The Influence of Cigarette Regulatory Information on Belief Expectancy and Value

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Abstract

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Recent legislation has been proposed to have the United States Food and Drug Administration (FDA) regulate tobacco products sold in the U.S. This study assessed the impact of information about such regulation on young adults' beliefs about cigarette smoking. Non-smoking university undergraduates (n=285) were randomly assigned to receive information indicating that 1) the FDA regulates cigarettes; 2) the FDA does not regulate cigarettes; or 3) no regulatory information (control condition). Expectancy-value theory was utilized as a guide for this online, between-subjects experimental study. Results indicated that participants in the non-FDA regulation condition viewed health outcomes as more likely than participants in the control condition and marginally more likely than the FDA regulation condition. The interaction between FDA expertise perceptions and condition marginally predicted health expectancy. In addition, the non-FDA regulation participants viewed health outcomes as worse than the control condition. Practical and theoretical contributions of this research are discussed.

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Introduction

Tobacco use is the leading cause of preventable death and disease in the United States (U.S. Department of Health and Human Services, 2004). It is estimated that 440,000 Americans die each year as a result of cigarette smoking or exposure to secondhand smoke (Centers for Disease Control and Prevention, 2005). In 2006, 20.8% of U.S. adults were current smokers: i.e. smoking some days or every day currently and at least 100 cigarettes in their lives (Centers for Disease Control and Prevention, 2007). Each day approximately 7,000 Americans initiate smoking, over three fourths of whom are under 18 years old (Substance Abuse and Mental Health Services Administration, 2004). Despite the well-known negative health effects of tobacco products (U.S. Department of Health and Human Services, 2004; U.S. Department of Health and Human Services, 2006), there is currently no regulation of tobacco in the U.S.

To reduce the negative health consequences of cigarette smoking in the U.S., legislation has been proposed to give this regulatory authority to the U.S. Food and Drug Administration (FDA). The most current legislation was introduced in the U.S. Senate in 2007, and is titled the "Family Smoking Prevention and Tobacco Control Act" (2007). The legislation would grant the FDA the authority to approve label statements and restrict tobacco marketing. The act would also prohibit any flavored cigarettes (with the exception of menthol), restrict the sale of so-called "reduced-exposure" tobacco products

(e.g., light cigarettes), and require premarket approval of new tobacco products. The legislation would require reductions in nicotine and other additives, as well as chemicals that make second-hand smoke more dangerous. A Tobacco Products Scientific Advisory Committee within the FDA would be established to oversee the regulation of tobacco products.

Although this legislation has the potential to reduce the associated hazards of tobacco in the U.S., having tobacco products regulated by the FDA may also have an unintended, potentially detrimental effect on people's beliefs about the health effects of smoking. For example, regulation may suggest to people that cigarettes have the tacit approval of the U.S. Government, and thus may not be as harmful. Prior research has demonstrated that regulated products are rated as safer than non-regulated products (Dodge & Kaufman, 2007) and, as stated by Chapman (2008), regulation may give a "misleading message by the media that the newly regulated tobacco products are now 'safer'" (p.73). Such a decreased sense of risk may in turn lead individuals to initiate or increase tobacco use and may make smokers less likely to quit (Kozlowski, 2008). Such effects of FDA regulation on people's beliefs about cigarette smoking would have implications for health-care research, policy, and delivery, such as the framing of messages for encouraging smoking cessation and discouraging smoking uptake. However, there is currently no published research assessing the impact of tobacco regulation on people's smoking-related beliefs.

If FDA regulation of tobacco does reduce consumer risk perceptions regarding cigarettes, it may be due in part to the fact that the FDA is currently tasked with approving food and drugs only when there is reasonable assurance that the product is safe

and effective (Food and Drug Administration Modernization Act of 1997, 1997). In assuming the FDA is fulfilling its traditional role, consumers may conclude from FDA tobacco regulation that cigarettes must be relatively safe. Understanding how tobacco regulation influences safety perceptions also has important implications for smoking intentions and behavior. Increased perceptions of tobacco-product safety have been shown to be associated with greater intentions to use the product (O'Connor, et al., 2007). In addition, efforts to correct misperceptions about the safety of tobacco products are associated with smokers increasing their intentions to quit smoking (Shiffman, Pillitteri, Burton, Rohay, & Gitchell, 2001). The legislation for FDA tobacco regulation may also have an impact on non-smokers intentions to use tobacco products. Intentions to use tobacco may vary more among non-smokers than intentions to quit vary among smokers. Thus, a better understanding of how regulation may impact non-smokers is important because regulation may affect intentions to use tobacco products through lowered perceptions of risk.

Risk perceptions are one of many potential beliefs people may hold about tobacco products. Individuals typically hold a collection of beliefs about any single behavior (e.g., smoking causes cancer, smoking results in relaxation, smoking causes health problems, etc.). An abundance of research has shown that one's beliefs about smoking are significant predictors of smoking intentions and behavior (Godin, Valois, Lepage, & Desharnais, 1992; O'Callaghan, Callan, & Baglioni, 1999; Smith, Bean, Mitchell, Speizer, & Fries, 2007; ter Doest, Dijkstra, Gebhardt, & Vitale, 2007). In addition, studies have demonstrated that changes in beliefs can result in changes in behavior (Kahle & Berman, 1979; Mahler, Kulik, Gerrard, & Gibbons, 2007). Thus, belief change

is an important mechanism to examine, as beliefs have been shown to impact behaviors. Specifically, FDA regulation of tobacco may influence consumer behavior through changing beliefs about tobacco products.

Risk perceptions have typically been assessed in terms of the subjective probability of a particular outcome. However, it is important to not only consider a subjective estimate of the likelihood of an outcome, but also the subjective evaluation of that outcome. Rather than focusing exclusively on risk estimates in general, the expectancy-value approach considers both perceptions of risk and assessment of how positive or negative outcomes are. In order to have a full understanding, it is important to consider the value of outcomes in addition to expectancy.

Essential Belief Components: Expectancy and Value

To understand beliefs, it is useful to examine two essential components: expectancy and value. *Expectancy* refers to a person's subjective probability that a behavior will result in the achievement of some goal or specified outcome. For example, how likely it would be that cigarette smoking would cause cancer. *Value* refers to an individual's view of how positive or negative each goal or outcome is. For example, how good or bad it would be if cancer was a result of cigarette smoking.

Theoretical approaches that combine these elements—i.e., expectancy-value models—can provide a framework for understanding beliefs and predicting resulting intentions and behaviors (Fishbein & Ajzen, 1975; Rosenberg, 1956). Numerous expectancy-value models have been developed to explain phenomena such as decision making, motivation, and attitudes (e.g., Fishbein & Ajzen, 1975; Lawler, 1968; Lewin, 1943; Rosenberg, 1956). Each of these models posits these outcomes as a product of

expectancy and value. One of the earliest expectancy-value models is Field Theory, which proposes that a person's actions are determined by *force*, the product of value and the likelihood of success or failure in reaching a desired outcome (Lewin, 1943). While Lewin's theory was broad-based in its applicability, later expectancy-value models were developed for more specific contexts. For example, within the organizational setting two different expectancy-value models were developed to explain workplace motivation (Lawler, 1968; Vroom, 1964). Other researchers have developed expectancy-value models to explain variability in attitudes. Early research in this domain demonstrated that expectancies and values were separate and manipulable components of attitudes (Rosenberg, 1956). Like attitudes, beliefs cannot be fully understood without examining the cognitive structure which underlies them, specifically expectancy and value. Theories that include the expectancy-value distinction are useful in that these components may operate differentially to influence attitudes and subsequent behaviors. One of the most prominent expectancy-value models is the Theory of Reasoned Action (TRA; Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975).

Theory of Reasoned Action

The TRA has been used for decades to predict health behaviors in general (Jaccard & Davidson, 1972; Jaccard, Hand, Ku, Richardson, & Abella, 1981; Umstattd & Hallam, 2007; Williams, Anderson, & Winett, 2005) and cigarette smoking in particular (Rogers, Deckner, & Mewborn, 1978; Sutton, Marsh, & Matheson, 1991; van Harreveld, van der Pligt, & de Vries, 1999). In addition, the TRA can help clarify the underlying structure of attitudes: namely, beliefs about an outcome and their associated expectancies and values.

