Between Race, Emotion Regulation Difficulties, Tobacco Use



Note. Path analysis depicting race (Caucasian American as the reference group), age, and gender (Female as the reference group as exogenous variables, DERS subscales (awareness, clarity, goals, impulse, nonacceptance) as the mediators, and e-cigarette use and cigarette/cigar use as the endogenous variables. Significant paths displayed in red and betas for non-significant paths were not included. *p< .05, **p<.01, ***p<.001.

Table 22

Summary of Hypothesized Results

Hypothesis	Description	Data Analysis	Results	Supported or Not
1a	African Americans across institutions would report lower 30-day e-cigarette use than Caucasian Americans.	Multivariate Logistic Regression	Identifying as African American decreased risk of having current e-cigarette use (*OR*= 0.34, 95% CI [0.20, 0.57], *p*= .001.	Yes.
1b	African Americans across institutions would report higher past six-month little cigar use than Caucasian Americans.	Multivariate Logistic Regression.	Race was not a significant predictor of past 6-month cigar use (*OR*= 1.32, 95% CI [0.84, 2.07]).	No.
2a	All three positive e-cigarette outcome expectancy scales (negative reinforcement, positive reinforcement, appetite/weight control) would be higher in the e-cigarette user sample. Negative consequences would be lower in the e-cigarette user sample.	MANCOVA	Multivariate main effect of e-cigarette use on expectancies, Pillai's Trace = .146, $F(4, 1179) = 50.46$, $p < .001$, partial $\eta^2 = .146$ Current e-cigarette users reported significantly higher positive reinforcement (1.14 vs. 0.89), negative reinforcement (1.23 vs. 1.03), and weight control beliefs (0.91 vs. 0.84). Non-users reported significantly higher negative consequences about e-cigarette use (1.01 v. 0.95).	Yes, for all 4 expectancy subscales.
2b	All four e-cigarette outcome expectancy scales would be higher among the Caucasian American sample.	MANCOVA	Multivariate main effect of e-cigarette use on outcome variables, Pillai's Trace = .02, multivariate $F(4, 1179) = 5.34$, $p < .001$, partial $\eta^2 = .018$. Follow-up pairwise comparisons indicated that Caucasian Americans had significantly higher negative consequences (1.04 vs. 0.99), positive reinforcement (0.96 vs. 0.90) than African Americans.	Partially, for two out of 4 expectancy scales.

Table 22 (Continued)

Hypothesis	Description	Data Analysis	Results	Supported or Not
2c	The relation between race (Caucasian/African American), and e-cigarette/cigarette/little cigar use, controlling for gender and age, would be mediated by e-cigarette outcome expectancies (negative reinforcement, positive reinforcement, appetite/weight control, negative consequences).	Path Analysis	Race was significantly associated with the negative reinforcement (β=-.12), positive reinforcement (β=-.20), and negative consequences (β= -.12) expectancy subscales. Gender was significantly associated with current e-cigarette use (β=-.08). The weight control (β=-.157), negative reinforcement (β=.157), positive reinforcement (β=.32), and negative consequences (β=--.116) expectancy subscales were all significantly associated with current e-cigarette use. Race was also significantly associated with current e-cigarette use (β=. -15). There was an indirect effect of race on current e-cigarette use via outcome expectancies, β = -.062 with 95% BC CI [-.036, -.090].	Yes, a significant indirect effect of race on e-cigarette use and 9 significant direct paths.
3a	The Differences in Emotion Regulation Scale (DERS) Awareness, Clarity, and Non-acceptance subscales would be higher within the African American sample, and the Impulse, Goals, and Strategies subscales would be higher among the Caucasian American sample.	MANCOVA	Multivariate main effect of race on outcome variables, Pillai's Trace = .032, multivariate F (6, 1174) = 6.00, p< .001, partial η^2 = .032. Caucasian Americans had significantly higher scores on the DERS goal (.880 vs. .814), strategies (.752 vs. .716), and nonacceptance subscales than African Americans (.772 vs. .716).	Partially, for 3 out of the 6 subscales. Goals and strategies were higher for CA as hypothesized, and Nonacceptance, not as hypothesized.

