**Introduction**

A three-wave longitudinal study of tobacco use among alternative high school students was conducted between October of 2014 and August of 2017. The measurement instruments utilized were designed to assess the cognitive processes and tobacco use behaviors of at-risk youth and the effects of tobacco marketing on this population. Potential confounders and covariates were also incorporated into the assessment. All measures were administered using either a web-based or phone-based survey. Participants were asked to complete this survey once per year over a period of three years.

**Assessments**

**Access to Tobacco Products**

Four items adapted from the National Youth Tobacco Survey (CDC, 2014a) and the Youth Tobacco Survey (CDC, 2014b) were used to characterize the participants’ access to tobacco products. The first item used a ‘*Check all that apply*’ format to determine where participants typically obtained tobacco products. Response options included ‘*I did not buy tobacco products during the past 30 days*’, ‘*A gas station*’, ‘*A convenience store*’, ‘*A grocery store*’, ‘*A drugstore or pharmacy*’, ‘*A vending machine*’, ‘*Over the Internet*’, ‘*Through the mail*’, ‘*A friend*’, ‘*A family member*’, ‘*None of the above*’, and ‘*Other’*. The second item asked ‘Did anyone refuse to sell you a tobacco product because of your age?’ The third item assessed whether participants were asked to show proof of age if and when they tried to buy tobacco products in a store. The fourth item asked participants, ‘If you wanted to, how easy or hard do you think it would be for you to purchase tobacco products in a store?’ Participants chose from the response options ‘*Very easy*’, ‘*Sort of easy*’, ‘*Sort of hard*’, and ‘*Very hard*’.

In the second and third wave of the study, four additional items were added. The first item asked ‘During the past 30 days, where did you get MOST of your tobacco products?’ Response options included ‘*I did not buy tobacco products during the past 30 days*’, ‘*A gas station*’, ‘*A convenience store*’, ‘*A grocery store*’, ‘*A drugstore or pharmacy*’, ‘*A vending machine*’, ‘*Over the Internet*’, ‘*Through the mail*’, ‘*A friend*’, ‘*A family member*’, and ‘*Other (please specify)*’. The second item asked ‘What is the CHEAPEST way to buy tobacco products?’ Response options included ‘*At a gas station*’, ‘*At a convenience store*’, ‘*At a grocery store*’, ‘*At a drugstore or pharmacy*’, ‘*At a vending machine*’, ‘*Over the Internet*’, ‘*Through the mail*’, and ‘*Other (please specify)*’. The third item inquired ‘What is the CHEAPEST tobacco product to buy?’ and asked the participant to select among the response options ‘*Cigarettes*’, ‘*Electronic Cigarettes, Vaporizers, or Vape Pens*’, ‘*Cigars, Cigarillos, or Little Cigars*’, ‘*Chewing Tobacco, Snuff, or Dip*’, ‘*Pipe Tobacco*’, ‘*Hookah or Shisha*’, or ‘*Other (please specify)*’. The fourth item used a ‘*Check all that apply*’ format to determine if the participant had bought tobacco products in their lifetime from a store near the school they attended at the baseline assessment. Response options included ‘*Cigarettes*’, ‘*Electronic Cigarettes, Vaporizers, or Vape Pens*’, ‘*Cigars, Cigarillos, or Little Cigars*’, ‘*Chewing Tobacco, Snuff, or Dip*’, ‘*Pipe Tobacco*’, ‘*Hookah or Shisha*’, and ‘*None of the above*’.

**Acculturation (Wave 1 Only)**

**[Wave 1 α = .85]**

Adolescents’ acculturation to the United States from their country of origin was measured by an 8-item Acculturation, Habits, and Interests Multicultural Scale for Adolescents (AHIMSA; Unger, Gallaher, Shakib, Ritt-Olson, Palmer, & Johnson, 2002) that demonstrated good internal reliability (Cronbach’s α = .79) in prior studies. Participants responded to items such as *‘I am most comfortable being with people from’,* *‘My favorite TV shows are from’* and *‘My best friends are from’* with the following response *options ‘the United States’, ‘the country my family is from’, ‘both’* and *‘neither’.* Four sub-scales were then derived from the number of times a participant chose each response option: Assimilation (the total number of *‘United States’* responses), Separation (the total number of *‘The country my family is from’* responses), Integration (the total number of *‘Both’* responses), and Marginalization (the total number of *‘Neither’* responses).

**Affective Response to Point-Of-Sale Ads and Warning Signs (Wave 3 Only)**

During the third wave of the study, a 24-item measure was added to assess affective reactions to six signs commonly displayed at tobacco retail outlets. Three of the signs promoted tobacco products. One sign advertised Marlboro cigarettes, one sign advertised Blu electronic cigarettes, and one sign advertised Swisher Sweets cigars. Three of the signs warned against underage tobacco purchases. One sign was distributed through the Stop Tobacco Access to Kids Enforcement (STAKE) Act, one sign was provided through the “We Card” program (Apollonio & Malone, 2010), and one sign was manufactured by Phillip Morris. Four semantic differential items were presented for each sign. These items assessed affect in a traditional bipolar manner (Osgood, 1952, 1962) using a five-point scale anchored by the adjectives ‘*Very Happy-Very Unhappy*’, ‘*Very Pleasant-Very Unpleasant*’, ‘*Very Good-Very Bad*’, and ‘*Very Cool-Very Uncool*’.

**Brand Recognition**

**[Wave 1 α = .72 for items depicting tobacco products, 0.55 for items depicting products advertised at tobacco retail outlets, and 0.56 for items depicting products not advertised at tobacco retail outlets]**

An 18-item instrument was created to measure exposure to point-of-sale advertising for nine separate products. For each product, an advertisement at a store was photographed and the brand name was digitally removed. Three of the products were cigarette brands (Marlboro, Camel, and Newport) used in prior studies to document the impact of ad exposure on brand recognition and tobacco initiation among teenagers (Dauphinee, Doxey, Schleicher, Fortmann, & Henriksen, 2013). Three of the products (Corona beer, Good Humor ice cream, and California lotto tickets) were selected because of their frequent presence at tobacco retail outlets in California. The remaining three products (Apple iPhone, Starbucks iced coffee, and Baskin Robbins ice cream cake) were chosen because they were never present at tobacco retail outlets but were often located at stores frequented by youth.

For each of the nine modified advertisements, participants were asked two questions that demonstrated high in internal consistency (α =.74) in a past study (Hanewinkel, Isensee, Sargent, & Morgenstern, 2011). The first question asked ‘*How many times have you seen this advertisement?*’ Response options included: ‘*Never*’ (0), ‘*1-4 times*’ (1), ‘*5-10 times*’ (2), and ‘*More than 10 times*’ (3). The second question asked ‘*What brand is being advertised?*’ using an open-ended format. Correct brand names were post-coded by trained project staff as 1. All other answers were post-coded as 0. Misspellings of brands were counted as correct.

**Change Perception**

The influence of point-of-sale advertising may be affected by a person’s ability to perceive changes in their environment. Research on this phenomenon also suggests differences in change detection may be explained by prior substance use behavior (Chanon, Sours, & Boettiger, 2010; Jones, Bruce, Livingstone, & Reed, 2006). To test these theories, a measure was developed using a “flicker” paradigm task (Rensink, 1997) that showed participants an image of a generic tobacco display “power wall”. A flicker paradigm task works by quickly alternating between two nearly identical images where only one aspect changes between the two versions of the image. Participants are then instructed to focus on the changing image and press the spacebar if and when they notice the change.

During the first wave of the study, only one image was presented as prior research has demonstrated the efficacy of using a single image to detect an attentional bias (Jones et al., 2006; Jones, Jones, Blundell, & Bruce, 2002). In this image, a point-of-sale advertisement for Marlboro cigarettes was modified to remove all text except the brand name. This manipulation was designed to assess the impact of in-store marketing efforts.

During the second and third wave of the study, two images were presented. These images were positioned at the beginning or the end of the survey so that participants would be less likely to develop visual search strategies through repeated practice of the task. The images were also counterbalanced across participants. In the first image, the number of Marlboro cigarette packs present within a “power wall” was modified. This manipulation was intended to measure the effect of product facing counts which prior studies have demonstrated have a strong impact on consumer brand evaluation and choice (Chandon et al., 2009). In the second image a point-of-sale advertisement for Vuse electronic cigarettes was modified to remove all text except the brand name. This modification was designed to test whether the effects observed for regular cigarettes were also detectable among a relatively novel product.

In each version of the task, participants had up to one minute to detect the change before the flickering image stopped. Participants were then asked to describe the change via an open response format. This description was coded as correct or incorrect by two independent coders. A third coder made a definitive choice when there was disagreement. Reaction time for correct descriptions was then used as a measure of the ability to detect changes in the environment.

Following exposure to the image, participants were asked three additional questions. The first question inquired ‘*How difficult was it to detect the change?*’ Response options included ‘*Very Easy*’, ‘*Somewhat Easy*’, ‘*Somewhat Difficult*’, and ‘*Very Difficult*’. The second question displayed the unmodified version of the power wall and asked ‘*How often do you visit stores that have displays that look like the one above?*’ Response options included ‘*Every day or almost every day*’, ‘*Two or three times a week*’, ‘*Once a week*’, ‘*Two or three times a month*’, ‘*Once a month or less*’, and ‘*Never*’. The third question showed participants a blown-up version of the Marlboro advertisement and asked ‘*How often have you seen this advertisement at a store?*’ with response options identical to the previous question.

**Cigarette Use**

A 3-item scale adapted from the National Youth Tobacco Survey (CDC, 2014a), and the Youth Tobacco Survey (CDC, 2014b) asked participants about their experience with cigarettes. The first question asked ‘*About how many cigarettes have you smoked in your entire life?*’ Response options included ‘*None*’, ‘*1 or more puffs but never a whole cigarette*’, ‘*1 cigarette*’, ‘*2 to 5 cigarettes*’, ‘*6 to 15 cigarettes*’, *’16 to 25 cigarettes (about 1 pack)*’, ’*26 to 99 cigarettes (more than 1 pack, but less than 5 packs)*’, and ‘*100 or more cigarettes (more than 5 packs)*’. The second question asked whether they had ever been a daily smoker for a period of 30 days in a row (‘*yes*’ or ‘*no*’). The third question asked ‘*During the past 30 days, how many cigarettes did you smoke per day?*‘ Response options included ‘*I did not smoke cigarettes during the past 30 days*’, ‘*Less than 1 cigarette per day*’, ‘*1 cigarette per day*’, ‘*2 to 5 cigarettes per day*’, ‘*6 to 10 cigarettes per day*’, ’*11 to 20 cigarettes per day*’, and ‘*More than 20 cigarettes per day*’.

**Demographics**

An 18-item demographics measure was administered at the beginning of the questionnaire. The first two questions instructed the participant to provide their birthdate and indicate their gender. The next question asked if the participant was Hispanic or Latino. If the participant was Hispanic or Latino, a follow-up question assessed the origin of their Hispanic roots. Response options included *‘Mexican American’, ‘Central American’, ‘South American’, ‘Cuban American or Cuban’, ‘Puerto Rican American’, ‘Mixed Hispanic or Latino’,* and *‘Other (please specify)’*.

The fifth question assessed the participant’s collective race using a ‘*Check all that apply*’ format. Response options included ‘*White*’, ‘*Black or African American*’, ‘*Asian*’, ‘*Native Hawaiian or Other Pacific Islander*’, ‘*American Indian or Alaska Native*’, and ‘*Other (please specify)*’. The sixth question determined the participant’s primary race by asking ‘*Which one of these groups BEST describes you?*’ and listing the same response options.

The seventh question ascertained the participant’s place of birth. Response options included ‘*United States*’, ‘*Mexico*’, ‘*Central America*’, ‘*Other Latin American Country*’, ‘*Middle East*’, ‘*Africa*’, ‘*Asia*’, ‘*Pacific Islands*’, ‘*Europe*’, and ‘*Other (please specify)*’. The eighth question determined the number of years of the participant had lived in the United States. The ninth and tenth question asked about the place of birth of the participant’s father and mother.

The next nine items were adapted from two separate sources (Ensminger et al., 2000; Hollingshead & Redlich, 1958) to measure socioeconomic status. The eleventh and twelfth questions asked about parental education. Response options included ‘*Did not finish high school*’, ‘*Completed high school*’, ‘*Some college*’, ‘*Finished college*’, ‘*Finished graduate school, law school, or medical school*’, and ‘*Don’t know*’. The thirteenth and fourteenth questions determine the profession of the participant’s parents. Response options included ‘*Major professional: doctor, lawyer, large business owner*’, ‘*Minor professional: teacher, engineer, nurse, pilot, military officer*’, ‘*Small business owner or manager*’, ‘*Clerk, salesperson, flight attendant*’, ‘*Skilled laborer: electrician, plumber, tailor, mechanic, truck driver, military enlisted*’, ‘*Semi-skilled laborer: machine operator, cook, waiter/waitress*’, ‘*Manual labor*’, ‘*Unemployed/welfare*’, ‘*Househusband/wife*’, and ‘*Don’t know*’. The fifteenth and sixteenth questions assessed current parental employment. Response options included ‘*Working full-time*’, ‘*Working part-time*’, and ‘*Not working*’. The final three questions employed a *‘Yes’* or *‘No’* format to measure family welfare status (‘*Does your family receive a welfare check?*’), family participation in SNAP (‘*Does your family receive food stamps?*’), and family participation in a subsidized lunch program (‘*Do you or any of your siblings receive free or reduced lunches at school?*’).

In the second and third wave of the study, a single item was added that assessed the employment status of the participant. Response options included ‘*Working full-time*’, ‘*Working part-time*’, and ‘*Not working*’.

Ten items that remained constant, such as the participant’s place of birth, were eliminated after the first wave of the study.

**Depression, Anxiety, and Stress**

**[Wave 1 α = .94 for all items, 0.89 for depression items, 0.82 for anxiety items, and 0.85 for stress items]**

A 21-item measure was used to assess the related constructs of depression, anxiety, and stress. The Depression Anxiety Stress Scale (DASS-21) short-form has been shown to possess excellent construct validity (Henry & Crawford, 2005) and psychometric properties (Cronbach’s *α* = .93) in an adolescent sample (Szabo, 2010). Participants were asked to indicate how much the following statements applied to them over the past week on a 4-point scale with the response options *0: ‘Did not apply to me at all’, 1: ‘Applied to me to some degree, or some of the time’, 2: ‘Applied to me to a considerable degree, or a good part of time’, 3: ‘Applied to me very much, or most of the time.* Example items for each subscale included Depression: ‘*I felt I wasn’t worth much as a person*’ (7-items, *α* = .88), Anxiety: ‘*I felt I was close to panic*’ (7-items, *α* = .82), Stress: ‘*I felt that I was using a lot of nervous energy*’ (7-items, *α* = .90).