The TRA proposes that attitudes are made up of a set of people's beliefs about a behavior, or a belief structure. Beliefs are represented as positive outcomes and negative outcomes associated with engaging in a particular behavior. For example, an individual may hold a positive belief such as 'smoking helps me relax' and also hold a negative belief such as 'smoking is bad for my health.' Each belief is associated with an expectancy component (the behavior leads to specific outcomes) and a value component (evaluation of the outcomes). The TRA proposes that there is a causal link between the expectancies and values associated with these beliefs and attitude towards the behavior (Fishbein & Ajzen, 1975).

The expectancy-value aspect of the TRA can be expressed in the following equation:

$$A= \Sigma e_i v_i$$

An attitude (A) is the summed product of expectancy (e) and value (v) for each potential outcome of engaging in the attitude-relevant behavior (Fishbein & Ajzen, 1975). Therefore, the TRA predicts that changes which occur in the expectancy component, value component, or both, can result in attitude change (Fishbein & Ajzen, 1981). In the full TRA framework, attitudes are used to predict intentions (i.e., a person's expectation of performing a behavior). These intentions, in turn, predict behavior. So, at the most fundamental level, behavior is a function of a person's collection of belief expectancies and values (Figure 1).

Given that beliefs are fundamental to attitude formation (and ultimately behavior), it is important to understand factors that influence these beliefs. Individuals form beliefs that reflect the things that they experience, including information (Fishbein & Ajzen,

1975). Within the expectancy-value framework, a message can have an impact on an attitude because it influences perceptions of expectancy and/or value (Fishbein & Ajzen, 1981). While the TRA explains how expectancy and value influence and predict attitudes, there is no clear explanation of how these two constructs may be influenced. The present study will address this gap in the literature by examining how information about FDA tobacco regulation will affect participants' tobacco-related expectancies and values.

Differential Effects of Regulation: Expectancy vs. Value

Although both are fundamental components of beliefs, people's expectancies and values regarding cigarette smoking may be differentially affected by FDA regulation of tobacco. For instance, changes in one's expectancy of an outcome associated with smoking will not necessarily correspond with changes in how positive or negative that outcome is viewed. Regulation is unlikely to change the *content* of beliefs that people hold about the outcomes of smoking because these outcomes are generally known (Tuakli, Smith, & Heaton, 1990).

Expectancies. Because regulation is likely to be viewed as a means of reducing the odds of experiencing negative outcomes associated with tobacco use, it is expected that individuals given information that cigarettes are regulated will report low expectancies of negative outcomes.[1] In contrast, providing individuals with information that cigarettes are *not* regulated is expected to lead people to believe that negative outcomes are more likely.

[1] Because the focus of regulation is on reduction of negative outcomes, we do not consider the effect of regulation on positive outcomes. Products that are regulated are thought to be controlled for health and safety reasons in order to protect consumers from *negative* health outcomes. Therefore, beliefs about the advantages of smoking should not be influenced by information regarding FDA regulation

Values. While regulation information is predicted to influence expectancy ratings, the value component is not expected to change. How positive or negative a smoking consequence is to an individual should remain unchanged, for these beliefs should be more firmly established in people's minds. In addition, value ratings are directly linked only to the outcome, rather than the product that caused the outcome. For example, how positive or negative one rates the outcome of cancer is independent of regulation information and is only tied to the outcome (in this case cancer). Because regulation is tied to the product and the product is not directly related to the value associated with the outcome, this component of the belief structure should remain unchanged.

Health vs. Non-Health Outcomes

Some of the negative outcomes of smoking cigarettes are related specifically to negative health consequences of smoking (e.g., "smoking causes lung cancer"), whereas other negative outcomes are non-health related (e.g., "smoking makes my breath smell bad") (Hanson, 1999). The most prominent negative outcomes associated with cigarette smoking are health related. Individuals commonly (and correctly) associate negative health effects with smoking (Tuakli et al., 1990). Providing individuals with information that the FDA regulates cigarettes should result in lower expectancy ratings for negative health outcomes than those who are given information that the FDA does not regulate cigarettes. Conversely, information about regulation is not expected to have an impact on expectancy ratings associated with *non-health* related disadvantages of smoking, such as smoking results in unpleasant odor. Regulation is associated with protection and implies

safeguards against negative health outcomes, but not necessarily negative outcomes unrelated to health.

Perceptions of FDA Expertise

The FDA will be responsible for the oversight of tobacco products under the pending legislation. Perception of FDA expertise may have implications for how individuals interpret regulation information. Whether consumers think that the FDA is knowledgeable, able, competent, and qualified to regulate tobacco will likely influence the relationship between regulation information and negative health outcome expectancy ratings. If perceived FDA expertise is high, the effect of regulation information will be stronger than if perceived FDA expertise is low.

Research has examined how characteristics of government sources influence consumers (Bates, Romina, Ahmed, & Hopson, 2006; Guttman, Boccher-Lattimore, & Salmon, 1998; Guttman & Peleg, 2003; Hyland & Birrell, 1979). This research suggests government credibility, or perceptions of trustworthiness and expertise, plays an important role in communicating health information and individual's willingness to accept these messages (Guttman, et al., 1998). Additionally, existing knowledge or perceptions about the FDA may influence how regulation information is processed (Cacioppo, Petty, & Sidera, 1982). Studies have shown that there is generally a lack of trust in the government (Chanley, Rudolph, & Rahn, 2000; Keele, 2007). In particular, the FDA has come under recent criticism, specifically in the area of drug oversight. Individuals may associate the FDA with poor capabilities which could lead consumers to have low perceptions of FDA expertise, which may in turn make people skeptical about the FDA's ability to regulate tobacco. This is an important factor to examine in the

context of the current study because regulation will be attributed to this government source.

It is predicted that perceptions of FDA expertise will moderate the relationship between information about FDA regulation and a person's expectancy ratings of negative health outcomes. High FDA expertise will buffer the relationship between FDA regulation information and expectancies about negative health outcomes. When individuals are informed that the FDA regulates cigarettes, those who think the FDA has high expertise will have lower expectancy ratings for negative health outcomes than those who think the FDA has little expertise. Those who think the FDA is expert with regards to cigarette regulation may think that FDA regulation makes cigarettes particularly safe. When individuals are informed that the FDA does not regulate cigarettes, those who think the FDA has high expertise will have higher expectancy ratings for negative health outcomes than those who think the FDA has little expertise. Those who think the expertise of the FDA is high may think that no FDA regulation makes cigarettes particularly dangerous. Expectancies of negative health outcomes for those who believe the FDA has low expertise should not be affected by regulation information. These individuals do not believe the FDA is competent to regulate and therefore regulation will not result in a safer product (and no regulation will not make the product any more unsafe than it already is).

Present Study

This study will investigate how information regarding FDA regulation of cigarettes impacts individuals' expectancies and values about the negative outcomes associated with cigarette smoking. Although tobacco regulation has been proposed, no

empirical studies have examined how information about regulation will be interpreted and understood by the public. Given pending legislation for FDA regulation of tobacco, examination of the effects of regulation on consumer beliefs may have important implications for public health. The regulation of cigarettes may greatly impact the initiation or progression of smoking for adolescents and young adults who are most at risk for smoking uptake. Although about one third of regular smokers begin before the age of 18, 11% of smokers report trying cigarettes for the first time after 19 years of age (Everett, et al., 1999). In addition, 19% of college student smokers advance from occasional to daily smoking (Wechsler, Rigotti, Gledhill-Hoyt, & Lee, 1998). This study will recruit a sample of non-smoking university undergraduates.

A between-subjects experimental design will be utilized to isolate the effects of FDA regulation on beliefs about cigarette smoking. The experimental manipulations will be embedded in a description of a new cigarette product. The *FDA regulation* condition will state that the FDA regulates cigarette products. The *non-FDA regulation* condition will state that the FDA does not regulate cigarette products (which reflects what is true, but is not labeled as such). The *control* condition will have no information about FDA regulation, which will reflect the current standard in the U.S.

The following hypotheses will be tested:

1a) Participants in the *FDA regulation* condition will have *lower* expectancy ratings for negative health outcomes of cigarette smoking than those in the *control* condition.

1b) Participants in the *non-FDA regulation* condition will have *higher* expectancy ratings for negative health outcomes of cigarette smoking than those in the *control* condition

1c) Participants in the *FDA regulation* condition will have *lower* expectancy ratings for

negative health outcomes of cigarette smoking than those in the *non-FDA regulation* condition.

