Liking of Specific Tobacco Advertisements as a Mediator of Individual Difference Influences on Contemporaneous Susceptibility and Change in Use after 12 Months

THESIS

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Abstract

Tobacco marketing exposure has been linked to adolescent tobacco use, yet there is scarce research examining adolescents’ reactions to tobacco advertisements. The present research explored how individual difference variables influence the extent to which one likes a tobacco advertisement, and how liking a tobacco advertisement predicts tobacco susceptibility and change in tobacco use after one year. Additionally, the effect of attitudes toward tobacco print advertisements was hypothesized to be conditioned on dispositional variables including sensation seeking and delay discounting.

The sample consisted of a total of 1,221 eleven- to sixteen-year-old boys from urban and rural counties in Ohio. Participants completed a survey at baseline and were exposed to print magazine advertisements for e-cigarettes, cigarettes, and smokeless tobacco, alcohol, and soft drinks and subsequently asked their attitudes toward the respective advertisements. Attitudes toward tobacco advertising significantly mediated the relationship between the individual difference variables and baseline tobacco susceptible, but no evidence of mediation was found for the 12-month use analyses. The effect of adolescents’ attitudes toward tobacco advertisements was a significant predictor of change in e-cigarette and smokeless tobacco use at 12-months and was conditioned on one’s level of sensation seeking. Further research should explore adolescents’ attitudes toward tobacco advertisements in order to develop tailored intervention strategies to prevent adolescent tobacco use.
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Chapter 1: Introduction

For decades, big tobacco companies have publicly denied the notion that their advertising and promotion efforts have been targeting youth audiences. However, there has been substantial evidence evincing otherwise (Bates & Roswell, 2004; Warner, 1985). Longitudinal studies exploring these effects suggest that an adolescent’s likelihood of smoking is positively associated with increased exposure to tobacco advertising and promotion (Difranza et al., 2006; Lovato, Watts, & Stead, 2011). These findings are particularly disturbing given the already enforced governmental regulations of tobacco advertising intended to decrease adolescent tobacco uptake (e.g., Master Settlement Agreement and Tobacco Control Act).

In order for an individual to be persuaded by an advertisement, the viewer should find the product relevant and also hold predominantly favorable attitudes toward the advertisement or product (Lavidge & Steiner, 1961; Petty, Cacioppo, & Schumann, 1981). Attitudes toward advertisements have been explored utilizing Petty and Cacioppo’s elaboration likelihood model (ELM; 1986) of persuasion, where more favorable attitudes lead to sustained attitude change and purchase intention, yet few studies have applied this concept respective to tobacco products. Past research has suggested that attitudes toward cigarette advertisements mediate the relationship between advertisement exposure and the desirability of cigarettes, although the antecedents of such attitudes were not fully explored and cigarettes were the only tobacco
advertisements examined (Kelly, Slater, & Karan, 2002). Furthermore, an adolescent’s social image, or prototype of a smoker (Gibbons & Gerrard, 1995) has been found to mediate the relationship between attention paid to cigarette advertising and adolescent smoking behavior (Aloise-Young, Slater, & Cruickshank, 2006). The purpose of the current study is to explore the underlying determinants that influence attitudes toward tobacco advertising, smoker prototypes, and these effects on adolescent boys’ susceptibility to tobacco and future use.

To further examine this relationship, it is essential to incorporate a broad scope of the factors that might influence tobacco advertisement liking. The social ecological model (SEM) is a multi-level model widely used in public health to identify the determinants of health behaviors (Bronfenbrenner, 1994; McLeroy, Bibeau, Steckler, & Glanz, 1988). The levels of SEM include the individual, interpersonal, community, and societal levels. Age, and dispositional factors such as sensation seeking and delay discounting are characteristics of the individual level that influence the way in which adolescents process messages (Donohew, Lorch, & Palmgreen, 1998; Doran, Spring, & McChargue, 2007), in addition to directly affecting adolescent tobacco use (Baker, Johnson, & Bickel, 2003; Zuckerman, 2014). Interpersonal factors such as parent and peer use have been found to positively influence adolescent tobacco use (Biglan, Duncan, Ary, & Smolkowski, 1995), and may cause tobacco advertisements to be more relevant to the viewer given the increased exposure to tobacco use. Community level variables such as convenience store tobacco marketing exposure and media use may also increase the accessibility of attitudes toward tobacco advertising and thus positively influence tobacco use (Fazio, 1995; Gibbons et al., 2010; Henriksen et al., 2008). The amalgamation of
these diverse variables will provide a deeper understanding of the mechanisms through which adolescents hold favorable attitudes toward tobacco advertisements and their prototype smoker evaluation, and how attitudes and prototypes affect tobacco susceptibility and change in future use. Other contextual variables such as neighborhood tobacco marketing density are not addressed in the scope of this thesis, but will be included in subsequent analyses at a later date. Further details as to the specific mechanisms of the relationships and the proposed models will be discussed later in this paper.

**Background**

Tobacco use is the leading cause of preventable death in the U.S. with over 480,000 deaths each year caused by cigarette smoking (CDC, 2014). Cigarette smoking causes most cases of lung cancer in addition to increasing one’s chances of getting a stroke and developing coronary heart disease. Additionally, smoking has been linked to cancer in nearly every part of the human body (CDC, 2010). In most areas of the U.S., the minimum age to be able to legally purchase tobacco products is 18; however, every day, more than 3,200 children under the age of 18 start smoking, with almost 90 percent of smokers starting before they turn 18 years old (CDC, 2010).

Due to several sanctions by the U.S. Food and Drug Administration (FDA), the tobacco industry has confined means to advertise their products to consumers. Even though tobacco companies are no longer able to use cartoons, product placement in media, advertise on billboards, or sponsor at sporting events, they have managed to spend $9.5 billion in 2013 on promoting and advertising in the U.S. alone (FTC, 2016). The majority of that money ($8.95 billion) was used toward cigarette advertising. With
billions of dollars spent on advertising each year, children and adolescents are inevitably exposed.

While there has been a substantial amount of research concerning cigarette advertising, there have been limited studies examining the effects of smokeless tobacco (ST) among adolescents. Despite the smaller proportion of money dedicated to ST advertisements, the five major U.S. smokeless tobacco manufacturers spent $503.2 million on smokeless tobacco advertising and promotion in 2013 (FTC, 2016). These advertising efforts have been largely effective at reaching adolescents; in 2002 an estimated 64.3% of adolescents were exposed to smokeless tobacco advertisements within magazines (Morrison, Krugman, Park, 2008). Furthermore, adolescent boys may have had even higher exposure than indicated because many of the magazines with high adolescent readership are tailored toward male audiences. While ST is non-combustible and has reduced ties to cancer and other diseases caused by cigarettes, it nonetheless contains cancer causing chemicals, and nicotine which is the addictive substance found in cigarettes (WHO, 2007).

A growing phenomenon spreading across the U.S. is the use of e-cigarettes and other electronic nicotine delivery systems. Indeed, e-cigarette use has increased among high school students from 4.5 percent in 2013 to 13.4 percent in 2014 and more than tripled among middle school students from 1.1 percent in 2013 to 3.9 percent in 2014, suggesting that e-cigarette advertising campaigns may successfully be exposed to adolescents and young adults (Bunnell & Ralph, 2015). Most recently, 16 percent of high school and 5.3 percent of middle school students were current (≥1 day in the past 30
days) e-cigarette users in 2015, making e-cigarettes the most commonly used tobacco product among America’s youth for the second consecutive year (CDC, 2016).

One of the most attractive qualities of e-cigarettes is the availability of different appealing flavors for purchase. In 2013-2014, 81% of current adolescent e-cigarette users reported attractive flavors as the primary reason for using e-cigarettes (Ambrose et al., 2015). E-cigarette use is a potential issue for public health because even though ENDS involve combusting tobacco, they do contain liquid nicotine, which has addictive properties and known carcinogens (CDC, 2013). Additionally, e-cigarette use has been found to be a predictor of conventional cigarette use among adolescents (Wills et al., 2016). Given the rapid increase in e-cigarette use over the years, and the relatively unregulated advertising techniques companies can employ, e-cigarettes have become a rising concern among adolescents.
Chapter 2: Literature Review

**Attitudes to the Ad (A_{ad}) Theory**

The link between adolescents’ attitudes and behavior change has been heavily supported in the context of smoking (Fishbein & Cappella, 2006; O'callaghan, Callan, & Baglioni, 1999), however, attitudes toward advertisements have commonly been overlooked in the field of health communication (Slater, 2006). The role of attitudes toward advertisements have been explored using Petty & Cacioppo’s elaboration likelihood model (ELM; 1986), whereby attitudes to the ad function in accordance with the peripheral route of persuasion, which is heuristic based and occurs when an individual lacks sufficient ability or motivation to process a message. Indeed, oftentimes, advertisements inundate our environment, making it impossible to attend to each message with analytic thought.

According to Attitude to the Ad (A_{ad}) theory, there is a distinction between attitudes toward the behavior or product and attitudes toward the advertisement itself. The latter is involved with the overall evaluation of the advertisement stimulus, and the extent to which one’s reactions are favorable or unfavorable (Lutz, 1985; Mitchell & Olson, 1981). This difference is worth noting because it is likely that adolescents today would report having negative attitudes toward smoking, but may have slightly more positive attitudes toward tobacco advertisements, which has been found to increase one’s desirability of cigarettes (Kelly et al., 2002). Moreover, researchers have found support
indicating that liking an ad is the best indicator of advertising effectiveness (Haley & Baldinger, 1991), thus warranting further exploration of this concept within the context of tobacco advertising.

Previously supported theoretical models incorporating attitudes toward advertisements reveal that $A_{ad}$ consistently acts as a mediator of advertising effectiveness (e.g., purchase intentions; Homer, 1990; MacKenzie & Lutz, 1989; MacKenzie, Lutz & Belch, 1986). In some instances, advertisers do not necessarily aim to influence one’s attitudes toward the product or brand itself, but instead attempt to place the viewer in a more positive affective state in anticipation that those feelings are then transferred to the product or brand, which would then influence purchase intentions (MacKenzie et al, 1986; Shimp, 1981). Indeed, support for this relationship was also found in the context of cigarette advertisements and cigarette desirability (Kelly et al., 2002), however currently, there are no published studies to the knowledge of the author that explore the relationship between attitudes toward tobacco advertising and future tobacco use. Drawing on other health behavior theories, we attempt to identify predictors of favorable attitudes toward tobacco advertisements and expect the attitudes to mediate the relationship between those predictors and tobacco use. Therefore it is hypothesized that:

**H1**: Attitudes toward tobacco advertisements will mediate the relationship between predictor variables in that more positive attitudes toward tobacco advertising will predict increased tobacco susceptibility and change in future use.

