

The Impact of Source, Channel, and Theme
on Receptivity to Tobacco Control Messages

Jessica M. Pikowski

A thesis submitted to the faculty of the University of North Carolina at Chapel Hill in partial fulfillment of the requirements for the degree of Master of Arts in the School of Journalism Interdisciplinary Health Communication curriculum.

Chapel Hill
2017

Approved by:

Allison Lazard

Seth M. Noar

Paschal Sheeran

© 2017
Jessica M. Pikowski
ALL RIGHTS RESERVED

ABSTRACT

Jessica Pikowski: The Impact of Source, Channel, and Theme
on Receptivity to Tobacco Control Messages
(Under the direction of Allison Lazard)

Mass media campaigns can effectively promote quitting and reduce smoking prevalence. However, questions remain about specific message components that make campaign messages most effective. This experimental research investigated the impact of message channel, source, and theme on the credibility and perceived effectiveness of tobacco control messages.

We conducted two experiments to test tobacco control messages among U.S. adults. The first experiment used message channel and message source as between-subjects factors, and message theme as within-subjects factors. Outcome measures included source credibility, message believability, perceived effectiveness, and attitudes towards the message. The second experiment used only message source and theme as between-subject factors. Outcome measures included message believability and perceived effectiveness.

Results suggest that the theme of a tobacco control message has a greater impact than source or channel on the evaluations of a message. Future tobacco control media campaigns may utilize this research to maximally impact message outcomes.

ACKNOWLEDGEMENTS

I would like to sincerely thank Allison Lazard, my committee chair, for her patience, support, and motivation through every step of this project. Her guidance on decisions and willingness to help whenever I had a question about my research or writing is what made this project possible. I would also like to thank my committee members, Dr. Seth M. Noar and Dr. Paschal Sheeran, for their subject and research expertise, their insightful comments, and their overall support.

Lastly, I would like to thank Adam Goldstein, Kristen Jarman, Marcy Boynton, Tara Queen, and the rest of the team at the The University of North Carolina Tobacco Prevention and Evaluation Program (TPEP), housed in the UNC Department of Family Medicine, for their constant encouragement and for graciously allowing me to collect data through their survey for the second part of this study.

TABLE OF CONTENTS

I. LIST OF TABLES.....	vii
II. LIST OF FIGURES.....	viii
III. INTRODUCTION.....	2
IV. LITERATURE REVIEW, RESEARCH QUESTIONS, & HYPOTHESES.....	3
V. METHODS (STUDY 1)	11
VI. RESULTS (STUDY 1)	17
VII. METHODS (STUDY 2)	20
VIII. RESULTS (STUDY 2)	23
X. DISCUSSION	25
XI. LIMITATIONS & FUTURE RESEARCH.....	27
XII. APPENDIX A: STIMULI (STUDY 1)	30
XIII. APPENDIX B: QUESTIONNAIRE (STUDY 1)	31
XIV. APPENDIX C: QUESTIONNAIRE (STUDY 2)	33
XV. REFERENCES.....	35

LIST OF TABLES

Table 1 – Message Conditions	13
Table 2 – Main Effects for Channel	18
Table 3 – Main Effects for Source	19
Table 4 – Repeated Measures Across Themes	20
Table 5– Logistic Regression Results	24

LIST OF FIGURES

Figure 1 – Study 1 Message Design	29
---	----

INTRODUCTION

Tobacco use remains the leading preventable cause of death in the United States, responsible for an estimated 480,000 deaths each year (Center for Disease Control and Prevention, 2015). Further, smoking-related illness results in more than \$300 billion in annual costs for the nation (CDC, 2015). While cigarette smoking rates have significantly declined since the Surgeon General's landmark report in 1964, approximately 36 million Americans still smoke and more than 16 million live with a smoking-related disease (CDC, 2015). For this reason, continued efforts to prevent and reduce tobacco use at a more rapid rate are necessary.

Mass media campaigns have increasingly become an effective way to reduce overall tobacco use, especially among youth and young adults (US Department of Health and Human Services, 2012). Able to reach wide-spread audiences, they not only have the ability to influence individual decision making, but can also shift social norms and increase the likelihood of tobacco control policy change. Research shows that these population-level campaigns are effective in both preventing initiation of smoking (Pierce, White, & Emery, 2012) and increasing the amount of smokers who quit (see Durkin, Brennan, & Wakefield, 2012 for a review). Additionally, the effects of mass media campaigns on tobacco use are proven to be more numerous than for any other health-related issue (Wakefield, 2010).

When designing an effective mass media campaign, however, there are many things to consider, one of the most fundamental being credibility. With the ability to impact how audiences process and evaluate information, an audience members' perception of credibility can be a critical aspect of the persuasiveness of a message. When a message is perceived as highly

credible, it becomes more effective at changing a person's attitudes or behavior (Sternthal, Phillips & Dholakia, 1978; Goldsmith, Lafferty, & Newell, 2000). Conversely, if the message is not perceived as credible, it can interfere with the desired effects of the message or campaign. How an audience member perceives the credibility of a message can depend on a variety of factors, including who says the message, where the message is said, and what the message says (Metzger et al., 2013). Therefore, the purpose of this study is to uncover how to best optimize perceived credibility for tobacco control messages.

We use the United States Food and Drug Administration (FDA) as an example of a national organization that develops and disseminates such tobacco control campaigns. In 2009, the FDA was granted authority under the Family Smoking Prevention and Tobacco Control Act to regulate the manufacturing, distribution, and marketing of tobacco products, leading to the development of their very first national tobacco control campaign, *The Real Cost* (Duke et al., 2015). Given that regulating tobacco is a relatively new role for the FDA, it is important that they gain a better understanding of how the public views the credibility of their messages, as this information can inform the future development of tobacco control campaigns.

To address this, we conducted two separate experiments. The first experiment used an online national convenience sample, and assessed how different sources (The FDA, *The Real Cost*, or both), channels (social media, website, or print ad), and message themes (health effects, addiction, or chemicals) affect audience perceptions of source credibility, message believability, and message effectiveness, as well as attitudes towards the message and intentions to consider and share the message. The second experiment, replicated the aspects of the first study with a larger and more diverse audience, a national probability phone sample, to assess how different

sources and message themes affect audience perceptions of message believability and message effectiveness.

Literature Review

Credibility as a method of persuasion dates back to all the way to when the ancient Greek philosopher Aristotle argued that persuasion could be divided into three categories: ethos (credibility), pathos (emotion) and logos (logic). According to him, ethos, which implies the communicator's knowledge of the message, moral authority and expressed goodwill, plays the most important role in influencing audiences thoughts and beliefs (Umeogu, 2012). Centuries later, communication scholars began to study the effects of ethos, or credibility, mainly in relation to the source of the message. However, credibility was eventually separated into three distinct concepts: source credibility, which refers to perceptions of who communicates the message (Hovland, Janis, & Kelley, 1953); media credibility, which refers to the believability of the channel or platform the information comes from (e.g. television, website, etc.); and message credibility, which refers to the believability of the content of the message itself (Metzger et al., 2003). Despite often being treated as distinct concepts in research, all three have the ability to influence perceptions of a message.