Table 22 (Continued)

Hypothesis	Description	Data Analysis	Results	Supported or Not
3b	All DERS subscales (Awareness, Clarity, Goals, Impulse, Nonacceptance, Strategies) would be positively associated with both current e-cigarette use, cigarette use, and little cigar use.	Multivariate Logistic Regressions	No significant impact of DERS subscales on current e-cigarette and cigarette use. Difficulties in goal setting was a significant predictor of past 6-month cigar use (*OR*= 4.78, 95% CI [1.44, 15.82]). Impulse was also a significant predictor of past-six-month cigar use (*OR*= 3.44, 95% CI [1.06, 11.18]), as well as difficulties with emotional awareness (*OR*= 3.90, 95% CI [1.57, 9.67]).	Partially for past six-month cigar use. Not supported for current e-cigarette or cigarette use.
3c	Emotion regulation subscales (Awareness, Clarity, Goals, Impulse, Nonacceptance, Strategies) would mediate the relation between race (Caucasian/African American) and e-cigarette/cigarette/little cigar use, controlling for gender and age.	Path Analysis	Race was significantly associated with DERS goals (β=-.132), nonacceptance (β=-.153), strategies (β= -.059), current e-cigarette use (β=-.21), current cigarette use (β=-.19), and past 6-month cigar use (β=-.06). Gender was associated with current e-cigarette use (β=--.12). Age was associated with current cigarette use (β=.084) There were significant direct effects of DERS awareness (β=.08) and goals (β= .10) on the past six-month cigar use. There was a significant direct effect of DERS awareness (β=.06) on current e-cigarette use.	Partially, no significant indirect effects. 11 significant direct effects.

CHAPTER IV

DISCUSSION

The current study sought to examine the impact of emotion regulation on tobacco use. Tobacco use was hypothesized to differ between Caucasian Americans and African Americans with Caucasians more likely to use e-cigarettes and African Americans more likely to use little cigars (e.g., "Black and Milds"). Considering robust correlations between outcome expectancies and e-cigarette use (e.g., Harrell et al., 2015; Pokhrel, Little, Fagan, Muranaka, & Herzog, 2014), this study hypothesized that outcome expectancies would mediate the relationship between race and e-cigarette use. As a result of culture-specific coping strategies that have been found for both Caucasian Americans and African Americans (e.g., Bautista, 2013; Jaser et al., 2012), it was hypothesized that emotion regulation skills and would mediate the relationship between race and tobacco use. Overall, the purpose of this study is to compare prevalence rates and risk factors of tobacco use between African Americans and Caucasian Americans samples from a Historically Black College or University (HBCU) and a Community College.

Racial Differences in Tobacco Use

Hypothesis 1a. African Americans report less ever-use of e-cigarettes compared to Caucasian Americans and Hispanics (Webb Hooper & Kolar, 2016). Current analyses demonstrated that Caucasians Americans were significantly more likely to report current (past month) e-cigarette use. This finding was in the expected direction and is in line with other work indicating that Caucasian Americans are more likely to engage in both ever and current e-cigarette use than African Americans (Pearson et al., 2012; Shoeborn & Gindi, 2015).

Hypothesis 1b. African Americans report the highest little cigar use in comparison to other racial/ethnic groups (Cullen, 2011; Arrazola, 2015). However, although rates of little cigar

use were higher among African Americans, the difference was not significant. Given that this result is contrary to other research, there are several potential explanations. It is possible that the non-significant results were due to confounding. Considering data were taken from an HBCU and community college, it is possible that institution, which was a covariate for this analysis, was highly related to race and obscured the findings as well.

Expectancies as Mediators of Racial Differences in Tobacco Use

Hypothesis 2a. Given that e-cigarette outcome expectancies and use are highly correlated (Pokhrel, Little, Fagan, Muranaka, & Herzog, 2014), it was expected that positive e-cigarette expectancies (positive reinforcement, negative reinforcement/negative affect reduction, and appetite/weight control) would be higher in the e-cigarette user sample. It was expected that the baker research and indicate the continued belief that outcome expectancies are related to e-cigarette behaviors (Kristjansson et al., 2011; Pokhrel et al., 2014). Considering the sample was predominately African American, it indicates that theory regarding outcome expectations about e-cigarette use may be relevant to this specific population as well.

Hypothesis 2b. Due to African Americans reporting less strong weight control cigarette outcome expectancies, and the lack of racial differences among other cigarette outcome expectancies (Sánchez-Johnsen, Ahluwalia, & Fitzgibbon, 2006; Sánchez-Johnsen, Carpentier, & King, 2011; Sánchez-Johnsen, Spring, Sommerfeld, & Fitzgibbon, 2005), this study sought to extend the literature by examining racial differences in e-cigarette outcome expectancies. Given their higher rates of e-cigarette use, it was expected that Caucasian Americans would report more positive e-cigarette outcome expectancies. As expected, there was a significant multivariate effect of race on outcome expectancies. However, further examination indicated that Caucasian Americans reported higher negative consequences and positive reinforcement outcome

expectancies than African Americans with no significant differences for appetite/weight control and negative reinforcement.