The DASS-21 is associated with specific scoring criteria indicating the level of severity of Depression, Anxiety, or Stress. These criteria are based on the 42-item long form, therefore after each category’s seven items are summed, they must be multiplied by two. For example, a person scoring the maximum on each of the seven items associated with Depression would have a score of 42 (7(items)3(highest possible response)2(to match long-form criteria)). There are five diagnostic categories for each of the three categories which are ‘*Normal*’, ‘*Mild*’, ‘*Moderate*’, ‘*Severe*’, and ‘*Extremely Severe*’. However, the same scores for each of the three constructs do not necessarily equate to the same level of severity. For example, a person who scores a ‘21’ on Anxiety would be considered to have ‘*Extremely Severe*’ symptoms, whereas a person scoring ‘21’ on Stress would only be considered to have ‘*Moderate*’ symptoms. For the complete information on the DASS scale and scoring criteria visit [www.psy.unsw.edu.au/dass](http://www.psy.unsw.edu.au/dass).

**Disposable Income**

**[Wave 1 α = .45 for receiving income items and 0.74 for spending income items]**

An 8-item measure was crafted to assess how much money participants had available to spend on non-essential purchases, e.g. soda, tobacco products, etc., by adapting scales from two studies focusing on adolescent disposable income (West, Sweeting, Young, & Robins, 2006) and spending habits (Darling, Reeder, McGee, & Williams, 2006). The first three questions asked participants ‘*In an average week, how much money do you receive from the following*: *(1) Your Family, (2) A Job, (3) Other Sources.*’ The remaining five questions asked participants ‘*In an average week, how much money do you spend on the following*: *(1) Snack Foods, (2) Soda or Energy Drinks, (3) Alcohol, (4) Tobacco Products, (5) Other*.’ Participants responded to all eight questions by selecting one of the following dollar amount ranges *‘$0’*, *‘$1-5’*, *‘$6-10’*, *‘$11-20’*, *‘$21-35’*, *‘$36-50’*, *‘$51-75’*, *‘$76-125’*, *‘$126-175’*, and *‘$176+’*.

**Disposable Income Spent At Tobacco Retail Outlets (Wave 3 Only)**

During the third wave of the study, a 7-item measure was integrated to assess the amount of money participants typically spend at tobacco retail outlets. The questions asked participants ‘*In an average week, how much money do you spend at (1) Supermarkets, (2) Small Grocery Stores, (3) Convenience Stores, (4) Gas Stations, (5) Drug Stores, (6) Liquor Stores, (7) Tobacco Stores.*’ Participants responded to each item by selecting one of the following dollar amount ranges *‘$0’*, *‘$1-5’*, *‘$6-10’*, *‘$11-20’*, *‘$21-35’*, *‘$36-50’*, *‘$51-75’*, *‘$76-125’*, *‘$126-175’*, and *‘$176+’*. Three of the store types (‘*convenience stores*’, ‘*small grocery stores*’, and ‘*liquor stores*’) were included based on a prior study of exposure to Point-of-Sale cigarette marketing (Feighery, Henriksen, Wang, Schleicher, & Fortmann, 2006). The remaining four store types (‘*large supermarkets*’, ‘*gas stations*’, ‘*drug stores*’, and ‘*tobacco stores*’) were modeled on the classifications utilized in prior tobacco store audit studies (Feighery, Ribisl, Schleicher, Lee, & Halvorson, 2001; Henriksen, Feighery, Schleicher, Haladjian, & Fortmann, 2004; Schleicher, Johnson, Dauphinee, & Henriksen, 2011).

**Drug Use**

**[Wave 1 α = .89 for past year items and 0.87 for past 30 days items]**

Participants were asked questions relating to their past and current substance use. The first sixteen items were adapted from a previously validated drug use questionnaire (Graham, Flay, Johnson, Hansen, Grossman, & Sobel, 1984) and asked participants ‘*How many times have you used each of the drugs below in the PAST YEAR?*’ Categories of substances included ‘*Cigarettes*’, ‘*Electronic Cigarettes, Vaporizers, or Vape Pens*’, ‘*Cigars, Cigarillos, or Little Cigars*’, ‘*Chewing Tobacco, Snuff, or Dip*’, ‘*Alcohol (beer, wine, wine coolers, liquor)*’, ‘*Marijuana (weed, grass, pot, chronic)*’, ‘*Cocaine or crack*’, ‘*Caffeine (coffee, energy drinks, soda, NoDoz pills)*’, ‘*Ecstasy (‘E’)*’, ‘*Hallucinogens (LSD, PCP, peyote, mushrooms)*’, ‘*Methamphetamine (speed, crank, ice, crystal meth)*’, ‘*Tranquilizers (valium, Xanax)*’, ‘*Opiates (heroin, opium, morphine, Vicodin, OxyContin)*’, ‘*Inhalants or vapors (poppers, rush, nitrous, gas, paint, glues)*’, ‘*Other club/party drugs (special K, ketamine, Rohypnol, GHB)*’, and ‘*Ritalin/Adderall (addy, bennies, uppers)*’. Response options for each category included ‘*0*’, ‘*1-10 times*’, ‘*11-20 times*’, ‘*21-30 times*’, ‘*31-40 times*’, ‘*41-50 times*’, ‘*51-60 times*’, ‘*61-70 times*’, ‘*71-80 times*’, ‘*81-90 times*’, and ‘*91+ times*’.

Items 17 and 18 (Mayer & Filstead, 1979; Moberg and Hahn, 1991) asked specific questions about how much alcohol and marijuana the participant typically consumed. The first item asked ‘*When you drink alcohol, how much do you usually drink?*’ Response options included ‘*1 drink*’, ‘*2 drinks*’, ‘*3-4 drinks*’, ‘*5-9 drinks*’, *’10 or more drinks*’, and ‘*I do not drink alcohol*’. The second item asked ‘*When you smoke pot, how many hits do you usually take?*’ Response options included ‘*1 hit*’, ‘*2 hits*’, ‘*3-4 hits*’, ‘*5-9 hits*’, *’10 or more hits*’, and ‘*I do not smoke pot*’.

Items 19 through 25 were created specifically for this study and aimed to measure polysubstance use among participants. Items 19 through 22 asked ‘*About how many times have you used the drugs below at the same time?*’ with the following four substance combinations: ‘*Tobacco and Alcohol*’, ‘*Tobacco and Marijuana*’, ‘*Tobacco and Methamphetamine*’, and ‘*Tobacco, Alcohol, and Energy Drinks (Red Bull, RockStar, Monster, etc.)*’\*. Response options for each category were ‘*0*’, ‘*1-10 times*’, ‘*11-20 times*’, ‘*21-30 times*’, ‘*31-40 times*’, ‘*41-50 times*’, ‘*51-60 times*’, ‘*61-70 times*’, ‘*71-80 times*’, ‘*81-90 times*’, and ‘*91+times*’. Items 23 through 25 asked more specific questions relating to the use of tobacco when under the influence of other drugs. Participants were asked ‘*In the past year, how often did you…*’ with respect to the following three categories: ‘*Smoke cigarettes while high or drunk on alcohol*’, ‘*Smoke cigarettes while high on marijuana*’, and ‘*Smoke cigarettes while high on methamphetamine (speed, crank, meth)*’. Response options included ‘*Less than half the time*’, ‘*About half the time*’, ‘*More than half the time*’, and ‘*All the time*’.

Items 26 through 37 mirrored the prior items except participants were asked about their substance use in the ‘PAST 30 DAYS’ rather than the ‘PAST YEAR’. Categories of substances included ‘*Cigarettes*’, ‘*Electronic Cigarettes, Vaporizers, or Vape Pens*’, ‘*Cigars, Cigarillos, or Little Cigars*’, ‘*Chewing Tobacco, Snuff, or Dip*’, ‘*Alcohol (beer, wine, wine coolers, liquor)*’, ‘*Marijuana (weed, grass, pot, chronic)*’, ‘*Methamphetamine (speed, crank, ice, crystal meth)*’, ‘*Ritalin/Adderall (addy, bennies, uppers)*’, ‘*Tobacco and Alcohol*’, ‘*Tobacco and Marijuana*’, ‘*Tobacco and Methamphetamine*’, and ‘*Tobacco, Alcohol, and Energy Drinks*’\*.

**\*Note:** Items 22 and 37 were added after the first wave of the study.

**Electronic Cigarette Commercial Exposure**

**[Wave 1 α = .89 for television exposure items, 0.94 for affective response to electronic cigarette commercial items, 0.77 for liking of electronic cigarette commercial items, 0.72 for receptivity to electronic cigarette commercial items, and 0.59 for frequency of exposure to electronic cigarette commercial items]**

The advertising of electronic cigarettes is a relatively new phenomenon, therefore a total of 30 items were adapted from several measures relating to alcohol and cigarette advertising. Items 1 through 7 asked about television and online video viewing habits in general as a baseline for potential exposure to electronic cigarette commercials. These items have been shown to possess high validity (Cronbach’s α = 0.82) in previous research on beer advertising directed at school children (Grube & Wallack, 1994). Participants were asked how long they typically watched television during three time periods on weekdays (‘*before school*’, ‘*after school before dinner*‘, and ‘*from dinner until bedtime*’) and four time periods on weekends (‘*Saturday morning until noon*’, ‘*Saturday noon until bedtime*’, ‘*Sunday morning until noon*’, and ‘*Sunday noon until bedtime*’.) Response options included ‘*Did not watch TV or Online Videos*’, ‘*Less than 1 hour*’, ‘*1-2 hours*’, ‘*3-4 hours*’, and ‘*5 hours or more*’.

Item 8 asked ‘*Have you ever seen a commercial for electronic cigarettes on television?*’ Item 9 asked ‘*Have you ever seen a commercial for electronic cigarettes online (Youtube, Hulu, Netflix, etc.)?*’ If a respondent answered ‘*Yes*’ to either item, then they were asked additional questions about the electronic cigarette commercials they saw.

Items 10 through 20 began with a prompt asking participants to recollect the last time they saw a commercial for electronic cigarettes either on TV or online. Item 10 asked ‘*What were you doing when you saw the electronic cigarette commercial?*’ Responses options included ‘*Watching television*’, ‘*Watching a video online at a website*’, ‘*Using a social network*’, and ‘*Other (please specify)*’. Item 11 asked ‘*When did you last see this electronic cigarette commercial?*’ Response options included ‘*1-2 days ago*’, ‘*3-6 days ago*’, ‘*1-2 weeks ago*’, ‘*3-4 weeks ago*’, ‘*1-2 months ago*’, ‘*3-6 months ago*’, and ‘*More than 6 months ago*’. Item 12 asked specifically about the brand of electronic cigarette being advertised. Response options included *‘Blu’*, *‘Green Smart Living’*, *‘MarkTen’*, *‘NJOY’*, *‘Xcite’*, *‘Square’*, *‘Vuse’*, *‘V2’*, ‘*I don’t know*’, and ‘*Another brand (please specify)*’.

For items 13 through 16 participants were asked ‘*How did the electronic cigarette commercial make you feel?*’ Participants then responded using a five-point scale anchored by the adjectives ‘*Very Happy-Very Unhappy*’, ‘*Very Pleasant-Very Unpleasant*’, ‘*Very Good-Very Bad*’, and ‘*Very Cool-Very Uncool*’. Item 17 asked ‘*Were there people in the electronic cigarette commercial?*’ Item 18 asked ‘*How old were the people in the electronic cigarette commercial?*’ using a ‘*Check all that apply*’ format. Response options included ‘*Under 18*’, ‘*18-25*’, ‘*26-30*’, ‘*31 or older*’, and ‘*There were no people in advertisement*’. Item 19 asked ‘*What was the gender of the people in the electronic cigarette commercial?*’ with the response options ‘*One male only*’, ‘*Two or more males (no females)*’, ‘*One female only*’, ‘*Two or more females (no males)*’, ‘*A mix of males and females*’, and ‘*There were no people in advertisement*’. Item 20 asked ‘*What was the race/ethnicity of the people in the electronic cigarette commercial’* using a ‘*Check all that apply*’ format. Response options included ‘*White*’, ‘*Hispanic*’, ‘*Black or African American*’, ‘*Asian*’, ‘*Native Hawaiian or Other Pacific Islander*’, ‘*American Indian or Alaska Native*’, ‘*There were no people in advertisement*’, and ‘*Other (please specify)*’.

Items 21 through 27 were adapted from previous work on adolescent exposure to alcohol advertising (Unger et al., 2003). Items 21 through 23 were comprised of a 3-item scale of ‘liking’ which has been shown to possess a high Cronbach’s alpha of .80. Participants were asked ‘*When you see electronic cigarette commercials on TV or online…*’ ‘*Do you think they are funny?*’, ‘*Do you think they are sexy?*’, ‘*Do you wish you were like the people in the commercials?*‘. Response options for all three items were ‘*Yes, always*’, ‘*Yes, usually*’, ‘*No, usually not*’, and ‘*No, never*’. Item 24 asked ‘*When you see electronic cigarette commercials, how often do you pay attention to them?*’ with the response options ‘*Always*’, ‘*Most of the time*’, ‘*Some of the time*’, and ‘*Never*’. Item 25 asked ‘*Of all the commercials you see, how much do you like electronic cigarette commercials?*’ Participants responded on a 4-point scale ranging from ‘*I like electronic cigarettes the most*’ to ‘*I like electronic cigarette commercials the least.*’ Items 26 and 27 employed a 2-item scale on receptiveness to electronic cigarettes (Cronbach’s α = 0.77). Item 26 asked ‘*What brand of electronic cigarette was advertised the most in the past month?*’ Response options included *‘Blu’*, *‘Green Smart Living’*, *‘MarkTen’*, *‘NJOY’*, *‘Xcite’*, *‘Square’*, *‘Vuse’*, *‘V2’*, ‘*I don’t know*’, and ‘*Another brand (please specify)*’. Item 27 asked ‘*What is the name of the brand of your favorite electronic cigarette commercial?*’ with the same response as the prior question.

Item 28 asked ‘*How often do you talk to other people about electronic cigarette commercials you saw on TV or online?*’ with participants responding on a 4-point scale ranging from ‘*Very Often*’ to ‘*Never*’. Items 29 and 30 were part of a 2-item scale assessing frequency of exposure to electronic cigarette commercials. These two items have previously demonstrated acceptable validity (Cronbach’s α = 0.67) in previous research on exposure to alcohol ads (Stacy et al., 2004). Item 29 asked ‘*About how often did you see an electronic cigarette commercial in the last six months?*’ with participants responding on a 7-point scale ranging from ‘*Every day*’ to ‘*Never*’. Item 30 asked ‘*In the past week, how many commercials have you seen for electronic cigarettes?*’ with participants responding on a 7-point scale ranging from ‘*0*’ to ‘*6 or more*’.