Source Credibility

Defined as "judgments made by a perceiver concerning the believability of a communicator," source credibility not only has the ability to affect how audiences receive and process messages, but also typically can affect message persuasion, making it an important consideration in message design (O'Keefe, 1990, pp.130-131). In early research, source credibility was broken down into two constructs: expertise and trustworthiness (Hovland, Janis,

& Kelley, 1953; McCroskey, 1966). Perceived expertise is defined as the extent to which the source is viewed as an expert on the topic, and perceived trustworthiness is defined as how honest and believable an audience feels the source is (Hovland, Janis, & Kelley, 1953). While other secondary dimensions of source credibility, such as dynamism, composure, and socialability have also been tested (Berlo, Lemert, & Mertz, 1969; Gass & Seiter, 1999; Jurma 1981; Whitehead 1968), trustworthiness and expertise “remain the most frequently cited, tested, and theoretically agreed upon dimensions” of source credibility (Schmidt, Ranney, Pepper, & Goldstein, 2016 p. 3).

Over the years, empirical research has consistently shown that as source credibility increases, so does the persuasiveness of the message. (see Pornpitakpan, 2004 for a review). In one of the very first studies to test this, Hovland and Weiss (1951) gave some high school students’ articles attributed to a high credible source, and others articles attributed to a low credible source. Despite the fact that articles with the same topic were exactly the same in terms of content, students rated articles with the high credible source much more positively, even rating them as having stronger arguments (Hovland and Weiss, 1951). Since then, research has continued to confirm the assumption that credible sources tend to result in the desired impact on the audience (Gotlieb, Gwinner, and Schlacter, 1987; Jain & Posavac, 2001; McCroskey et al., 1974).

In the area of tobacco control communication, there is also some evidence that higher source credibility can increase persuasion. One study found that as the credibility of the source of tobacco messages increased from low to high, the percentage of participants trusting and agreeing with the information also increased (Zagona & Harter, 1966). Another study found that negative reactions towards graphic visual warnings on cigarette packs were generated by the lack

of credibility of some of the messages (Gallopel-Morvan, Gabriel, Le Gall-Ely, Rieunier & Urien, 2011). However, results have sometimes been mixed. Another study found that source of lung cancer prevention messages did not have a significant effect on consumers' evaluations of the quality of the information (Bates, Romina, & Hopson, 2006).

Organizations as Sources

While much prior research on source credibility has been studied in the context of individuals, it is important to note that these conclusions can also be applied to organizations as sources (Haley, 1996). The idea of organizations as sources suggests that the source of the message is not an individual person, but rather “a complex institutional structure with a history or experience and information to which the public has already been exposed” (Metzger et al., 2003, p. 299). Similar to the credibility of an individual communicator, the credibility of an organization can directly influence consumers' attitudes toward a brand and purchase intentions (Goldsmith, Lafferty, & Newell, 2000).

Organizational source credibility has been widely studied in the area of communication (Hammond, 1987; Goldsmith et al., 2000; Lafferty & Goldsmith, 1999; Wathen & Burkell, 2002). Previous studies have shown that when it comes to health information, non-profits are perceived as more highly credible than for-profit organizations, which leads to greater behavioral intentions (Hammond, 1987). Additionally, messages are perceived as more credible if they came from a government entity than from a local news or industry source (McComas & Trumbo, 2001). A recent survey found that while only 19% of respondents reported trusting the government in Washington to do what is right, 62% held favorable views of workers at federal government agencies, like the FDA or the CDC (Pew Research Center, 2013). All of these findings illustrate source credibility as a promising factor in increasing behavior change in health

communication, as many of these messages come from federal government agencies or non-profit organizations, like the FDA.

The FDA has also been studied in the context of its source credibility as an organization. A previous study about regulation of cold medicine found that parents who trusted the FDA were more likely to follow their recommendations (Hammond, 1987). Another recent study found that a majority of adults, both smokers and nonsmokers, believed that the FDA can effectively regulate tobacco products (Boynton et al., 2016). While this shows promise for the FDA, studies have not yet looked at how audiences perceive the organization as a source of tobacco control messages. Therefore, this study will investigate the differences in perceived source credibility and message perceptions across tobacco control messages.

The FDA's first tobacco-focused public education campaign, branded as *The Real Cost*, was launched in 2014 across multiple media outlets (Duke, 2015). While this campaign is funded by the FDA, many of *The Real Cost* messages do not clearly indicate that the FDA is the source of such messages. Instead they use the campaign brand, *The Real Cost*, as the main source. While general trust in the federal government is low, most U.S. adults have favorable opinions of the FDA (Boynton et al., 2016; Pew Research Center, 2013). Therefore, identifying the FDA as the source of such messages may help to increase credibility and message perceptions. This study will specifically compare the differences between having the FDA as the source, *The Real Cost* as the source, or a combination of both for tobacco control messages.

H1: The FDA will be perceived as a more credible source than *The Real Cost*.

H2: Messages with the FDA as the source will yield more positive message perceptions than messages with *The Real Cost* as the source.

RQ1: Will the combined source (The FDA and *The Real Cost*) (a) be perceived as more credible and (b) yield more positive message perceptions than either the FDA source or *The Real Cost*?

Medium Credibility

Medium or media credibility is most often defined as the believability of information from different platforms, such as television, newspapers, or the Internet. Distinct from source credibility, which focuses on the believability of an “internal source” (an individual, organization, institution, etc.), medium credibility focuses on the “external source,” or the channel used to transmit the message (Gaziano & McGrath, 1986; Sundar & Nass, 2001). In the very first study to examine the credibility of different channels, Westley and Severin (1964) found that television news was perceived as more accurate than print news. Research following this study generated similar results, consistently finding television more credible as a medium than newspapers (Abel & Wirth, 1977; Gaziano & McGrath, 1986; Jacobson, 1969; Major and Atwood, 1997; Newhagen and Nass, 1989).

With the rise of the use of the Internet, especially for health information, many organizations have begun to utilize different online platforms to disseminate campaign messages (Pew Research Center, 2013). Because of this, many studies have now examined the credibility of the Internet compared to more traditional channels (Sundar & Nass, 2001; Flanagin & Metzger, 2000; Johnson & Kaye, 1998; Eastin et al., 2001). Most of this research shows a rise in perceived credibility for online sources. For example, Flanagin & Metzger (2000) found that people perceived online information to be as credible as that obtained from traditional media such as television, radio, and magazines, but not as credible as newspaper information. Additionally, Johnson and Kaye (1998) found that online media was judged as more credible

than traditional media. However, no studies to date have looked at media credibility in the context of tobacco control messages. Given that the FDA in particular utilizes a variety of traditional and online media platforms to distribute messages for its' tobacco control campaigns, and that 73% of teens and 90% of young adults currently use online social network sites (Pew Research Center, 2015), it becomes important for them to understand which of these media channels are perceived as more credible among audiences and whether or not this credibility is affecting their overall credibility as a source.