Similarly, to hypothesis 1b, institution was included as a covariate for analyses, which may have removed variance relating to race. Research indicates that White women report much higher appetite/weight control smoking outcome expectancies than White men, with no gender differences for African Americans (Aguirre, 2016). Therefore, it may be more appropriate to examine appetite weight/control expectancies, and possibly other expectancies, across both gender and race. Further support for this notion is that women, across race, report higher negative reinforcement expectancies than men (Aguirre, 2016). However, the lack of significant racial differences in negative affect reduction outcome expectancies may indicate that both groups have similar views about the impact of e-cigarette use on reducing negative affect. In conjunction with hypothesis 2a, it may be that e-cigarette use is the most significant determinator for differences in outcome expectancies. Lastly, such findings may indicate that racial differences seen in smoking expectancies may not translate to e-cigarette outcome expectancies. Future research should examine the intersection of race and gender when examining e-cigarette outcome expectancies.

Hypotheses 2c. To test the relevancy of current outcome expectancy theories (Brandon & Baker, 1991) on the association between race and e-cigarette use, this study hypothesized that outcome expectancies would mediate the relationship between race and e-cigarette/cigarette/little cigar use. Consistent with the hypothesis, African Americans' current e-cigarette use significantly differed from those of Caucasian Americans. Further, outcome expectancies mediated the relationship between race and current e-cigarette use. Specifically, it is possible that African American's weaker positive reinforcement and negative reinforcement expectancies

contributed to lower current use. This is in line with smoking expectancy research indicating that increased negative reinforcement expectancies are associated with future cigarette smoking behaviors including initiation (Dalton, Sargent, Beach, Bernhardt, & Stevens, 1999; Kristjansson et al., 2011; Stevens, Colwell, Smith, Robinson, & McMillan, 2005). Similarly, the current finding is also in line with e-cigarette expectancy work indicating positive expectancies are associated with current 30-day use (Pokhrel, Little, Fagan, Muranaka, & Herzog, 2014) and switching from cigarettes to e-cigarettes (Harrell, Simmons, et al., 2015).

Appetite/weight control outcome expectancies were negatively associated with e-cigarette use. This is in direct contrast with research indicating a positive association between appetite/weight control expectancies and e-cigarette use for both men and women (Pokhrel, Bennett, & Boushey, 2020). It is possible that e-cigarette users report less weight control expectancies after experiencing the product or that this conceptualization is not useful for the sample being examined. Uniquely, this association is seen after variance associated with gender is removed. It may be useful for future research to specifically examine racial differences in outcome expectancies within a sample of e-cigarette users since this study examined racial differences based on non-use and use.

Difficulties in Emotion Regulation as Mediators of Racial Differences in Tobacco Use

Hypothesis 3a. Due to research indicating racial differences in emotion regulation techniques among African Americans and Caucasian Americans (Plummer & Slane, 1996, Vassilliere, Holahan, & Holahan, 2016), it was expected that the Differences in Emotion Regulation Scale (DERS) Awareness, Clarity, and Non-acceptance subscales would be higher within the African American sample, and the Impulse, Goals, and Strategies subscales would be higher among the Caucasian American sample. As expected, there was a significant multivariate

effect of race on DERS such that Caucasian Americans had significantly higher scores on the DERS goals and strategies subscales than African Americans. These findings suggest that Caucasian Americans have greater difficulty engaging in goal-directed behaviors when experiencing negative affect or are more likely to endorse difficulty with goal-directed behaviors due to a cultural emphasis on using problem-focused behaviors (Plummer & Slane, 1996). Arguably, this is consistent with research indicating that Caucasian Americans report significantly higher use of active coping (Lee & Mason, 2012). In other words, Caucasian Americans may report more difficulty due to more attempts to use this specific type of coping. Unexpectedly, Caucasian Americans also had higher scores on the nonacceptance subscale. More research is needed to investigate these findings.

The lack of differences in Awareness, Clarity, and Nonacceptance subscales may suggest that both groups rely on these strategies in equal measure, or these types of emotion regulation strategies may not capture racial/ethnic differences. Other African American samples have reported higher denial and emotional suppression than Caucasian Americans, which may align well with the nonacceptance subscale used in this study (Gross & John, 2003, Baustia, 2013). However, African American samples from the Gross and John study (2003) were much smaller (i.e., 13 to 30 participants) and the Baustia study (2013) focused on African American adults with epilepsy. Both the small sample size and inclusion of other demographic factors could have impacted the results presented.

The literature on Africultural coping suggest that outside of avoidance and distraction, engaging in spiritual or religious activities, using spiritual objects, and connecting with others to deal with an identified problem are popular strategies (Utsey, Adams, & Bolden, 2000). Given that these types of emotional coping were not examined in the current study, the lack of findings

may be understandable. The lack of incorporation of spiritual/religious coping and social connection could have limited this study's ability to gain a better conceptualization of the relation between race and emotion regulation.