**Extracurricular Activities (Wave 2 and Wave 3 Only)**

During the second and third wave of the study, a new measure was added that assessed the participants’ activities outside of school. This measure was modeled on the National Survey of Parents and Youth (Hornik, Hornik, Hornik, & Maklan, 2011) and asked between two and five questions based on the participant’s responses. The first question asked ‘In the last 12 months, which of the following organized activities or groups have you participated in?’ A ‘*Check all that apply*’ format was then used to select among the response options ‘*Music, dance theater or other performing arts (in or outside of school)*’, ‘*Athletic teams or organized sports (in or outside of school)*’, ‘*Boys or girls clubs (Boy Scouts, Girl Scouts, etc.)*’, ‘*Youth groups sponsored by a church, synagogue, mosque, or other religious institution*’, ‘*Another club or activity, in or outside of school, or volunteer work*’, and ‘*None of these clubs or activities*’. Participants who participated in at least one activity were then asked ‘How many hours a week did you participate in these activities?’ Data was gathered using an open-ended response format. The next item asked, ‘Which of the following organized activities or groups are you currently participating in?’ A ‘*Check all that apply*’ format was then used to select among the same response options presented for the first question. Participants who participated in at least one activity were asked ‘How many hours a week did you participate in these activities?’ and ‘How many close friends participate in these activities with you?’ The former question used an open-ended response format. The latter question utilized the response options ‘*None of them*’, ‘*A few of them*’, ‘*About half of them*’, ‘*Most of them*’, and ‘*All of them*’.

**Family and Peer Smoking**

Seven items compiled from the 2013 National Youth Tobacco Survey (CDC, 2014a), the Youth Tobacco Survey (CDC, 2014b), and the California Student Tobacco Survey (CDPH, 2014) assessed the number of individuals in the participants’ immediate environment that use tobacco products and the types of tobacco products used. The first item asked which family members smoked at home. Response options included *‘No one smokes in my home’, 'I am the only one who smokes in my home', 'Mother (Female Guardian)', 'Father (Male Guardian)', 'Older Brother', 'Older Sister', 'Younger Brother', 'Younger Sister', 'Grandmother / Grandfather',* and *'Other'*. The second item adapted the same response options to determine which family members used chewing tobacco, snuff, or dip. The third item assessed whether anyone living with the participant *'Uses electronic cigarettes, vaporizers, or vape pens', 'Smokes cigars, cigarillos, or little cigars', 'Smokes tobacco in a pipe', 'Smokes cigarettes with tobacco and marijuana’, 'Smokes hookah or shisha'*, or *'Uses any other form of tobacco'*.

During the second and third wave of the item, these items were modified to account for the possibility that participants no longer lived at home. The first item was refined to ask ‘Who **in your family** smokes?’ Response options included *‘No one smokes in my* ***family****’, 'I am the only one who smokes in my* ***family****', 'Mother (Female Guardian)', 'Father (Male Guardian)', 'Older Brother', 'Older Sister', 'Younger Brother', 'Younger Sister', 'Grandmother / Grandfather',* and *'Other'*. The second item adapted the same response options to determine which family members used chewing tobacco, snuff, or dip. The third item assessed whether anyone currently living with the participant ‘*Smokes cigarettes*’, *'Uses electronic cigarettes, vaporizers, or vape pens', ‘Uses chewing tobacco, snuff, or dip’, 'Smokes cigars, cigarillos, or little cigars', 'Smokes tobacco in a pipe', 'Smokes cigarettes with tobacco and marijuana’, 'Smokes hookah or shisha'*, or *'Uses any other form of tobacco'*. All three questions employed a ‘*Check all that apply*’ format.

The fourth, fifth, and sixth items asked how many of the participants four closest friends smoke cigarettes, use chewing tobacco, snuff, or dip, or use electronic cigarettes, vaporizers, or vape pens. Response options ranged from *‘None’* to *‘Four’* with a *‘Not sure’* option. The seventh item asked whether any of the participants four closest friends *'Smoke cigars, cigarillos, or little cigars', 'Smoke tobacco in a pipe', 'Smoke cigarettes with tobacco and marijuana', 'Smoke hookah or shisha'*, or *'Use any other form of tobacco'* using a ‘*Check all that apply*’ format.

**Family Structure**

A 5-item scale was used to determine the composition of the home environment in which the participant resides. The first three items were adapted from the National Survey of Youth and Religion (Smith & Denton, 2003).

The first item asked where the participant currently lives. Response options included *‘Your parent’s home’, ‘Another person’s home’, ‘Your own place’,’ Group home’*, and *‘Other’*. The second item asked whether the participant lived alone or with others. The third item used a ‘*Check all that apply*’ format to determine who lived with the participant most of the time. Response options included *'Father', 'Mother', 'Stepfather', 'Stepmother', 'Foster Parent(s)', 'Brother(s)', 'Sister(s)', 'Grandfather(s)', 'Grandmother(s)', 'Other Relatives (Aunt, Uncle, Cousin)', 'Wife/Husband', 'Girlfriend/Boyfriend', 'Daughter(s)', 'Son(s)', 'Roommate(s)/Friend(s)',* and *'Other People'*.

The fourth and fifth item asked about the number of people who lived with the participant who were under the age of eighteen and the number of people who were eighteen or older.

**General Health Perceptions**

Four items modeled on prior studies conducted by Popova and Ling (2013) asked participants how harmful they perceived tobacco products to be. With respect to four broad categories of tobacco products (i.e. ‘*Cigarettes*’, ‘*Electronic Cigarettes/Vaporizers/Vape Pens*’, ‘*Cigars/Cigarillos/Little Cigars*’, and ‘*Chewing Tobacco/Snuff/Dip*’) participants were asked ‘*In your opinion, how harmful are using the following tobacco products to your general health?*’ Responses were given on a 4-point scale with the response options *‘Not Harmful’*, *‘A Little Harmful’*, *‘Somewhat Harmful’*, and *‘Very Harmful’*.

**Go/No-Go Task**

Inhibitory control was measured by a Go/No-Go task in which an empty rectangle was filled with the color green (Go) or the color blue (No-Go). Participants were instructed to press a response key as rapidly as possible when presented with Go signals and to withhold a response when presented with No-Go signals.

The orientation of the rectangle (i.e. horizontal or vertical) preceding the target color stimulus signaled the probability that a go or no-go target will be displayed. Cues presented horizontally preceded the go target on 70% of the trials and preceded the no-go target on 30% of the trials. Cues presented vertically preceded the no-go target on 70% of the trials and preceded the go target on 30% of the trials. Half the cues were vertical rectangles and half the cues were horizontal rectangles. The task consisted of 160 trials presented in four blocks. Individual trials with mean reaction times greater than 1000ms or less than 100ms were excluded from the statistical analysis (Fillmore et al., 2006; 2009).

Previous research has demonstrated that this level of cue validity produces prepotent responding (Fillmore, Rush, & Hays, 2006; Fillmore, Ostling, Martin, & Kelly, 2009; Finn, Justus, Mazas, & Steinmetz, 1999; Mostofsky & Simmonds, 2008; Simmonds, Pekar, & Mostofsky, 2008). Failing to withhold a response to a No-Go stimulus is designated as a false alarm and serves as a measure of response inhibition failure indicative of impulsive behavior (Fillmore et al., 2006; 2009; Weafer, Fillmore, & Milich, 2009).

For predictive models, three parcel score indicators were used for the latent variables for the generic-cued false alarm. Individual trials were randomly assigned to one of the three parcels, and then standardized scores were computed within each parcel. Parceling creates an accurate representation of the data if the measure is uni-dimensional in theory and measurement (for a detailed discussion of the advantages of parceling, please see Little, Cunningham, Shahar, & Widaman, 2002).

**Head Injury**

Recent head injuries had the potential to bias results obtained from neurocognitive tasks administered during the survey (Suhr & Gunstad, 2002). For that reason, a single item asked participants to answer either *‘Yes’* or *‘No’* to the question ‘*Have you experienced a concussion or head injury in the past year where you were knocked unconscious?*’

**Health Professional Warnings**

Two items taken from the Youth Tobacco Survey (CDC, 2014b) measured whether participants had had conversations with health professionals (e.g. doctors, dentists, nurses, etc.) about tobacco products in the past 12 months. The first item inquired if a health professional had asked the participant if they used tobacco products. The second item asked whether a health professional had advised the participant not to use tobacco products. For each question the participants responded with ‘*Yes*’, ‘*No*’, or ‘*Don’t know / not sure*’.

**Impulsive Sensation-Seeking (Wave 1 Only)**

**[Wave 1 α = .82]**

Research supports the hypothesis that some individuals have a biologically-based preference for stimulation and susceptibility to the reinforcing effects of pleasurable stimuli (Cloninger, 1994; Cloninger, Svrakic & Przybeck, 1993; Hegerl, Lipperheide, Juckel, Schmidt & Rommelspacher, 1995; Zuckerman, 1993), including various drugs of abuse. Impulsive sensation seeking has been implicated as a personality correlate of neurobiological processes. Individuals who score higher on trait measures of sensation seeking are more susceptible to the reinforcing effects of pleasurable stimuli evidenced by a tendency to engage in risk-taking behaviors (see Newcomb & Earleywine, 1996). Sensation seeking as a susceptibility factor has been found to be positively related to and predictive of drug use (Newcomb & McGee, 1991; Ames, Sussman & Dent, 1999) and alcohol use (Stacy, Newcomb & Bentler, 1993). To measure this trait, a 19-item subscale of the Zuckerman-Kuhlman Personality Questionnaire was used to assess participants’ tendency to act impulsively, take risks, or otherwise engage in experience seeking behavior (Zuckerman, Kuhlman, Joireman, Teta, & Kraft, 1993). This scale has demonstrated good internal reliability (Cronbach’s α = .80) in prior studies of the measure’s psychometric properties (Roberti, Storch, & Bravata, 2003). Participants were asked to read a series of statements that might be used to describe themselves (e.g. ‘*I often do things on impulse*’). For each statement, participants would then mark *‘True’* if they agreed that the statement described them or *‘False’* if they disagreed.

**Injunctive Norms**

**[Wave 1 α = .93]**

Injunctive norms are the expectations that our friends and loved ones have for our behavior. A 7-item measure of injunctive norms for adolescent smoking behavior was adapted from a previous research study (Wilkinson & Abraham, 2004) that demonstrated good internal reliability (Cronbach’s α = .81). The response options were altered from the original measure based on the work of Ajzen & Fishbein (1980) so that the scale points were easier to understand by the at-risk youth that took in the study. Participants were asked how likely it would be that 7 categories of significant others (e.g. ‘*Mother*’, ‘*Father*’, ‘*Friends*’, etc.) would want them to smoke. Respondents answered on a 5-point scale ranging from *‘1: Extremely Likely’* to *‘5: Extremely Unlikely.’* Responses were then summed and averaged to create a general injunctive norm for adolescent smoking, where higher scores indicated a stronger norm to abstain from smoking.

**Media Exposure**

A composite measure of sixteen items was created to assess how frequently and to what degree participants were exposed to tobacco marketing via multiple media outlets. Except where indicated, all items were adapted from the 2012 National Youth Tobacco Survey (CDC, 2014a) and the Youth Tobacco Survey (CDC, 2014b).

Questions fell into one of eight categories of media exposure. The first category consisted of two items and measured point of sale exposure. The first question measured ‘pro’ tobacco ad exposure (‘*During the past 30 days, about how often have you seen ads or promotions FOR tobacco products at convenience stores, supermarkets, or gas stations?*’) while the second question measured exposure to tobacco warning labels (‘*During the past 30 days, about how often have you seen warning signs about UNDERAGE PURCHASES of tobacco products at convenience stores, supermarkets, or gas stations?*’). Response options included ‘*None*’, ‘*1-3 times in the past 30 days*’, ‘*1-3 times per week*’, ‘*Daily or almost daily*’, and ‘*More than once a day*’.

The second category included a single item measuring exposure to anti-tobacco media (‘*During the past 30 days, about how often have you seen ads, commercials, or signs about NOT using tobacco products?*’). Response options included ‘*None*’, ‘*1-3 times in the past 30 days*’, ‘*1-3 times per week*’, ‘*Daily or almost daily*’, and ‘*More than once a day*’.

The third category consisted of six items measuring exposure to ‘pro’ tobacco advertisements. Example items included ‘*During the past 30 days, about how often have you seen posters or signs FOR tobacco products (cigarettes, electronic cigarettes, vape pens, cigars, chewing tobacco, etc.)*? and ‘*During the past 30 days, about how often have you seen ads online FOR tobacco products?*’. Response options included ‘*None*’, ‘*1-3 times in the past 30 days*’, ‘*1-3 times per week*’, ‘*Daily or almost daily*’, and ‘*More than once a day*’.

The fourth category employed a single item modeled on an existing typology of youth internet use (Eynon & Malmberg, 2011). The question asked ‘*During the past 30 days, where did you see ads online FOR tobacco products?*’ using a ‘*Check all that apply’* format. Response options included ‘*Social Networks*’, ‘*Email*’, ‘*Forums*’, ‘*Search Engines*’, ‘*Online Shopping Sites’*, ‘*Video Streaming Sites*’, ‘*Music Streaming Sites*’, ‘*Download Sites*’, ‘*Blogs*’, ‘*Wikis*’, ‘*Podcasts*’, and *‘None of the above’*.

The fifth category was a single item asking about the receipt of price discounts (i.e. coupons). Participants were asked ‘*During the past 30 days, did you receive coupons from a tobacco company through…?*’. Using a ‘*Check all that apply*’ format, the participant then selected from the response options ‘*The mail*’, ‘*E-mail*’, ‘*The Internet*’, ‘*A text message*’, ‘*A cigarette pack or other tobacco product*’, and ‘*I did not receive coupons from a tobacco company*’.

The sixth category assessed exposure to celebrity endorsement of tobacco products with a single item asking, ‘*How often do you see celebrities (movie stars, musicians, athletes, etc.) using tobacco products in the media or face-to-face?*’ Response options included ‘*Never*’, ‘*Less than half the time*’, ‘*About half the time*’, ‘*More than half the time*’, and ‘*All the time*’.

The seventh category asked three questions about brand preferences. The first item asked ‘*What are the brand names of your favorite cigarette ads?*’ with a ‘*Check all that apply*’ format. Response options included ‘*American Spirit*’, ‘*Camel*’, ‘*GPC, Basic, or Doral*’, ‘*Kool*’, ‘*Lucky Strike*’, ‘*Marlboro*’, ‘*Newport*’, ‘*Parliament*’, ‘*Summit*’, ‘*Virginia Slims*’, ‘*Another brand (please specify)*’, and ‘*I don’t have any favorite cigarette ads*’. The second item asked ‘*What are the brand names of your favorite electronic cigarette ads?*’ with a ‘*Check all that apply*‘ response format. Response options included ‘*Blu*’, ‘*Green Smart Living*’, ‘*MarkTen*’, ‘*NJOY*’, ‘*Xcite*’, ‘Square’, ‘*Vuse*’, ‘*V2*’, ‘*Another brand (please specify)*’, and ‘*I don’t have any favorite electronic cigarette ads*’. The third item asked ‘*What are the brand names of your favorite chewing tobacco, snuff, or dip ads?*’ with a ‘*Check all that apply*’ format. Response options included ‘*Beechnut*’, ‘*Back Country*’, ‘*Copenhagen*’, ‘*Grizzly*’, ‘*Kodiak*’, ‘*Levi Garrett*’, ‘*Longhorn*’, ‘*Red Man*’, ‘*Skoal*’, ‘*Another brand (please specify)*’, and ‘*I don’t have any favorite chewing tobacco, snuff, or dip ads*’. The brands ‘*Summit*’, ‘*Xcite*’, and ‘*Back Country*’ were fictional and used to verify the validity of the responses provided.