H3: Messages presented online (social media & website) will be (a) perceived as having more source credibility and will (b) yield more positive message perceptions than messages presented as a print ad.

RQ2: Will messages presented on social media be (a) perceived as having more source credibility and (b) yield more positive message perceptions than messages presented on a website?

Message Credibility

Message credibility is defined as an individual's judgment of the content of the message itself (Appelman & Sundar, 2015). Alongside source credibility and medium credibility, message credibility has the potential to play a crucial role in the persuasion process. Previous research has found that various message characteristics, including information quality, accuracy, currency, and language all have an impact on believability and credibility of the message (Metzger et al., 2003). For example, use of opinionated language has been found to decrease perceived credibility of a message, while use of powerful language has been shown to increase perceptions of credibility (Burrell & Koper 1998; Hamilton, 1998).

While assessments of message credibility and source credibility have become distinct, studies have also found that the two are linked, in that message content and quality can mediate source credibility effects (Rieh et al. 2007). For example, Slater and Rouner (1997) found that as perceptions of message quality increased, so did perceptions of source credibility. Additionally, Luchok & McCroskey (1978) found that providing irrelevant evidence in a message decreased attitudes, even when the source was perceived as highly credible. Mediated effects of message credibility can also come from characteristics of the receiver. The elaboration likelihood model of persuasion predicts that factors of the message are more important than source factors when issue involvement, knowledge of the topic, and relevance are high, because they scrutinize the content of the message instead of the source as a peripheral cue (Petty & Cacioppo, 1981). For example, in an online study of responses to messages about AIDS, knowledge of the health topic affected the perceived credibility of the message, regardless of beliefs about the author's expertise (Eastin et al., 2001).

The overall theme of a campaign or message can also impact message credibility and effectiveness, especially in tobacco control. Previous campaigns in tobacco control have used themes ranging from negative health effects to industry manipulation to social norms (Allen et al., 2015). While no one theme is deemed as the "best" in tobacco control communication, there are themes that consistently test better than others. For example, messages about negative health effects are often shown to decrease intentions to smoke and increase overall perceptions of risk (Harakeh et al., 2010; Pechmann & Reibling, 2006; Terry-McElrath, 2007). One study showed that messages about disease and suffering were the only ones among other themes to significantly differ from the control in terms of reducing intentions to smoke (Pechmann & Reibling, 2006). Campaigns with messages about cosmetic effects are also proven to have a

significant impact on smoking intentions and behaviors (Pechmann & Reibling, 2006, Worden et al., 1996)

Other successful themes include anti-industry and social norms, which have all been found to increase disapproval thoughts and lower intentions among smokers (Brennan, 2012; Farrelly et al., 2009; Niederdeppe et al., 2004; Pechmann & Wang, 2010). Addiction however, has shown to not be as promising a campaign theme. Pechmann et al. (2003) demonstrates that while exposure to these types of messages increases the perceptions of health risk, this change does not lead to reduced intentions to smoke. Another study showed that addiction ads elicited the most negative response from participants (Popova et al., 2014). Messages about harmful ingredients or chemicals in tobacco products have also recently become a popular theme for tobacco control messages; however, because it is a relatively new theme, there is currently no substantial evidence to show whether this theme is effective or not (Brennan et al., 2012).

Message themes chosen for the FDA's *The Real Cost* campaign were based on a study conducted by Brennan et al., (2017) which followed on an approach for choosing promising target beliefs proposed by Hornik and Woolf (1999). After consideration of the results from this study and the scope of the FDA's regulatory authority, three message themes were identified for the campaign: health consequences of smoking, loss of control due to addiction and dangerous chemicals. While evaluation and pretest studies have tested the perceived effectiveness of these campaign messages as a whole, the comparative impact of these themes to each other has not yet been tested (Duke et al., 2015; Huang et al., 2017; Zhao et al., 2016). Therefore, the present study aimed to test the impact of three of these message themes on perceptions of source credibility and message perceptions.

H4: Messages about negative health effects will (a) result in higher perceptions of source credibility and (b) yield more positive perceptions than messages about addiction.

RQ2: Will messages about negative health effects (a) result in higher perceptions of source credibility and (b) yield more positive perceptions than messages about chemicals?

RQ3: Will messages about addiction (a) result in higher perceptions of source credibility and (b) yield more positive perceptions than messages about chemicals?

Methods (Study 1)

Design Overview

A mixed-factorial experiment was conducted online to investigate the effects of message source, channel, and theme on users' perceptions of source credibility (expertise and trustworthiness) and message perceptions (believability, attitudes, and perceived effectiveness of the message, as well as their intentions to consider and share the information). Participants were randomly assigned to one of nine between-subjects conditions, which varied in message channel (social media vs. website vs. print ad) and message source (FDA vs. *The Real Cost* vs. combined source). Within each condition, participants saw three messages that each represented a different theme of *The Real Cost* campaign (health effects, chemicals, addiction). After exposure to each message, credibility, message evaluation items, and behavioral intentions were measured.

Sample

Participants included adults ($n=638$) recruited via Amazon.com's crowd-sourcing website, Mechanical Turk (MTurk). MTurk workers are a diverse group of people with varied demographic characteristics and data obtained using this platform has been shown to mirror

responses obtained from more traditional approaches (Paolacci, Changler, & Ipeirotis, 2010). Participants were directed to the survey through a link posted on MTurk and provided consent by reading the consent form and clicking forward on the survey, indicating their agreement to participate in the study. Participants were compensated with 12 cents/minute for their time (see Paolacci, Chandler, & Ipeirotis, 2010 for validation).

Participants ranged in age from 18 to 74, with an average age of 36 ($M = 36.19$ $SD = 11.20$). The sample consisted of males (53%) and females (46.6%). A majority of participants classified themselves as white (82.8%), with the remainder identifying as African American (8%), Asian (5.2%), American Indian/Alaska native (.6%), Native Hawaiian or Pacific Islander (2%) or Other (2.5%). Smokers represented 26.5% of the total sample.

Stimuli

The experimental stimuli were created by utilizing existing ads from *The Real Cost* campaign, the FDA's major youth-prevention tobacco campaign. It was important that when testing credibility of these tobacco control messages, actual FDA created messages were used to ensure real world application. A total of nine conditions were created (see Table 1) and three themes of messages consistent with the themes of *The Real Cost* campaign (health consequences, chemicals, addiction) were used as within subjects factors (FDA, 2016).