An important consideration of the current study is that it is neither expected nor implied that one-time exposure to a tobacco print advertisement will influence subsequent behavior. Short term exposure to recently marketed tobacco ads, should have
very limited, if any effects on a viewer; and the current study’s purpose is not to manipulate or alter any attitudes about tobacco advertisements. Instead, an assumption is that the attitudes toward these ads are related to general reactions to tobacco advertising that adolescents encounter in the real world, and through repeated exposure to tobacco advertising, attitudes are made more accessible or easily recalled from memory, which may subsequently influence behavior under certain circumstances (Ewoldsen, Rhodes, & Fazio, 2015). Adolescents with more accessible pro-smoking attitudes engaged in more biased elaborative processing of anti-smoking public service announcements, in other words, they were more resistant to anti-smoking messages (Shen et al., 2009).

**Dispositional Factors**

Social health psychologists have focused a great deal on determining the dispositional factors of an individual in order to predict one’s likelihood to engage in risky health behaviors (Murray, 2014). In particular, delay discounting and sensation seeking are well supported dispositional factors associated with tobacco use but may also act as a determinant of advertisement liking, the reasons for which will be discussed in further detail in the following sections.

**Delay Discounting**

Delay discounting is a measure of impulsivity with regards to how individuals favor immediate rewards with lesser value over temporally delayed rewards with higher value (Mischel, 1966; Rachlin, Raineri & Cross, 1991). If an individual was given a choice between receiving $100 now versus $125 six months in the future and they chose the $100 reward, they would have exhibited delay discounting. Delay discounting is thought to be pertinent to tobacco use because of the choice one makes to choose the
immediate noticeable rewards associated with tobacco use versus the delayed rewards of never using tobacco (Stanger et al., 2013).

Previous research has supported the notion that adult current smokers partake in delay discounting more than never smokers (Baker, Johnson, & Bickel, 2003; Bickel, Odum, & Madden, 1999; Ohmura, Takahashi, & Kitamura, 2016; Reynolds, Richards, Horn, & Karraker, 2004), however, research looking at the relationship between delay discounting and adolescent smokers has been relatively inconclusive. A few studies have found that adolescent smokers do indeed rate higher on delay discounting than their non-smoker counterparts (Fields, Leeras, Collins, & Brady, 2009; Reynolds & Fields, 2012), with one study determining that delay discounting is a steady trait over time that is predictive of smoking rather than a result of smoking (Audrain-McGovern et al., 2009). Conversely, some research found no difference between smokers and non-smokers, but rather discovered that adolescents who were classified as triers (e.g., recently tried smoking) engaged in delay discounting more than smokers and non-smokers (Reynolds, Karraker, Horn, & Richards, 2003). Additionally, Audrain-McGovern and colleagues (2004) found support for an association between higher delay discounting and smoking at baseline but concluded that there was no direct effect of delay discounting on adolescent smoking progression over time. While the conclusions are indefinite about adolescents’ inclination to engage in delay discounting and the relationship with tobacco use, it may have an indirect effect on uptake via impact on attitudes toward tobacco advertising.

In relation to adolescents’ attitudes to tobacco advertising, delay discounting may be a factor influencing whether an adolescent holds more favorable attitudes toward a tobacco ad. Tobacco advertisements tend to focus on the immediate rewards
accompanying use, such as the appearance of being independent and masculine when smoking, or associating the product with appealing social situations, all while failing to show the negative health effects caused by long term use (Warner, 1985). Additional research in the judgment and decision making field link impulsivity to lower effortful thinking and more heuristic based processing when making decisions (Hoffman, Friese, & Wiers, 2008; Penchmann, Levine, Loughling, & Leslie, 2005). Therefore, adolescents who engage in more delay discounting may focus more on the overall theme portrayed in a tobacco advertisement, which is typically positive. It is also possible that adolescents may in general like tobacco advertisements, however those who favor more immediate rewards will be more likely to use tobacco, while those who favor delayed rewards will never end up trying tobacco. Therefore, it is hypothesized that:

H2: Individuals high in delay discounting will have predominantly positive attitudes toward tobacco advertisements which will in turn predict tobacco susceptibility and change in use at 12-months.

H3: The effects of attitudes toward tobacco advertisements on tobacco susceptibility and change in use at 12-months will be moderated by delay discounting, where stronger effects will be observed for those who engage in high delay discounting.

**Sensation seeking**

While delay discounting is conceptualized as a measure of impulsivity, sensation seeking is a characteristic that incorporates an individual’s need for varied, novel, and complex sensations (Zuckerman, 2014). The sensations often refer to experiences or actions that result in some heightened stimulation or arousal and the willingness to take
risks to attain that arousal; the seeking aspect refers to the perpetual desire to maintain that arousal and engage in these experiences by actively seeking them out. In relation to tobacco use, high sensation seekers are posited to be drawn to the novel behavior of smoking and other tobacco products (Hampson, Andrews, Secerson, & Barckley, 2015) and to also under-evaluate the risks associated (Hoyle, Stephenson, Palmgreen, Lorch, & Donohew, 2002; Zuckerman, 2014).

Previous research has found support that adolescents who rated highly on sensation seeking and impulsivity were most likely to engage in risky health behaviors (Donohew et al., 2000; Malmberg et al., 2013) resulting in the development of dual process theories emphasizing the importance of the two constructs (Casey, Hones, & Hare, 2008). With respect to sex differences, adolescent boys typically report higher levels of sensation seeking and lower levels of impulse control than females, with males maintaining higher levels of both throughout adolescence (Shulman, Harden, Chein, & Steinberg, 2015). Thus, the examination of sensation seeking in addition to delay discounting may provide a deeper understanding of the dispositional factors associated with tobacco use. In addition to the relationship between sensation seeking and tobacco behavior, it may also be used as an influential variable for attitudes toward tobacco advertisements.

In the past couple decades, health communication scholars have heavily researched sensation seeking as it relates to audience’s receptivity to health messages. Following support of the link between high sensation seekers and risky behaviors, it became ever-important to target this population with intervention messages containing specific characteristics tailored toward high sensation seekers (Kang, Cappella, &
Fishbein, 2006; Miller & Quick, 2010; Palmgreen, Donohew, Lorch, Hoyle, & Stephenson, 2001). The activation theory of information exposure (Donohew, Lorch, & Palmgreen, 1998) incorporates sensation seeking as a key characteristic of determining whether an individual will attend to a certain message and a public health media campaign formed using the activation theory of information exposure was found to be successful in lowering marijuana use among adolescents by designing high sensation value messages (Palmgreen at al., 2001). In the application of the limited capacity model for motivated mediated message processing (LC4MP) framework, sensation seeking mediates the level of attention, arousal, emotional response, and memory ascribed to tobacco images (Lang & Yegiyan, 2011). Specifically, high sensation seekers tend to hold more positive emotional responses to images of tobacco and alcohol products. While many studies have explored the role of sensation seeking with risk behavior and public health campaign messages, the current study is interested in exploring its role in adolescents’ attitudes toward tobacco advertising and subsequent tobacco use. Therefore:

H4: Sensation seeking will have an indirect effect on tobacco use at time two, by which high sensation seekers will respond more positively to tobacco advertisements, which in turn will positively predict tobacco use at time two.

H5: Effects of advertisement attitudes will be moderated by sensation seeking, where the effects will be attenuated among low sensation seekers.

Media use

The driving theories explaining media’s effects on tobacco use have largely been attributed to Bandura’s social learning theory (1997) and social cognitive theory (1986). These theories maintain that adolescents learn about tobacco behavior vicariously
through viewing the actions of others, and will subsequently model that behavior if there are rewards or positives associated with the behavior (Akers & Lee, 1996). If an adolescent watches a music video of an artist smoking a cigarette and sees them relaxing and having fun soon after, the viewer may associate positives with tobacco use and would thus be more likely to use tobacco in the future.

Indeed, previous research has found a positive association between music television exposure (e.g., MTV & VH1) and smoking, whereby early music television exposure predicted an increase in smoking among adolescents, in addition to an increase in fraternizing with smoking peers (Slater & Hayes, 2010; Slater & Henry, 2013). The researchers explain the nature of this relationship through a dynamic reinforcing spirals framework. The reinforcing spirals model (Slater, 2007) proposes that since adolescence is a time when individuals are developing their social identities, they will engage with media that explore different values from what they are accustomed to, including media that model fun, risky behaviors (e.g., smoking, drinking, sex) that go against their parents’ values, and in turn, will reinforce that identity. Reality television shows from the television program MTV depict frequent smoking among cast members in addition to other risky behaviors (Flynn, Morin, Park, & Stana, 2015). Furthermore, male cast members who were depicted smoking were more likely to engage in sexual activities than their non-smoking counterparts. This depiction of male smokers may appeal to adolescent boys who want to adopt some of the characteristics that demand sex appeal.

Another form of media that may be of especial influence to adolescents is social media. In 2015, 71% of American teens reported using more than one social media site, while the majority of teen Facebook users were boys (Lenhardt, 2015). Limited studies
have examined tobacco-related Facebook user posts, however, Beullens and Schepers (2013) conducted a content analysis of alcohol-related Facebook posts and found that over 72% of pictures were portrayed in a positive context and most of the peer reactions to these posts were also positive. An analysis of Twitter posts about tobacco found that the majority of tobacco related tweets are positive. Among them, mentioning e-cigarettes and sharing first-hand experiences using tobacco were the most likely types of tobacco posts to be positive (Myslin, Zhu, Chapman, & Conway, 2013). Social media allow adolescent users to learn and share information about tobacco and view the experiences that other adolescents in their school might be partaking in indirectly, through pictures and videos posted online (Link et al., 2015) This allows for a wider range of influence beyond just a small group of friends, giving researchers another method to explore peer influence on tobacco use.

Given, the proposed importance of adolescents’ attitudes toward tobacco print advertisements, another key factor determining subsequent tobacco use is an adolescent’s readership of magazines that contain tobacco advertising. Researchers reported that despite major regulations enacted in 1998, ST advertising increased from 1998 to 2006, with their themes focusing on portraying ST as an alternative to smoking and tailoring messages toward male audiences (Curry, Pederson, & Stryker, 2011). Tobacco print advertisements in magazines have been shown to reach a high percentage of adolescents in the U.S. (Morrison, Krugman, & Park, 2008), and this exposure has been previously linked with increased adolescent tobacco use (Pucci & Siegel, 1999).
The overall effects of media use discussed may have an influence on adolescents’ attitudes toward tobacco advertisements by the repeated exposure to media content portraying tobacco use positively. Therefore:

H6: Media use variables will influence tobacco use at 12-months and baseline susceptibility in that, individuals who are exposed to more media content will have more favorable attitudes toward tobacco ads which will in turn predict tobacco susceptibility and use.