The eighth category was composed of two items used in a prior study (Unger, Cruz, Schuster, Flora, & Johnson, 2001) to assess branded functional objects used as tobacco promotional tools. The first item asked ‘*How often do you see other young people wearing clothing or carrying gear, like t-shirts, lighters, gym bags, hats, or sunglasses that have a tobacco company name or picture on it?*’ A 5-point frequency response format was used for this question with the options ‘*Never*’, ‘*Less than half the time*’, ‘*About half the time*’, ‘*More than half the time*’, and ‘*All the time*’. The second item asked ‘*How many items do you own that have a tobacco company name or picture on it?*’ with an open response format.

**Military Enrollment**

A 2-item measure was adapted from the Monitoring the Future Survey (Johnston, O’Malley, Bachman, & Schulenberg, 2014) to assess current and possible future enrollment in the armed services. The first question asked ‘*Are you a member of the…*’ with the response options *‘Army’, ‘Navy’, ‘Marine Corps’, ‘Air Force’, ‘Coast Guard’*, and *‘None of the above.’* For respondents who answered *‘None of the above’*, a follow-up question was asked ‘*Are you thinking about enlisting in the…*’ with the same response options.

**Nicotine Dependence**

**[Wave 1 α = .83]**

The Modified Fagerstrom Tolerance Questionnaire (mFTQ) is a measure of nicotine dependence designed and validated specifically for adolescents (Prokhorov, Pallonen, Fava, Ding, & Niaura, 1996). The 7-item scale has been shown to possess good internal consistency (Cronbach’s *α* =.75) and correlates positively with biometric (i.e. saliva cotinine) measures of nicotine consumption (Prokhorov, De Moor, Pallonen, Hudmon, Koehly, & Hu, 2000). Example items included, ‘*How many cigarettes a day do you smoke?*’ and ‘*Do you find it difficult to refrain from smoking in places where it is forbidden (church, library, movies, etc.)?*’ Each response receives a score of 0 (Low Dependence), 1 (Moderate Dependence), or 2 (High Dependence: *first two items only*). Scores on the mFTQ range from 0-9 with higher scores indicating greater dependency on nicotine.

**Perceived Stress**

**[Wave 1 α = .55]**

The Perceived Stress Scale (Cohen, Kamarck, & Mermelstein, 1983) was used to assess the stress experiences by participants over the past month. A 10-item version (PSS-10) of this measure was selected as it has been shown to be a more reliable (Cronbach’s α = .78) measure of stress over prior versions (Cohen, 1988). Examples of questions included, ‘*In the past month, how often have you been upset because of something that happened unexpectedly?*’ and ‘*In the past month, how often have you felt nervous and “stressed”?*’ Responses to the ten items were given on a 5-point frequency scale with the response options ‘*Never*’, ‘*Almost Never*’, ‘*Sometimes*’, ‘*Fairly Often*’, and ‘*Very Often*’.

**Perception of Peer Tobacco Use**

Two items adapted from the Monitoring the Future study (Johnston et al., 2014) asked participants about their schoolmates smoking behavior. The first item asked ‘*These days, how many students in your school would you guess are regular CIGARETTE smokers?*’ The second item asked ‘*These days, how many students in your school would you guess are regular smokers of electronic cigarettes, vaporizers, or vape pens?*’ Both question had the same frequency response option set: ‘*0% to 10%*’, ‘*11% to 30%*’, ‘*31% to 50%*’, ‘*51% to 70%*’, ‘*71% to 90%*’, ‘*91% to 100%*’, and ‘*Have no idea*’.

During the second and third wave of the study, two additional questions were added to provide for the contingency that a participant no longer attended school. In this instance, participants were asked ‘*These days, how many people around your age would you guess are regular CIGARETTE smokers?*’ and ‘*These days, how many people around your age would you guess are regular smokers of electronic cigarettes, vaporizers, or vape pens?*’ Response options for both questions were ‘*0% to 10%*’, ‘*11% to 30%*’, ‘*31% to 50%*’, ‘*51% to 70%*’, ‘*71% to 90%*’, ‘*91% to 100%*’, and ‘*Have no idea*’.

**Point-Of-Sale Advertising Sensitivity**

**[Wave 1 α = .65]**

A 3-item measure of sensitivity to Point-of-Sale (POS) advertising was adapted from an Australian study (Germain, McCarthy, & Wakefield, 2009) on tobacco displays and cessation attempts wherein the researchers found smokers who were moderately to highly sensitive to POS displays were significantly less likely to have quit at an 18 month follow up [odds ratio (OR) = 0.32, 95% confidence interval (CI) = 0.14–0.74; OR = 0.27, 95% CI = 0.08–0.91, respectively]. In the questionnaire, participants answered such questions as ‘*When shopping for something other than cigarettes, how often do you decide to buy cigarettes as a result of seeing the cigarette pack in the store?*’ using a 5-point frequency scale ranging from ‘*1 (All the time)*’ to ‘*5 (Never)*’.

**Prevention Program Exposure**

The degree to which participants had been exposed to formal tobacco prevention programs and/or utilized other means to quit smoking was assessed using a 2-item measure. The first item was based on information from a statewide sponsored resource center (California Healthy Kids, 2014) while the second is from the 2012 National Youth Tobacco Survey (CDC, 2014).

The first item asked ‘*Have you received any of the following programs in the past year?*’ with 23 potential prevention programs to choose from drawn from four categories: Research Validated Programs (i.e. *'LifeSkills Training', 'Keepin’ it REAL', 'Minnesota Smoking Prevention Program', 'Project ALERT', 'Project Northland', 'Project SUCCESS', 'Project Toward No Drug Abuse', 'Project Toward No Tobacco Use', 'Reconnecting Youth', 'Residential Student Assistance Program',* and *'State-Wide Indian Drug Prevention Program'*), Non-Research Validated Programs (i.e*. 'DARE', 'Empowering Discipline', ‘Here’s Looking At You', 'McGruff', 'QUEST',* and *'Red Ribbon Week')*, Tobacco Industry Sponsored Programs (i.e. *'Butt Out Now', 'Right Decisions, Right Now', 'Think. Don’t Smoke', 'Tobacco is Whacko If You’re A Teen',* and *'Wake Up, Live Big, Be Smoke Free'*)and Fictitious Programs (i.e. *‘In It to Win It‘*). The Fictitious Program was included to verify the validity of the responses provided.

The second item asked ‘*In the past 12 months, did you do any of the following to help you quit using tobacco?*’ Possible answers to this item included *'I did not use tobacco of any kind during the past 12 months', 'I did not try to quit during the past 12 months', 'Attended a program at my school', 'Attended a program in the community', 'Called a telephone help line or telephone quit line', 'Used nicotine gum', 'Used nicotine patch', 'Used medicine to help quit', ‘Used electronic cigarettes, vaporizers, or vape pens’\*, ‘Visited an Internet quit site', 'Got help from family or friends', 'Used another method such as hypnosis or acupuncture',* and *'Tried to quit on my own or quit ‘cold turkey’'.*

**\*Note:** This response option was added after the first wave of the study.

**Price Consciousness (Wave 2 Only)**

Three items were added to the second wave of the study to assess the role of price consciousness (Wells & Tigert, 1971) on youth tobacco purchases. These items were taken from prior research (Tat & Bejou, 1994) that demonstrated adequately reliability (Cronbach’s α = 0.78) among minority populations. Participants were asked to indicate the extent to which they agreed or disagreed with the statements ‘*I shop a lot for “specials”,* ‘*I check the prices even for inexpensive items.*’, and ‘*I pay attention to sales and specials.*’ A 4-point scale ranging from *‘Strongly Disagree’* to *‘Strongly Agree’* was utilized.

**Product Category Selection**

A 12-item measure was introduced in the third wave of the study based on prior marketing research conducted in retail environments (Sorensen, 2009). In each question, participants were presented with an image of the entrance to a tobacco retail outlet or the checkout counter inside the outlet. The participant was then asked to ‘*Click on the area of the picture that grabs your attention first.*’ The type of product or advertisement selected and the amount of time it took to make a selection were recorded. The types of products and advertisements available for selection across all images included *'Smokeless Tobacco', 'Cigarettes', 'Cigars or Cigarillos', 'Electronic Cigarettes, Vaporizers, or Vape Pens', 'Tobacco Paraphernalia', 'Underage warning signs about the purchase of tobacco products', 'Underage warning signs about the purchase of alcohol products', 'General warning signs’, 'Electronics', 'Soda', 'Diet Soda', 'Energy Drinks' 'Coffee Drinks', 'Alcohol', 'Juice’, ‘Water', ‘Candy’, 'Snacks', 'Fruits or Vegetables', 'Lottery Tickets', and 'Magazine or Newspapers'.* The images presented were from convenience stores, liquor stores, small grocery stores, large supermarkets, gas stations, and drug stores. They were added based on the classifications utilized in prior tobacco Point-Of-Sale studies (Feighery, Ribisl, Schleicher, Lee, & Halvorson, 2001; Henriksen, Feighery, Schleicher, Haladjian, & Fortmann, 2004; Schleicher, Johnson, Dauphinee, & Henriksen, 2011).

**Recent Tobacco Use**

Twelve items adapted from the National Youth Tobacco Survey (CDC, 2014a) measured recent tobacco use. Six items asked how recently participants had used a tobacco product from the categories ‘*Cigarettes*’, ‘*Electronic Cigarettes*’, ‘*Cigars/Cigarillos/Little Cigars*’, ‘*Chewing Tobacco/Snuff/Dip*’, ‘*Pipe Tobacco*’, and ‘*Hookah/Shisha*’. Responses options included ‘*Never tried*’, ‘*5 or more years ago*’, ‘*1 to 4 years ago*’, ‘*6 to 11 months ago*’, ‘*1 to 5 months ago*’, ‘*7 to 30 days ago*’, ‘*1 to 6 days ago*’, and ‘*Earlier today*’. Six additional items asked how many days out of the past 30 days participants had used tobacco products from the same six categories. Responses options included ‘*0 days*’, ‘*1 or 2 days*’, ‘*3 to 5 days*’, ‘*6 to 9 days*’, ‘*10 to 19 days*’, ‘*20 to 29 days*’, and ‘*All 30 days*’.

**Retention (Wave 1 and Wave 2 Only)**

**[Wave 1 α = .92]**

The likelihood that participants would take part in the one-year follow-up survey was assessed using a 4-item measure inspired by the existing literature on customer loyalty (Ford, 2003; Garnefeld, Helm, & Eggert, 2011). The first three items asked questions about participants’ satisfaction with and subsequent commitment to the study (e.g. ‘*I am likely to complete the next CHAMP survey a year from now.*’). These questions were answered with a 4-point scale ranging from *‘Strongly Disagree’* to *‘Strongly Agree’*. The fourth item asked participants to write down what they would say to a friend to convince them to sign up for the study. This measure served a dual purpose of reinforcing participants’ commitment to the study and identifying potential attrition problems early on.

**Sale Proneness (Wave 1 Only)**

**[Wave 1 α = .93]**

The participant’s responsiveness to products on sale was measured with a 6-item sub-scale adapted from earlier work on consumer behavior (Lichtenstein, Ridgway, & Netemeyer, 1993). Example items from this scale include, ‘*If a product is on sale, that can be a reason for me to buy it*’ and ‘*I am more likely to buy brands that are on sale.*’ Participants responded to each item using a 4-point Likert scale ranging from ‘*Strongly Disagree*’ to ‘*Strongly Agree*’.

**Secondhand Smoke Exposure**

Two items adapted from the Youth Tobacco Survey (CDC, 2014b) measured the participant’s exposure to secondhand smoke. The first item asked ‘*During the past 7 days, on how many days were you in the same room or vehicle with someone who was smoking tobacco?*’ The second item asked ‘*Which of these best describes the rules about smoking?* *Smoking is…*’ with four possible response options: ‘*Never allowed inside my home or inside my car*’, ‘*Allowed only at some times or in some places*’, ‘*Always allowed inside my home or inside my car*’, and ‘*There are no rules about smoking*’.

**Shopper Type (Wave 3 Only)**

A 6-item measure was introduced in the third wave of the study based on prior marketing research conducted in retail environments (Sorensen, 2009). These questions asked participants ‘*When you go to (type of tobacco retail outlet), what types of products do you typically buy?’* and employed a ‘*Check all that apply’* format. Three of the tobacco retail outlets listed (‘*convenience stores*’, ‘*small grocery stores*’, and ‘*liquor stores*’) were adapted from a prior study of exposure to Point-of-Sale cigarette marketing (Feighery, Henriksen, Wang, Schleicher, & Fortmann, 2006). The remaining four tobacco retail outlets listed (‘*large supermarkets*’, ‘*gas stations*’, ‘*drug stores*’, and ‘*tobacco stores*’) were modeled on the classifications utilized in prior tobacco store audit studies (Feighery, Ribisl, Schleicher, Lee, & Halvorson, 2001; Henriksen, Feighery, Schleicher, Haladjian, & Fortmann, 2004; Schleicher, Johnson, Dauphinee, & Henriksen, 2011). Response options for each item included *'Cigarettes', 'Electronic Cigarettes, Vaporizers, or Vape Pens', 'Cigars, Cigarillos, or Little Cigars', 'Chewing Tobacco, Snuff, or Dip', 'Snacks (chips, candy, ice cream)', 'Fruits or Vegetables (bananas, apples, celery NOT fruit rollups, fruit candy, onion rings)', 'Soda (Coke, Pepsi Mountain Dew)', 'Diet Soda (Diet Coke, Coke Zero, Diet Pepsi)', 'Energy Drinks (Red Bull, Rock Star, Gatorade, PowerAde)', 'Coffee or Coffee Drinks (latte, cappuccino, frappuccino)', 'Alcohol (beer, wine, wine coolers, liquor)', 'Juice (orange juice, apple juice, tomato juice)', 'Water', 'Lottery Tickets', 'Magazines or Newspapers',* and *'None of the above'.*

**Single Target Implicit Association Test (ST-IAT)**

The Single Target Implicit Association Test (ST-IAT) is modeled after the Implicit Association Test (IAT) developed by Greenwald, McGhee, and Schwartz (1998), a measure designed to assess automatic associations between constructs and target objects in memory. The key difference between the IAT and the ST-IAT is that, wherein the IAT subjects are associating two semantically opposite categories of objects (e.g. ‘*boys*’ and ‘*girls*’) with bipolar constructs (e.g. ‘*good*’ and ‘*bad*’), the ST-IAT utilizes only one target object (i.e. ‘*tobacco*’) which is more appropriate given the absence of a clear semantically opposite target object. The ST-IAT has been shown to possess adequate internal consistency (α = .72) and test-retest reliability (Kendall’s W = .75) in previous research (Bluemke & Friese, 2008).