The manipulation of the source of the message was indicated by the presence of either the FDA logo, *The Real Cost* logo, or both logos. To manipulate message channel, messages were shown as screenshots from mobile devices, showing either a Facebook page, a website, or a print ad. Mobile screenshots were used to be consistent with the fact that the majority of consumers are viewing information on mobile devices rather than desktop computers (Chaffey, 2016).

Stimuli for all conditions were presented as embedded images in the online questionnaire (see Figure 1 in the Appendix for stimuli).

Procedure

The questionnaire was distributed online via Amazon's Mechanical Turk to participants who received appropriate monetary compensation for participation, as determined by Paolacci, Changler, and Ipeirotis (2010). After participants provided consent and read study instructions, they were randomly assigned to one of the nine conditions and viewed each of the three different messages that varied in message theme. The order of these messages was also randomized to control for order effects. After viewing each message, participants responded to perceived credibility, believability, attitudes toward the message, perceived effectiveness, and behavioral intentions items. After viewing all messages, participants responded to manipulation check questions, control measures, and provided demographic information.

Table 1. Message Conditions

Channel → Source	Social Media (Facebook)	Online Website	Print Ad
FDA	Within subjects: Theme (<i>n</i> = 71) Health Effects Chemicals Addiction	Within subjects: Theme (<i>n</i> = 66) Health Effects Chemicals Addiction	Within subjects: Theme (<i>n</i> = 71) Health Effects Chemicals Addiction
<i>The Real Cost</i>	Within subjects: Theme (<i>n</i> = 71) Health Effects Chemicals Addiction	Within subjects: Theme (<i>n</i> = 69) Health Effects Chemicals Addiction	Within subjects: Theme (<i>n</i> = 72) Health Effects Chemicals Addiction

Combined Source (Both)	Within subjects: Theme ($n= 72$) Health Effects Chemicals Addiction	Within subjects: Theme ($n= 72$) Health Effects Chemicals Addiction	Within subjects: Theme ($n= 74$) Health Effects Chemicals Addiction
---------------------------	---	---	---

Dependent Measures

Source Credibility. Six items adapted from McCroskey and Teven's (1999) scale were used to evaluate source credibility. These items captured perceived credibility using two different dimensions: expertise and trustworthiness. Expertise was measured to determine the extent to which the audience perceived the source has the necessary skills to make accurate statements, and included three items that asked the participant to rate the source of the message on a five-point scale that ranged from "intelligent/unintelligent," "expert/inexpert" and "informed/uninformed" (health effects messages: $M = 4.13$, $SD = .77$, $\alpha = .848$; chemical messages: $M = 4.09$, $SD = .85$, $\alpha = .855$; addiction messages: $M = 3.78$, $SD = .95$, $\alpha = .881$). Trustworthiness was measured to determine how honest and believable the audience felt the source was, and also included three items on a five-point scale that ranged from "moral/immoral," "ethical/unethical" and "trustworthy/untrustworthy" (health effects messages: $M = 4.03$, $SD = .76$, $\alpha = .802$; chemical messages: $M = 3.97$, $SD = .81$, $\alpha = .813$; addiction messages: $M = 3.90$, $SD = .86$, $\alpha = .849$).

Message Perceptions. Message perceptions were evaluated using four items: message believability, attitude towards the message, perceived message effectiveness, and intentions to consider and share the message.

Message Believability. A one-item measure asking participants, "How believable was this message to you?" was asked to assess believability of the message. Participants

responded on a five-point scale ranging from “is not believable” (1) to “is very believable” (5) (Kowitt et al., 2016) (health effects messages: $M = 4.41$, $SD = .79$; chemical messages: $M = 4.27$, $SD = .93$; addiction messages: $M = 4.02$, $SD = 1.11$).

Attitudes Toward the Message. Three items adapted from Spears and Singh’s (2004) scale were used to evaluate attitude towards the message (health effects messages: $M = 3.05$, $SD = 1.06$, $\alpha = .835$; chemical messages: $M = 3.05$, $SD = 1.01$, $\alpha = .843$; addiction messages: $M = 3.20$, $SD = 1.11$, $\alpha = .894$). Participants were asked to rate their opinions of the message on a 5-point scale that ranged from: “good” (1) to “bad” (5), “pleasant” (1) to “unpleasant” (5), and “likeable” (1) to “unlikeable” (5).

Perceived Message Effectiveness. A one-item measure asking participants how much they agreed with the following statement: “This message discourages me from wanting to smoke” was used to measure perceived effectiveness (Pepper et al. 2016). Participants responded on a five-point Likert scale ranging from “strongly disagree” (1) to “strongly agree” (5). (health effects messages: $M = 4.25$, $SD = .93$; chemical messages: $M = 4.27$, $SD = .98$; addiction messages: $M = 3.75$, $SD = 1.21$).

Intentions to Consider & Share. Two items were used to assess how likely the respondent is to (a) consider the information offered in the message and (b) share the information given in the message with another person (Hu & Sundar, 2010; health effects messages: $M = 3.72$, $SD = 1.09$, $\alpha = .838$; chemical messages: $M = 3.78$, $SD = 1.14$; addiction messages: $M = 3.28$, $SD = 1.25$). Participants were asked to respond to the following questions: “How likely would you consider the information given in this message when making a decision about smoking?” and “How likely would you be to

share the information given in this message with others?” on a five-point scale ranging from “extremely unlikely” (1) to “extremely likely” (5).

Control Measures

Since these were all tobacco control messages, one’s current status as a smoker or non-smoker could also influence their perceptions and behavioral intentions towards the information. Therefore, this study also controlled for this by asking participants two-items to determine current smoking status. Questions asked included: “Have you smoked at least 100 cigarettes in your entire life?” and “Do you now smoke cigarettes every day, some days, or not at all?” Individuals were classified as current cigarette smokers if they reported having previously smoked at least 100 cigarettes (i.e., five packs) in their lifetime and were currently smoking some days or every day.

Data Analysis

A mixed design repeated measures (RM) multivariate analysis of variance (MANOVA) was conducted to investigate differences in the between-subjects predictor variables: source (FDA, *The Real Cost*, combined source) and channel (social media, website, print ad), and the within subjects factor: theme (health effects, chemicals, addiction). Outcomes were perceived source credibility, message believability, attitudes towards message, perceived message effectiveness and behavioral intentions. Following a significant omnibus test, we conducted follow-up univariate analyses of variance (ANOVAs) and post-hoc pairwise comparisons with Bonferroni corrections.