2) The effect of FDA regulation on health expectancy will be greater among participants who view the FDA as having more expertise than those who view the FDA as having less expertise.

3) FDA regulation information will have *no effect* on the *value* participants' place on the *negative health outcomes* of cigarette smoking.

4) FDA regulation information will have *no effect* on participants' *expectancies* regarding the *non-health outcomes* related to cigarette smoking.

5) FDA regulation information will have *no effect* on the *value* participants' place on the *non-health outcomes* related to cigarette smoking.

Method

Participants

The sample for this study was non-smoking university students (those who reported not having smoked 100 cigarettes in their lifetime). Participants were recruited through The George Washington University Psychology Department subject pool. Based on medium effect size (f^2=.25), an alpha of .05, and power of .80, a power analysis indicated that 269 were needed for this research. Of 292 initial participants, six who indicated smoking 100 or more cigarettes in their life and one who was missing data on all key variables were eliminated from the study, resulting in a final sample size of 285. Approximately 74% were female. The mean age was 18.89 (SD=1.26). Approximately 50% were freshmen, 26% sophomores, 15% juniors, and 9% seniors. Approximately 71% identified as White, 8% African American, 11% Asian, 5% Latino, 3% Middle Eastern, and 2% other.

Design and Procedure

Students enrolled in introductory psychology courses had the option to sign up for the study through the Psychology Research Sign-Up website. Recruitment information stated that the study was enrolling non-smokers only, which was verified through a question in the study. Once enrolled, participants were directed to a secure data collection website on Survey Monkey. Research utilizing the web has shown that results are

consistent with findings obtained using traditional methods (For a review see Gosling, Vazire, Srivastava, & John, 2004).

Participants indicated their consent to participate by clicking on the appropriate icon and were directed to the survey. They completed items assessing perceptions of FDA expertise. Participants then received a description of a new cigarette. A cover story stated the following:

> *On the next screen you will see a description for a new cigarette product. The description for the product is in plain text to avoid influencing your opinions about the product. The name of the product has also been removed for this reason. After seeing the description of the new cigarette, you will be asked a series of questions.*

This study utilized a between-subjects design to test the effects of FDA regulation on beliefs about smoking. Disclaimers about FDA regulation of cigarettes were embedded in the cigarette description to test the effect of regulation on beliefs. Participants were randomly assigned to one of three conditions: 1) FDA regulation information; 2) non-FDA regulation information; or 3) no information (control). In the *FDA regulation* condition, participants received information that the FDA will regulate the product. In the *non-FDA regulation* condition, participants received information that the FDA will not regulate the product. In the *control* condition, participants received the cigarette description without any information about regulation. Manipulations such as these have been used in past studies examining the effects of regulation (Dodge & Kaufman, 2007). The product descriptions used for the current study are shown in Appendix A.

Following the description, participants received a manipulation check which assessed if they remembered the claim on the description. Nineteen participants reported the incorrect manipulation in the check; however follow-up analyses showed that these participants were not significantly different on outcome variables from those who marked the correct statement and effect sizes were comparable when these participants were taken out of the analysis. A questionnaire assessed the primary dependent variables: expectancy beliefs and value beliefs. The last set of questions assessed demographic variables which included a measure of past smoking behavior. All measures in the order that they appeared for participants are shown in Appendix B. Following completion of these measures, participants were debriefed (Appendix C).

Measures

Pilot Study. In order to create the expectancy and value belief measures for the current study, a pilot study was conducted using an open-ended elicitation task recommended by Ajzen and Fishbein (1980). This pilot test solicited salient beliefs about the disadvantages of smoking the cigarettes in the description. Thirty-nine non-smokers from The George Washington University psychology subject pool were recruited for this pilot study. After reading the description of the cigarette (see the control condition in Appendix A), participants were asked,

> *"What would be the disadvantages if you were to regularly smoke the cigarette that was described? Please list the disadvantages, one per line. It is not necessary to list 10. Just list those disadvantages that come to mind."*

Sixteen disadvantage categories were created from the data collected. Two researchers coded the data and there was 96% agreement and discrepancies were discussed and

resolved. In total, 162 disadvantages of smoking the cigarettes in the description were listed. Proportions for each category were calculated. Fishbein and Ajzen (1975) argue that a person's attitude is determined by a limited number of salient beliefs that, when arranged hierarchically by probabilities, the first 5-9 salient beliefs are sufficient. Seven salient disadvantages were retained for the current study. Of the 16 disadvantage categories, eight categories were dropped due to low frequency in addition to the 'other' category. Of the seven disadvantage categories, five appear specifically health related (respiratory, teeth harm, lung cancer, cancer, and general health) and two appear non-health related (smell and expensive). Expectancy and value measures were created based on these beliefs.

Expectancy. Participants were asked to indicate the subjective probability that smoking the cigarettes in the description would result in the outcomes that were most commonly listed in the pilot study with the following question, "How likely do you think it is that smoking the cigarettes described will (specific outcome)?" Response options ranged from 0 to 9. Above the numbers 0, 3, 6, and 9 were the labels "not at all likely," "somewhat likely," "quite likely" and "extremely likely" respectively. A five-item expectancy health scale was created from the following beliefs: respiratory, teeth harm, lung cancer, cancer, and general health (α= .92). A two item expectancy non-health scale was created from the following beliefs: smell and expensive (α=.60).

Examination of the expectancy health (Kurtosis=5.62, Skewness=-1.95) and non-health (Kurtosis= 4.57, Skewness=-1.83) scales revealed that each were non-normal and positively skewed in that smoking outcomes were seen as extremely likely. It was determined that a median split was the best way to resolve this issue. MacCallum,

Zhang, Preacher, and Rucker (2002) suggest that when the distribution of a variable is highly skewed and there are a large number of observations at the most extreme score on the distribution, dichotomization at the median of the variable is warranted. Participants who scored below the median (7.80) on the expectancy health scale were recoded as '1' and those at or above the median were recoded as '2'. Participants who scored below the median (8.00) on the expectancy non-health scale were recoded as '1' and those at or above the median were recoded as '2'.

Value. For each belief, participants reported how positive or negative they viewed each outcome of cigarette smoking. These questions asked, "How good or bad would it be if (specific outcome) was a result of smoking the cigarettes described?" Response options included "extremely bad," "very bad," "moderately bad," slightly bad," "neither bad nor good," slightly good," "moderately good," "very good" and "extremely good." A five-item value health scale was created from the following beliefs: respiratory, teeth harm, lung cancer, cancer, and general health (α=.91). A two item value non-health scale was created from the following beliefs: smell and expensive (α=.46).

Examination of the value health (Kurtosis=11.07, Skewness=3.11) and non-health (Kurtosis=1.26, Skewness=.96) scales revealed that each were non-normal and negatively skewed in that smoking outcomes were seen as extremely bad. Again, this was resolved using a median split (MacCallum et al., 2002). Participants who scored below the median (1.20) on the value health scale were recoded as '1' and those at or above the median were recoded as '2'. Participants who scored at or below the median (2.50) on the value non-health scale were recoded as '1' and those above the median were recoded as '2'.

FDA Expertise. Four semantic differential items assessed perceptions of the FDA including if the FDA is competent, expert, knowledgeable, and qualified to regulate cigarettes. A scale, FDA expertise, was created from these four items (α=.87). FDA expertise was recoded into a dichotomous variable: those with perception of high FDA expertise above the mean (n=151) and those with perception of low FDA expertise at or below the mean (n=134). Prior research has shown that the optimal design for detecting interactions with ANOVA is using the extreme scores in the distribution (McClelland and Judd, 1993), although participants from the middle of the distribution were retained in the current study.

Manipulation Check. After reading the cigarette description, participants were asked to check off which disclaimer (if any) was present on the description that they read.

Demographic Information. Participants were asked to report their sex, year in school, race, and age. The analyses for this study were limited to never smokers, or those who report not having smoked at least 100 cigarettes in their life.

Data Analysis

Preliminary analyses consisted of generating descriptive information for all study variables and assessing normality of the data. Demographics were correlated with variables of interest to determine if they should be included as covariates in the main analyses. Cronbach's alphas for scales and intercorrelations among main study variables were calculated.