**Smoking Media Literacy**

Many scholars and public officials conform that youth’s ability to effectively evaluate, analyze, and critique tobacco companies’ advertisement efforts may prevent the uptake of tobacco products (CDC, 2005; Banerjee & Greene, 2007; Primack & Hobbs, 2009). This ability to understand the advertising techniques of tobacco companies is a term known as smoking media literacy. Developing a higher level of smoking literacy can influence how an individual reacts to tobacco advertising by making them aware of the methods in which advertisers market their products, and by doing so allows the individual to make a more objective and knowledgeable reaction to the advertisement.

If an individual knows that smoking portrayed in movies is meant to make the smoker look cool while omitting content that shows the smoker coughing or experiencing other negative consequences of smoking, he or she may be more likely to develop counterarguments while viewing the movie, thus reducing the appeal of smoking (Primack & Hobbs, 2009). Previously determined antecedents to attitudes toward advertising included advertiser credibility, which is defined as a consumer’s perception of how honest or believable the sponsor of the advertisement is (MacKenzie & Lutz, 1989).
Given the awareness and critical evaluation of tobacco companies’ marketing efforts, smoking media literacy can be perceived similarly to one’s assessment of the credibility of tobacco companies. Therefore:

H7: Adolescents with higher levels of smoking media literacy will have less positive attitudes toward tobacco advertisements, which will in turn negatively predict tobacco use.

Perceptions of Tobacco

Adolescent’s perceptions of how harmful or beneficial tobacco products play a key role in determining whether or not they might try a tobacco product. The health belief model (Becker, 1974; Hochbaum, Rosenstock & Kegels, 1952) places a good deal of importance on individuals’ perceived severity of a behavior on predicting health behavior. If an individual does not perceive a behavior to be harmful, they will be less likely to attempt to avoid engaging in that behavior. Indeed, a recent study found that non-smokers who expressed interest in receiving a free tobacco product had significantly lower perceptions of harm (Popova & Ling, 2014). If an adolescent views a tobacco advertisement and does not maintain that tobacco products are unhealthy but are rather beneficial to one’s well-being, they are likely to engage in less counterarguing with the message being advertised and therefore:

H8: Adolescents who report higher perceptions of tobacco harmfulness will have more negative attitudes toward tobacco advertising which will in turn, negatively predict tobacco use.
H9: Adolescents who report higher benefits of using tobacco products will have more positive reactions to tobacco advertisements which will in turn, positively predict tobacco use.

Parent and Peer Use

Other important determinants of adolescent tobacco use are parent use and peer use (Boyle, Claxton, & Forster, 1997; Liao, Huang, Huh, Pentz, & Chou, 2013). Parent use is linked to more intense smoking patterns among adolescents and these effects tend to increase over time (Mays et al., 2014). These factors directly influence use and may also affect reactions to advertisements by making the tobacco advertisements more personally relevant to the viewer, and thus increasing their involvement with the message. Even if an adolescent has never smoked before, the topic of tobacco may be relevant to him because of his perpetual exposure to peer and or parent use. Furthermore, the role of family and peer tobacco use has been associated with the formation of prototypes of smokers (Blanton, Gibbons, Gerrard, Conger, & Smith, 1997).

H10: Past, parent, and peer use will have a positive indirect effect on tobacco use at time two through adolescents’ positive attitudes toward tobacco advertising.

Region

The differences among adolescent tobacco use between urban and rural regions have been reported with mixed results. There is some support indicating that adolescent tobacco use is more prominent in rural areas of the U.S. (Aloise-Young, Wayman, & Edwards, 2002). A more recent study found similar results in relation to ST products, but there were no significant differences in cigarette use based on region (Rhew, Hawkins, & Oesterle, 2011). While others found no differences between tobacco use and residing in
either a rural or urban area (Scheer, Borden, & Donnermeyer, 2000). Specifically, in Ohio, there are a number of rural Appalachian counties where tobacco farming is prevalent, which has resulted in the formation of social norms and a culture more amenable toward ST use (Denham & Rathburn, 2005; Nemeth et al., 2012), therefore:

H11: Adolescents from rural areas will hold more positive attitudes toward tobacco advertising, which in turn will affect ST susceptibility and future use.

Beyond ST use, differences in rural and urban tobacco use have not been consistent (Roberts et al., 2016), therefore the following research question is asked:

RQ1: Will region influence an adolescent’s e-cigarette and cigarette susceptibility and future use indirectly through attitudes toward tobacco advertising?

**Smoker Prototype**

The prototype willingness model (PWM; Gibbons & Gerrard, 1995), is a behavior prediction model that focuses on adolescent risky-health behaviors. According to Gibbons and Gerrard, adolescents may not have much experience with smoking or other health-risk behaviors but they do have a perception or social image of what the typical smoker their age is like. This social image, or *prototype* is the evaluation of a typical person who engages in a certain risk behavior and may act as a goal state for adolescents, where they are in a moment in their lives when they are trying to seek and develop their identity. Prototypes are evaluated on a list of characteristics that define an individual, such as how cool, smart, or popular they are. In general, prototype favorability has been associated with increased age during adolescence. Within the PWM framework, it is posited that adolescents who hold favorable prototypes of smokers will be more willing to smoke, which is a proximal antecedent to smoking behavior (Gerrard et al., 2008).
The formation of prototypes has been attributed to several of the variables that were previously hypothesized to influence attitudes toward tobacco advertising. Increased exposure to media portrayals of substance use, where increased exposure leads to more positive evaluations of prototypes which then increases one’s willingness and behavior to engage in risky behaviors (Dal Cin et al., 2009; Gerrard et al., 2008; Gibbons et al., 2010). Past, peer, and parent tobacco use have also been positively associated with the formation of positive smoker prototypes, which mediated the effect on smoking behavior (Blanton et al., 1997; Gerrard et al., 2005). Also, the dispositional factors previously noted to affect message processing for attitudes toward tobacco ads, have been posited to influence willingness to smoke, such as measures related to self-control (e.g., impulsivity) and sensation seeking (Gerrard et al., 2008). The application of prototype evaluations predicting tobacco use have largely been limited to cigarette smoking, thus, the current study is expanding the current literature by examining the relationship between prototypes of smokers with e-cigarette and ST use.

Therefore:

H12: Prototypes of smokers will mediate the relationship between predictor variables in that more positive prototypes will predict increased tobacco susceptibility and future use.

H13: The effects of prototypes on tobacco susceptibility and use at 12-months will be moderated by sensation seeking and delay discounting.

RQ2: Will region influence an adolescent’s tobacco susceptibility and future use indirectly through prototype evaluations of smokers?
Chapter 3: Method

Participants

Participants ($N = 1,221$) consist of adolescent boys ranging from 11 to 16 years old at baseline. 58% of boys were sampled from urban areas of Ohio within Franklin County while the remaining 42% were sampled from rural areas in Appalachia County. The recruiting process involved two different strategies. The first was address-based sampling which involved mailing letters and subsequent phone calls to homes with eligible participants. The second was through community-based sampling which occurred through recruiting at local fairs, sporting events, and other community events in addition to posting flyers and advertising via radio, newspapers and other types of media. In the occurrence of a home having more than one eligible adolescent boy, the boy whose birthday most recently occurred would be selected to participate. Consent was obtained by each boy whose parents provided permission.

Procedure

The baseline interview occurred at the homes of the participants where a trained interviewer asked participants questions regarding demographics, delay discounting, media use, marketing exposure, neighborhood density of retail establishments, benefits of using tobacco, perception of harm, and smoking media literacy. Question items that concerned more sensitive information were administered via audio and the responses were recorded on a computer that only the participant had access to. These questions included tobacco use, smoker prototypes, sensation seeking, and tobacco related media
use. Participants were then exposed to five different print advertisements (three tobacco ads, one alcohol ad, and one soft drink ad) for a total of eight seconds per advertisement, further details about the advertisements are discussed later. After exposure, participants were asked closed ended items for their attitudes toward the advertisement. All question items had available options to indicate they didn’t know how to answer the question or to refuse the question altogether, so as not to force a response.

Participants were compensated $20 for the baseline interview and an additional $10 for telephone surveys which are performed every six months. This data is part of a larger study with various public health aims and goals, though the variables of interest to this thesis are focused on. All procedures were reviewed and approved by the Ohio State University Institutional Review Board.

**Stimuli**

The tobacco advertisements were full page print ads selected from magazines that did not have restrictions on tobacco advertising and were considered to be of those that had a high likelihood of being read adolescent boys (e.g., *ESPN, Rolling Stone, People, Popular Science, Sports Illustrated*; See Appendix for example ads). There was a total of 184 print advertisements (33 cigarette, 14 e-cigarette, 76 alcohol, 32 smokeless tobacco, and 29 soft drink), and participants were randomly chosen to view one for each category which were also presented in a randomized order.

**Measures**

*Tobacco use.* Prior to seeing questions regarding tobacco use, participants were asked if they have heard of e-cigarettes or ST products. Only those who have heard about e-cigarettes or ST products would then be shown additional questions on tobacco use. All
participants were asked about their cigarette use without a prior question asking if they have heard of cigarettes. The measures focused upon in this paper were ever use of e-cigarettes, cigarettes, and ST at baseline and once more at the 12-month follow up (see Table 1).

Those who reported never having tried any of the tobacco products were subsequently asked about tobacco susceptibility measures while those who were ever users did not complete susceptibility items.

**Tobacco susceptibility.** Tobacco susceptibility measures were taken from previously reliable scales seeking to establish how susceptible and curious one is to begin using a tobacco product in the future (Nodora et al., 2014; Pierce et al., 1996). Cigarette susceptibility was measured using three items asking if the participant was ever curious about smoking a cigarette, if they would try a cigarette in the next year, and how likely they would say yes if one of best friends offered a cigarette to them (α = .68). E-cigarette susceptibility was measured using the same three items respective to e-cigarettes (α = .82). ST susceptibility included only two items, if they were ever curious about using ST products and how likely they would say yes if one of their best friends offered it to them (α = .75). All items were measured on 4-point Likert scales. For data analyses, susceptibility measures were dummy coded so that 0 indicated that a participant was not at all susceptible, and 1 represented individuals who were susceptible to tobacco products in the future (see Table 1).