Results

Message Source

There was a statistically significant difference between source on source credibility, message believability and behavioral intentions for messages from one theme. Differences were found for the chemical theme only. Means, F scores, and pairwise comparisons are presented in Table 2 below. As predicted in H1, chemical messages with just the FDA as the source resulted in higher perceptions of expertise (a factor of source credibility) than messages with just *The Real Cost* as the source ($p < .05$). However, there were no differences for perceptions of trustworthiness between these two sources or differences in source credibility for health effect or addiction messages; thus, our findings only partially support H1. When looking at the combination of sources, as asked in RQ1, messages about chemicals with the combined source (FDA & *The Real Cost*) led to higher perceptions of source credibility (expertise and trustworthiness), message believability and intentions than messages with just *The Real Cost* as the source (all $p < .05$). There were no differences for perceived effectiveness or attitudes towards the message for any of the sources. H2, which predicted messages from the FDA would have more positive message perceptions than messages from *The Real Cost* was not supported; there were no differences for believability, attitude towards the message, perceived effectiveness, or intentions among any of the message themes.

Message Channel

There was a statistically significant difference between channel for messages from two themes. Differences were found only for messages about chemicals and about health effects, as shown in Table 3. For these themes, messages presented on social media resulted in higher perceptions of source credibility (expertise and trustworthiness) than messages presented as a print ad (all $p < .05$). However, there were no significant differences in perceptions of source credibility between messages presented on a website and messages presented as a print ad,

giving us only partial support for H3a. In regards to message perceptions, messages presented on social media were also more believable and yielded more positive attitudes than messages presented on a website (all $p < .05$), answering RQ2. Additionally, for messages about health effects only, messages presented on social media were also perceived as significantly more believable than messages presented as a print ad, partially supporting H3b ($p < .05$).

Message Theme

There was also a statistically significant difference between message theme, as shown in Table 4. H4a and H4b were supported, as messages about negative health effects resulted in higher perceptions of source credibility and higher message perceptions than messages about addiction (all $p < .001$). Messages about health effects were significantly more believable and resulted only in higher perceptions of trustworthiness (a factor of source credibility) than messages about chemicals (all $p < .05$), answering RQ2. Messages about chemicals resulted in higher perceptions of expertise (a factor of source credibility) and resulted in higher message perceptions than messages about addiction (all $p < .05$), answering RQ3. There were no interactions between smoking status and any of the independent variables.

Table 2. Means – Main Effects for Source

			FDA	Real Cost	Combined	<i>F</i>	<i>p</i>	<i>Partial Eta Squared</i>
			M, SD	M, SD	M, SD			
Addiction	SC	SC- Expertise/Competence	3.80, .98	3.70, .96	3.81, .90			
		SC- Trustworthiness	3.94, .87	3.86, .88	3.89, .82			
	BV	Believability (1 item)	4.01, 1.2	4.00, 1.1	4.02, 1.1			
	ATT	Attitudes (3 items)	3.06, 1.2	3.22, 1.2	3.27, 1.1			
	PE	Perceived effectiveness (1 item)	3.75, 1.2	3.59, 1.2	3.82, 1.2			
	INT	Intentions (consider & share info-2 items)	3.31, 1.3	3.13, 1.2	3.30, 1.3			
Chemical	SC	SC- Expertise	4.18, .79 ^a	3.93, .93 ^{ab}	4.20, .82 ^b	5.94	**	.020
		SC- Trustworthiness	4.01, .74	3.84, .91 ^a	4.06, .76 ^b	4.05	*	.014

Health Effects	BV	Believability (1 item)	4.25, .97	4.13, .99 ^a	4.37, .88 ^a	3.12	*	.011
	ATT	Attitudes (3 items)	3.03, 1.1	3.05, 1.1	3.07, 1.1			
	PE	Perceived effectiveness (1 item)	4.28, .94	4.14, 1.0	4.36, .98			
	INT	Intentions (consider &share info-2 items)	3.72, 1.1	3.63, 1.2 ^a	3.93, 1.1 ^a	3.61	*	.012
	SC	SC- Expertise/Competence	4.21, .71	4.07, .81	4.16, .76			
		SC- Trustworthiness	4.08, .74	4.00, .78	4.04, .76			
	BV	Believability (1 item)	4.43, .71	4.35, .86	4.46, .77			
	ATT	Attitudes (3 items)	3.07, 1.1	3.08, 1.0	2.99, 1.1			
	PE	Perceived effectiveness (1 item)	4.22, .90	4.19, .96	4.29, .94			
	INT	Intentions (consider &share info-2 items)	3.78, 1.1	3.62, 1.1	3.75, 1.1			

Note: * $p < .05$; ** $p < .01$; *** $p < .001$

Means that share a superscript letter significantly differ by $p < .05$

Table 3. Means – Main Effects for Channel

			SM	Web	Print	<i>F</i>	<i>p</i>	<i>Partial Eta Squared</i>
			M, SD	M, SD	M, SD			
Addiction	SC	SC- Expertise/Competence	3.86, .95	3.74, .99	3.71, .89			
		SC- Trustworthiness	3.96, .90	3.87, .86	3.87, .83			
	BV	Believability (1 item)	4.04, 1.2	3.97, 1.1	4.02, 1.1			
	ATT	Attitudes (3 items)	3.25, 1.1	3.09, 1.1	3.21, 1.1			
	PE	Perceived effectiveness (1 item)	3.80, 1.3	3.62, 1.2	3.75, 1.2			
	INT	Intentions (consider &share info-2 items)	3.32, 1.2	3.16, 1.3	3.26, 1.3			
Chemical	SC	SC- Expertise/Competence	4.21, .81 ^a	4.12, .89	3.98, .85 ^a	3.87	*	.013
		SC- Trustworthiness	4.10, .76 ^a	3.95, .85	3.86, .81 ^a	4.33	**	.015
	BV	Believability (1 item)	4.40, .87 ^a	4.18, 1.0 ^a	4.17, .93	3.76	*	.013
	ATT	Attitudes (3 items)	3.20, 1.1 ^a	2.91, 1.1 ^a	3.05, 1.1	3.44	*	.012
	PE	Perceived effectiveness (1 item)	4.30, 1.0	4.26, .97	4.23, 1.0			
	INT	Intentions (consider &share info-2 items)	3.84, 1.1	3.75, 1.2	3.69, 1.2			
Health Effects	SC	SC- Expertise/Competence	4.24, .74 ^a	4.16, .77	4.04, .77 ^a	3.35	**	.012
		SC- Trustworthiness	4.17, .69 ^a	4.04, .78	3.92, .79 ^a	5.10	**	.018
	BV	Believability (1 item)	4.57, .67 ^{ab}	4.33, .85 ^a	4.34, .80 ^b	5.73	*	.020
	ATT	Attitudes (3 items)	3.21, 1.1 ^a	2.90, 1.0 ^a	3.02, 1.1	3.94	*	.014
	PE	Perceived effectiveness (1 item)	4.28, .92	4.24, .88	4.18, 1.0			
	INT	Intentions (consider &share	3.82, .99	3.66, 1.1	3.67, 1.2			