This study mirrored the typical IAT paradigm with one notable exception. The ST-IAT procedure in this study consisted of two sets, rather than one set, of six blocks of trials administered via computer. This was done in order to compare responses to valenced primes (i.e. ‘*Pleasant*’ or ‘*Unpleasant*’) against a non-valenced prime (i.e. ‘*Neutral*’). The revision resulted in the use of four categories of stimuli previously shown to be effective primes: Pleasant (Waters et al., 2007), Unpleasant (Ames et al., 2007; Waters et al., 2007), Neutral (Houben & Wiers, 2009), and Tobacco (Ames et al., 2013; Huijding et al., 2005). A total of four versions of the task were used in order to counterbalance in which order and on what side of the screen categories were presented.

Participants that completed the first of the four versions were initially presented with a practice round (20 trials) wherein they were asked to sort the words appearing in the center of the screen into the categories *‘Unpleasant’* and ‘*Neutral*’. These categories appeared in the top two corners of the screen. During this practice round, feedback on incorrect trials was given in the form of a red ‘X’. The second block was similar to the first except that no feedback was provided.

The third and fourth blocks had as the sorting categories ‘*Unpleasant or Tobacco*’(left side) and ‘*Neutral*’(right side). If the word was unpleasant (e.g. ‘*harmful*’, ‘*negative*’) OR if the word was tobacco-related (e.g. ‘*smoking*’, ‘*nicotine*’) it would be sorted under the ‘*Unpleasant or Tobacco*’ category on the left. If the word was neutral (e.g. ‘*circle*’, ‘*factory*’) it would be sorted under the ‘*Neutral*’ category on the right. The fifth and sixth blocks were identical to the third and fourth blocks except that ‘*Tobacco*’ now appeared with the category ‘*Neutral*’ while ‘*Unpleasant*’ stood alone. The second set of six blocks was virtually identical to the first set except that the category ‘*Unpleasant*’ was replaced with the category ‘*Pleasant*’. This was done to account for the ambivalence many smokers feel towards tobacco use. For each category (‘*Pleasant*’, ‘*Neutral*’, ‘*Tobacco*’, & ‘*Unpleasant*’), 10 stimuli were used. Each test block consisted of 30 trials.

An algorithm suggested by Greenwald, Nosek, and Banaji (2003) and employed by Karpinski and Steinman (2006) to score a similar ST-IAT was adapted for current study (see Table 1). In addition to calculating the traditional D-score for the task, a Quad model was used to estimate parameters for four distinct processes (activation of associations, overcoming bias, discriminability, and guessing) by taking into account the probability of correct and incorrect responses in different ST-IAT conditions (Conrey, Sherman, Gawronski, Hugenberg, & Groom, 2005; Sherman, Gawronski, Gonsalkorale, Hugenberg, Allen, & Groom, 2008).

Summary of Scoring Procedures

1. Delete trials greater than 10,000 msec
2. Delete subjects for whom more than 10% of trials have latency less than 300 msec
3. Compute mean latency of correct responses for each combined Stage (3, 4, 6, 7)
4. Replace each error latency with an error penalty computed optionally as ‘Stage mean + 600 msec’ or ‘Stage mean + twice the SD of correct responses for that Stage.’
5. Compute the ‘inclusive’ standard deviation for all trials in Stages 3 and 6 and likewise for all trials in Stages 4 and 7
6. Compute the mean latency for responses for each of Stages 3, 4, 6, and 7.
7. Compute the two mean differences (MeanStage 6 – MeanStage 3) and MeanStage 7 – Mean

Stage 4)

1. Divide each difference score by its associated ‘inclusive’ standard deviation.
2. D = the equal-weight average of the two resulting ratios.

SPSS and SAS syntax for implementing the scoring algorithm are available at [faculty.washington.ed/aff/iat\_materials.htm](http://faculty.washington.edu/agg/iat_materials.htm) and [www.briannosek.com](http://www.briannosek.com).

The current study adapted these procedures by setting 400ms as the cutoff for trial latency removal and calculating the replacement of error trials as the stage mean + 600ms.

An alternative scoring procedure outlined by Wagenmakers and colleagues (2007) known as the EZ-diffusion model attempts to correct for the “speed-accuracy” tradeoff which represents significant variance in scores between participants. The EZ-diffusion model calculates an “efficiency score” that takes into account variability of response times, accuracy, and response conservativeness to reflect a more accurate implicit association by controlling for measurement artifacts based on individual differences not reflected in a traditional D-score. This procedure was successfully employed in a single-category implicit association test of physical activity and shown to be a significant improvement over the traditional D-score of the SC-IAT in predicting actual behavior (Rebar, Ram, & Conroy, 2015).

**Smoking Consequences**

**[Wave 1 α = .96 for all items, 0.92 for negative consequences items, 0.96 for negative reinforcement items, 0.94 for positive reinforcement items, and 0.90 for appetite-weight control items]**

The Short Form Smoking Consequences Questionnaire (S-SCQ) is a 21-item measure of perceived expectancies of smoking adapted for use with adolescent samples (Myers, MacPherson, McCarthy, & Brown, 2003). Participants were asked to read each statement and answer how likely or unlikely each consequence is for them when they smoke, or in the case of non-smokers, how likely they believed each consequence would be if they chose to smoke. The response options were altered from the original measure using a work previously published by Ajzen & Fishbein (1980) so that the scale points were easier to understand. All items were answered on a 5-point Likert scale ranging from ‘*Extremely Likely*’ to ‘*Extremely Unlikely*’. The four categories of consequences associated with smoking measured were Negative Consequences (4 items, *α* =.84: *e.g. ‘Smoking is hazardous to my health.’*), Negative Reinforcement (7 items, *α* =.92: *e.g. ‘Cigarettes help me deal with anger.’*), Positive Reinforcement (5 items, *α* =.95: *e.g. ‘Cigarettes taste good.’*), and Appetite-Weight Control (5 items, *α* =.93: *e.g. ‘Smoking controls my appetite.’*).

**Store Visit Frequency**

**[Wave 1 α = .74]**

Each participant was asked to indicate the frequency with which they visited 7 types of retail stores that are generally known to sell tobacco products. Three of the store types (‘*convenience stores*’, ‘*small grocery stores*’, and ‘*liquor stores*’) were included based a prior study of exposure to Point-of-Sale cigarette marketing (Feighery, Henriksen, Wang, Schleicher, & Fortmann, 2006). The remaining four store types (‘*large supermarkets*’, ‘*gas stations*’, ‘*drug stores*’, and ‘*tobacco stores*’) were modeled on the classifications utilized in prior tobacco store audit studies (Feighery, Ribisl, Schleicher, Lee, & Halvorson, 2001; Henriksen, Feighery, Schleicher, Haladjian, & Fortmann, 2004; Schleicher, Johnson, Dauphinee, & Henriksen, 2011). For each type of store, participants were asked to indicate whether they went ‘*Almost every day*’, ‘*Two or three times a week*’, ‘*Once a week*’, ‘*Two or three times a month*’, ‘*Once a month*’, or ‘*Never*’.

After indicating the frequency with which they visited different store types, participants were presented with a photograph, address, and name (Feighery, Henriksen, Wang, Schleicher, & Fortmann, 2006; Henriksen, Feighery, Wang, & Fortmann, 2004) for all of the stores currently in business within a quarter mile of their school that were issued a Cigarette and Tobacco Products Retailer License by the California Board of Equalization. Participants were also presented with a photograph, address, and name for all of the gas stations, convenience stores, and small grocery stores between a quarter mile and a half mile of their school that were issued a Cigarette and Tobacco Products Retailer License. For each store depicted, participants were asked ‘*How often do you go to the store at this address?*’ Response options included ‘*Almost every day*’, ‘*Two or three times a week*’, ‘*Once a week*’, ‘*Two or three times a month*’, ‘*Once a month*’, and ‘*Never*’.

During the second and third wave of the study, a filtering question was asked to confirm whether or not the participant still attended the school they were enrolled in during the baseline assessment. The question asked ‘*Are you currently a student at [Name of School]?*’ If the participant answered ‘*No*’, a skip pattern would bypass the presentation of specific store photographs, addresses, and names.

**Symmetry Span Task**

The Symmetry Span Task or SSPAN is a measure of working memory capacity that has been identified as a key element of attentional control (Heitz & Engle, 2007). The task involves two parts, each presented separately in practice rounds before the actual task begins.

The first part involves looking at a matrix divided into 16 equal squares. In sequential turn order, different quadrants will be filled with the color red. Then the participant is asked to remember those same quadrants in the correct order they were presented.

The second part also involves a square matrix, but in this case the squares are either filled in black or white creating an image the participant is asked to evaluate. Specifically, the participant must imagine a line drawn from top to bottom down the center of the image and then determine whether the image is symmetrical. Once the practice rounds for both tasks are completed, participants were then told that the tasks will be combined. For example, a participant might be shown a black and white image and then be asked to determine whether or not it is symmetrical. On the next screen, the participant will see an empty matrix with one quadrant filled red. Following that, they will see a second black and white image and be asked again whether it is symmetrical. Finally, they will be shown a second empty matrix with a different quadrant filled red. The participant will then be asked to recall the order of quadrants presented in the 16 block matrix. This pattern is then repeated with different spans of numbers to be recalled. Specifically, the participant is asked to remember a span of 2 (3x), 3 (3x), 4 (3x), and 5(3x) numbers for a total of 12 trials.

Participants were scored on their recall of squares as well as the number of symmetry images they evaluated correctly. For the square recall portion a partial scoring method was used where the total number of correct squares recalled was counted. Symmetry task scores were simply the number of images evaluated correctly. This task is designed to test short-term working memory and has been shown to be a valid and reliable metric across several studies (Kane, Hambrick, Tuholski, Wilhelm, Payne, & Engle, 2004; Redick, Broadway, Meier, Kiriakose, Unsworth, Kane, & Engle, 2012). This particular version of the task has a Cronbach’s alpha of .76 and test-retest reliability of r = .77 (Redick et al., 2012) computed using methods derived from previous validation research on working memory capacity (Kane et al., 2004).

**Tobacco Brand Preference**

Five items modeled after items found in the National Youth Tobacco Survey (CDC, 2014a) and the Youth Tobacco Survey (CDC, 2014b) assessed tobacco brand preference. The first item asked ‘*If you were going to smoke a cigarette, what brand would you choose?*’ Response options included ‘*American Spirit*’, ‘*Camel*’, ‘*GPC, Basic, or Doral*’, ‘*Kool*’, ‘*Lucky Strike*’, ‘*Marlboro*’, ‘*Newport*’, ‘*Parliament*’, ‘*Summit*’, ‘*Virginia Slims*’, ‘*I would never choose any brand’,* and ‘*Another brand (please specify)*’. The second item asked ‘*If you were going to smoke an electronic cigarette, vaporizer, or vape pen, what brand would you choose?*’ Response options included ‘*Blu*’, *’Green Smart Living’*, ‘*MarkTen*’, ‘*NJOY*’, ‘*Xcite*’, *‘Square’*, ‘*Vuse*’, ‘*V2*’, ‘*I would never choose any brand’,* and ‘*Another brand (please specify)*’. The third item asked ‘*If you were going to smoke a cigar, cigarillo, or little cigar, what brand would you choose?*’ Response options included ‘*Al Capone*’, ‘*Backwoods*’, ‘*Black and Mild*’, ‘*Colonials*’, ‘*Dutch Masters*’, ‘*Phillies*’, ‘*Prime Time*’, *‘Royal Comfort’, ‘Splitarillos’*, ‘*Swisher Sweets*’, *‘White Owl’*, ‘*I would never choose any brand’*, and ‘*Another brand (please specify)*’. The fourth item asked ‘*If you were going to use chewing tobacco, snuff, or dip what brand would you choose?*’ Response options included ‘*Beechnut*’, ‘*Back Country*’, ‘*Copenhagen*’, ‘*Grizzly*’, ‘*Kodiak*’, ‘*Levi Garrett*’, ‘*Longhorn*’, ‘*Red Man*’, ‘*Skoal*’, ‘*I would never choose any brand’,* and ‘*Another brand (please specify)*’. For all four items, participants were asked to choose only one answer. The brands ‘*Summit*’, ‘*Xcite*’, ‘*Colonials*’, and ‘*Back Country*’ were fake brand names used solely as a manipulation check of participants intention to use real tobacco products. A final item asked ‘*If you were going to have a tobacco product, would you prefer…?*’ with the following three choices: ‘*Regular*’, ‘*Menthol*’, and ‘*Flavored*’.

During the second and third wave of the study, four items were added to assess the participants’ tobacco purchasing behavior over the previous year. As with the baseline items, these new items were modeled on the National Youth Tobacco Survey (CDC, 2014a) and the Youth Tobacco Survey (CDC, 2014b). The first item asked ‘*In the past year when you bought cigarettes, what brand did you purchase the most?*’ Response options included ‘*American Spirit*’, ‘*Camel*’, ‘*GPC, Basic, or Doral*’, ‘*Kool*’, ‘*Lucky Strike*’, ‘*Marlboro*’, ‘*Newport*’, ‘*Parliament*’, ‘*Summit*’, ‘*Virginia Slims*’, ‘*I did not buy cigarettes in the past year’,* and ‘*Another brand (please specify)*’. The second item asked ‘*In the past year when you bought electronic cigarettes, vaporizers, or vape pens, what brand did you purchase the most?*’ Response options included ‘*Blu*’, *’Green Smart Living’*, ‘*MarkTen*’, ‘*NJOY*’, ‘*Xcite*’, *‘Square’*, ‘*Vuse*’, ‘*V2*’, ‘*I did not buy electronic cigarettes, vaporizers, or vape pens in the past year’,* and ‘*Another brand (please specify)*’. The third item asked ‘*In the past year when you bought cigars, cigarillos, or little cigars, what brand did you purchase the most?*’ Response options included ‘*Al Capone*’, ‘*Backwoods*’, ‘*Black and Mild*’, ‘*Colonials*’, ‘*Dutch Masters*’, ‘*Phillies*’, ‘*Prime Time*’, *‘Royal Comfort’, ‘Splitarillos’*, ‘*Swisher Sweets*’, *‘White Owl’*, ‘*I did not buy cigars, cigarillos, or little cigars in the past year’*, and ‘*Another brand (please specify)*’. The fourth item asked ‘*In the past year when you bought chewing tobacco, snuff, or dip, what brand did you purchase the most?*’ Response options included ‘*Beechnut*’, ‘*Back Country*’, ‘*Copenhagen*’, ‘*Grizzly*’, ‘*Kodiak*’, ‘*Levi Garrett*’, ‘*Longhorn*’, ‘*Red Man*’, ‘*Skoal*’, ‘*I did not buy chewing tobacco, snuff, or dip in the past year’,* and ‘*Another brand (please specify)*’. For all four items, participants were asked to choose only one answer. The brands ‘*Summit*’, ‘*Xcite*’, ‘*Colonials*’, and ‘*Back Country*’ were fake brand names used solely as a manipulation check.