**Peer use.** Participants were requested to report the extent of tobacco use by their peers by answering two questions. One question asked how many of their friends used e-cigarettes (M = 1.36, SD = .65). and the other item asked how many of their friends used
a tobacco product of any kind ($M = 1.41$, $SD = .74$). Both items were recorded on a Likert-scale ranging from $1 = \text{none}$ to $5 = \text{all}$.

**Attitudes toward the advertisement.** After the initial exposure of each advertisement, participants were asked how enjoyable, likeable, and appealing the advertisement was. Responses were recorded on an 11-point scale ranging from “not at all” to “very” enjoyable, likable, or appealing. Separate indices were created per tobacco advertisement, in addition to an index for soft drink ads and alcohol ads for comparison ($\alpha = .88$). Please see Table 5 for means and standard deviations, as well as correlations between attitudes toward the different advertisement types.

**Prototype.** In accordance with the PWM, participants were asked to think about an individual their age who smokes, and to rate them on various individual characteristics (e.g., cool, independent, tough) on an 11-point scale ranging from 0 (not at all) to 10 (extremely). Results of a principal components analysis revealed that the items formed a single component with an eigenvalue exceeding one, therefore the five items were averaged to create an index of a prototypical smoker ($\alpha = .81$, $M = 1.11$, $SD = 1.59$).

**Sensation seeking.** The brief sensation seeking scale (BSSS-4) was implemented to assess sensation seeking while still maintaining reliability (Stephenson, Hoyle, Palmgreen, & Slater, 2003). These four items included (a) I would like to explore strange places; (b) I like to do frightening things; (c) I like new and exciting experiences, even if I have to break the rules; and (d) I prefer friends who are exciting and unpredictable. Responses were measured on a five-point Likert scale (1 = strongly disagree, 5 = strongly agree) and averaged to create an index of sensation seeking ($\alpha = .71$, $M = 2.68$, $SD = .96$).
**Delay discounting.** Measures for delay discounting were taken from Kirby & Maraković (1996) and included 9 items. Participants were told that they would not receive the rewards that they chose but that they should make their decisions as if they were to receive them. An example is: “Would you prefer $55 today or $75 in 61 days?” The rewards varied from $31 to $85, with the difference in rewards ranging from $2 to $54, and the delay ranged from seven days to 119 days. The value used to represent delay discounting is the $k$ value which represents the degree of discounting over time, similarly used in other studies (see Odum, 2011). This value was not transformed from its original form and can be interpreted as higher values indicating greater discounting of delayed rewards and vice versa ($M = .05, SD = .07$).

**Media use.** In order to gain a rich understanding of the effects of media use, participants were asked to report their exposure of various different media sources. Participants were asked how often they have read ten different magazines, some of which advertised tobacco products (e.g., Rolling Stone, People, Sports Illustrated). The responses were recorded on a Likert-scale ranging from 1 = *never* to 4 = *often* and summed to create an index of magazine readership ($M = 1.91, SD = 2.86$).

Participants were also asked about some of their behavior associated with social media sites. 934 participants (76.5%) reported having a social networking account such as Facebook or Twitter. They were subsequently asked how often people discussed tobacco products on their social networking sites, how often they have seen pictures or watched videos of people similar in age who were using tobacco products, and how often they saw pictures or videos of their friends who were using tobacco products. The three
items ranged from 1 = *never* to 5 = *several times a day*, and were averaged to create an index of tobacco exposure on social media sites ($\alpha = .75, M = 1.23, SD = .83$).

Participants were asked “In the last 7 days, on how many days have you watched reality television shows on MTV, VH1, BET, or other music stations?” ($M = .49, SD = 1.31$). and “In the last 7 days, on how many days have you watched music videos music videos on MTV, VH1, BET, or other music stations,” ($M = .34, SD = 1.14$). both were measured via open ended response. These items were adapted from previous used scales (Slater & Hayes, 2010; Slater & Henry, 2013).

An additional measure of music video exposure was asked in order to record how frequently participants watched music videos on YouTube or other online sites in the past week. Responses were recorded using Likert-scale items ranging from 1 = *never* to 5 = *several times a day* ($M = 2.98, SD = 1.63$). Each item was assessed as separate independent variables instead of creating an index.

*Self-reported Tobacco Advertising Exposure.* In order to assess the effects of tobacco advertising, the boys were asked how often they saw advertisements for cigarettes and other tobacco products when reading newspapers or magazines in the past week. They were also asked how often they saw advertisements for tobacco products when they went to convenience stores in the past week. Both of these items were recorded on a five-point Likert-scale ranging from 1 = *not going to convenience stores or reading magazines or newspapers* to 5 = *often*. The two items were summed to create a composite index for self-reported exposure to tobacco advertising ($M = 5.14, SD = 1.92$).

*Smoking Media Literacy.* Comprised of five questions concerning the motives and marketing methods that tobacco companies employ. An example question is “To make
money, tobacco companies would do anything they could get away with” with response choices ranging from $1 = \text{strongly disagree}$ to $4 = \text{strongly agree}$ adopted from previously tested and reliable scales (Primack, Sidani, Carroll, & Fine, 2009). The five items were averaged to create an index for smoking literacy ($a = .72, M = 3.22, SD = .53$).

*Benefits of using tobacco.* Respondents were asked three questions, whether they thought that tobacco could help when feeling stressed, could help with relaxing, or if it could energize them. Responses were indicated on a four-point scale from $1 = \text{strongly disagree}$ to $4 = \text{strongly agree}$ ($a = .85, M = 1.40, SD = .53$).

*Perception of Harm.* Perception of harm was assessed by asking participants how much they thought people harmed themselves when using cigarettes, e-cigarettes, or smokeless tobacco products, ranging from $0 = \text{no harm}$ to $10 = \text{extreme harm}$ respectively. The three items were averaged to create an index for perceived harm of tobacco products ($a = .80, M = 7.26, SD = 1.89$).
Chapter 4: Results

Descriptive statistics concerning the baseline measures of tobacco use and susceptibility are shown in Table 1. Preliminary analyses examining attitudes toward the advertisements showed that attitudes toward tobacco advertising were generally low, but highly correlated among tobacco advertisements (see Table 2). The results of these correlations suggest that adolescents’ attitudes toward advertising of risky products are strongly correlated, and while correlations between attitudes toward tobacco ads and attitudes toward soft drink ads are statistically significant, these are correlated at a lesser degree \( r < .30 \). These results encourage the likelihood that there are determinants of liking tobacco advertisements that are consistent for cigarette, e-cigarette, and ST advertisements.

In order to test research questions 1 and 2, t-tests were performed to compare the attitudes toward tobacco advertising and prototypes of smokers between rural and urban youth. Adolescent boys who resided in urban counties held higher attitudes toward cigarette advertising \( M = 1.73 \) than those in rural counties, \( M = 1.24 \), \( t(1,216) = -4.03, p < .001 \) two-tailed, 95% CI = [-.71, -.24], in addition to more favorable attitudes toward e-cigarette advertising \( M = 1.72 \) than those in rural counties, \( M = 1.10 \), \( t(1,217) = -5.2, p < .001 \) two-tailed, 95% CI = [-.85, -.39], and ST advertisements \( M = 1.48 \) than those in rural counties, \( M = 1.18 \), \( t(1,218) = -2.70, p = .007 \) two-tailed, 95% CI = [-.53, -.08]. There were statistically significant differences in prototype evaluations of smokers between rural and urban youth as well. Adolescent boys who resided in urban counties
held more positive prototypes \( (M = 1.30) \) compared to those in rural counties, \( M = .85, \)
\( t(1,171) = -4.78, p < .001 \) two-tailed, 95\% \( CI = [-.63, -.26] \).

Descriptive statistics and zero order correlations were conducted to examine the
data, as seen in Table 3. The model tested for conditional indirect effects is shown in
Figure 1.

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**Figure 1. Model predicting tobacco susceptibility through moderated mediation**

*Note:* Sensation seeking or delay discounting was included in the model as a covariate if it was not the moderator. Please see the methods section to see all the media use variables that were included in the model. The outcome variable was tobacco susceptibility at baseline for either cigarettes, e-cigarettes or ST. Separate models examined the change in tobacco use after 12-months among the three different tobacco products. The 12-month models used the same variables except for the addition of baseline tobacco use as a predictor variable. Separate models were examined for each independent variable whereby the other predictor variables were treated as covariates. Each model was then repeatedly analyzed to treat either delay discounting or sensation seeking as the single moderator.
The analyses examining moderated mediation were conducted using Process macro version 2.16.3 in SPSS version 24 (Hayes, 2015) utilizing model 14 with a 95% bias-corrected bootstrap estimation approach with 10,000 samples, as shown in Figure 1. The proposed models have two simultaneous mediators, prototype of a smoker and attitudes toward the ad. These mediators are then moderated by either sensation seeking or delay discounting as previously hypothesized. Separate models were conducted for each independent variable and were repeated with either sensation seeking or delay discounting as the single moderator of mediation. Each model was a test of maximum likelihood logistic regression provided the outcome variables’ binary value of either being susceptible or not susceptible, and of having ever used or never used a certain tobacco product at 12-months. Region was dummy coded with 0 representing rural and 1 representing urban counties. Ethnicity was also dummy coded as White participants (83%) compared to all other ethnic groups. Tables were created to represent the statistically significant indirect conditional effects as indicated by the bootstrap confidence intervals that did not include zero.

**Moderated Mediation Analyses Examining Baseline Susceptibility**

The first set of models explore the relationship between the predictor variables and cigarette susceptibility at baseline. The following analyses were used to test the hypotheses that the predictor variables act through attitudes toward tobacco advertisements and prototypes of smokers which then influence cigarette susceptibility, with these effects conditioned on either sensation seeking or delay discounting \( n = 844 \).
The indirect effect of age on attitudes toward cigarette advertisements was conditioned on levels of sensation seeking and delay discounting. The effect of attitudes toward cigarette advertisements was not significant for low sensation seekers or those who engaged in high delay discounting. The effect of age on prototypes was conditioned on sensation seeking, specifically average sensation seekers were not significantly influenced by prototypes of smokers (Table 4).

The indirect effect of adolescent’s perceived benefits of tobacco was significant through prototypes regardless of sensation seeking or delay discounting, and through attitudes toward ads conditioned on sensation seeking but not delay discounting (Table 5).