Note: * $p < .05$; ** $p < .01$; *** $p < .001$

Means that share a superscript letter significantly differ by $p < .05$

Table 4. Means – Repeated Measures Across Themes

		Theme			F	p	Partial Eta Squared
		ADCT M, SD	CHM M, SD	HE M, SD			
SC	SC- Expertise/Competence	3.77, .95 ^{ab}	4.11, .85 ^a	4.15, .76 ^b	74.54	***	.108
	SC- Trustworthiness	3.90, .86 ^a	3.97, .81 ^b	4.05, .76 ^{ab}	12.06	*** / *	.019
BV	Believability (1 item)	4.01, 1.1 ^{ab}	4.26, .95 ^{ac}	4.42, .79 ^{bc}	43.32	***	.066
ATT	Attitudes (3 items)	3.19, 1.1 ^{ab}	3.05, 1.1 ^a	3.05, 1.1 ^b	9.46	***	.015
PE	Perceived effectiveness (1 item)	3.73, 1.2 ^{ab}	4.27, .99 ^a	4.25, .94 ^b	104.75	***	.144
INT	Intentions (consider & share info-2 items)	3.25, 1.3 ^{ab}	3.77, 1.2 ^a	3.76, 1.1 ^b	94.27	***	.132

Note: * $p < .05$; ** $p < .01$; *** $p < .001$

Means that share a superscript letter significantly differ by $p < .05$

Methods (Study 2)

Design Overview

In the first experiment, we found significant effects on our outcome variables for message source, channel, and theme. In order to ensure validity of these findings, we replicated this study as a phone experiment with a national probability sample of U.S. adults ($n=1111$). Given the difficulty of manipulating message channel over the phone, the channel factor was not used in this experiment. Instead, the experiment used a 4 (message source: FDA, *The Real Cost*, combined source, no source) x 3 (theme: health effects, chemicals, addiction) between subjects design. Participants were randomly assigned to one of 12 conditions, in which they heard one

message. After hearing the message, they responded to measures of believability and perceived effectiveness.

Sample

Data utilized in this research come from a national phone survey administered by the Center for Regulatory Research on Tobacco Communication in the fall of 2016. Two independent and nonoverlapping random digit dialing frames were used for sampling, ensuring coverage to approximately 98% of U.S. households. The weighted sample is nationally representative of 18- to 99-year-olds living in the U.S., with cell or landline access. The sample resulted in 1,111 interviews. Participation was voluntary and anonymous. All procedures were approved by the UNC Chapel Hill Institutional Review Board.

Participants ranged in age from 18-80, with an average age of 50 ($M = 49.5$ $SD = 13.62$). The sample consisted of males (45.7%) and females (54.1%). A majority of participants classified themselves as non-Hispanic (91.9%) and white (70.7%) with the remaining identifying as African American (18.9), Asian (0.9%), American Indian/Alaska native (4.1%) Native Hawaiian or Pacific Islander (0.3%) or Other (5%). Smokers represented 23.2% of the total sample.

Procedure

Using a 4 x 3 experimental design, participants were told “imagine seeing this ad” and then were randomly assigned to receive 1 of 12 conditions. These included the following three messages that were used in the previous experiment to represent each of the message themes used in *The Real Cost* campaign: “Smoking is a common way to get gum disease that can cause tooth loss,” “There’s a toxic mix of over 7,000 chemicals in every puff of cigarette smoke,” and

“The first symptoms of addiction can start before you become a daily smoker.” Messages began with one of four randomly assigned sources: FDA, *The Real Cost*, *The Real Cost*, brought to you by the FDA, or no source. This experiment was preceded by questions assessing cigarette smoking status, which was included as a covariate, as described below.

Dependent Measures

Believability. A one-item measure asking participants, “How believable is this message?” was asked to assess believability of the message. Participants responded on a three-point scale ranging from “not at all” (1) to “very.” (3) This scale was then collapsed into two items, “not at all” and “somewhat” believable (1) and “very” believable (2). (M= 1.63, SD= .482) (Kowitt, 2017).

Perceived Effectiveness. A one-item measure asking participants, “how much does this message discourage you from wanting to smoke?” was used to measure perceived effectiveness (Pepper et al., 2016). Participants responded on a four-point scale ranging from “not at all” (1) to “a lot” (4). (M= 3.36 SD=1.05).

Data Analysis

Since there were three-ordered response options to the outcome variable believability (i.e., very, somewhat, not at all believable), we initially conducted an ordinal logistic regression analysis to assess predictors associated with advertisement believability. However, since the proportional odds assumption was violated ($\chi^2 = 29.505$, Degrees of Freedom = 5, $p = .000$), and few respondents chose the option “not at all believable” ($n=92$, 8.6%), we conducted analyses utilizing a multivariate logistic regression model, comparing adults who reported the advertisements to be very believable with adults who reported the ads to be somewhat or not at all believable. We entered all predictors simultaneously into the multivariate logistic regression

model to identify variables significantly associated with believability of the ads. Then, to determine if messages with any source (i.e., FDA, *The Real Cost*, combined source) were more believable or effective than messages with no source, we conducted a separate multivariable logistic regression model with the four-level source condition dichotomized as any source versus no source.

We also conducted two sets of additional analyses. First, for believability, we stratified results from the multivariable logistic regression model by smoker status to determine if those categorized as smokers found different messages to be very believable. For perceived effectiveness, we ran an analysis of variance (ANOVA) to detect differences across message theme and message source.

Results

Believability

Logistic regression results are presented in Table 5. The full model containing both predictors (theme and source) was statistically significant, $X^2(5, N=1111) = 33.65, p < .001$, indicating that the model was able to distinguish between respondents who felt the ads were very believable or not very believable. However, only theme made a unique statistically significant contribution to the model. Messages about health effects were more likely to be “very believable” than messages about chemicals or addiction ($p < .001$). There was not a significant difference between messages about chemicals and messages about addiction ($p = .305$). The source for the ads did not predict believability of the ads. Additionally, when source was collapsed into categories for any source (i.e., FDA, *The Real Cost*, and the combined source), versus no source, no statistically significant effects on believability occurred (AOR: .758; 95% CI: .572, 1.01, $p = .054$; results not shown). When results were stratified by smoker status, those

who were smokers reported the messages more to be “not at all” or “somewhat believable” (49.6%) than nonsmokers (32.8%).

Perceived Effectiveness

A two-way between-subjects ANOVA was conducted to explore the impact of source and theme on perceived effectiveness. There was a statistically significant main effect for theme, $F(2, 1098) = 8.73, p = .000$, however, effect size was small (partial eta squared = .016). Messages about health effects and chemicals were perceived as significantly more effective than messages about addiction ($p < .01$). Messages about chemicals did not significantly differ from messages about health effects. The main effect for source, $F(3, 1098) = .557, p = .64$, did not reach statistical significance.