Hypothesis 1a, 1b, and 1c were assessed using independent samples t-test. Hypothesis 1a tested if the *FDA regulation* mean expectancy rating of negative health outcomes was statistically significantly different from the *control* condition. Hypothesis

1b tested if the *non-FDA regulation* mean expectancy rating for negative health outcomes was statistically significantly different from the *control* condition. Hypothesis 1c tested if the *FDA regulation* mean expectancy rating for negative health outcomes was statistically significantly different from the *non-FDA regulation* condition. Hypothesis 2 tested if FDA expertise moderates the relationship between FDA regulation information and expectancies of negative outcomes with ANOVA. Hypotheses 3, 4, and 5 were assessed using a series of independent samples t-tests, which tested the hypotheses that mean ratings of the value of negative health outcomes, expectancy of non-health outcomes, and the value of non-health outcomes did not statistically significantly differ between conditions.

Results

Preliminary Analyses

Means and standard deviations for study variables are shown in Table 1. Mean FDA expertise was at approximately the midpoint of the scale. In general, participants had high expectancies of negative outcomes of cigarette use, and they believed these outcomes to be bad. The correlation matrix shown in Table 2 shows the relationships between the expectancy belief items. These items were positively and significantly correlated with each other. The correlation matrix shown in Table 3 shows the relationships between the value belief items. These items were positively and statistically significantly correlated with each other.

The correlations between the study scales created for health and non-health expectancies and values as well as FDA expertise are shown in Table 4. The health and non-health expectancy scales were positively and significantly related to each other, as were the health and non-health value scales. Expectancy and value scales were negatively and significantly related to each other, in that outcomes that were rated as bad were also rated as more likely to occur. No demographic variables were significantly correlated with the expectancy or value scales. Means and standard deviations for median split study scales by condition are shown in Table 5. Analyses assessing the differences of these means are discussed below.

The Effect of Regulation Information on Health Outcome Expectancy

FDA Regulation vs. Control. The mean health expectancy ratings of the FDA regulation and control conditions were not statistically significantly different (p=.83).

Non-FDA Regulation vs. Control. The mean health expectancy rating of the non-FDA regulation condition was significantly higher than the control condition (t(186)=1.63, one-tailed p=.05).

FDA Regulation vs. Non-FDA Regulation. The mean health expectancy rating in the FDA regulation condition was marginally lower than the non-FDA regulation condition (t(183)= -1.41, one-tailed p=.08). Results of these analyses are shown in Figure 2.

Moderating Effect of Perceived FDA Expertise

An ANOVA was conducted in order to test if FDA expertise moderated the relationship between FDA regulation information and health expectancy ratings. The results of this analysis are shown in Table 6. The overall model was marginally significant (F(5)=2.05, p=.07) and accounted for 3.6% of the variance in health expectancy. The main effect of FDA expertise was non-significant (p=.22), but its moderating effect on regulation information was marginally significant (p =.06); higher perceived expertise increased the impact of regulation information on participants' expectations of negative health outcomes of cigarette use. Figure 3 shows the results for the moderation analysis. Among those in the FDA regulation condition, health expectancies go down with high levels of FDA expertise. Conversely, among those in the non-FDA regulation condition, health expectancies go up with high levels of FDA

expertise. The control condition trend line follows similarly, however is not as extreme with higher health expectancies at high levels of FDA expertise.

The Effect of Regulation Information on Health Outcome Value

FDA Regulation vs. Control. The mean health value ratings of the FDA regulation and the control conditions were not statistically significantly different (p=.39).

Non-FDA Regulation vs. Control. The mean health value rating of the non-FDA regulation condition was lower than the control condition. Results of the independent samples t-test assessing the difference of these value ratings were marginally statistically significant (t(188) = -1.60, one-tailed p=.06).

FDA Regulation vs. Non-FDA Regulation. The mean health value ratings of the FDA regulation and non-FDA regulation conditions were not statistically significantly different (p=.47). Results of these analyses are shown in Figure 4.

The Effect of Regulation Information on Non-Health Outcome Expectancy and Value

FDA Regulation vs. Control. The mean non-health expectancy ratings of the FDA regulation and the control conditions were not significantly different (p=.85), nor were non-health value ratings (p=.57).

Non-FDA Regulation vs. Control. The mean non-health expectancy ratings of the non-FDA regulation and the control conditions were not statistically significantly different (p=.54), nor were non-health value ratings (p=.79).

FDA Regulation vs. Non-FDA Regulation. The mean non-health expectancy ratings of the FDA regulation and non-FDA regulation conditions were not statistically significantly different (p=.43), nor were non-health value ratings (p=.77).

Discussion

Telling non-smokers that cigarettes are *not* regulated by the FDA led to higher perceived likelihood of negative health outcomes than telling them either nothing about regulation or that cigarettes were regulated. Also, participants in the no regulation condition rated health outcomes as worse than the control condition. Informing individuals that cigarettes are FDA regulated did not appear to influence expectancy or value in relation to the control condition. These results suggest that non-smokers perceive that cigarettes are more dangerous when they are not regulated.

FDA non-regulation information may have influenced expectancy of health outcomes because individuals interpret no regulation as a warning, leading to worry about the health effects. In addition, when individuals are explicitly told that there is no regulation and they believe tobacco *ought* to be regulated, health outcomes will be perceived as more likely. Results of this study indicate that if individuals had accurate knowledge regarding the lack of regulation of cigarettes, they would perceive negative health outcomes as more likely than those not knowledgeable about regulation. Unfortunately, this is not the situation under the pending legislation for regulation and results showed that regulation information leads to perceptions of cigarettes being safer than the no regulation condition.

Informing non-smokers that cigarettes are *not* regulated marginally influenced not only their expectancies of negative health outcomes, but also the value of these outcomes. This unexpected finding indicated that participants in the non-regulation condition perceived health outcomes as being worse than those in the control condition. Perhaps telling individuals that there is no regulation of cigarettes triggers perceptions of more severe outcomes from smoking. Additionally, informing non-smokers that there is a lack of regulation may be interpreted as a warning of the magnitude of dangers associated with smoking. Further research is warranted to better understand this relationship between regulation information and health outcome value.

Greater perceived FDA expertise marginally strengthened the effect of regulation information on health-outcome expectancies. Thus, health-related expectancies were less affected by regulation information among non-smokers who believed that the FDA is less competent. In particular, participants who were told there was no FDA regulation and thought the FDA had more expertise believed cigarettes were more likely to produce negative health outcomes. This study sample had about an equal number of participants perceiving the FDA as expert or not expert to regulate cigarettes. However, the U.S. population's perception of FDA expertise in the domain of cigarette regulation is unknown. According to the study results, if perception of FDA expertise is generally low, then regulation should have a lesser impact on health outcome expectancies. However, if perception of FDA expertise is generally high in the U.S., then regulation will have a significant impact on health outcome expectancies, especially among those who believe there is no regulation. The results of this study indicate that perceptions of FDA expertise

are pertinent when considering how regulation will impact non-smokers' health outcome expectancies.

While it was predicted that those in the FDA regulation condition would rate health outcomes as less likely than the control condition (which reflects the current regulatory climate), there were no significant differences in health expectancy. It may be that non-smokers simply do not believe that regulation of cigarettes will make them any safer. Or, this may indicate that individuals may be under the assumption that cigarettes are currently regulated. This would essentially equate the FDA-regulation and control conditions. In this study more than half (~56%) of participants reported (prior to the manipulation) that the FDA regulates cigarettes, which is consistent with a nationally representative study of smokers which found that approximately 54% believed cigarettes are evaluated for safety by the FDA (Kaufman et al., 2009). This null finding indicates that when cigarettes do come under FDA regulation, informing non-smokers that cigarettes are regulated should not have a substantial impact on health outcome expectancy or value. Making tobacco regulation salient to individuals (the FDA regulation condition) in the experimental environment may be similar to the flood of media messages the public will receive once the legislation is passed for FDA regulation of tobacco. According to the results of this study, explicit messages about regulation should not impact expectancy or value ratings. However, it may be that the measurement of expectancy beliefs may not have accounted for differences in these groups. Measurement of risk is varied and complex (Slovic, 2000), thus future studies should explore if differences between FDA-regulation and no information may differ when risk is measured in other ways. A within-subjects design could also reveal potential

distinctions that people make when told a product is regulated versus told nothing about regulation.

Alternatively, if a majority of individuals think that cigarettes are already regulated, or regulation is not salient to them, when FDA regulation is enacted these individuals will come to know that cigarettes were not *previously* regulated. This shift may lead people to believe cigarettes under regulation must be safer than they were in the past. Although the current study explicitly stated that the product would be regulated by the FDA, perceptions in the actual regulated environment may sway more considerably.