**Tobacco Brand Recognition**

Four items based on items found in the National Youth Tobacco Survey (CDC, 2014a) and the Youth Tobacco Survey (CDC, 2014b) assessed the degree to which participants were familiar with popular brands of cigarettes, electronic cigarettes/vaporizers/vape pens, cigars/cigarillos/little cigars, and chewing tobacco/snuff/dip. The first item asked ‘*Which of the following cigarette brands have you heard of?*’ Response options included ‘*American Spirit*’, ‘*Camel*’, ‘*GPC, Basic, or Doral*’, ‘*Kool*’, ‘*Lucky Strike*’, ‘*Marlboro*’, ‘*Newport*’, ‘*Parliament*’, ‘*Summit*’, ‘*Virginia Slims*’, and *‘None of the above’*. The second item asked ‘*Which of the following electronic cigarette, vaporizer, or vape pen brands have you heard of?*’ Response options included ‘*Blu*’, *’Green Smart Living’*, ‘*MarkTen*’, ‘*NJOY*’, ‘*Xcite*’, *‘Square’*, ‘*Vuse*’, ‘*V2*’, and *‘None of the above’*. The third item asked ‘*Which of the following cigar, cigarillo, or little cigar brands have you heard of?*’ Response options included ‘*Al Capone*’, ‘*Backwoods*’, ‘*Black and Mild*’, ‘*Colonials*’, ‘*Dutch Masters*’, ‘*Phillies*’, ‘*Prime Time*’, *‘Royal Comfort’, ‘Splitarillos’*, ‘*Swisher Sweets*’, *‘White Owl’*, and *‘None of the above’*. The fourth item asked ‘*Which of the following chewing tobacco, snuff, or dip brands have you heard of?*’ Response options included ‘*Beechnut*’, ‘*Back Country*’, ‘*Copenhagen*’, ‘*Grizzly*’, ‘*Kodiak*’, ‘*Levi Garrett*’, ‘*Longhorn*’, ‘*Red Man*’, ‘*Skoal*’, and *‘None of the above’*. For each of the four categories, participants used a ‘*Check all that apply*’ format to select brands they recognized from a predefined list. It should also be noted that the brands ‘*Summit*’, ‘*Xcite*’, ‘*Colonials*’, and ‘*Back Country’* were fictional and used to verify the validity of the responses provided.

**Tobacco Cessation**

Three items adapted from the National Youth Tobacco Survey (CDC, 2014a) asked participants about their attempts to quit using tobacco products. The first item inquired whether or not the participant had thought about and/or planned to quit using tobacco. Response options included ‘*No*’, ‘*I thought about it but did not want to*’, ‘*I thought about it but have not made up my mind*’, ‘*I plan to quit in the next 30 days*’, and ‘*I plan to quit in the next 6 months*’. The second item asked how many quit attempts the participant had made in the previous 12 months. Response options included ‘*I have not tried to quit*’, ‘*1 time*’, ‘*2 times*’, ‘*3 to 5 times*’, ‘*6 to 9 times*’, and ’*10 or more times*’. The third item asked about the participant how long they had managed to abstain from smoking during their last quit attempt. Response options included ‘*Less than a day*’, ‘*1 to 7 days*’, ‘*More than 7 days but less than 30 days*’, ‘*6 months or more but less than a year*’, and ‘*1 year or more*’.

**Tobacco Initiation**

Eleven items were used to assess participants’ initial experiences with tobacco products. The first seven items were adapted from the National Youth Tobacco Survey (CDC, 2014a) while the remaining four items were created for this survey.

A 2-item scaled asked about the types of tobacco products participants had tried even once. Using a ‘*Check all that apply*’ format, participants first made selections from the categories ‘*Cigarettes*’, ‘*Electronic Cigarettes*’, ‘*Cigars/Cigarillos/Little Cigars*’, ‘*Chewing Tobacco/Snuff/Dip*’, ‘*Pipe Tobacco*’, ‘*Hookah/Shisha*’, and ‘*None of the above*’. Following this, participants were asked ‘*Which of the following tobacco products have you ever tried, even just one time?*’ with respect to the following tobacco product categories: ‘*Roll-your-own cigarettes*’, ‘*Bidis*’, ‘*Clove cigarettes*’, ‘*Snus*’, ‘*Dissolvable tobacco*’, ‘*Some other new tobacco product*’, and ‘*None of the above*’.

A 5-item scale asked participants about their first experience with different tobacco products. Four items asked participants to indicate how old they were when they first tried a tobacco product from the following categories: ‘*Cigarettes*’, ‘*Electronic Cigarettes/Vaporizers/Vape Pens*’, ‘*Cigars/Cigarillos/Little Cigars*’, and ‘*Chewing Tobacco/Snuff/Dip*’. One item asked separately, ‘*How old were you when you first smoked a WHOLE cigarette?*’ For these questions, response options ranged from ‘*Never tried*’, ‘*8 Years Old or Younger*’, any age from 9 to 18 years old respectively (e.g. ‘*9 years old*’, ’*10 years old*’, etc.), and ‘*19 Years Old or Older.*’

A 4-item scale asked the participants the specific brand they first tried from the categories ‘*Cigarettes*’, ‘*Electronic Cigarettes/Vaporizers/Vape Pens*’, ‘*Cigars/Cigarillos/Little Cigars*’, and ‘*Chewing Tobacco/Snuff/Dip*’. Participants were asked to choose from a list of the most popular brands in each category, enter another brand if the appropriate option was not listed, or indicate that they had never tried that type of tobacco product.

**Tobacco Pricing (Wave 1 Only)**

A 9-item measure of purchasing behavior was created to assess the types and costs of tobacco products adolescents may buy as well as the price elasticity of their favorite brands. Items were adapted from the most recent Tobacco Use Supplement to the Current Population Survey (NCI, 2012) and the National Youth Tobacco Survey (CDC, 2014).

The first question asked ‘*Have you ever bought a pack of cigarettes from a store near your school?*’ The second question employed an open-ended response format to determine the amount the participant paid of the last pack of cigarettes they bought. The third question inquired about the brand of cigarettes the participant bought. Response options included ‘*American Spirit*’, ‘*Camel*’, ‘*GPC, Basic, or Doral*’, ‘*Kool*’, ‘*Lucky Strike*’, ‘*Marlboro*’, ‘*Newport*’, ‘*Parliament*’, ‘*Summit*’, ‘*Virginia Slims*’, and *‘Another brand (please specify)’*. The brand ‘*Summit*’ was fictional and used to verify the validity of the responses provided.

The fourth and fifth question used an open-ended response format to assess how much the participant would be willing to pay for a pack of their favorite brand of cigarettes versus a generic brand of cigarettes. These questions were designed to study the role of brand equity and price discounts in tobacco purchasing behavior.

The sixth question asked ‘*Have you ever bought electronic cigarettes, vaporizers, or vape pens from a store near your school?*’ The seventh question inquired about the brand the participant bought. Response options included ‘*Blu*’, *’Green Smart Living’*, ‘*MarkTen*’, ‘*NJOY*’, ‘*Xcite*’, *‘Square’*, ‘*Vuse*’, ‘*V2*’, and *‘Another brand (please specify)’*. The brand ‘*Xcite*’ was fictional and used to verify the validity of the responses provided.

The eighth question asked ‘*Have you ever bought chewing tobacco, snuff, or dip from a store near your school?*’ The ninth question asked ‘*Have you ever bought cigars, cigarillos, or little cigars from a store near your school?*’

**Tobacco Quantity**

Five items modeled on the National Youth Tobacco Survey (CDC, 2014a) measured the type and amount of tobacco products consumed by the participant. The first item used a ‘*Check all that apply*’ format to determine which tobacco products the participant had on a typical day. Response options included ‘*Cigarettes*’, ‘*Electronic Cigarettes*’, ‘*Cigars/Cigarillos/Little Cigars*’, ‘*Chewing Tobacco/Snuff/Dip*’, ‘*Pipe Tobacco*’, and ‘*Hookah/Shisha*. The remaining four items asked the participant how much of a given product they used on a typical day. For smoked tobacco products, the participant was asked ‘*On a typical day when you smoke, how many puffs do you take?*’ for each of the following categories ‘*Cigarettes*’, ‘*Electronic Cigarettes/Vaporizers/Vape Pens*’, and ‘*Cigars/Cigarillos/Little Cigars*’. Response options for smoked tobacco products were ‘*0*’, ‘*1-10 puffs*’, ‘*11-50 puffs*’, ‘*51-200 puffs*’, and ‘*201 or more puffs*’. For smokeless tobacco products, participants were asked ‘*On a typical day when you have chewing tobacco, snuff, or dip, how much do you use?*’ Response options included ‘*None*’, ‘*About 10% of a tin*’, ‘*About a quarter of a tin*’, ‘*About a half of a tin*’, ‘*About three-quarters of a tin*’, ‘*A full tin*’, and ‘*More than one tin*’.

**Tobacco Shopper Type (Wave 2 Only)**

Six new items were introduced after the first wave of the study. These items were modeled after work done by Sorensen (2009) on consumer psychology. The first item asked ‘*Have you ever bought tobacco products at a store?*’ Every participant who answered ‘*Yes*’ saw the following prompt, ‘*Think of the last time you bought tobacco products at a store. Try to form a picture of this in your mind.*’ Then the second item employed a ‘*Check all that apply*’ format and asked ‘*In addition to tobacco products, did you buy any of the following?*’ Response options included ‘*Snack foods*’, ‘*Alcohol*’, ‘*Coffee Drinks*’, ‘*Soda or Energy Drinks*’, ‘*Lottery Tickets*’, and ‘*Magazines or Newspapers*’. The third item asked ‘*How many different types of products did you buy?*’ Response options included ‘*One*’, ‘*Two*’, ‘*Three*’, ‘*Four*’, ‘*Five*’, ‘*Six or more*’. A fourth item asked ‘*When did you last purchase a pack of cigarettes at a store?*’ Response options included ‘*1-2 days ago*’, ‘*3-6 days ago*’, ‘*1-2 weeks ago*’, ‘*3-4 weeks ago*’, ‘*1-2 months ago*’, ‘*3-6 months ago*’, ‘*More than 6 months ago*’, and ‘*I have never bought a pack of cigarettes at a store.*’ The remaining two items were asked only if the participant indicated they had purchased cigarettes. The fifth item asked ‘*How much did you pay for the last pack of cigarettes you bought at a store?*’ with an open response format. The sixth item inquired ‘*What brand did you buy?*’ Response options included, ‘*American Spirit*’, ‘*Camel*’, ‘*GPC, Basic, or Doral*’, ‘*Kool*’, ‘*Lucky Strike*’, ‘*Marlboro*’, ‘*Newport*’, ‘*Parliament*’, ‘*Summit*’, ‘*Virginia Slims*’, and ‘*Another brand (please specify)*.’ The response option ‘*Summit*’ was fictional and used to verify the validity of the responses provided.

**Tobacco Use Willingness**

Six items were adapted from a previous study on health risk decision making (Gerrard et al., 2008). Participants were asked to imagine that they were at a party with friends and that there were tobacco products available. They were then asked ‘*If it were offered by one of your friends, how willing would you be to try…?*’. The participant then selected from the response options ‘*Definitely No*’, ‘*Probably No*’, ‘*Probably Yes*’, and ‘*Definitely Yes*’ for the categories ‘*Cigarettes*’, ‘*Electronic Cigarettes/Vaporizers/Vape Pens*’, ‘*Cigars/Cigarillos/Little Cigars*’, ‘*Chewing Tobacco/Snuff/Dip*’, ‘*Pipe Tobacco*’, and ‘*Hookah/Shisha*’.

**Word Association**

A three-part word association paradigm was administered to participants as a measure of implicit associations as they relate to substance use. A systematic review of the literature has revealed a robust relationship between implicit cognitions and substance abuse (Rooke, Hine, & Thorsteinsson, 2008). Further, research supports the hypothesis that working memory is a key moderator of this relationship (Grenard et al., 2008). For these reasons, participants were asked to attend to a variety of cues and stimuli and then report the first behavior, word, or product that came to mind. Then, by revisiting their self-reported associations and linking them to categories (e.g. ‘food or snacks’, ‘tobacco cigarettes/cigars’), it would be possible to determine the associations participants had with a variety of stimuli.

*Verb Generation.* Verb generation measures test the associative strength between possible behavioral outcomes (e.g., feeling more relaxed, feeling dreamy) and the target behavior. The first word association paradigm involved a series of 25 phrases\* with instructions for the participant to type the very first behavior or action that comes to mind after each phrase. For example, a participant might see the phrase ‘tasting something sweet’ to which they might type ‘eating ice cream’. Stimuli for the cues were taken from previous studies (Grenard et al., 2008; Sussman et al., 1998, Stacy et al., 1996) showing the prompts to be correlated with substance-related responses in high risk adolescents that attend alternative high schools. In addition to single concept cues, compound cues were also part of the task. A compound cue consists of a high-risk global situation item and a high-risk affective outcome item that occurred at high frequency (for items, see Stacy et al., 1996; Sussman et al., 1998). In general, memory research presents a single cue to elicit a target concept, but this may be unrealistic given the complex context provided for retrieval in real world events (see Dosher & Rosedale,1997). It was deemed important to use compound cues because the effect of multiple cues on memory access or activation, broadly defined, is not just additive but synergistic. That is, a single cue alone often may be powerless or at least weak in activating memories. In many instances, it is only when a cue is coupled with a second cue that its power as a “trigger” of relevant cognitions is detected. That is, the two cues form a constellation that is more than the sum of its parts (for discussion, see Dosher & Rosdale, 1997). Of the 25 phrases, 15\* were single concept phrases (e.g. ‘*feeling relaxed*’), 8 were dual concept phrases (e.g. ‘*after school, walking home’*), and 2 were tripartite concept phrases (e.g. ‘*Friday night, friend’s house, having fun’*). 4 of the single concept phrases, 2 of the dual concept phrases, and 1 of the tripartite phrases were control stimuli not designed to elicit a substance-related response. After a practice trial, participants were instructed to work quickly and notified of the time limit for each cue. During the second and third wave of the study two single concept phrases (‘*At a gas station’* and *‘in a convenience store’*) were added based on the frequent presence of tobacco-related advertising at these types of locations (Feighery, Ribisl, Schleicher, Lee, & Halvorson, 2001). In addition, three temporal single concept phrases (‘*first thing in the morning*’, ‘*after a mea*l’, and ‘*taking a break*’) were included to expand the range of cues provided.