Table 5. Logistic Regression Predicting Believability of Advertisements

	Reported very believable, n (%)	Very believable versus not at all or somewhat believable, AOR (95% CI)
Theme		
Health Effects	279 (73.8%)	Ref
Chemicals	205 (56%)	.463 (.340, .632)
Addiction	219 (59.7%)	.540 (.396, .738)
Source		
FDA	170 (62%)	Ref
The Real Cost	164 (65.3%)	1.09 (.761, 1.57)
Combined Source	168 (57.9%)	.859 (.610, 1.20)
No Source	201 (67.9%)	1.23 (.868, 1.75)

Discussion

Mass media campaigns are among the most effective ways to warn about the dangers about tobacco use and reduce smoking prevalence among youth and young adults (US Department of Health and Human Services, 2012). When designing these campaigns, there are many things to consider, one of the most important being the perceived credibility of the message. How credible (or not credible) the audience views a message or source can affect their attitudes, beliefs, behaviors, and the overall persuasiveness of a message (Sternthal, Phillips & Dholakia, 1978; Goldsmith, Lafferty, & Newell, 2000; Metzger et al., 2003). To help inform design of future tobacco control campaign messages, we conducted two experimental studies to identify which message sources, channels, and themes would yield optimal results for source credibility and message perceptions among adults.

Findings indicate that the theme of the message is most important. In both studies, we found that the theme of the message greatly influences positive perceptions of the source and the message itself. Messages about negative health effects consistently resulted in higher message perceptions and source credibility than messages about addiction. Additionally, messages about chemicals also performed better than messages about addiction on expertise (a factor of source credibility) and message perceptions. From these results, we can conclude that using messages centered around addiction is not an optimal choice. This supports what we know from previous literature, which tells us that most adults do not recognize addiction and are turned away from these types of messages (Pechmann et al., 2003; Popova et al., 2014). These results also tell us that messages about chemicals, which we don't know much about from prior research, may be as effective as messages about negative health effects, which have been proven over and over again

to be an effective message theme in tobacco control campaigns (Harakeh et al., 2010; Pechman & Reibling, 2006; Terry-McElrath, 2007).

Source also yielded some differences in Study 1. Generally, using the FDA or the combined source resulted in more positive message perceptions than using just *The Real Cost* as the source. Our results demonstrated that using the combined source is the most optimal choice, as this leads to higher perceptions of source credibility and message perceptions. However, these differences were only for messages about chemicals, which highlights an important interaction between theme and source. Since using messages about chemicals have not really been used before this campaign, the information was likely novel for participants. Because people are generally more critical and think more about novel information versus known facts, it is possible that this is the reason for these differences. (novel info v. facts cite). Additionally, Study 2 did not replicate these differences, however, this could be attributed to the fact that because Study 2 was conducted over the phone, the source was heard instead of seen. When comparing all of the sources combined to the no source control in Study 2, there were also no significant differences, providing evidence that source was potentially overlooked in this second experiment.

Study 1 also presented noteworthy differences for channel. It is important to point out that these differences only occurred in messages about chemicals and health effects. There were no differences for messages about addiction which could be attributed to the fact that addiction messages performed poorly overall. Social media appears to be the optimal choice for disseminating these tobacco control messages, as these messages were perceived as significantly more credible than messages presented on a print ad. Interestingly enough, messages on social media were also more believable and yielded more positive attitudes than messages presented on

a website. While many people often question the credibility of social media as a source of information, as it is being used more and more by youth and young adults, it seems that it is becoming a much more credible and believable source than it once was. Additionally, while we know from previous research that online sources are perceived as more credible than some offline sources, these results also provide insight into how two online channels differ from one another for tobacco control messages (Flanagin & Metzger, 2000; Johnson and Kaye, 1998).

Overall, our results suggest that the theme of a tobacco control message has the greatest impact on the perceived credibility of the source and perceptions of the message. While source and channel provided some differences, these only occurred for messages with particular message themes. Therefore, it seems that when it comes to these tobacco control messages, audience members care most about the content of the message itself. Messages about health effects and chemicals appear most promising for adults, while messages about addiction appear much less advantageous. Our results not only provide regulators with insight into developing optimal tobacco control messages, but will also help to ensure that future public health communication campaigns focus on using the message themes that will maximally impact message outcomes among adult audiences.

Limitations

Several limitations are noted. First, while we used messages from *The Real Cost*, a campaign designed and developed by the FDA, targeted at preventing youth (ages 13-17) from using tobacco, we tested these messages among samples of adult populations. While testing these messages among adult populations provides useful insights into how the FDA can develop campaigns targeted at adults, future research should replicate this study with adolescents. Additionally, our study did not measure the impact of the messages on smoking intentions or

behavior. Future studies should include these behavioral items, along with message perceptions and evaluations, in longitudinal studies to measure actual smoking behavior over time. Our study was also unable to replicate the channel manipulation in Study 2, due to the difficulty of manipulating this variable over the phone.

When looking at within-subjects differences between message theme, we only used one message to represent each theme. Because of this, differences could be attributed to the message itself rather than the overarching theme. Future research testing tobacco message themes should use message repetition to ensure results can be attributed to the theme and not the individual message. Lastly, because Study 2 was a phone survey, reports of believability and perceived effectiveness were based on hearing the ads rather than seeing them (written presentations are more effective). Further, adult participants could have had prior exposure to these ads, which could have impacted believability and perceived effectiveness.

Despite all these limitations, our study relied on experimental data from both a large convenience sample and a large national sample of adults living in the U.S. and is one of the first experiments to test the impact of source, channel, and message theme on tobacco control messages. Our study provided insights into which sources, channels, and themes should be used to create a credible, believable, effective, message. Future research should continue to explore the impact of source, channel, and theme on message credibility and perceptions for tobacco control messages.