The indirect effect of magazine readership through prototypes of smokers was a significant predictor of smoking susceptibility, regardless of sensation seeking or delay discounting (Table 6).

The indirect effects of region on cigarette susceptibility were significant for prototypes regardless of the level of sensation seeking or delay discounting, and significant for attitudes toward cigarette advertisements conditioned on sensation seeking (Table 7).

**Baselines E-cigarette Susceptibility**

The following analyses are predictive models examining the mediation effects of prototypes of smokers and attitudes toward cigarette advertisements conditioned on either sensation seeking or delay discounting ($n = 742$). Overall, there was evidence to suggest
indirect effects on e-cigarette susceptibility, these effects however, were not moderated by sensation seeking or delay discounting.

The indirect effect of age on prototypes and attitudes toward e-cigarette advertisements predicting e-cigarette susceptibility was significant, with no indication of moderation effects (Table 8).

Perceived benefits of tobacco predicted e-cigarette susceptibility through prototypes and attitudes toward e-cigarette ads at all levels of sensation seeking or delay discounting (Table 9). Tobacco content exposure on social media indirectly predicted e-cigarette susceptibility through prototypes of smokers, with no evidence of moderation occurring (Table 10). The indirect effects of region on prototypes and attitudes toward e-cigarette advertisements on susceptibility was significant, with no evidence of conditional effects (Table 11).

**Baseline ST Susceptibility**

The following models test the conditional indirect effects of the predictor variables of ST susceptibility ($n = 744$).

Age indirectly affected ST susceptibility through attitudes toward ST advertisements regardless of sensation seeking, but conditioned on delay discounting. Specifically, the effects of attitudes toward ST advertisements was significant for low and average delay discounters, but not for those who engaged in high levels of delay discounting (Table 12).

The indirect effects of perceived benefits of tobacco was significant through prototypes of smokers, conditioned on both sensation seeking and delay discounting. The
effect of prototypes was not significantly different from zero among low sensation seekers and those who engage in high delay discounting. The indirect effects on attitudes toward ST advertisements was significant for all levels of sensation seeking, but conditioned on delay discounting whereby the effect was not significant for high delay discounters (Table 13).

The indirect effects of perceived benefits of tobacco content exposure on social media sites was significant through prototypes of smokers, conditioned on both sensation seeking and delay discounting. The effect of prototypes was not significantly different from zero among low sensation seekers and those who engage in high delay discounting. There was no evidence to suggest indirect effects through attitudes toward ST advertisements (Table 14).

The indirect effects of region was significant through prototypes of smokers, conditioned on both sensation seeking and delay discounting. The effect of prototypes was not significantly different from zero among low sensation seekers and those who engage in high delay discounting. The indirect effects on attitudes toward ST advertisements was significant for all levels of sensation seeking, but conditioned on delay discounting whereby the effect was not significant for high delay discounters (Table 15).

**Indirect Conditional Effects on Change in Tobacco Use after 12-months**

The following analyses tested a similar shown in Figure 1, with the exception of having specific tobacco use at 12-months as the outcome variable and the addition of
baseline tobacco use as a predictor variable. With the inclusion of baseline tobacco use, we are therefore examining change in tobacco use after 12 months.

For models predicting cigarette change in tobacco use at 12-months, prototypes of smokers and attitudes toward cigarette advertisements were not significant predictors of use, thus, there was no evidence of moderated mediation occurring \( (n = 489) \).

For models predicting change in e-cigarette use at 12-months, there was no evidence to suggest moderated mediation for either prototype or attitudes toward e-cigarette advertisements. The interaction term between attitudes toward e-cigarette advertisements and sensation seeking was significant though \( (n = 411) \). The effect of having favorable attitudes toward an e-cigarette advertisement was a significant predictor of use among low and average sensation seekers (Table 16; for a graphic representation see Figure 2).

For models predicting change in ST use at 12-months, there was no evidence to suggest moderated mediation for either prototype or attitudes toward ST advertisements. The interaction term between attitudes toward ST advertisements and sensation seeking was significant though (Table 17; for a graphic representation, see Figure 3).

The interaction term between attitudes toward ST advertisements and delay discounting was also a significant predictor of use. Those who engaged in higher delay discounting were significantly influenced by their attitudes toward ST advertisements, while low and average delay discounters were not (Table 18; for a graphic representation, see Figure 4).
Chapter 5: Discussion

The purpose of this study is to inform us of some of the socio-ecological variables that influence attitudes toward tobacco advertisements and prototypes of smokers, which then affect an adolescent’s likelihood of tobacco use in the future. Mediation effects were supported for baseline susceptibility models with some instances of moderation by sensation seeking and delay discounting. For models predicting change in use after 12-months, mediation effects were not supported, however attitudes toward tobacco advertisements were significant predictors of use conditioned on sensation seeking and delay discounting. These findings support the notion that affective responses toward tobacco advertisements are predictive of future behavior change, even after controlling for previously supported factors linked to adolescent tobacco use.

The factors that indirectly affected cigarette susceptibility through prototypes of smokers were region, perceived benefits of tobacco, age, and magazine readership. Prototypes were found to be moderated by sensation seeking when age was the independent variable such that those who were low and high sensation seekers were significantly more susceptible to smoke based on their prototype evaluation. Therefore, age was not a significant predictor of prototypes of smokers among average sensation seekers. Sensation seeking and delay discounting were not significant moderators of prototypes for cigarette susceptibility for any of the remaining independent variables.
The factors associated with cigarette susceptibility through attitudes toward cigarette advertisements were region, perceived benefits of tobacco, and age. The effect of attitudes toward cigarette advertising was moderated by sensation seeking where average and high sensation seekers were significantly more likely to be susceptible to cigarette smoking based on their attitudes toward cigarette advertising. This finding is consistent with H5 because high sensation seekers are likely to attend more to tobacco-related messages (Lang & Yegiyan, 2011), thus resulting in an increase in likelihood of centrally processing the tobacco advertisements. The effect of attitudes toward cigarette advertisements on cigarette susceptibility was also conditioned by delay discounting when age was the independent variable. The effect of attitudes toward cigarette ads was not significantly associated with cigarette susceptibility among high delay discounters. This indicates that those who have favorable attitudes toward cigarette ads were more likely to be susceptible to cigarettes, but only if they were average or low delay discounters. This was opposite of what was anticipated, given that more impulsivity has been linked to adolescent tobacco use and it was posited that high delay discounters would attend to more of the positive heuristics of tobacco advertising, while placing less emphasis on the delayed health effects (Fields et al., 2009; Penchmann et al., 2005). However, adolescents who reported ever smoking at baseline were omitted from susceptibility models and many of them would presumably be grouped as high delay discounters. Indeed, a t-test comparison of baseline cigarette ever users ($M = .057$) to non-users ($M = .046$) revealed higher levels of delay discounting for cigarette users, however this difference was not statistically significant $t(1,192) = -1.54, p = .124$ two-
tailed, 95% CI = [-.027, .003]. Further investigation of the concept of delay discounting as it relates to adolescent tobacco use is discussed later in this section.

The factors that indirectly affected e-cigarette susceptibility through prototypes of smokers were age, perceived benefits of tobacco, tobacco exposure through social media, and region. The factors that indirectly affected e-cigarette susceptibility through attitudes toward e-cigarette advertisements were age, perceived benefits of e-cigarette susceptibility, and region. Prototypes of smokers and attitudes toward e-cigarette advertising were not moderated by sensation seeking or delay discounting. This may mean that previously supported moderators of health risk behavior may not necessarily have as strong of an impact on e-cigarette susceptibility. Individuals regardless of their levels of impulsivity or sensation seeking were influenced by their attitudes toward e-cigarette advertising.

Interestingly, region acted indirectly through prototypes and attitudes toward e-cigarette advertisements. The effect on region was positive, indicating that residing in an urban county increased the effects of one’s likelihood of being susceptible to e-cigarettes. This is consistent with the literature on adolescent e-cigarette use, where urban areas are subject to greater increases of e-cigarette use than rural areas (Pesko & Robarts, 2017). This is an expansion on the current literature by providing support that adolescents from urban areas are significantly influenced by positive prototypes of smokers and higher attitudes toward e-cigarette advertisements. Future health campaigns should target urban youth especially given their increased susceptibility to e-cigarette advertising.
The factors that indirectly affected ST susceptibility through prototypes of smokers were perceived benefits of tobacco, tobacco exposure on social media, and region. The effect of prototypes on ST susceptibility was conditioned on sensation seeking, whereby low sensation seekers were initially less susceptible to ST and did not become significantly more susceptible to ST use based on their prototype evaluations. The effect of prototypes of smokers on individuals who engaged in high delay discounting was not significantly different from zero. This means that individuals who are average or low delay discounters will become more susceptible to ST based on more positive evaluations of smokers, however those who engage in the highest level of delay discounting do not experience this effect.

The factors that indirectly affected ST susceptibility through attitudes toward ST ads were age, perceived benefits of tobacco use, and region. These effects were not moderated by sensation seeking, thus, regardless of sensation seeking, adolescents with favorable attitudes toward ST advertisements would become more susceptible to ST. The effect of attitudes toward ST ads on ST susceptibility was moderated by delay discounting, whereby high delay discounters were typically less susceptible to ST use regardless of their attitudes toward ST ads.

Both attitudes toward ST advertisements and prototypes of smokers mediated the relationship between residing in either an urban or rural county, and one’s susceptibility to ST. The relationship is such that being from an urban county increased the effects of prototypes and attitudes toward ST advertisements. This finding is opposite of what was
hypothesized, given the strong links between rural communities and ST use (Aloise-
Young et al., 2002).

12-month Analyses

Retention rate suggested the likelihood of differential mortality impacting results
(53.5%), however the results of the analyses conducted for the 12 month follow ups are
more conservative given that those who were susceptible to use tobacco at baseline were
less likely to have completed the 12-month follow up.

There was no evidence of mediation for prototypes or attitudes toward tobacco
advertising for any of the models predicting tobacco use at 12-months. The lack of
mediation effects indicates that the independent variables leading to attitudes toward
advertisements and prototypes did not predict increase or decrease in tobacco use after
12-months.