Hypotheses 3b. Considering research indicated strong associations between emotion regulation and tobacco use, it was expected that all DERS subscales (Awareness, Clarity, Goals, Impulse, Nonacceptance, Strategies) would be positively associated with current e-cigarette use, cigarette use, and little cigar use. Unexpectedly, there was no significant effect of DERS subscales on e-cigarette or cigarette use. However, analyses indicated that individuals with greater difficulty goal setting and increased impulsivity when distressed were more likely to have used little cigars within the past 6 months. The association between difficulty goal setting when distressed and cigar use is in line with another research indicating that cigar use is associated with affect reduction motives for use (Wong, 2017). Cigars may be used to reduce affective distress so that an individual can then engage in more adaptive emotion regulation skills, like goal setting. The association between impulsivity when distressed and cigar use is also consistent with research indicating facets of impulsivity, like negative urgency, are associated with cigarette use (Lee, Peters, Adams, Milich, & Lynam, 2015; Doran & Tully, 2018). Such findings indicate that impulsivity may impact cigar and cigarette use in similar ways.

The unexpected lack of differences for both cigarette and e-cigarette use are in contrast with other studies that report greater emotion dysregulation among e-cigarette users compared to non-users (Wills, Knight, Williams, Pagano, & Sargent, 2014). It is possible that even examination of past 30-day use may not be sensitive enough to determine variations in emotion dysregulation. This is evidenced by emotion regulation difficulties being positively associated with past hour cigarette use (Adams et al. 2012). It is important to note that the inclusion of all

six DERS subscales did result in significant improvement in the model for both current e-cigarette and current cigarette use. In this vein, a more global conceptualization of emotion dysregulation may be a stronger predictor than individual subsets of emotion regulation.

Hypotheses 3c. To test the relevancy of emotion regulation on the associations between race and tobacco use, this study hypothesized that emotion regulation skills would mediate the relationship between race and e-cigarette, cigarette, and cigar use. Contrary to what was expected, emotion regulation skills did not mediate the relationship between race and tobacco use.

However, race was significantly associated with DERS goals, nonacceptance, strategies, current e-cigarette use, current cigarette use, and past 6-month cigar use. Specifically, African Americans reported significantly lower difficulty engaging in goal-directed behavior when distressed and more access to effective emotion regulation strategies in comparison to Caucasian Americans. This is consistent with the findings in hypothesis 3a, which indicated that Caucasian Americans reported higher difficulty engaging in goal-directed behaviors when distressed and more limited access to effective emotion-regulation strategies.

African Americans also reported lower current cigarette use and current e-cigarette use, but higher past-six-month cigar use compared to Caucasian Americans. This is consistent with the findings in hypothesis 1a, which indicated Caucasian Americans reported high e-cigarette use than African Americans. However, this is inconsistent with the findings on Hypothesis 1b, which indicated that there were no racial differences in the past six-month cigar use. The exclusion of institution as a covariate may allow for greater variation to be associated with the Caucasian American vs African American variable, which allowed for a significant effect. Further, it is

possible that the simultaneous examination of several types of tobacco use within the model allowed for a significant effect.

African Americans also reported higher nonacceptance. This is inconsistent with the findings from Hypothesis 3b which found that Caucasian Americans reported greater difficulty accepting their negative emotional responses. Considering higher tobacco use in the Caucasian sample and the association between tobacco use and emotion dysregulation (e.g., Adams et al. 2012; Wills, Knight, Williams, Pagano, & Sargent, 2014), an examination of causal associations via path analysis may have highlighted these trends.

Interestingly, increased difficulty engaging in goal-directed behaviors when distressed were associated with higher past six-month cigar use, and difficulties in emotional awareness were associated with both cigar and cigarette use. This finding is partially in line with hypothesis 3b, which found a positive association between cigar use and difficulty goal setting when distressed. However, a significant association between difficulties with emotional awareness and cigar use was not found for hypothesis 3b. These findings may suggest that those with difficulty attending to and acknowledging their emotions may believe that engaging in cigar and/or cigarette use will reduce or suppress their emotions. This is consistent with research indicating that both cigar and cigarette use are associated with affect reduction outcome expectancies (Wetter et al., 2004; Wong, 2017) and that emotion dysregulation is associated with negative affect reduction outcome expectancies (Johnson et al., 2008).

Limitations

There are several limitations to the current study. First, data used was archival and as such may not accurately reflect the individual's current experiences with emotion regulation, outcome expectancies, and tobacco use. Data collection ended in 2017 and since then major

events related to e-cigarette use have occurred, such as changes in e-cigarette technology, the sharp increase in e-cigarette use, e-cigarette and vaping associated lung injuries (EVALI), and an increase in age requirement to buy tobacco products from 18 to 21 years old in both Virginia and federally (CDC, 2020; Virginia Law Library, 2020). Events like these have likely shifted e-cigarette user demographics and perhaps other variables since data for this study were collected. . Even further, this study was cross-sectional and no manipulation of variables across groups was completed.