There are numerous ways to potentially counteract the effects of regulation messages. The "Family Smoking Prevention and Tobacco Control Act" (2007) contains provisions for strengthening health warnings on tobacco product packaging. These messages may neutralize the effects of regulation messages by reinforcing the dangers of smoking. The legislation also prohibits tobacco companies from making claims that products are regulated by the FDA, including any misleading statements about the harmfulness of a product (Amendment of Section 103, Family Smoking Prevention and Tobacco Control Act, 2007). While the tobacco companies will not be allowed to convey a message about regulation, the media will be communicating this to the public and it could be beneficial to instruct the media on how to do this. This may include informing the public that the term 'regulation' in the context of tobacco is *not* comparable to other product oversight or safety testing (e.g., drugs, medical devices) but rather that tobacco regulation applies to product testing and standards. A simple message such as

"Regulation ≠ Safe" could be used to express this. The media's accurate portrayal of tobacco regulation may offset the effects of regulation. Further research is needed to examine what messages will be most effective to counteract the effects of regulation.

These results are not only relevant to informing policy, but also support the expectancy-value approach to understanding the impact of regulatory information on people's perceptions and potentially their behaviors. According to the TRA, the effects of information on a person's attitude can only be understood if the influence of the information on a person's belief structure are known (Fishbein and Ajzen, 1975), however this is seldom tested. Often, a general measure of attitude towards smoking is used without measuring the underlying belief structure (Godin, et al., 1992; O'Callaghan, et al., 1999; Smith, et al., 2007; ter Doest, et al., 2007). This study demonstrated that providing information about regulation has a causal effect on individual's health belief expectancy and value. Furthermore, belief expectancies and values are independently influenced by cigarette regulation information. This provides guidance for future studies to measure these aspects of attitude (expectancy and value) separately when examining informational influence on attitude. A better understanding of the belief structure and how information may influence these components will help to improve interventions to reduce cigarette smoking.

The results of this study make contributions to prospective public policy for regulation of tobacco and offer interesting directions for future research, however there are several limitations that should be acknowledged. First, while this study utilized young adult non-smoking university students, future studies should examine how regulation information may influence risk perceptions in other populations (e.g., smokers and

adolescents). A cross-sectional nationally representative study found that smokers who believe cigarettes are evaluated for safety by the FDA believe the risks of smoking are less than those who believe cigarettes are not evaluated (Kaufman et al., 2009). Further research is needed to determine the *causal* relationship of regulation on risk perception among smokers to help inform and develop smoking cessation interventions. Understanding how regulation information may change beliefs leading to intentions and behavior (both smoking cessation and initiation) is an important area for future research.

A second limitation is that the term 'regulation' was not defined for the participants in the study, leaving this term open to interpretation. It is likely that when regulation of tobacco takes effect, individuals will interpret what this means in their own way. However the question remains: What does regulation mean to people? There are varying degrees of regulation, from the regulation of product marketing to the regulation of controlled substances. Future research should explore both how people interpret tobacco regulation and how, when regulation is defined, it will impact perception of risk.

A third limitation is generalizing these results and determining how relevant they are to a regulated environment. While this study was able to determine cause and effect, there are numerous other factors (e.g., family history of smoking related disease, the Surgeon General's warning, etc.) that should be taken into account when determining how individuals determine the risks of smoking. It is important to consider that, with such a subtle manipulation in a web-based context, it is likely that the effects of regulation information could have an even larger effect outside of the experimental environment. A fourth limitation is the results were marginally significant or null, indicating that Type II

error could be a factor. There was an emerging pattern for the no regulation condition, so an increase of power may help to better determine the effects of regulation.

Finally, it is important to note the many ways risk perception may be measured. Future studies should explore other measurements of risk in order to determine how regulation may influence perception. This study examined one aspect of the TRA; belief expectancy and value. More components of this model should be measured in order to determine the influence of information on smoking behavior. While the dangers of smoking are well documented, this study demonstrates that regulation information may influence individuals' perceptions of health outcome expectancy and value. Though this study centered on these two components of attitude, according to TRA, changes caused by regulation could have lasting effects on public health through attitudes and behavioral intentions.

References

Ajzen, I., & Fishbein, M. (1980). *Understanding Attitudes and Predicting Social Behavior*. Upper Saddle River, NJ: Prentice-Hall, Inc.

Bates, B. R., Romina, S., Ahmed, R., & Hopson, D. (2006). The effect of source credibility on consumers' perceptions of the quality of health information on the Internet. *Medical Informatics and the Internet in Medicine, 31*(1), 45-52.

Cacioppo, J. T., Petty, R. E., & Sidera, J. (1982). The effects of salient self-schema on the evaluation of proattitudinal editorials: Top-down versus bottom-up message processing. *Journal of Experimental Social Psychology, 18*, 324-338.

Centers for Disease Control and Prevention. Annual smoking-attributable mortality years of potential life lost and productivity losses- United States 1997-2001 (2005). MMWR July 1, 2005; 54(25); 625-628. Retrieved August 31, 2007 from http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5425a1.htm.

Centers for Disease Control and Prevention. Cigarette Smoking Among Adults- United States 2006 (2007). MMWR November 9, 2007; 56 (44); 1157-1161. Retrieved April, 6, 2008 from http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5644a2.htm.

Chanley, V. A., Rudolph, T. J., & Rahn, W. M. (2000). The origins and consequences of public trust in government: A time series analysis. *Public Opinion Quarterly, 64*, 239-256.

Chapman, S. (2008). Benefits and risks in ending regulatory exceptionalism for tobacco. *Tobacco Control, 17*, 73-74.

Dodge, T., & Kaufman, A. (2007). What Makes Consumers Think Dietary Supplements are Safe and Effective? The Role of Disclaimers and FDA Approval. *Health Psychology, 26*(4), 513-517.

Everett, S. A., Husten, C. G., Kann, L., Warren, C. W., Sharp, D., & Crossett, L. (1999). Smoking initiation and smoking patterns among U.S. college students. *Journal of American College Health, 48,* 55-60.

Family Smoking Prevention and Tobacco Control Act (2007). *110th Congress, S.625.IS*. Retrieved June 6, 2008 from http://thomas.loc.gov/cgi-bin/query/z?c110:S.625:.

Fishbein, M., & Ajzen, I. (1975). *Belief, Attitude, Intention, and Behavior: An Introduction to Theory and Research*. Reading, MA: Addison-Wesley.

Fishbein, M., & Ajzen, I. (1981). Acceptance, yielding and impact: Cognitive processes in persuasion. In R. E. Petty, T. M. Ostrom & T. D. Brock (Eds.), *Cognitive responses in persuasion* (pp. 339-359). Hillsdale, NJ: Lawrence Erlbaum Associates.

Food and Drug Administration Modernization Act of 1997 (1997). *105th Congress S. 830*. Retrieved June 14, 2008 from http://www.fda.gov/CDER/guidance/105-115.htm.

Godin, G., Valois, P., Lepage, L., & Desharnais, R. (1992). Predictors of smoking behaviour: An application of Ajzen's theory of planned behaviour. *British Journal of Addiction, 87*(9), 1335-1343.

Gosling, S. D., Vazire, S., Srivastava, S., & John, O. P. (2004). Should we trust web-based studies? A comparative analysis of six preconceptions about internet questionnaires. *American Psychologist, 59*(2), 93-104.

Guttman, N., Boccher-Lattimore, D., & Salmon, C. T. (1998). Credibility of information from official sources on HIV/AIDS transmission. *Public Health Reports, 113*(5), 465.

Guttman, N., & Peleg, H. (2003). Public preferences for an attribution to government or to medical research versus unattributed messages in cigarette warning labels in Israel. *Health Communication, 15*(1), 1-25.

Hanson, M. J. S. (1999). Cross-cultural study of beliefs about smoking among teenaged females *Western Journal of Nursing Research, 21*(5), 635-651.

Hyland, M., & Birrell, J. (1979). Government health warnings and the "boomerang" effect. *Psychological Reports, 44*(2), 643-647.

Jaccard, J., & Davidson, A. R. (1972). Toward an understanding of family planning behaviors: An initial investigation. *Journal of Applied Social Psychology, 2*(3), 228-235.