\*[Note: The phrases ‘at a gas station’, ‘in a convenience store’, ‘first thing in the morning’, ‘after a meal’, and ‘taking a break’ were added after the first wave of the study. Thus, the survey administered in the second wave and the third wave had a total of 30 phrases].

After participants completed the stimuli-response portion of the task, they were shown each of their responses one at a time and presented with a list of categories. Participants were asked to ‘check all that apply’ for each category that they perceived to be close to the meaning of their previous response. The 14 coding categories included ‘*caffeine (energy drinks, soda, coffee drinks)*’, ‘*food or snacks*’, ‘*cigarettes or cigars*’, ‘*smokeless tobacco (chew, snuff, dip)*’, ‘*electronic cigarettes, vaporizers, or vape pens*’, ‘*marijuana (weed, pot, grass, chronic)*’, ‘*alcohol (beer, wine, wine coolers, liquor)*’, ‘*speed (crystal, meth, ice, amp)*’, ‘*other drugs*’, ‘*exercise, workout, or sports*’, ‘*school*’, ‘*party*’, ‘*sleeping*’, and ‘*none of the above*’.

*Word Association (Image).* The second word association paradigm differed from the first in that instead of phrases, 6 images of the exterior of different retail stores served as the cue objects. In addition, participants were asked to type the first word that came to mind instead of a ‘behavior or action’. Three of the cues were images of stores (‘*AM/PM*’, ‘*7-Eleven*’, and ‘*Circle-K*’) that had an average of 57.4 (*SD = 23.3*) tobacco-related advertisements per store according to the store audit study. The other three cues were images of stores without any tobacco-related advertising (‘*Whole Foods*’, ‘*Fresh & Easy*’, ‘*Target*’). After the stimuli-response portion of the task participants were again presented with their responses and asked to identify all the categories that were close to the meaning of their responses using the same previously mentioned 14 groupings.

*Word Association (Slogan).* The third word association paradigm utilized 6 point-of-sale advertising slogans as cues and asked participants to type the first product or brand that comes to mind. Three Marlboro ciagrette slogans (e.g. ‘*Bold Flavor. Distinct Edge.*’) and three slogans associated with other products (e.g. ‘*Here we go.*’ for Bud Light) were presented in the same format as the previous two word association tasks. After the stimuli-response portion participants were again asked to code their responses using the following 9 categories: ‘*food or snacks (sandwiches, chips, candy, ice cream)*’, ‘*drinks (energy drinks, soda, coffee drinks)*’, ‘*alcohol (beer, wine, wine coolers, liquor)*’, ‘*tobacco (cigarettes, cigars, cigarillos)*’, ‘*smokeless tobacco (chew, snuff, dip)*’, ‘*electronic cigarettes, vaporizers, or vape pens*’, ‘*clothes*’, ‘*electronic devices (cell phone, MP3 player, tablet)*’, and *‘none of the above*’.

**References**

Ames, S.L., Grenard, J.L., Stacy, A.W., Xiao, L., He, Q., Wong, S.W., Xue, G., Wiers, R.W., Bechara,

A. (2013). Functional imaging of implicit marijuana associations during performance on an Implicit Association Test (IAT). *Behavioural Brain Research, 256*, 494-502.

Ames, S.L., Grenard, J.L., Thush, C., Sussman, S., Wiers, R.W., & Stacy, A.W. (2007). Comparison

of indirect assessments of association as predictors of marijuana use among at-risk adolescents. *Experimental and Clinical Psychopharmacology, 15*, 204-218.

Ames, S.L., Sussman, S., & Dent, C.W. (1999). Pro-drug-use myths and competing constructs in the

prediction of substance use among youth at continuation high schools: A one-year prospective study. *Personality And Individual Differences*, *26*(6), 987-1003.

Apollonio, D.E. & Malone, R.E. (2010). The "We Card" program: tobacco industry "youth smoking

prevention" as industry self-preservation. *American Journal of Public Health,*

*100*(7), 1188-1201.

Arpawong, T.E., Sun, P., Chang, M.C., Gallaher, P., Pang, Z., Guo, Q., Johnson, C.A., Unger J.

(2010). Family and personal protective factors moderate the effects of adversity and negative disposition on smoking among chinese adolescents. *Substance Use & Misuse, 45*, 1367–1389.

Ajzen, I. & Fishbein, M. (1980). *Understanding Attitudes and Predicting Social Behavior.*

Englewood Cliffs, NJ: Prentice-Hall, Inc.

Bauman, S. (2005). The reliability and validity of the Brief Acculturation Rating Scale for

Mexican Americans-II for children and adolescents. *Hispanic Journal of Behavioral Sciences*, *27*(4), 426-441.

Bluemke, M., Friese, M. (2008). Reliability and validity of the single-target IAT (ST-IAT): Assessing

automatic affect towards multiple attitude objects. *European Journal of Social Psychology, 38*, 977-997.

Caldas, S.J., & Bankston, C. (1997). Effect of school population socioeconomic status on individual

academic achievement. Journal of Educational Research, 90(5), 269-277.

California Department of Public Health (CDPH). (2014). 2011-2012 California Student Tobacco

Survey (CSTS). Retrieved from: <http://www.cdph.ca.gov/programs/tobacco/Pages/default.aspx>

California Department of Public Health. (2010). California county and statewide archive of of tobacco

statistics. [Internet]. [cited 2015 Mar 5]. Available from: <http://www.cstats.info/index.cfm>.

California Department of Public Health, California Tobacco Control Program, State Health Officer’s

Report on E-Cigarettes: A Community Health Threat, Sacramento, CA 2015

California Department of Public Health, California Tobacco Control Program, California Tobacco

Facts and Figures 2015, Sacramento, CA, 2015

California Health Interview Survey. (CHIS). (2013). 2011-12 Adolescent Questionnaire. Release

Version 15.3[computer file]. Los Angeles, CA: UCLA Center for Health Policy Research, March 2013.

California Healthy Kids Resource Center (2014). Research Validated Programs: R-V Tobacco.

Retrieved From: <http://www.californiahealthykids.org/rvtobacco>

Centers for Disease Control and Prevention (CDC). ( 2014a). 2012 National youth tobacco survey

(NYTS). Retrieved from: <http://www.cdc.gov/TOBACCO/data_statistics/surveys/NYTS/index.htm>

Centers for Disease Control and Prevention (CDC). (2014b). 2011 Youth tobacco survey

(YTS). Retrieved from: http://www.cdc.gov/tobacco/data\_statistics/surveys/yts/index.htm

Chandon, P., Hutchinson, J. W., Bradlow, E. T., & Young, S. H. (2009). Does in-store

marketing work? Effects of the number and position of shelf facings on brand attention and evaluation at the point of purchase. *Journal Of Marketing*, *73*(6), 1-17.

Chanon, V.W., Sours, C.R., & Boettiger, C.A. (2010). Attentional bias toward cigarette cues in active

smokers. *Psychopharmacology, 212*, 309-320.

Cloninger, C., Svrakic, D.M., & Przybeck, T.R. (1993). A psychobiological model of temperament

and character. *Archives Of General Psychiatry*, *50*(12), 975-990.

Cohen, S. (1988). Perceived stress in a probability sample of the United States. In S. Spacapan, S.

Oskamp (Eds.) , *The social psychology of health* (pp. 31-67). Thousand Oaks, CA, US: Sage Publications, Inc.

Cohen, S., Kamarck, T., Mermelstein, R. (1983). A global measure of perceived stress. *Journal of*

*Health and Social Behavior, 24*, 385-396.

Conrey, F.R., Sherman, J.W., Gawronski, B., Hugenberg, K. & Groom, C.J. (2005). Separating

multiple processes in implicit social cognition: The quad model of implicit task performance. *Journal of Personality and Social Psychology, 89*(4): 469-87.

Darling, H., Reeder, A.I., McGee, R., & Williams, S. (2006). Brief report: Disposable income, and

spending on fast food, alcohol, cigarettes, and gambling by New Zealand secondary school

students. *Journal Of Adolescence, 29*(5), 837-843.

Dauphinee, A.L., Doxey, J.R., Schleicher, N.C., Fortmann, S.P., & Henriksen, L. (2013). Racial

differences in cigarette brand recognition and impact on youth smoking. *BMC Public Health, 13*, 170-177.

de Leeuw, E.D. (2005). To mix or not to mix data collection modes in surveys. *Journal of Official*

*Statistics, 21*(2), 233–255.

Dillman, D. (2000). *Mail and internet surveys, 2nd Edition*. New York: John Wiley and Sons.

Dillman, D., R. Sangster, J. Tarnai, & T. Rockwood. (1996). Understanding differences in people’s

answers to telephone and mail surveys. In M. Braverman and J. Slater (Ed.), *Advances in*

*survey research*, (pp. 45-62). San Francisco: Jossey-Bass.

Dosher, B., & Rosedale, G.S. (1997). Configural processing in memory retrieval: Multiple cues and

ensemble representations.*Cognitive Psychology*, *33*(3), 209-265.

El-Shahawy, O., Sun, P., Tsai, J.Y., Rohrbach, L.A., & Sussman, S. (2015). Sense of coherence

and tobacco use myths among adolescents as predictors of at-risk youth cigarette use. *Substance Use & Misuse*, *50*(1), 8-14.

Ensminger, M.E., Forrest, C.B., Riley, A.W., Kang, M., Green, B.F., Starfield, B., & Ryan, S.A.

(2000). The validity of measures of socioeconomic status of adolescents. *Journal Of Adolescent Research, 15*(3), 392-419.

Eynon, R., & Malmberg, L-E. (2011). A typology of young people's Internet use: Implications for

education. *Computers & Education*, 585-595.

Feighery, E.C., Henriksen, L., Wang, Y., Schleicher, N.C., & Fortmann, S.P. (2006). An evaluation of

four measures of adolescents' exposure to cigarette marketing in stores. *Nicotine & Tobacco Research, 8*(6), 751-759.

Feighery, E.C, Ribisl, K.M., Schleicher, N., Lee, R., & Halvorson, S. (2001). Cigarette advertising

and promotional strategies in retail outlets: Results of a statewide survey in California.

*Tobacco Control, 10*, 184-188.

Feighery, E.C, Ribisl, K.M., Schleicher, N., & Clark, P.I. (2004). Retailer participation in cigarette

company incentive programs is related to increased levels of cigarette advertising and

cheaper cigarette prices in stores. *Preventive Medicine, 38*, 876-884.

Fillmore, M.T., Ostling, E.W., Martin, C.A., Kelly, T.H. (2009). Acute effects of alcohol on inhibitory

control and information processing in high and low sensation-seekers. *Drug and Alcohol*

*Dependence, 100*(1-2), 91-99.

Fillmore, M.T., Rush, C.R., and Hays, L. (2006). Acute effects of cocaine in two models of inhibitory

control: Implications of non-linear dose effects. *Addiction, 101*, 1323-1332.

Finn, P.R., Justus, A., Mazas, C., Steinmetz, J.E. (1999). Working memory, executive processes and

the effects of alcohol on Go/No-go learning: Testing a model of behavioral regulation and impulsivity. *Psychopharmacology, 146*(4), 465-472.

Ford, W. (2003). Communication practices of professional service providers: Predicting customer

satisfaction and loyalty. *Journal Of Applied Communication Research, 31*(3), 189-211.

Garnefeld, I., Helm, S., & Eggert, A. (2011). Walk your talk: An experimental investigation of the

relationship between word of mouth and communicators’ loyalty. *Journal of Service*

*Research, 14*(1), 93-107.

Germain, D., McCarthy, M., & Wakefield, M. (2009). Smoker sensitivity to retail tobacco displays and

quitting: a cohort study. *Addiction. 105*, 159-163.

Gerrard, M., Gibbons, F.X., Houlihan, A.E., Stock, M.L., & Pomery, E.A. (2008). A dual-process

approach to health risk decision making: The prototype willingness model. *Developmental Review, 28*(1), 29-61.

Graham, J.W., Flay B.R., Johnson, C.A., Hansen, W.B., Grossman, L., & Sobel, J.L. (1984) Reliability

of self-report measures of drug use in prevention research: Evaluation of the Project SMART questionnaire via the test-retest reliability matrix. *Journal of Drug Education, 14*, 75–193.

Grana, R.A., Black, D., Sun, P., Rohrbach, L.A., Gunning, M., & Sussman, S. (2010). School

disrepair and substance use among regular and alternative high school students. *Journal of School Health, 80*(8), 387-93.

Greene, J., Speizer, H., & Wiitala, W. (2008). Telephone and web: Mixed-mode challenge. *Health*

*Services Research, 43*(1), 230–248.

Greenwald, A.G., McGhee, D.E., & Schwartz, J.K. (1998). Measuring individual differences in

implicit cognition: The implicit association test. *Journal Of Personality And Social Psychology*,*74*(6), 1464-1480.

Greenwald, A.G., Nosek, B.A., & Banaji, M.R. (2003). Understanding and using the Implicit

Association Test: I. An improved scoring algorithm. *Journal Of Personality And Social Psychology*, *85*(2), 197-216.

Grenard, J.L., Ames, S.L., Thush, C., Sussman, S., Wiers, R., & Stacy, A.W. (2008). Working

memory capacity moderates the predictive effects of drug-related associations on substance use. *Psychology of Addictive Behaviors, 22*(3): 426-432.

Grube, J.W., & Wallack, L. (1994). Television beer advertising and drinking knowledge, beliefs, and

intentions among schoolchildren. *American Journal of Public Health, 84*(2), 254-259.

Grunbaum, J.A., Lowry, R., & Kann, L. (2001). Prevalence of health-related behaviors among

alternative high school students as compared with students attending regular high schools. *Journal Of Adolescent Health*, *29*(5), 337-343.

Hall, E.A., Zuniga, R., Cartier, J., Anglin, M.D., Danila, B., Ryan, R., & Mantius, K. (2003) *Staying in*

*Touch: A Fieldwork Manual of Tracking Procedures for Locating Substance Abusers in Follow*

*up Studies, 2nd Edition*. Los Angeles, CA: UCLA Integrated Substance Abuse Programs.

Hanewinkel, R., Isensee, B, Sargent, J.D., & Morgenstern, M. (2011). Cigarette advertising and teen

smoking initiation. *Pediatrics, 127*, e271-278.

Harwell, M., & LeBeau, B. (2010). Student eligibility for a free Lunch as an SES measure in education

research. *Educational Researcher, 39*(2), 120–131.

Hegerl, U.U., Lipperheide, K.K., Juckel, G.G., Schmidt, L.G., & Rommelspacher, H.H. (1995).

Antisocial tendencies and cortical sensory-evoked responses in alcoholism. *Alcoholism: Clinical And Experimental Research*, *19*(1), 31-36.