Therefore, causation between emotion regulation, outcome expectancies, and tobacco use cannot be inferred. Further, this study extended literature by incorporating racial/ethnic diversity in terms of focusing on African Americans, who experience smoking-related health disparities. However, this study does not examine other racial/ethnic cultural identities (Hispanic, Asian-American, American Indian, etc.). Therefore, it is unclear if results and interpretations from this study can be generalized to these populations. Similarly, other areas of diversity (age, sexual orientation, gender identity) were not represented and specifically examined in the study, indicating limitations in generalizability. Information regarding socio-economic status was not collected and could have been a confounding factor to the race variables used. Unfortunately, this study was unable to procure information related to past 30-day cigar use and used past six-month cigar use for analysis. The inclusion of current cigar use may have allowed for a more consistent temporal comparison of all three types of tobacco use. Even further, the inclusion of current cigar use may have allowed for clearer examination between cigar, e-cigarette, and cigarette use and outcome variables. Lastly, this study was unable to examine unique emotion coping strategies associated with the African American community (use of social support,

praying, etc.) and therefore limited the ability to determine racial differences in emotion regulation skills.

CHAPTER V
CONCLUSION

Implications

Given the findings described in this study, tobacco interventions focused on increasing goal-directed behavior when distressed, emotion regulation strategies, and acceptance of emotional experiences might be most helpful for Caucasian American populations. Further, targeting, or challenging beliefs that e-cigarettes provide a positive sensory experience might be useful for individuals who identify as Caucasian American. Further, the current study suggests Caucasian Americans report higher beliefs that e-cigarette cause negative health concerns, but they also report higher use. Such findings suggest that providing psychoeducation about the health effects of e-cigarettes may not help reduce e-cigarette susceptibility or use. Future efforts should seek to create culture-specific interventions that are more tailored to the specific emotion regulation difficulties or outcome expectancies the two groups have and relations to e-cigarette, cigarette, and cigar use. Future efforts should also seek to determine the usefulness of psychoeducation or advertisements combating outcome expectancies before tobacco initiation.

Based on path analysis findings, African Americans were much less likely to smoke cigarettes, but slightly more likely than Caucasian Americans to smoke little cigars. Despite this, increased higher mortality related to smoking-related diseases has been found for this population. Such findings support sustained belief that health disparities impact this population and continued examination of upstream (e.g., poverty and limited health care access) and downstream (e.g., better patient-provider interactions and increasing patient participation in health-care decisions) prevention methods is necessary; Hooper, 2018). Overall, cigarette use in this population appears to be a high-risk behavior, but unrelated to any emotion regulation difficulties.

In addition, reported difficulties in goal setting were associated with cigar use in the model. Thus, it appears that addressing difficulties related to goal setting when distressed could be useful for African American cigar smokers. Notably, goal setting was arguably the only emotion regulation subscale related to stressful work situations. A higher prevalence of chronic stressors among the African American population like job insecurity, discrimination, and loss of a loved one likely exacerbate difficulties with goal setting when distressed (Sternthal, Slopen, & Williams, 2011). Significant associations between perceived stress, nicotine dependence, and cigarettes smoked per day have been found among African American samples (Hooper, Dietz, Wilson; 2016). Further, symptoms of depression are greater among low-income African American smokers compared to comparable Caucasian samples (Hooper, Baker, &McNutt, 2014; Webb Hooper & Kolar, 2015). Research suggests that high distress levels among African American smokers are associated with depressive symptomology and perceived stress (Berg et al., 2012). Increased depressive symptomology and higher distress may make African American smokers more likely to have difficulty completing tasks and remaining goal-directed when distressed.

Future Directions

Results of this study suggest that e-cigarette use is most prominent among Caucasian Americans, with African Americans possibly reporting higher past-six-month cigar use. Future research should determine if there are variations in these racial differences based on age, as well as examining the intersectionality between race and other demographic factors (sexual orientation, age, and gender). The findings of this study suggest differences in outcome expectancy by racial group, such that Caucasian Americans report higher negative consequences and positive reinforcement e-cigarette outcome expectancies than African Americans. Research should aim to further determine the association between expectancy and use, especially for cigar

use, where African Americans report higher use than their Caucasian American counterparts. Findings also suggest racial differences in emotion regulation skills. Therefore, future research should aim to examine emotion regulation and outcome expectancies with other designs, such as via ecological assessment, to determine day to day associations between these variables. Multi-level modeling may provide useful information regarding possible examination of individual racial differences within institutions and across institutions. Research should aim to possibly replicate findings suggesting mediation between race, outcome expectancies, and tobacco use or include both outcome expectancies and emotion regulation within SEM models together to determine their unique impact on tobacco outcomes. Research should also aim to use longitudinal and experimental research designs to determine causality between emotion regulation difficulties, outcome expectancies, and tobacco use. It is also important to replicate the current findings in a more recently collected data sample to determine relevancy. Lastly, future research should aim to examine the connection between Africultural coping strategies/ skills described in Utsey and colleagues' (2000) work and tobacco use. It is important to address motivating factors or risks that may prompt tobacco use in African American populations due to racial/ethnic tobacco health disparities (Haiman et al. 2006). It is the hope that the research completed here will help provide a foundation for future work to continue this area of important research.