While the predictor variables of tobacco use were not mediated, the interaction
effects between attitudes toward advertisements and the dispositional factors were
significant. The effect of attitudes toward e-cigarette advertisements on e-cigarette use is
conditioned on sensation seeking, specifically when the individual is either a low or
average sensation seeker. The visual representation (Figure 2) illustrates that high
sensation seekers are initially more likely to use an e-cigarette at 12-months, regardless of
the extent to which they held favorable attitudes toward e-cigarette ads. Therefore, low
and average sensation seekers would be more likely to use e-cigarettes at 12-months
conditioned on when attitudes toward e-cigarettes were more favorable. This highlights
the effectiveness of e-cigarette advertising on an adolescent’s of e-cigarettes use. Even if
a boy is not susceptible to e-cigarette use based on his dispositional factors, the way he reacts to an advertisement will positively predict his e-cigarette uptake. This might be indicative of the wide appeal of e-cigarettes to adolescents. Perhaps they no longer need to be as risk taking as they were in the past as it relates to cigarette smoking. Instead, individual differences may not have as much of an influence on whether or not an adolescent will use e-cigarettes in the future.

The effect of attitudes toward ST advertisements on ST use is moderated by sensation seeking, whereby low sensation seekers are significantly affected by positive attitudes toward ST advertisements and this relationship would increase the likelihood of tobacco use at 12-months. Interestingly, the relationship between attitudes toward ST advertisements and use at 12-months reveals that high sensation seekers were less likely to use tobacco at the one-year follow up, with every unit increase in one’s favorability of the advertisements. So, having more positive attitudes toward ST advertisements decreased the likelihood of ST use for high sensation seekers. This may be explained by the lack of correlation between ST use and sensation seeking (Table 3). The motives for starting ST use may be considerably different than what is common for smoking, drinking, and other risky behaviors. Future studies should examine variables assessing masculinity, cultural values, and other interpersonal factors specific to ST use (Nemeth et al., 2012).

Delay discounting was a significant moderator for attitude toward ST ads and its effect on ST use at 12-months. Interestingly, from the graphic portrayed in Figure 4, it seems that for low delay discounters, the effects of attitudes toward ST ads was the
The strongest predictor of ST use at 12-months when they held low attitudes. This effect on low delay discounters was not significant though. The effects of attitudes toward advertisements on average delay discounters was marginally significant though ($p = .07$). High delay discounters were most influenced by attitudes toward ST advertisements, where higher attitudes toward ST advertisements had the strongest effect on ST use when they were high delay discounters. This means that those who are more impulsive, tend to be more affected by attitudes toward ST advertising. However, the conflicting impact of delay discounting on attitudes toward tobacco advertising do raise questions.

Delay discounting was negatively correlated with baseline cigarette susceptibility, attitudes toward cigarette ads, and smoking media literacy. It is important to note that these correlations were weak ($r \leq |.10|$). It was only positively correlated with adult tobacco use and parent e-cigarette use, which may provide evidence to the hereditary nature of impulsiveness as measured through delay discounting (Odum, 2011). Further analyses should be conducted to test this relationship considering that the adults who took the surveys in the current study did not complete a measure of delay discounting for comparison. Lastly, there were no statistically significant differences of mean delay discounting between users and non-users at 12-months.

Perhaps this measure of impulsivity needs to be tailored to accommodate adolescents more than adults given monetary rewards may not relate as well to youth. Previous research supports that the domain of the type of reward affects the extent to which they are delay discounted, whereby health gains are delayed at a higher rate than monetary gains (Chapman & Elstein, 1995). Additionally, other measures of impulsivity...
may be better apt for adolescent risk behavior. Indeed, a recent study from Gibbons and other (2016) examined impulsivity as a moderator of adolescent health risk behavior but used a scale which is operationalized more similarly to self-control and includes items such as “I get carried away by new and exciting ideas, but I don’t think of the possible problems” (Kendall & Wilcox, 1979). The wording of these items may be more amenable to adolescents and provide a more accurate measure of impulsivity.

An unexpected discovery is that smoking media literacy was not a significant predictor of attitudes toward the advertisement or tobacco susceptibility or tobacco use. This finding is particularly interesting because scholars tend to agree that one of the ways to counteract tobacco advertising efforts is to increase individuals’ smoking media literacy (Primack & Hobbs, 2009). It is important to note that the mean value was $M = 3.22$, out of a maximum value of four, and there was a predominant negative skew of responses in a way that indicated that respondents were very much aware of tobacco companies’ methods and deception involved in how they market their products. It was however positively correlated with age and perceived harm and negatively correlated with adult tobacco use and perceived benefits of tobacco products, thus the effects of smoking literacy may have been diminished due to these inter-correlations.

The relationship between tobacco exposure viewed on social media sites was a significant predictor of tobacco susceptibility for cigarettes, e-cigarettes, and ST. This finding emphasizes the importance of social influence through a computer mediated communication standpoint. Instead of merely asking participants whether their friends use tobacco products, recording the extent to which social media friends post tobacco-
related material should explain more of the variance of tobacco uptake among adolescents. Future studies interested in social networks and adolescent tobacco use should include similar constructs of social media sites as an additional measure of social influence on adolescent smoking.

The differences between rural and urban youth’s prototype of smokers and attitudes toward tobacco advertising are interesting. Urban adolescents on average held more positive attitudes toward tobacco advertising and more favorable evaluations of a prototypical smoker. This finding is particularly interesting for ST use, which is opposite of H11 and contrary to recent research that examined similar factors that influence ST use (Nemeth et al., 2012). Future studies should explore the differences between rural and urban adolescent tobacco use to examine this relationship further.

**Strengths and Limitations**

There were several limitations to the current study. This study is limited due to the exclusion of adolescent girls in the sample population. While this was deliberately done in order to sensibly examine the effects of tobacco advertising on boys, future studies should test if the relationship is similar for adolescent girls. An advantage to this study is the different methods employed to recruit participants from both a convenience and representative sample of adolescents in Ohio, in addition to the longitudinal design allowing for conclusions based on causality. Additional regression analyses will be conducted with appropriate weights to determine if the current variables are consistent predictors of tobacco use when making claims about the population of adolescent boys in Ohio.
Conclusion

Attitudes toward advertisements have been explained using the ELM, however the results of the current paper do not measure the extent to which an adolescent either centrally or peripherally processed an advertisement. Subsequent studies should measure the extent of elaboration on tobacco advertisements to provide more insight on the type of processing that an adolescent undergoes when viewing a tobacco advertisement. Furthermore, the stimuli used consisted of a limited sample of print tobacco advertisements that adolescents might be exposed to, therefore the generalizability is somewhat restricted. This is however, the first study that we are aware of to examine adolescents’ tobacco ad responses as a risk factor in an etiological study, and the results encourage further intensive research to infer more generalizable claims.

In addition to sensation seeking and delay discounting, other variables may act as antecedents or moderators of the effects of prototypes on adolescent tobacco use. Social norms have been supported to moderate the effect of prototypes (Rhodes, Loiewski, Potocki, & Ralston, 2017). Also cigarette smoking was the only behavior assessed with prototypes, and while they were significant mediators and predictors of tobacco use, more variability might be explained if the prototypes evaluations were assessed for e-cigarette and ST users as well. Prototypes should be considered for future health campaigns combatting adolescent tobacco use given the support for altering herustic representations relevant to risk behaviors (Gerrard, 2008).

Further analyses should examine the relationship between the characteristics of tobacco ads that affect adolescent boys’ attitudes toward advertisements and how to
incorporate those qualities so as to include them in anti-smoking PSAs for preventative efforts. For communication scholars, the cognitive processes that determine attitudes toward tobacco advertising should be further explored as well, since they have been previously posited to precede attitudes (Brown & Stayman, 1992). Future studies should examine the accessibility of attitudes toward tobacco advertising as well given the more resistance and possibility of boomerang effects when exposed to an anti-smoking public service announcement (Miller et al., 2006; Shen et al., 2009).
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Appendix A: Tables

Table 1. Frequency of Tobacco use at Baseline

<table>
<thead>
<tr>
<th>Type</th>
<th>Ever Users</th>
<th>Susceptible Non-users</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cigarettes</td>
<td>106 (8.8%)</td>
<td>359 (32.6%)</td>
</tr>
<tr>
<td>E-cigarette</td>
<td>124 (11.6%)</td>
<td>291 (30.2%)</td>
</tr>
<tr>
<td>Smokeless Tobacco</td>
<td>38 (3.7%)</td>
<td>138 (14.7%)</td>
</tr>
</tbody>
</table>

Table 2. Inter-correlations, means, and standard deviations (SDs) for Attitudes toward Advertisements

<table>
<thead>
<tr>
<th>Type of Ad</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Cigarette</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.53</td>
<td>2.05</td>
</tr>
<tr>
<td>2. E-cigarette</td>
<td></td>
<td>.63**</td>
<td></td>
<td></td>
<td>1.46</td>
<td>2.02</td>
</tr>
<tr>
<td>3. Smokeless Tobacco</td>
<td></td>
<td>.63**</td>
<td>.62**</td>
<td></td>
<td>1.36</td>
<td>1.96</td>
</tr>
<tr>
<td>4. Alcohol</td>
<td></td>
<td>.62**</td>
<td>.61**</td>
<td>.59**</td>
<td>2.41</td>
<td>2.64</td>
</tr>
<tr>
<td>5. Soft Drink</td>
<td></td>
<td>.23**</td>
<td>.28**</td>
<td>.25**</td>
<td>.30**</td>
<td>4.96</td>
</tr>
</tbody>
</table>
Table 3. Pearson correlations for predictor variables and outcome variables

|   | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  | 11  | 12  | 13  | 14  | 15  | 16  | 17  | 18  | 19  | 20  | 21  | 22  | 23  | 24  | 25  | 26  | 27  | 28  |
|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1. E-cig susceptibility | 0.54 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 2. Cig susceptibility |     | 0.38 | 0.42 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 3. ST susceptibility |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 4. E-cig use 12m |     | 0.21 | 0.25 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 5. Cig use 12m |     | 0.20 | 0.25 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 6. ST use 12m |     | 0.03 | 0.03 | 0.2 | 0.2 | 0.4 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 7. Age |     | 0.15 | 0.11 | 0.02 | 0.18 | 0.09 | 0.1 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 8. Sensation Seeking |     | 0.24 | 0.23 | 0.15 | 0.19 | 0.12 | -0.01 | 0.2 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 9. Perceived Harm |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 10. Adult use |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 11. Parent e-cig use |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 12. Peer use |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 13. Peer e-cig use |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 14. Advertising Exposure |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 15. Perceived Benefits |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 16. Prototype of smoker |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 17. Cig ad attitude |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 18. E-cig ad attitude |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 19. ST ad attitude |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 20. Magazine readership |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 21. SML |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 22. Social media |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 23. Delay Discounting |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 24. Reality TV |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 25. Music TV |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 26. Music TV youtube |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 27. Region |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 28. Race |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |

Notes: SML stands for smoking media literacy
* Bold. Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).
Table 4. Conditional Indirect Effects of Age on Baseline Cigarette Susceptibility

<table>
<thead>
<tr>
<th>Moderators</th>
<th>Prototype</th>
<th>Attitudes toward Ad</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Estimate</td>
<td>95% BC CI</td>
<td>Estimate</td>
</tr>
<tr>
<td>Sensation Seeking</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.82 (-1 SD)</td>
<td>.0203a</td>
<td>.0005 to 0.0570</td>
<td>.0314</td>
</tr>
<tr>
<td>2.72 (M)</td>
<td>.0199</td>
<td>-.0006 to 0.0471</td>
<td>.0448a</td>
</tr>
<tr>
<td>3.62 (+1 SD)</td>
<td>.0194a</td>
<td>.0004 to 0.0529</td>
<td>.0582a</td>
</tr>
<tr>
<td>Delay Discounting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>.0002</td>
<td>.0193a</td>
<td>.0009 to 0.0470</td>
<td>.0507a</td>
</tr>
<tr>
<td>.0419 (M)</td>
<td>.0202a</td>
<td>.0006 to 0.0465</td>
<td>.0419a</td>
</tr>
<tr>
<td>.1100 (+1 SD)</td>
<td>.0216a</td>
<td>.0006 to 0.0545</td>
<td>.0380</td>
</tr>
</tbody>
</table>

Note: BC CI = Bias corrected confidence interval.

a. Statistically significant difference from zero, as zero is not contained in the confidence interval.
Table 5. Conditional Indirect Effects of Perceived Benefits on Baseline Cigarette Susceptibility

<table>
<thead>
<tr>
<th>Moderators</th>
<th>Prototype Estimate</th>
<th>95% BC CI</th>
<th>Attitudes toward Ad Estimate</th>
<th>95% BC CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensation Seeking</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.82 (-1 SD)</td>
<td>.1121&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.0241 to .2667</td>
<td>.0495</td>
<td>-.0055 to .1389</td>
</tr>
<tr>
<td>2.72 (M)</td>
<td>.1095&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.0361 to .2071</td>
<td>.0707&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.0236 to .1435</td>
</tr>
<tr>
<td>3.62 (+1 SD)</td>
<td>.1070&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.0367 to .2234</td>
<td>.0918&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.0311 to .1875</td>
</tr>
<tr>
<td>Delay Discounting</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>.0002</td>
<td>.0995&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.0306 to .2023</td>
<td>.0755&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.0264 to .1589</td>
</tr>
<tr>
<td>.0419 (M)</td>
<td>.1040&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.0313 to .2027</td>
<td>.0683&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.0227 to .1429</td>
</tr>
<tr>
<td>.1100 (+1 SD)</td>
<td>.1115&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.0232 to .2430</td>
<td>.0566&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.0024 to .1538</td>
</tr>
</tbody>
</table>

Note: BC CI = Bias corrected confidence interval.
<sup>a</sup> Statistically significant difference from zero, as zero is not contained in the CI.

Table 6. Conditional Indirect Effects of Magazine Readership on Baseline Cigarette Susceptibility

<table>
<thead>
<tr>
<th>Moderators</th>
<th>Prototype Estimate</th>
<th>95% BC CI</th>
<th>Attitudes toward Ad Estimate</th>
<th>95% BC CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensation Seeking</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.82 (-1 SD)</td>
<td>.0199&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.0038 to .0500</td>
<td>.0023</td>
<td>-.0029 to .0145</td>
</tr>
<tr>
<td>2.72 (M)</td>
<td>.0194&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.0052 to .0386</td>
<td>.0033</td>
<td>-.0049 to .0139</td>
</tr>
<tr>
<td>3.62 (+1 SD)</td>
<td>.0190&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.0057 to .0413</td>
<td>.0043</td>
<td>-.0065 to .0175</td>
</tr>
<tr>
<td>Delay Discounting</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>.0002</td>
<td>.0185&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.0056 to .0386</td>
<td>.0034</td>
<td>-.0058 to .0152</td>
</tr>
<tr>
<td>.0419 (M)</td>
<td>.0194&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.0056 to .0383</td>
<td>.0031</td>
<td>-.0053 to .0135</td>
</tr>
<tr>
<td>.1100 (+1 SD)</td>
<td>.0207&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.0044 to .0469</td>
<td>.0026</td>
<td>-.0039 to .0147</td>
</tr>
</tbody>
</table>

Note: BC CI = Bias corrected confidence interval.
<sup>a</sup> Statistically significant difference from zero, as zero is not contained in the CI.
### Table 7. Conditional Indirect Effects of Region on Baseline Cigarette Susceptibility

<table>
<thead>
<tr>
<th>Moderators</th>
<th>Prototype Estimate</th>
<th>95% BC CI</th>
<th>Attitudes toward Ad Estimate</th>
<th>95% BC CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensation Seeking</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.82 (-1 SD)</td>
<td>.0844(^a)</td>
<td>.0210 to .1937</td>
<td>.0311</td>
<td>-.0035 to .1097</td>
</tr>
<tr>
<td>2.72 (M)</td>
<td>.0825(^a)</td>
<td>.0210 to .1589</td>
<td>.0444(^a)</td>
<td>.0008 to .1123</td>
</tr>
<tr>
<td>3.62 (+1 SD)</td>
<td>.0806(^a)</td>
<td>.0180 to .1961</td>
<td>.0576(^a)</td>
<td>.0012 to .1531</td>
</tr>
<tr>
<td>Delay Discounting</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>.0002</td>
<td>.0780(^a)</td>
<td>.0185 to .1598</td>
<td>.0488</td>
<td>-.0008 to .1294</td>
</tr>
<tr>
<td>.0419 (M)</td>
<td>.0816(^a)</td>
<td>.0189 to .1606</td>
<td>.0442</td>
<td>-.0009 to .1148</td>
</tr>
<tr>
<td>.1100 (+1 SD)</td>
<td>.0875(^a)</td>
<td>.0139 to .1943</td>
<td>.0366</td>
<td>-.0030 to .1234</td>
</tr>
</tbody>
</table>

Note: BC CI = Bias corrected confidence interval.

\(^a\): Statistically significant difference from zero, as zero is not contained in the confidence interval.
Table 8. Conditional Indirect Effects of Age on Baseline E-cigarette Susceptibility

<table>
<thead>
<tr>
<th>Moderators</th>
<th>Prototype</th>
<th>Attitudes toward Ad</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Estimate</td>
<td>95% BC CI</td>
</tr>
<tr>
<td>Sensation Seeking</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.82 (-1 SD)</td>
<td>.0284&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.0039 to .0734</td>
</tr>
<tr>
<td>2.72 (M)</td>
<td>.0258&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.0043 to .0562</td>
</tr>
<tr>
<td>3.62 (+1 SD)</td>
<td>.0231&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.0036 to .0540</td>
</tr>
<tr>
<td>Delay Discounting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>.0002</td>
<td>.0251&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.0047 to .0586</td>
</tr>
<tr>
<td>.0419 (M)</td>
<td>.0245&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.0043 to .0532</td>
</tr>
<tr>
<td>.1100 (+1 SD)</td>
<td>.0235&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.0018 to .0622</td>
</tr>
</tbody>
</table>

Note: BC CI = Bias corrected confidence interval.
<sup>a</sup> Statistically significant difference from zero, as zero is not contained in the confidence interval.
Table 9. Conditional Indirect Effects of Perceived Benefits on Baseline E-cigarette Susceptibility

<table>
<thead>
<tr>
<th>Moderators</th>
<th>Prototype Estimate</th>
<th>95% BC CI</th>
<th>Attitudes toward Ad Estimate</th>
<th>95% BC CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensation Seeking</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.82 (-1 SD)</td>
<td>.1307&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.0272 to .3116</td>
<td>.1431&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.0428 to .3042</td>
</tr>
<tr>
<td>2.72 (M)</td>
<td>.1186&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.0358 to .2381</td>
<td>.1437&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.0569 to .2653</td>
</tr>
<tr>
<td>3.62 (+1 SD)</td>
<td>.1065&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.0273 to .2302</td>
<td>.1443&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.0517 to .2821</td>
</tr>
<tr>
<td>Delay Discounting</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>.0002</td>
<td>.1166&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.0335 to .2505</td>
<td>.1154&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.0407 to .2287</td>
</tr>
<tr>
<td>.0419 (M)</td>
<td>.1137&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.0329 to .2272</td>
<td>.1400&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.0526 to .2556</td>
</tr>
<tr>
<td>.1100 (+1 SD)</td>
<td>.1089&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.0102 to .2605</td>
<td>.1805&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.0520 to .3694</td>
</tr>
</tbody>
</table>

Note: BC CI = Bias corrected confidence interval.

<sup>a</sup> Statistically significant difference from zero, as zero is not contained in the confidence interval.
Table 10. Conditional Indirect Effects of Social Media on Baseline E-cigarette Susceptibility

<table>
<thead>
<tr>
<th>Moderators</th>
<th>Prototype</th>
<th>Attitudes toward Ad</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Estimate</td>
<td>95% BC CI</td>
</tr>
<tr>
<td>Sensation Seeking</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.82 (-1 SD)</td>
<td>.0610a</td>
<td>.0124 to .1493</td>
</tr>
<tr>
<td>2.72 (M)</td>
<td>.0554a</td>
<td>.0103 to .1222</td>
</tr>
<tr>
<td>3.62 (+1 SD)</td>
<td>.0497a</td>
<td>.0080 to .1401</td>
</tr>
<tr>
<td>Delay Discounting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>.0002</td>
<td>.0544a</td>
<td>.0099 to .1299</td>
</tr>
<tr>
<td>.0419 (M)</td>
<td>.0530a</td>
<td>.0070 to .1202</td>
</tr>
<tr>
<td>.1100 (+1 SD)</td>
<td>.0508a</td>
<td>.0037 to .1502</td>
</tr>
</tbody>
</table>

Note: BC CI = Bias corrected confidence interval.

a. Statistically significant difference from zero, as zero is not contained in the confidence interval.
Table 11. Conditional Indirect Effects of Region on Baseline E-cigarette Susceptibility

<table>
<thead>
<tr>
<th>Moderators</th>
<th>Prototype</th>
<th></th>
<th>Attitudes toward Ad</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Estimate</td>
<td>95% BC CI</td>
<td>Estimate</td>
<td>95% BC CI</td>
</tr>
<tr>
<td>Sensation Seeking</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.82 (-1 SD)</td>
<td>.0964a</td>
<td>.0243 to .2153</td>
<td>.1380a</td>
<td>.0462 to .2830</td>
</tr>
<tr>
<td>2.72 (M)</td>
<td>.0875a</td>
<td>.0237 to .1759</td>
<td>.1386a</td>
<td>.0592 to .2442</td>
</tr>
<tr>
<td>3.62 (+1 SD)</td>
<td>.0786a</td>
<td>.0160 to .1909</td>
<td>.1392a</td>
<td>.0538 to .2613</td>
</tr>
<tr>
<td>Delay Discounting</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>.0002</td>
<td>.0858a</td>
<td>.0239 to .1831</td>
<td>.1126a</td>
<td>.0426 to .2188</td>
</tr>
<tr>
<td>.0419 (M)</td>
<td>.0837a</td>
<td>.0214 to .1710</td>
<td>.1365a</td>
<td>.0576 to .2406</td>
</tr>
<tr>
<td>.1100 (+1 SD)</td>
<td>.0802a</td>
<td>.0097 to .2152</td>
<td>.1760a</td>
<td>.0563 to .3397</td>
</tr>
</tbody>
</table>

Note: BC CI = Bias corrected confidence interval.

a. Statistically significant difference from zero, as zero is not contained in the confidence interval.