Heitz, R.P. & Engle, R.W. (2007). Focusing the spotlight: Individual differences in visual attention

control. *Journal of Experimental Psychology: General, 136*, 217-240.

Henriksen L., Schleicher N.C., Feighery E.C., & Fortmann S.P. (2010). A longitudinal study of

exposure to retail cigarette advertising and smoking initiation. Pediatrics, 126(2), 232-8.

Henriksen, L., Feighery, E.C., Schleicher, N.C., Haladjian, H.H., & Fortmann, S.P. (2004). Reaching

youth at the point of sale: cigarette marketing is more prevalent in stores where adolescents

shop frequently. *Tobacco Control, 13*, 315–318.

Henriksen, L., Feighery, E.C., Wang, Y., & Fortmann, S.P. Association of retail tobacco marketing

with adolescent smoking. (2004). *American Journal of Public Health, 94*(12), 2081-2083.

Henry, J.D., & Crawford, J.R. (2005). The short-form version of the Depression Anxiety Stress

Scales (DASS-21): construct validity and normative data in a large non-clinical sample. *The*

*British Journal of Clinical Psychology / the British Psychological Society*, *44(2)*, 227–239.

Hollingshead, A.B., Redlich, F.C. (1958). Social class and mental illness: A community study. New

York, NY: Wiley.

Hobden, K., Forney, J., Durham, K., & Toro, P. (2001) Limiting attrition in longitudinal research on

homeless adolescents: What works best? *Journal Of Community Psychology, 39*(4), 443-451.

Hornik, D., Hornik, S., Hornik, R., & Maklan, D. (2011). National survey of parents and youth (NSPY),

1998-2004 -- Restricted Use Files. ICPSR27868-v2. Ann Arbor, MI: Inter-university Consortium for Political and Social Research [distributor], 2011-03-03. <http://doi.org/10.3886/ICPSR27868.v2>

Houben, K., & Wiers, R.W. (2009). Beer makes the heart grow fonder: Single-target implicit attitudes

toward beer but not alcohol are related to drinking behaviour in regular beer drinkers. *Netherlands Journal of Psychology, 65*, 10-21.

Huijding, J., de Jong, P.J., Wiers, R.W., & Verkooijen, K. (2005). Implicit and explicit attitudes toward

smoking in a smoking and nonsmoking setting. *Addictive Behaviors, 30*, 949-961.

Johnston, L.D., O’Malley, P.M., Bachman, J.G., & Schulenberg, J.E. (2014) 2011 Monitoring the

future survey (MTF). Retrieved from <http://www.monitoringthefuture.org/>. Ann Arbor: Institute

for Social Research, The University of Michigan.

Jones, B.T., Bruce, G., Livingstone, S., & Reed, E. (2006). Alcohol-related attentional bias in problem

drinkers with the flicker change blindness paradigm. *Psychology of Addictive Behaviors, 20*, 171-177.

Jones, B.C., Jones, B.T., Blundell, L., & Bruce, G. (2002). Social users of alcohol and cannabis who

detect substance-related changes in a change blindness paradigm report higher levels of use than those detecting substance-neutral changes. *Psychopharmacology, 165*, 93-96.

Karpinski, A., & Steinman, R.B. (2006). The single category implicit association test as a measure of

implicit social cognition. *Journal of Personality and Social Psychology, 91*(1), 16-32.

Kane, M.J., Hambrick, D.Z., Tuholski, S.W., Wilhelm, O., Payne, T.W., & Engle, R.W. (2004). The

generality of working memory capacity: A latent variable approach to verbal and visuospatial memory span and reasoning. *Journal of Experimental Psychology: General, 133*, 189-217.

Loomis, B.R., Kim, A.E., Busey, A.H., Farrelly, M.C., Willett, J.G., & Juster, H.R. (2012). The density

of tobacco retailers and its association with attitudes toward smoking, exposure to point-of-sale

tobacco advertising, cigarette purchasing, and smoking among New York youth. Preventive

Medicine, 55(5), 468-474.

Lichtenstein, D.R., Ridgway, N.M., & Netemeyer, R.G. (1993). Price perceptions and consumer

shopping behavior: A field study. *Journal of Marketing Research, 30*, 234-245.

Little, T.D., Cunningham, W.A., Shahar, G., & Widaman, K.F. (2002). To parcel or not to parcel:

Exploring the question, weighing the merits. *Structural Equation Modeling*, *9*(2), 151-173.

Mayer, J., Filstead, W.J. (1979). The Adolescent Alcohol Involvement Scale. An instrument for

measuring adolescents' use and misuse of alcohol. *Journal of Studies on Alcohol, 40*(3),

291-300.

McCarthy, W.J., Mistry, R., Lu, Y., Patel, M., Zheng, H., & Dietsch B. (2009) Density of tobacco

retailers near schools: Effects on tobacco use among students. *American Journal of*

*Public Health, 99*(11), 2006-2013.

McCuller, W.M., Sussman, S., Holiday, K., Craig, S., & Dent, C.W. (2002). Tracking procedures for

locating high-risk youth. *Evaluation & the Health Professions, 25*(3), 345-362.

Moberg, D., & Hahn, L. (1991). The Adolescent Drug Involvement Scale. *Journal Of Adolescent*

*Chemical Dependency*, *2*(1), 75-88.

Mostofsky, S.H., Simmonds, D.J. (2008). Response inhibition and response selection: Two sides of

the same coin. *Journal of Cognitive Neuroscience, 20*(5), 751-761.

Myers, M.G., MacPherson, L., McCarthy, D.M., & Brown, S.A. (2003). Constructing a short form of

the Smoking Consequences Questionnaire with adolescents and young adults. *Psychological*

*Assessment*, *15*(2), 163-172.

Newcomb, M., & Earleywine, M. (1996). Intrapersonal contributors to drug use: The willing

host. *American Behavioral Scientist*, *39*(7), 823-837.

Newcomb, M.D., & McGee, L. (1991). Influence of sensation seeking on general deviance and

specific problem behaviors from adolescence to young adulthood. *Journal Of Personality And Social Psychology*, *61*(4), 614-628.

Novak, S.P., Reardon, S.F., Raudenbush, S.W., & Buka, S.L. (2006). Retail tobacco outlet density

and youth cigarette smoking: A propensity-modeling approach. *American Journal of*

*Public Health, 96*(4), 670-676.

Osgood, C. E. (1962). Studies on the generality of affective meaning systems. *American*

*Psychologist*, *17*(1), 10-28.

Osgood, C. E. (1952). The nature and measurement of meaning. *Psychological*

*Bulletin*, *49*(3), 197-237.

Popova, L., & Ling, P.M. (2013). Perceptions of relative risk of snus and cigarettes among US

smokers. *American Journal of Public Health*, *103*(11), 21-23.

Prokhorov, A.V., Pallonen, U.E., Fava, J.L., Ding, L., & Niaura, R. (1996). Measuring nicotine

dependence among high-risk adolescent smokers. *Addictive Behaviors*, *21*(1), 117-127.

Prokhorov, A.V., De Moor, C., Pallonen, U.E., Suchanek Hudmon, K., Koehly, L., & Hu, S. (2000).

Validation of the modified Fagerström Tolerance Questionnaire with salivary cotinine among

adolescents. *Addictive Behaviors, 25*(3), 429-433.

Rebar, A. L., Ram, N., & Conroy, D. E. (2015). Using the EZ-diffusion model to score a Single-

Category Implicit Association Test of physical activity. *Psychology of Sport And Exercise,*

*16*(3), 96-105.

Redick, T.S., Broadway, J.M., Meier, M.E., Kuriakose, P.S., Unsworth, N., Kane, M.J., Engle, R.W.

(2012). Measuring working memory capacity with automated complex span tasks. *European Journal of Psychological Assessment, 28*(3), 164-171.

Rensink, R.A. (1997). To see or not to see: The need for attention to perceive changes in scenes.

*Psychological Science, 8*, 368-373.

Roberti, J.W., Storch, E.A., Bravata, E. Further psychometric support for the sensation seeking

scale--form V. (2003). *Journal of Personality Assessment, 81*(3), 291-292.

Rooke, S.E., Hine, D.W., & Thorsteinsson, E.B. (2008). Implicit cognition and substance use: A

meta-analysis. *Addictive Behaviors, 33*, 1314-1328.

Schleicher, N., Johnson, T.O., Dauphinee, A.L., Henriksen, L. (2011). Tobacco Marketing in

California’s Retail Environment (2008-2011), Final report for the California Tobacco Advertising

Survey.

Sherman, J.W., Gawronski, B., Gonsalkorale, K., Hugenberg, K., Allen, T.J., & Groom, C.J. (2008).

The self-regulation of automatic associations and behavioral impulses. *Psychology Review, 115*(2): 314-35.

Simmonds, D.J., Pekar, J.J., Mostofsky, S.H. (2008) Meta-analysis of go/no-go tasks demonstrating

that fMRI activation associated with response inhibition is task-dependent.

*Neuropsychologia, 46*(1), 224-232.

Smith, C. & Denton, M.L. (2003). Methodological Design and Procedures for the National Survey of

Youth and Religion (NSYR).

<http://www.thearda.com/Archive/Files/Codebooks/NSYRW3_CB.asp>

Sorensen, H. (2009). Inside the mind of the shopper: The science of retailing. Upper Saddle River,

N.J.: Prentice Hall.

Stacy, A.W. (1995) Memory association and ambiguous cues in models of alcohol and marijuana use.

*Experimental and Clinical Psychopharmacology, 3* (2), 183-194.

Stacy, A.W. (1997). Memory activation and expectancy as prospective predictors of alcohol and

marijuana use. *Journal of Abnormal Psychology*, *106* (1), 61-73.

Stacy, A.W., Ames, S.L. Sussman, S., Dent, C. (1996) Implicit cognition in adolescent drug use.

*Psychology of Addictive Behaviors, 10* (3), 190-203.

Stacy, A. W., Galaif, E.R., Sussman, S., & Dent, C.W. (1996). Self-generated drug outcomes in high

risk adolescents. *Psychology of Addictive Behaviors, 10*(1), 18-27.

Stacy, A.W, Leigh, B.C. & Weingardt, K., (1997). An individual-difference perspective applied to word

association. *Personality and Social Psychology Bulletin, 3*, 229-237.

Stacy, A.W., Newcomb, M.D., & Bentler, P.M. (1993). Cognitive motivations and sensation seeking

as long-term predictors of drinking problems. *Journal Of Social And Clinical Psychology*,*12*(1), 1-24.

Stacy, A.W., Zogg, J.B., Unger, J.B., & Dent, C.W. (2004). Exposure to televised alcohol ads and

subsequent adolescent alcohol use. *American Journal of Health Behavior, 28(6)*, 498-509.

Suhr, J.A., & Gunstad, J. (2002). ‘Diagnosis threat’: The effect of negative expectations on cognitive

performance in head injury. *Journal of Clinical and Experimental Neuropsychology, 24*,

448-457.

Sussman, S., Stacy, A.W., Dent, C.W., & Simon, T. R. (1995). Continuation high schools: Youth at

risk for drug abuse. *Journal of Drug Education, 25*(3), 191–209.

Sussman, S., Stacy, A.W., Ames, S.L., & Freedman, L.B. (1998). Self-reported high-risk locations of

adolescent drug use. *Addictive Behaviors, 23*, 405-11.

Szabo, M. (2010). The short version of the Depression Anxiety Stress Scales (DASS-21): Factor

structure in a young adolescent sample. *Journal of Adolescence, 33*(1), 1–8.

Tat, P.K., & Bejou, D. (1994). Examining black consumer motives for coupon usage. *Journal of*

*Advertising Research, 34*, 29-35.

US Department of Commerce, Census Bureau. (2012), National Cancer Institute sponsored Tobacco

Use Supplement to the Current Population Survey January 2011. Retrieved from

<http://riskfactor.cancer.gov/studies/tus-cps/> and

<http://www.census.gov/cps/methodology/techdocs.html>.

Waters, A.J., Carter, B.L., Robinson, J.D., Wetter, D.W., Lam, C.Y., & Cinciripini, P.M. (2007). Implicit

attitudes to smoking are associated with craving and dependence. *Drug and Alcohol Dependence, 91*, 178-186.

Weafer, J., Fillmore, M.T., & Milich, R. (2009). Increased sensitivity to the disinhibiting effects of

alcohol in adults with ADHD. *Experimental And Clinical Psychopharmacology*, *17*(2), 113-121.

Wells, W.D. & Tigert, D. (1971). Activities, interests, and opinions. *Journal of Advertising Research,*

*11*, 27-35.

West, P., Sweeting, H., Young, R., & Robins, M. (2006). A material paradox: Socioeconomic status,

young people's disposable income and consumer culture. *Journal Of Youth Studies, 9*(4),

437-462.

Unger, J.B., Cruz, T., Schuster, D., Flora, J.A., & Johnson, C. (2001). Measuring exposure to pro-

and anti-tobacco marketing among adolescents: Intercorrelations among measures and associations with smoking status. *Journal Of Health Communication, 6*(1), 11-29.

Unger, J.B., Gallaher, P., Shakib, S., Ritt-Olson, A., Palmer, P., & Johnson, C.A. (2002). The

AHMISA Acculturation scale: A new measure of acculturation for adolescents in a multicultural society. *The Journal of Early Adolescence, 22*, 225-251.

Unger, J.B., Schuster, D., Zogg, J.B., Dent, C.W., & Stacy, A.W. (2003). Alcohol advertising

exposure and adolescent alcohol use: A comparison of exposure measures. *Addiction Research & Theory, 11(3)*, 177-193.

Wagenmakers, E., van der Maas, H. J., & Grasman, R. P. (2007). An EZ-diffusion model for response

time and accuracy. *Psychonomic Bulletin & Review, 14*(1), 3-22.

Wilkinson, D., & Abraham, C. (2004). Constructing an integrated model of the antecedents of

adolescent smoking. *British Journal Of Health Psychology, 9*(3), 315-333.

Zuckerman, M. (1971) Dimensions of sensation seeking. *Journal of Consulting and Clinical*

*Psychology, 1*, 45-52.

Zuckerman, M. (1993). Sensation seeking and impulsivity: A marriage of traits made in biology?. In

W. G. McCown, J. L. Johnson, M. B. Shure (Eds.), *The impulsive client: Theory, research, and treatment* (pp. 71-91). Washington, DC, US: American Psychological Association.

Zuckerman, M., Kuhlman, D.M., Joireman, J., Teta, P., Kraft, M. (1993). A comparison of three

structural models for personality: the big three, the big five, and the alternative five. *Journal of Personality and Social Psychology, 65*, 757-768.

Zuckerman, M., Kuhlman, D.M., Thornquist, M. & Kiers, H. (1991) Five (or three) robust questionnaire

scale factors of personality without culture. *Personality Individual Differences, 12* (9), 929-941.