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APPENDICIES

APPENDIX A

DEMOGRAPHIC VARIABLES

These first few questions allow us to describe (as a group) the people completing this survey. This information will not be used to find out your name. No names or emails will ever be collected or reported.

What is your gender identity?	1 2 3 4 5	Male Female MTF transgender FTM transgender Prefer not to Answer
What is the highest level of education you have completed?	1 2 3 4 5 6 7 8 9 10	Less than high school Some high school, no diploma GED High School Diploma Some college, but no degree Associate Degree Bachelor's Degree Bachelor's degree and some graduate school Master's degree Doctorate
Do you currently attend school?	1 2 3	Yes, full-time Yes, part-time No
Are you of Hispanic, Latino/a, or Spanish origin?	1 2	No, not of Hispanic, Latino, Latina, or Spanish origin Yes, of Hispanic, Latino, Latina, or Spanish origin
What race(s) do you consider yourself to be?	1 2 3 4 5 6	American Indian or Alaskan Native Asian Black or African American Native Hawaiian or Other Pacific Islander White Other String Response

What type of school do you attend?	1	High School
	2	Vocational School
	3	Community College
	4	4-year college
	5	University
	6	Graduate school
How old are you?	7	18
	8	19
	9	20
	10	21
	11	22
	12	23
	13	24

APPENDIX B

CIGARETTE AND LITTLE CIGAR USE

The next questions ask about use and opinions of tobacco products. No one will know your answers, as no names or emails will ever be collected or reported.

IMPORTANT NOTE: Throughout this survey, "vaping device" refers to electronic devices used to vaporize and inhale nicotine, such as electronic cigarettes, e-cigarettes, e-vapes, vapes, vape-pens, mods, tanks, and e-hookah. "Cigarette" refers to regular burning (not electronic) tobacco cigarettes

Have you ever used (or tried) a cigarette, even one or two puffs?	1 2 3	No Yes, but not in the last 6 months Yes, in the last 6 months
Have you ever used (or tried) a little cigar or cigarillo, even one or two puffs (such as "Black and Milds")?	1 2 3	No Yes, but not in the last 6 months Yes, in the last 6 months

APPENDIX C

E-CIGARETTE USE

The next questions ask about use and opinions of tobacco products. No one will know your answers, as no names or emails will ever be collected or reported.

IMPORTANT NOTE: Throughout this survey, "vaping device" refers to electronic devices used to vaporize and inhale nicotine, such as electronic cigarettes, e-cigarettes, e-vapes, vapes, vape-pens, mods, tanks, and e-hookah. "Cigarette" refers to regular burning (not electronic) tobacco cigarettes

Have you ever used (or tried) a vaping device (e.g., e-cigarettes, vapes, vape-pens, tanks, etc.), even one or two puffs?	1 2 3	No Yes, but not in the last 6 months Yes, in the last 6 months
In the last 30 days, how often have you used a vaping device (e.g., e-cigarettes, vapes, vape-pens, tanks, etc.)?	1 2 3 4 5 6	Every day Almost every day Once or twice a week A few times a month Once I did not use a vaping device during the past 30 days

APPENDIX D

DIFFCULTIES IN EMOTION REGULATION SCALE

Please rate each question from 1 (Almost Never) to 5 (Almost Always).

I pay attention to how I feel	1 2 3 4 5	Almost Never (0-10%) Sometimes (11-35%) About half the time (36-65%) Most of the time (66-90%) Almost Always (91-100%)
I have no idea how I am feeling	1 2 3 4 5	Almost Never (0-10%) Sometimes (11-35%) About half the time (36-65%) Most of the time (66-90%) Almost Always (91-100%)
I have difficulty making sense out of my feelings	1 2 3 4 5	Almost Never (0-10%) Sometimes (11-35%) About half the time (36-65%) Most of the time (66-90%) Almost Always (91-100%)
I am attentive to my feelings	1 2 3 4 5	Almost Never (0-10%) Sometimes (11-35%) About half the time (36-65%) Most of the time (66-90%) Almost Always (91-100%)
I am confused about how I feel	1 2 3 4 5	Almost Never (0-10%) Sometimes (11-35%) About half the time (36-65%) Most of the time (66-90%) Almost Always (91-100%)
When I'm upset, I acknowledge my emotions	1 2 3 4 5	Almost Never (0-10%) Sometimes (11-35%) About half the time (36-65%) Most of the time (66-90%) Almost Always (91-100%)
When I'm upset, I become embarrassed for feeling that way	1 2 3 4 5	Almost Never (0-10%) Sometimes (11-35%) About half the time (36-65%) Most of the time (66-90%) Almost Always (91-100%)
When I'm upset, I have difficulty getting work done	1 2 3 4 5	Almost Never (0-10%) Sometimes (11-35%) About half the time (36-65%) Most of the time (66-90%) Almost Always (91-100%)