Table 12. Conditional Indirect Effects of Age on Baseline ST Susceptibility

<table>
<thead>
<tr>
<th>Moderators</th>
<th>Prototype</th>
<th></th>
<th>Attitudes toward Ad</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Estimate</td>
<td>95% BC CI</td>
<td>Estimate</td>
<td>95% BC CI</td>
</tr>
<tr>
<td>Sensation Seeking</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.86 (-1 SD)</td>
<td>.0047</td>
<td>-.0066 to .0381</td>
<td>.0598a</td>
<td>.0186 to .1232</td>
</tr>
<tr>
<td>2.77 (M)</td>
<td>.0059</td>
<td>-.0095 to .0299</td>
<td>.0433a</td>
<td>.0149 to .0842</td>
</tr>
<tr>
<td>3.67 (+1 SD)</td>
<td>.0071</td>
<td>-.0109 to .0328</td>
<td>.0267a</td>
<td>.0042 to .0626</td>
</tr>
<tr>
<td>Delay Discounting</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>.0002</td>
<td>.0066</td>
<td>-.0110 to .0320</td>
<td>.0309a</td>
<td>.0071 to .0693</td>
</tr>
<tr>
<td>.0407 (M)</td>
<td>.0060</td>
<td>-.0077 to .0301</td>
<td>.0351a</td>
<td>.0107 to .0707</td>
</tr>
<tr>
<td>.1074 (+1 SD)</td>
<td>.0051</td>
<td>-.0074 to .0383</td>
<td>.0420</td>
<td>-.0004 to .1084</td>
</tr>
</tbody>
</table>

Note: BC CI = Bias corrected confidence interval.

a. Statistically significant difference from zero, as zero is not contained in the confidence interval.
Table 13. Conditional Indirect Effects of Perceived Benefits on Baseline ST Susceptibility

<table>
<thead>
<tr>
<th>Prototypes</th>
<th>Estimate</th>
<th>95% BC CI</th>
<th>Estimate</th>
<th>95% BC CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensation Seeking</td>
<td>1.86 (-1 SD)</td>
<td>.0668</td>
<td>-.0311 to .2330</td>
<td>.2425&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>2.77 (M)</td>
<td>.0840&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.0121 to .1917</td>
<td>.1754&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>3.67 (+1 SD)</td>
<td>.1012&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.0182 to .2234</td>
<td>.1083&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Delay Discounting</td>
<td>.0002</td>
<td>.0943&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.0141 to .2131</td>
<td>.1247&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>.0407 (M)</td>
<td>.0862&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.0105 to .2075</td>
<td>.1417&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>.1074 (+1 SD)</td>
<td>.0729</td>
<td>-.0942 to .2451</td>
<td>.1697</td>
</tr>
</tbody>
</table>

Note: BC CI = Bias corrected confidence interval.
<sup>a</sup> Statistically significant difference from zero, as zero is not contained in the confidence interval.

Table 14. Conditional Indirect Effects of Social Media on Baseline ST Susceptibility

<table>
<thead>
<tr>
<th>Prototypes</th>
<th>Estimate</th>
<th>95% BC CI</th>
<th>Estimate</th>
<th>95% BC CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensation Seeking</td>
<td>1.86 (-1 SD)</td>
<td>.0378</td>
<td>-.0145 to .1245</td>
<td>-.0021</td>
</tr>
<tr>
<td></td>
<td>2.77 (M)</td>
<td>.0476&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.0056 to .1129</td>
<td>-.0015</td>
</tr>
<tr>
<td></td>
<td>3.67 (+1 SD)</td>
<td>.0573&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.0078 to .1517</td>
<td>-.0009</td>
</tr>
<tr>
<td>Delay Discounting</td>
<td>.0002</td>
<td>.0555&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.0065 to .1353</td>
<td>-.0018</td>
</tr>
<tr>
<td></td>
<td>.0407 (M)</td>
<td>.0507&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.0064 to .1268</td>
<td>-.0020</td>
</tr>
<tr>
<td></td>
<td>.1074 (+1 SD)</td>
<td>.0429</td>
<td>-.0448 to .1530</td>
<td>-.0024</td>
</tr>
</tbody>
</table>

Note: BC CI = Bias corrected confidence interval.
<sup>a</sup> Statistically significant difference from zero, as zero is not contained in the confidence interval.
Table 15. Conditional Indirect Effects of Region on Baseline ST Susceptibility

<table>
<thead>
<tr>
<th>Moderators</th>
<th>Prototype Estimate</th>
<th>95% BC CI</th>
<th>Attitudes toward Ad Estimate</th>
<th>95% BC CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensation Seeking</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.86 (-1 SD)</td>
<td>.0466</td>
<td>-.0246 to .1603</td>
<td>.1466&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.0331 to .3286</td>
</tr>
<tr>
<td>2.77 (M)</td>
<td>.0586&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.0052 to .1379</td>
<td>.1060&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.0279 to .2249</td>
</tr>
<tr>
<td>3.67 (+1 SD)</td>
<td>.0706&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.0098 to .1785</td>
<td>.0655&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.0094 to .1690</td>
</tr>
<tr>
<td>Delay Discounting</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>.0002</td>
<td>.0661&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.0068 to .1594</td>
<td>.0749&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.0105 to .1867</td>
</tr>
<tr>
<td>.0407 (M)</td>
<td>.0604&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.0075 to .1498</td>
<td>.0851&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.0125 to .1902</td>
</tr>
<tr>
<td>.1074 (+1 SD)</td>
<td>.0511</td>
<td>-.0556 to .1877</td>
<td>.1019</td>
<td>-.0082 to .2809</td>
</tr>
</tbody>
</table>

Note: BC CI = Bias corrected confidence interval.

<sup>a</sup> Statistically significant difference from zero, as zero is not contained in the confidence interval.

Table 16. Conditional Direct Effects of Attitudes toward E-cigarette Advertisements on Change in E-cigarette use after 12-months

<table>
<thead>
<tr>
<th></th>
<th>Estimate</th>
<th>Z-score</th>
<th>p</th>
<th>95% BC CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensation Seeking</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.87 (-1 SD)</td>
<td>.6654&lt;sup&gt;a&lt;/sup&gt;</td>
<td>3.2049</td>
<td>.0014</td>
<td>.2585 to 1.0723</td>
</tr>
<tr>
<td>2.75 (M)</td>
<td>.3699&lt;sup&gt;a&lt;/sup&gt;</td>
<td>3.0424</td>
<td>.0023</td>
<td>.1316 to .6082</td>
</tr>
<tr>
<td>3.64 (+1 SD)</td>
<td>.0744</td>
<td>.6198</td>
<td>.5354</td>
<td>-.1608 to .3095</td>
</tr>
</tbody>
</table>

Note: BC CI = Bias corrected confidence interval.

<sup>a</sup> Statistically significant difference from zero, as zero is not contained in the confidence interval.
Table 17. Conditional Direct Effects of Attitudes toward ST Advertisements on change in ST use after 12-months

<table>
<thead>
<tr>
<th>Sensation Seeking</th>
<th>Estimate</th>
<th>Z-score</th>
<th>p</th>
<th>95% BC CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.87 (-1 SD)</td>
<td>.4314a</td>
<td>2.3515</td>
<td>.0187</td>
<td>.0718 to .7909</td>
</tr>
<tr>
<td>2.76 (M)</td>
<td>.1908</td>
<td>1.4207</td>
<td>.1154</td>
<td>-.0724 to .4541</td>
</tr>
<tr>
<td>3.66 (+1 SD)</td>
<td>-.0497</td>
<td>-.2804</td>
<td>.7792</td>
<td>-.3973 to .2978</td>
</tr>
</tbody>
</table>

Note: BC CI = Bias corrected confidence interval.
a. Statistically significant difference from zero, as zero is not contained in the confidence interval.
Table 18. Conditional Direct Effects of Attitudes toward ST Advertisements on change in ST use after 12-months

<table>
<thead>
<tr>
<th></th>
<th>Estimate</th>
<th>Z-score</th>
<th>p</th>
<th>95% BC CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delay Discounting</td>
<td>.0002</td>
<td>-.0677</td>
<td>-.4141</td>
<td>.6788</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-.3880 to .2526</td>
</tr>
<tr>
<td>.0411 (M)</td>
<td>.3094</td>
<td>1.8076</td>
<td>.0707</td>
<td>-.0261 to .6449</td>
</tr>
<tr>
<td>.1089 (+1 SD)</td>
<td>.9345</td>
<td>2.0672</td>
<td>.0387</td>
<td>.0485 to 1.8205</td>
</tr>
</tbody>
</table>

Note: BC CI = Bias corrected confidence interval.

a. Statistically significant difference from zero, as zero is not contained in the confidence interval.
Figure 2. Graphic representation of the interaction term between attitudes toward e-cigarette advertising and sensation seeking (SS) and its effect on one’s probability of e-cigarette use at 12-months.
Figure 3. Graphic representation of the interaction term between attitudes toward smokeless tobacco advertising and sensation seeking (SS) and its effect on one’s probability of change in ST use at 12-months.
Figure 4. Graphic of interaction term between attitudes toward smokeless tobacco advertising and delay discounting (DD) and its effect on one’s probability of change in ST use at 12-months