Jaccard , J., Hand, D., Ku, L., Richardson, K., & Abella, R. (1981). Attitudes toward male oral contraceptives: Implications for models of the relationship between beliefs and attitudes. *Journal of Applied Social Psychology, 11*(3), 181-191.

Kahle, L. R., & Berman, J. J. (1979). Attitudes cause behaviors: A cross-lagged panel analysis. *Journal of Personality and Social Psychology, 37*(3), 315-321.

Kaufman, A., Waters, E., Augustson, E., Parascandola, M., Bansal-Travers, M., Hyland, A., Cummings, K.M. (2009). *Food and Drug Administration evaluation of cigarettes and cigarette smoking risk beliefs: Does evaluation imply less risk?* Manuscript to be submitted for publication.

Keele, L. (2007). Social capital and the dynamics of trust in government. *American Journal of Political Science, 51*(2), 241-524.

Kozlowski, L. T. (2008). The proposed tobacco regulation: The triumph of hope over experience? *Tobacco Control, 17*(2), 74-75.

Lawler, E. E. (1968). A correlational-causal analysis of the relationship between expectancy attitudes and job performance. *Journal of Applied Psychology, 52,* 462-468.

Lewin, K. (1943). Defining the 'field at a given time.' *Psychological Review, 50*(3), 292-310.

MacCallum, R. C., Zhang, S. Z., Preacher, K. J., & Rucker D. D. (2002). On the practice of dichotomization of quantitative variables. *Psychological Methods, 7*(1), 19-40.

Mahler, H. I. M., Kulik, J. A., Gerrard, M., & Gibbons, F. X. (2007). Long-term effects of appearance-based interventions on sun protection behaviors. *Health Psychology 26*(3), 350-360.

McClelland, G.H., & Judd, C.M. (1993). Statistical difficulties of detecting interactions and

moderator effects. *Psychological Bulletin, 114,* 376-390.

O'Callaghan, F. V., Callan, V. J., & Baglioni, A. (1999). Cigarette use by adolescents: attitude-behavior relationships. *Substance Use and Misuse, 34*(3), 455-468.

O'Connor, R. J., Ashare, R. L., Fix, B. V., Hawk, L. W., Cummings, M., & Schmidt, W. C. (2007). College students' expectancies for light cigarettes and potential reduced exposure products. *American Journal of Health Behavior, 31*(4), 402-410.

Rogers, R. W., Deckner, C. W., & Mewborn, C. R. (1978). An expectancy-value theory approach to the long-term modification of smoking behavior. *Journal of Clinical Psychology, 34*(2), 562-566.

Rosenberg, M. J. (1956). Cognitive structure and attitudinal affect. *The Journal of Abnormal and Social Psychology 53*(3), 367-372.

Shiffman, S., Pillitteri, J. L., Burton, S. L., Rohay, J. M., & Gitchell, J. G. (2001). Effect of health messages about "Light" and "Ultra Light" cigarettes on beliefs and quitting intent. *Tobacco Control, 10*(Suppl 1), i24-32.

Slovic, P. (2000). Perception of Risk. In P. Slovic (Ed.), *The Perception of Risk* (220-231). London, Earthscan Publications Ltd

Smith, B. N., Bean, M. K., Mitchell, K. S., Speizer, I. S., & Fries, E. A. (2007). Psychosocial factors associated with non-smoking adolescents' intentions to smoke. *Health Education Research, 22*(2), 238-247.

Substance Abuse and Mental Health Services Administration (2004). *Results from the 2003 National Survey on Drug Use and Health: National Findings* (Office of Applied Studies, NSDUH Series H–25, DHHS Publication No. SMA 04–3964. Rockville, MD).

Sutton, S. R., Marsh, A., & Matheson, J. (1991). Microanalysis of smokers' beliefs about the consequences of quitting: Results from a large population sample. *Journal of Applied Social Psychology, 20,* 1847-1862.

ter Doest, L., Dijkstra, A., Gebhardt, W. A., & Vitale, S. (2007). Cognitions about smoking and not smoking in adolescence. *Health Education and Behavior* (epub ahead of print).

Tuakli, N., Smith, M. A., & Heaton, C. (1990). Smoking in adolescence: Methods for health education and smoking cessation: A MIRNET study. *The Journal of Family Practice, 31*(4), 369-374.

U.S. Department of Health and Human Services. *The health consequences of smoking: A report of the Surgeon General.* Atlanta, GA: Dept of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office of Smoking and Health; Washington, D.C.: For sale by the Supt of Docs., U.S. G.P.O., 2004.

U.S. Department of Health and Human Services. *The health consequences of involuntary exposure to tobacco smoke: A report of the Surgeon General*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, Coordinating Center for Health Promotion, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 2006.

Umstattd, M. R., & Hallam, J. (2007). Older adults' exercise behavior: Roles of selected constructs of social-cognitive theory. *Journal of Aging and Physical Activity, 15*(2), 206-218.

van Harreveld, F., van der Pligt, J., & de Vries, N. K. (1999). Attitudes towards smoking and the subjective importance of attributes: Implications for changing risk-benefit ratios. *Swiss Journal of Psychology*, *58*(2), 65-72.

Vroom, V. H. (1964). *Work and Motivation*. New York: Wiley.

Wechsler, H., Rigotti, N. A., Gledhill-Hoyt, J., & Lee, H. (1998). Increased levels of cigarette use among college students. *Journal of the American Medical Association, 280*, 1673-1678.

Williams, D. M., Anderson, E. S., & Winett, R. A. (2005). A review of the outcome expectancy construct in physical activity research. *Annals of Behavioral Medicine, 29*(1), 70-79.

Appendices

Appendix A

Product Descriptions

FDA Regulation

A new cigarette* will be available on the market across the United States next month. This cigarette is made using the finest, premium-grade tobacco specially selected by tobacco leaf experts. With a unique blend of flue-cured, burley and exotic tobaccos, nothing tastes like this product- making it a unique and great tasting cigarette.

The technology of the innovative filter offers a smooth taste and slow burn, making the cigarette last longer than all other products. This new cigarette offers premium quality combined with smooth smoking satisfaction. Discover the fresh and exciting flavor of this new cigarette, available nationwide next month.

*This new cigarette will be regulated by the United States Food and Drug Administration (FDA).

Non-FDA Regulation

A new cigarette* will be available on the market across the United States next month. This cigarette is made using the finest, premium-grade tobacco specially selected by tobacco leaf experts. With a unique blend of flue-cured, burley and exotic tobaccos, nothing tastes like this product- making it a unique and great tasting cigarette.

The technology of the innovative filter offers a smooth taste and slow burn, making the cigarette last longer than all other products. This new cigarette offers premium quality

combined with smooth smoking satisfaction. Discover the fresh and exciting flavor of this new cigarette, available nationwide next month.

*This new cigarette will not be regulated by the United States Food and Drug Administration (FDA).

Control Condition

A new cigarette will be available on the market across the United States next month. This cigarette is made using the finest, premium-grade tobacco specially selected by tobacco leaf experts. With a unique blend of flue-cured, burley and exotic tobaccos, nothing tastes like this product- making it a unique and great tasting cigarette.

The technology of the innovative filter offers a smooth taste and slow burn, making the cigarette last longer than all other products. This new cigarette offers premium quality combined with smooth smoking satisfaction. Discover the fresh and exciting flavor of this new cigarette, available nationwide next month.

Appendix B

Measures

Expertise

When it comes to the FDA's ability to regulate cigarettes, the FDA is…

Not at all Competent _____ : _____ : _____ : _____ : _____ : _____ : _____ Extremely Competent

Not at all Expert _____ : _____ : _____ : _____ : _____ : _____ : _____ Extremely Expert

Not at all Knowledgeable _____ : _____ : _____ : _____ : _____ : _____ : _____ Extremely Knowledgeable

Not at all Qualified _____ : _____ : _____ : _____ : _____ : _____ : _____ Extremely Qualified

Manipulation Check

Please check the disclaimer that was present on the description you just read:

____ This new cigarette will be regulated by the United States Food and Drug Administration (FDA).

____ This new cigarette will not be regulated by the United States Food and Drug Administration (FDA).

____ There was no claim on the description I just read.

Expectancy Beliefs

1. How likely do you think it is that smoking the cigarettes described will result in smelling bad (such as one's clothes, breath, etc.)?