When I'm upset, I become out of control	1 2 3 4 5	Almost Never (0-10%) Sometimes (11-35%) About half the time (36-65%) Most of the time (66-90%) Almost Always (91-100%)
When I'm upset, I believe that I will remain that way for a long time	1 2 3 4 5	Almost Never (0-10%) Sometimes (11-35%) About half the time (36-65%) Most of the time (66-90%) Almost Always (91-100%)
When I'm upset, I believe that I'll end up feeling very depressed	1 2 3 4 5	Almost Never (0-10%) Sometimes (11-35%) About half the time (36-65%) Most of the time (66-90%) Almost Always (91-100%)
When I'm upset, I have difficulty focusing on other things	1 2 3 4 5	Almost Never (0-10%) Sometimes (11-35%) About half the time (36-65%) Most of the time (66-90%) Almost Always (91-100%)
When I'm upset, I feel ashamed with myself for feeling that way	1 2 3 4 5	Almost Never (0-10%) Sometimes (11-35%) About half the time (36-65%) Most of the time (66-90%) Almost Always (91-100%)
When I'm upset, I feel guilty for feeling that way	1 2 3 4 5	Almost Never (0-10%) Sometimes (11-35%) About half the time (36-65%) Most of the time (66-90%) Almost Always (91-100%)
When I'm upset, I have difficulty concentrating	1 2 3 4 5	Almost Never (0-10%) Sometimes (11-35%) About half the time (36-65%) Most of the time (66-90%) Almost Always (91-100%)
When I'm upset, I have difficulty controlling my behaviors	1 2 3 4 5	Almost Never (0-10%) Sometimes (11-35%) About half the time (36-65%) Most of the time (66-90%) Almost Always (91-100%)
When I'm upset, I believe that wallowing in it is all I can do	1 2 3 4 5	Almost Never (0-10%) Sometimes (11-35%) About half the time (36-65%) Most of the time (66-90%) Almost Always (91-100%)

When I'm upset, I lose control over my behaviors	1 2 3 4 5	Almost Never (0-10%) Sometimes (11-35%) About half the time (36-65%) Most of the time (66-90%) Almost Always (91-100%)

APPENDIX E

SHORT FORM VAPING CONSEQUENCES QUESTIONNAIRE

In the statements below, please rate how LIKELY or UNLIKELY you believe each consequence is for you when you use a vaping device (e.g. e-cigarette, vape, vape-pen, tank, etc.). If you have never vaped, you should answer according to your personal beliefs about the consequences when vaping, regardless of what other people think.

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

	1 2 3 4 5 6 7 8 9	Extremely Unlikely Very Unlikely Somewhat Unlikely A Little Unlikely A Little Likely Somewhat Likely Very Likely Extremely Likely Completely Likely
Vaping helps me deal with depression.	0 1 2 3 4 5 6 7 8 9	Completely Unlikely Extremely Unlikely Very Unlikely Somewhat Unlikely A Little Unlikely A Little Likely Somewhat Likely Very Likely Extremely Likely Completely Likely
E-cigarettes keep me from overeating.	0 1 2 3 4 5 6 7 8 9	Completely Unlikely Extremely Unlikely Very Unlikely Somewhat Unlikely A Little Unlikely A Little Likely Somewhat Likely Very Likely Extremely Likely Completely Likely
E-cigarettes help me deal with anger.	0 1 2 3 4 5 6 7 8 9	Completely Unlikely Extremely Unlikely Very Unlikely Somewhat Unlikely A Little Unlikely A Little Likely Somewhat Likely Very Likely Extremely Likely Completely Likely
When I vape the taste is pleasant.	0 1 2	Completely Unlikely Extremely Unlikely Very Unlikely