0	1	2	3	4	5	6	7	8	9
not at all likely			somewhat likely			quite likely			extremely likely

2. How likely do you think it is that smoking the cigarettes described will result in respiratory problems (such as coughing, shortness of breath, asthma, etc.)?

0	1	2	3	4	5	6	7	8	9
not at all likely			somewhat likely			quite likely			extremely likely

3. How likely do you think it is that smoking the cigarettes described will result in harm to one's teeth (such as discoloration, rotting, etc.)?

0	1	2	3	4	5	6	7	8	9
not at all likely			somewhat likely			quite likely			extremely likely

4. How likely do you think it is that smoking the cigarettes described will be expensive?

0	1	2	3	4	5	6	7	8	9
not at all likely			somewhat likely			quite likely			extremely likely

5. How likely do you think it is that smoking the cigarettes described will result in lung cancer?

0	1	2	3	4	5	6	7	8	9
not at all likely			somewhat likely			quite likely			extremely likely

6. How likely do you think it is that smoking the cigarettes described will result in cancer, other than lung cancer?

0	1	2	3	4	5	6	7	8	9
not at all likely			somewhat likely			quite likely			extremely likely

7. How likely do you think it is that smoking the cigarettes described will result in other health problems?

0	1	2	3	4	5	6	7	8	9
not at all likely			somewhat likely			quite likely			extremely likely

Value Beliefs

1. How good or bad would it be if smelling bad (including one's clothes, breath, etc.) was a result of smoking the cigarettes described?

extremely bad	very bad	moderately bad	slightly bad	neither bad nor good	slightly good	moderately good	very good	extremely good

2. How good or bad would it be if respiratory problems (such as coughing, shortness of breath, asthma, etc.) were a result of smoking the cigarettes described?

extremely bad	very bad	moderately bad	slightly bad	neither bad nor good	slightly good	moderately good	very good	extremely good

3. How good or bad would it be if harm to one's teeth (such as discoloration and rotting) was a result of smoking the cigarettes described?

extremely bad	very bad	moderately bad	slightly bad	neither bad nor good	slightly good	moderately good	very good	extremely good

4. How good or bad would it be if smoking the cigarettes described was expensive?

extremely bad	very bad	moderately bad	slightly bad	neither bad nor good	slightly good	moderately good	very good	extremely good

5. How good or bad would it be if lung cancer was a result of smoking the cigarettes described?

extremely bad	very bad	moderately bad	slightly bad	neither bad nor good	slightly good	moderately good	very good	extremely good

6. How good or bad would it be if cancer, other than lung cancer, was a result of smoking the cigarettes described?

extremely bad	very bad	moderately bad	slightly bad	neither bad nor good	slightly good	moderately good	very good	extremely good

7. How good or bad would it be if other health problems were a result of smoking the cigarettes described?

extremely bad	very bad	moderately bad	slightly bad	neither bad nor good	slightly good	moderately good	very good	extremely good

Personal Information

Instructions: It is essential to the scientific integrity of this study that you answer the following questions honestly. You will receive credit for your participation in this study regardless of your answers. We appreciate your honesty.

Have you smoked at least 100 cigarettes in your entire life? (Note: 100 cigarettes = approximately 5 packs in the United States)

____ Yes
____ No

What is your gender? ____male ____female

What is your year in school?

____ freshman ____ sophomore ____ junior ____ senior

____ Other (specify):_____

Which of the following best describes your racial/ ethnic background?

____ African American or Black
____ Asian
____ Latino or Hispanic
____ White or Caucasian
____ Middle Eastern
____ Native American or American Indian
____ Other (please specify): _____

What is your age? _____ years

Appendix C

Debriefing Information

Thank you for having participated in this research study. There is information about the study and its purpose that we would like to share with you.

The purpose of this study was to better understand how cigarette regulations influence consumer's beliefs about cigarettes. There were several different versions of the advertisements. Each of the versions allowed us to examine how FDA regulation influences beliefs about cigarettes. Currently, there is no regulation of tobacco products in the U.S.

Your participation in this study will help us further our understanding of consumer knowledge and perceptions of regulations of cigarettes.

One of the reasons we have done this study with college students is because some begin smoking while in college and the tobacco companies often target advertisements at college students. Cigarettes are highly addicting and quitting smoking is extremely challenging. So we feel it is important that college students be aware both that they are being targeted by tobacco companies and that avoiding smoking is very important.

If you have any questions about the study or wish to discuss the study in more detail, please feel free to contact Annette Kaufman during the workday at 202-994-3984. Thank you!

Table 1. Variable Scale Means and Standard Deviations

Measure (n)	M (SD)	Range
FDA Expertise (285)	3.97 (1.32)	1-7
<u>Expectancy Items</u>		0-9
Respiratory (284)	8.05 (1.68)	
Teeth Harm (285)	7.88 (1.71)	
Lung Cancer (285)	7.40 (1.85)	
Cancer (284)	6.45 (2.21)	
General Health (283)	7.60 (1.89)	
Smell (285)	7.47 (2.07)	
Expensive (283)	7.91 (1.61)	
<u>Expectancy Scales</u>		
Expectancy Health Scale (281)	7.47 (1.63)	0-9
Median Split Expectancy Health Scale (281)	1.52 (.50)	1-2
Expectancy Non-Health Scale (283)	7.69 (1.56)	0-9
Median Split Expectancy Non-Health Scale (283)	1.57 (.50)	1-2
<u>Value Items</u>		1-9
Respiratory (285)	1.56 (1.03)	
Teeth Harm (285)	1.84 (1.24)	
Lung Cancer (283)	1.31 (.93)	
Cancer (285)	1.27 (.75)	
General Health (285)	1.37 (.90)	
Smell (285)	2.21 (1.33)	
Expensive (284)	3.26 (2.26)	
<u>Value Scales</u>		
Value Health Scale (283)	1.47 (.84)	1-9
Median Split Value Health Scale (283)	1.50 (.50)	1-2
Value Non-Health Scale (284)	2.73 (1.49)	1-9
Median Split Value Non-Health Scale (284)	1.44 (.50)	1-2

Table 2. Intercorrelations Among Expectancy Belief Items

Variable	1	2	3	4	5	6
1.Respiratory	--					
2.Teeth Harm	.86**	--				
3.Lung Cancer	.68**	.66**	--			
4.Cancer	.57**	.59**	.75**	--		
5.General Health	.72**	.74**	.67**	.74**	--	
6.Smell	.64**	.65**	.45**	.38**	.51**	--
7.Expensive	.50**	.52**	.45**	.35**	.38**	.44**

** $p<.01$

Table 3. Intercorrelations Among Value Belief Items

Variable	1	2	3	4	5	6
1.Respiratory	--					
2.Teeth	.76**	--				
3.Lung Cancer	.69**	.48**	--			
4.Cancer	.69**	.52**	.92**	--		
5.General Health	.73**	.58**	.87**	.89**	--	
6.Smell	.66**	.69**	.41**	.44**	.51**	--
7.Expensive	.30**	.31**	.24**	.24**	.26**	.34**

** $p<.01$

Table 4. Intercorrelations of Study Scales

Variable	1	2	3	4	5
1. Health Expectancy	(.92)	-	-	-	-
2. Non-Health Expectancy	.43**	(.60)	-	-	-
3. Health Value	-.32**	-.26**	(.91)	-	-
4. Non-Health Value	-.12**	-.28**	.43**	(.46)	
5. FDA Expertise	.07	-.04	.05	.06	(.87)

** *p<.01*

Note. Cronbach's alpha for scale shown in parentheses.
Note. Expectancy and value scale correlations based on median split.

Table 5. Means and Standard Deviations for Study Scales Based on Median Split by Condition

Measure	FDA Regulation M (SD)	Non-FDA Regulation M (SD)	Control M (SD)
Expectancy Health Scale	1.49 (.50)	1.60 (.49)	1.48 (.50)
Value Health Scale	1.50 (.50)	1.44 (.50)	1.56 (.50)
Expectancy Non-Health Scale	1.55 (.50)	1.61 (.49)	1.56 (.50)
Value Non-Health Scale	1.46 (.50)	1.44 (.50)	1.42 (.50)

Table 6. Moderating Effect of FDA Expertise on FDA Regulation Information and Expectancy of Negative Health Outcomes

Variable	Type III Sum of Squares	df	Mean Square	F	p-value
Condition	.87	2	.43	1.76	.17
FDA Expertise	.38	1	.38	1.54	.22
Condition * FDA Expertise	1.37	2	.68	2.78	.06

Figure 1.

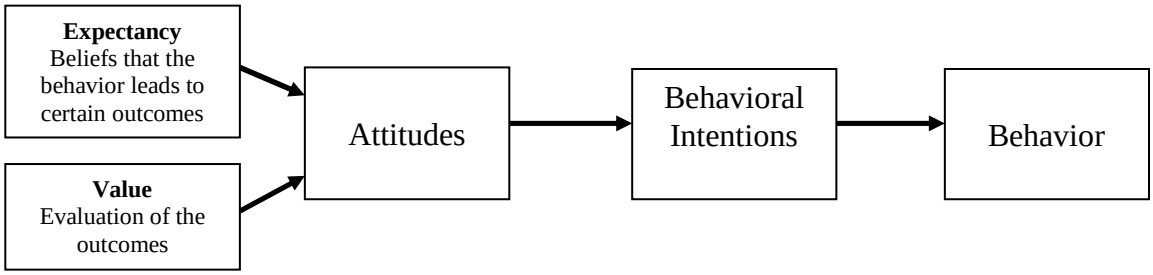

Expectancy
Beliefs that the behavior leads to certain outcomes
Value
Evaluation of the outcomes
Attitudes
Behavioral Intentions
Behavior

Figure 2.

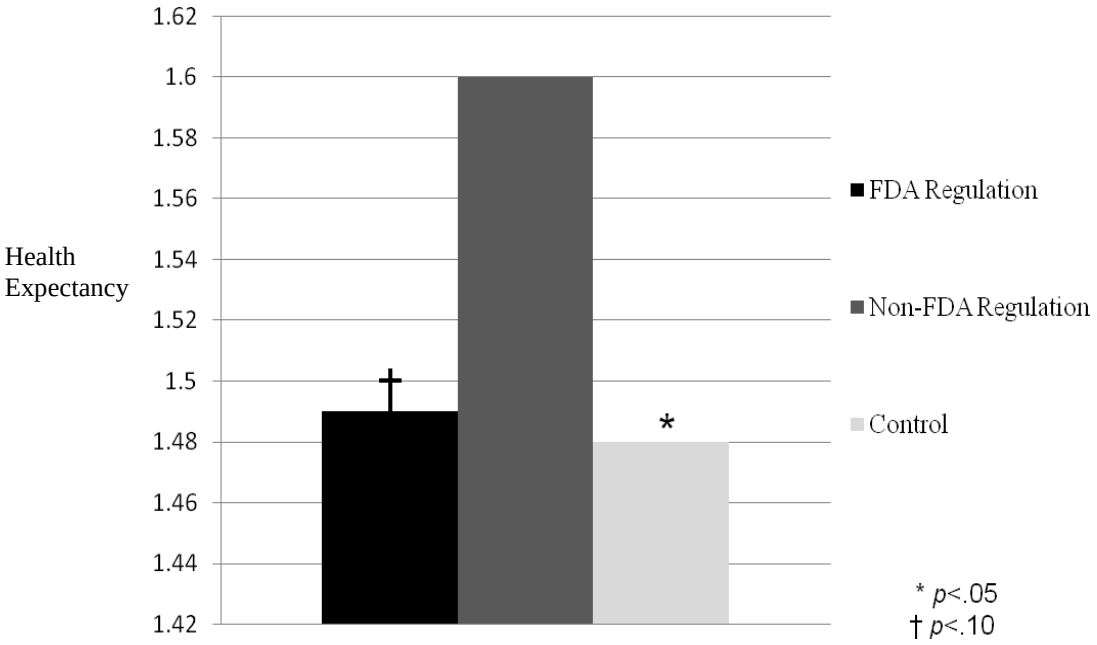

Health Expectancy
1.62
1.6
1.58
1.56
1.54
1.52
1.5
1.48
1.46
1.44
1.42
†
*
FDA Regulation
Non-FDA Regulation
Control
* p<.05
† p<.10

Figure 3.

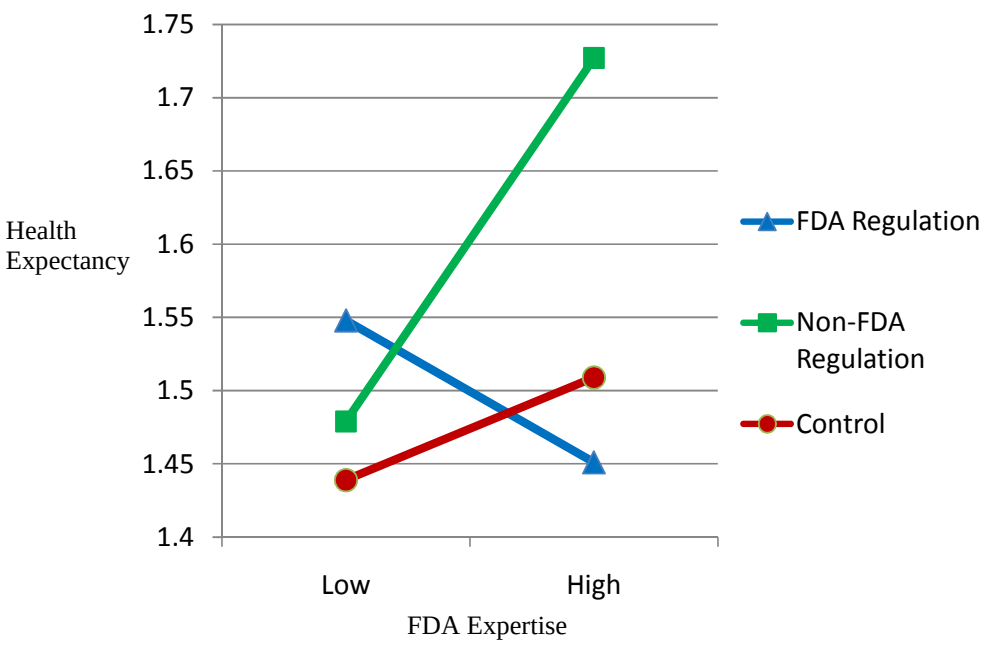
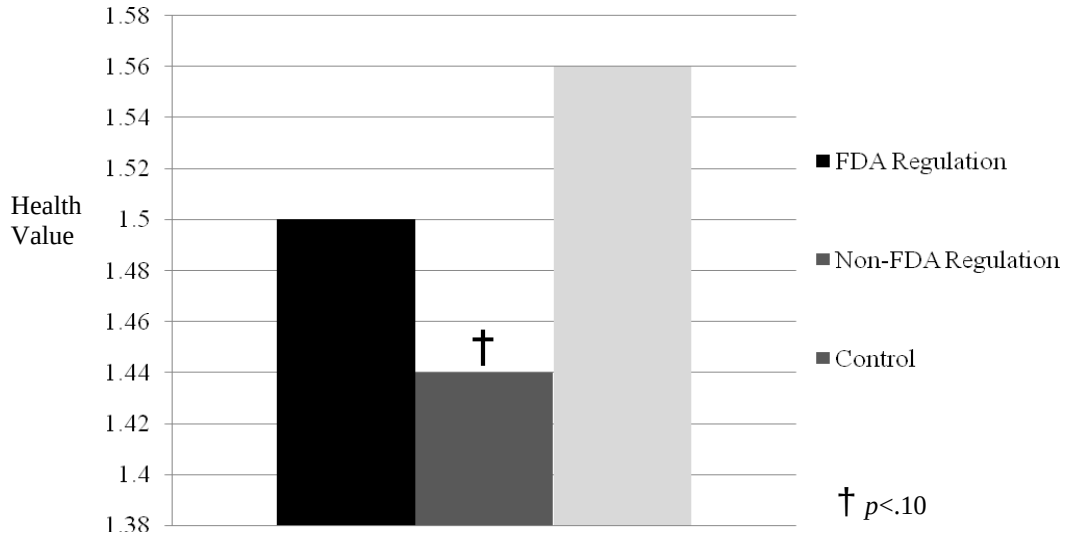

1.75
1.7
1.65
1.6
1.55
1.5
1.45
1.4
Health Expectancy
Low
High
FDA Expertise
FDA Regulation
Non-FDA Regulation
Control

Figure 4.


1.58
1.56
1.54
1.52
1.5
1.48
1.46
1.44
1.42
1.4
1.38
Health Value
†
FDA Regulation
Non-FDA Regulation
Control
† p<.10