	3 4 5 6 7 8 9	Somewhat Unlikely A Little Unlikely A Little Likely Somewhat Likely Very Likely Extremely Likely Completely Likely
I will enjoy the flavor of an E-cigarette.	0 1 2 3 4 5 6 7 8 9	Completely Unlikely Extremely Unlikely Very Unlikely Somewhat Unlikely A Little Unlikely A Little Likely Somewhat Likely Very Likely Extremely Likely Completely Likely
I will enjoy feeling an E-cigarette on my tongue and lips.	0 1 2 3 4 5 6 7 8 9	Completely Unlikely Extremely Unlikely Very Unlikely Somewhat Unlikely A Little Unlikely A Little Likely Somewhat Likely Very Likely Extremely Likely Completely Likely
By vaping I risk heart disease and lung cancer.	0 1 2 3 4 5 6 7 8 9	Completely Unlikely Extremely Unlikely Very Unlikely Somewhat Unlikely A Little Unlikely A Little Likely Somewhat Likely Very Likely Extremely Likely Completely Likely
E-cigarettes help me reduce or handle tension.	0 1 2 3 4	Completely Unlikely Extremely Unlikely Very Unlikely Somewhat Unlikely A Little Unlikely

	5 6 7 8 9	A Little Likely Somewhat Likely Very Likely Extremely Likely Completely Likely
Vaping helps me control my weight.	0 1 2 3 4 5 6 7 8 9	Completely Unlikely Extremely Unlikely Very Unlikely Somewhat Unlikely A Little Unlikely A Little Likely Somewhat Likely Very Likely Extremely Likely Completely Likely
When I'm upset with someone, an E-cigarette helps me cope.	0 1 2 3 4 5 6 7 8 9	Completely Unlikely Extremely Unlikely Very Unlikely Somewhat Unlikely A Little Unlikely A Little Likely Somewhat Likely Very Likely Extremely Likely Completely Likely
The more I vape, the more I risk my health.	0 1 2 3 4 5 6 7 8 9	Completely Unlikely Extremely Unlikely Very Unlikely Somewhat Unlikely A Little Unlikely A Little Likely Somewhat Likely Very Likely Extremely Likely Completely Likely
E-cigarettes keep me from eating more than I should.	0 1 2 3 4 5 6	Completely Unlikely Extremely Unlikely Very Unlikely Somewhat Unlikely A Little Unlikely A Little Likely Somewhat Likely

	7 8 9	Very Likely Extremely Likely Completely Likely
Vaping keeps my weight down.	0 1 2 3 4 5 6 7 8 9	Completely Unlikely Extremely Unlikely Very Unlikely Somewhat Unlikely A Little Unlikely A Little Likely Somewhat Likely Very Likely Extremely Likely Completely Likely
Vaping is hazardous to my health.	0 1 2 3 4 5 6 7 8 9	Completely Unlikely Extremely Unlikely Very Unlikely Somewhat Unlikely A Little Unlikely A Little Likely Somewhat Likely Very Likely Extremely Likely Completely Likely
Vaping calms me down when I feel nervous.	0 1 2 3 4 5 6 7 8 9	Completely Unlikely Extremely Unlikely Very Unlikely Somewhat Unlikely A Little Unlikely A Little Likely Somewhat Likely Very Likely Extremely Likely Completely Likely
When I'm angry an E-cigarette can calm me down.	0 1 2 3 4 5 6 7 8	Completely Unlikely Extremely Unlikely Very Unlikely Somewhat Unlikely A Little Unlikely A Little Likely Somewhat Likely Very Likely Extremely Likely

	9	Completely Likely
Vaping is taking years off my life.	0 1 2 3 4 5 6 7 8 9	Completely Unlikely Extremely Unlikely Very Unlikely Somewhat Unlikely A Little Unlikely A Little Likely Somewhat Likely Very Likely Extremely Likely Completely Likely

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RESEARCH INTERESTS

- Emotional Regulatory Processes
- Health-Risk Behaviors

Selected Publications and Poster Presentations

Massey, Z.B., **Brockenberry, L.O.**, & Harrell, P.T. (*in press*). Vaping, smartphones, and social media use among young adults: Snapchat is the platform of choice for young adult vapers. *Addictive Behaviors.*

Harrell, P.T., Brandon, T.H., England, K.E., Barnett, T. E., **Brockenberry, L.O.**, Simmons, V.N., Quinn, G.P. (2019). Vaping Expectancies: A Qualitative Study among Young Adult Non-users, Smokers, Vapers, and Dual Users. Substance Abuse: Research and Treatment.

Brockenberry, L (2020, May) Impact of emotional competencies on current e-cigarette use within a young adult sample. Old Dominion University. Society for Research on Nicotine and Tobacco Health Disparities Network Travel Scholars Webinar. Oral Presentation.

Harrell, P.T. & **Brockenberry, L.** (2020, March) African American Disparities in Tobacco Product Usage across Institutions. Society for Research on Nicotine and Tobacco Conference. New Orleans, LA.