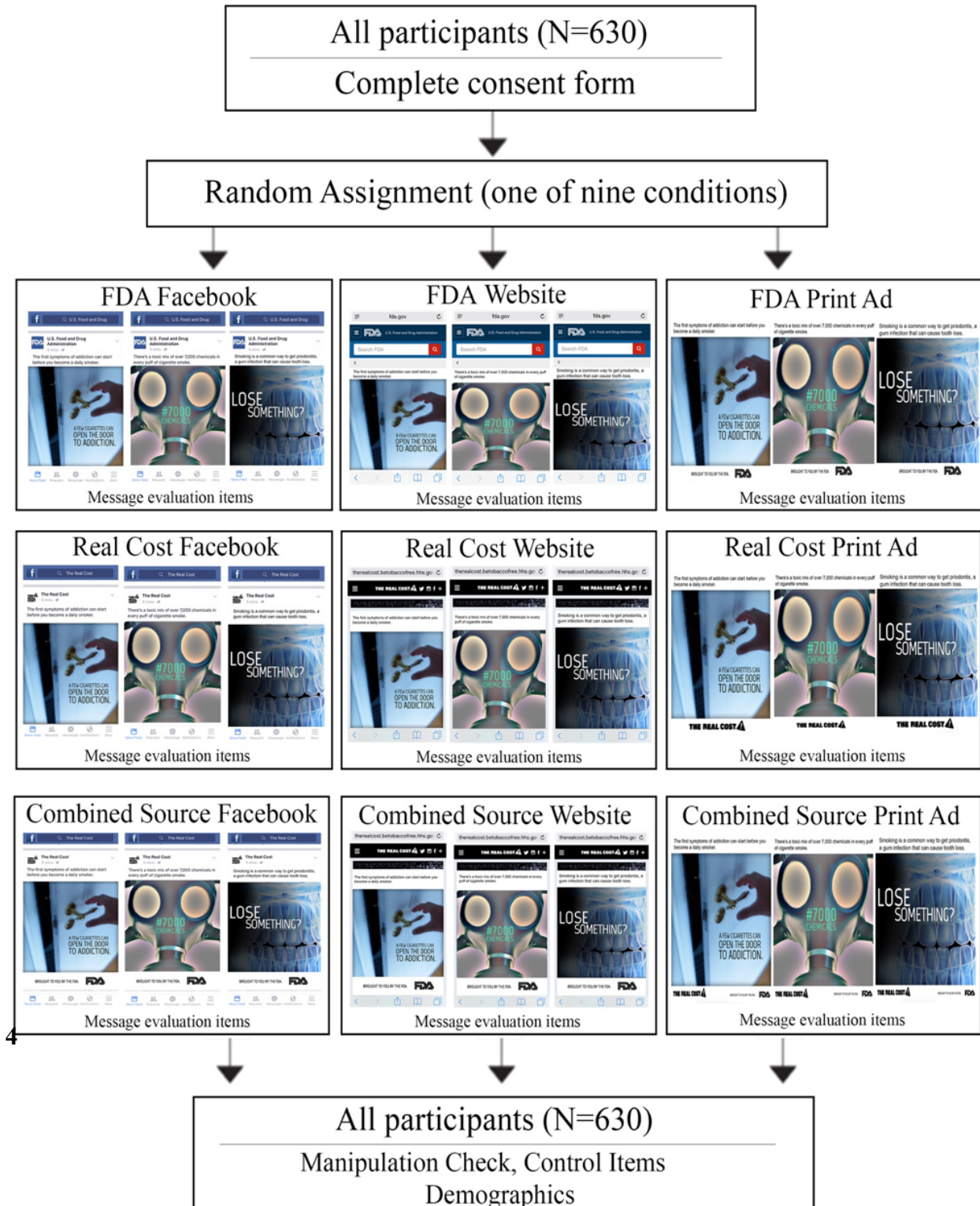
Funding Sources

Research reported in this publication was supported by grant number P50CA180907 from the National Cancer Institute and FDA Center for Tobacco Products (CTP). The content is solely

the responsibility of the authors and does not necessarily represent the official views of the NIH or the Food and Drug Administration.

APPENDIX A- STUDY 1 MESSAGE DESIGN

Figure 1



APPENDIX B- STUDY 1 QUESTIONNAIRE

ALL PARTICIPANTS WILL BE RANDOMLY ASSIGNED TO VIEW ONE CONDITION OF ANTI-TOBACCO MESSAGES. PARTICIPANTS WILL THEN RESPOND TO THE FOLLOWING ITEMS AFTER VIEWING EACH MESSAGE.

Source Credibility (McCroskey, J. C., & Teven, J. J., 1999)

On the scales below, indicate your feelings about the source of the message. Numbers 1 and 7 indicate a very strong feeling. Numbers 2 and 6 indicate a strong feeling. Numbers 3 and 5 indicate a fairly weak feeling. Number 4 indicates you are undecided.

- 1) Intelligent 1 2 3 4 5 6 7 Unintelligent
- 2) Untrustworthy 1 2 3 4 5 6 7 Trustworthy
- 3) Inexpert 1 2 3 4 5 6 7 Expert
- 4) Informed 1 2 3 4 5 6 7 Uninformed
- 5) Moral 1 2 3 4 5 6 7 Immoral
- 6) Unethical 1 2 3 4 5 6 7 Ethical

Expertise Factor (1, 3, 4) _____

Trustworthiness Factor (2, 5, 6) _____

Believability

How believable is this message to you? Would you say...

Is not believable : _____ : _____ : _____ : _____ : _____ : Is very believable

Attitude Toward the Message (Spears & Singh, 2004)

Please select the response that best describes your opinion of the message shown above.

1. Bad: _____ : _____ : _____ : _____ : _____ : Good
2. Unpleasant: _____ : _____ : _____ : _____ : _____ : Pleasant
3. Unlikeable: _____ : _____ : _____ : _____ : _____ : Likeable

Perceived effectiveness

On a scale of 1 to 5, how much do you agree with the following statement:

This message discourages me from wanting to smoke

1= Strongly disagree: 2= Somewhat disagree: 3= Neither agree nor disagree: 4= Somewhat agree: 5= Strongly agree

Behavioral Intentions (Hu & Sundar)

Please select the response that best describes your intentions. With 1 meaning extremely unlikely and 7 meaning extremely likely, how likely are you to:

1. Consider the information given in this message when making a decision about smoking cigarettes?

Extremely Unlikely 1 2 3 4 5 Extremely Likely

2. Share the information given in this message with others?

Extremely Unlikely 1 2 3 4 5 Extremely Likely

AFTER VIEWING ALL MESSAGES AND ANSWERING ITEMS AFTER EACH MESSAGE, PARTICIPANTS WILL ANSWER THE FOLLOWING QUESTIONS

Manipulation Check

Who sponsored this message?
(Open Ended)

What channel was this message delivered on?

Facebook
A website
A print ad

Self-reported behavior: Cigarette Use

Have you smoked at least 100 cigarettes in your entire life?

1. Yes
2. No

Do you now smoke cigarettes every day, some days, or not at all?

1. Every day
2. Some days
3. Not at all

APPENDIX C: STUDY 2 QUESTIONNAIRE

[RANDOMIZE TO ONE OF THE 12 STATEMENTS BELOW]

1. Imagine seeing or hearing the following message from the FDA: Smoking is a common way to get gum disease that can cause tooth loss.
2. Imagine seeing or hearing the following message from the FDA: There's a toxic mix of over 7,000 chemicals in every puff of cigarette smoke.
3. Imagine seeing or hearing the following message from the FDA: The first symptoms of addiction can start before you become a daily smoker.
4. Imagine seeing or hearing the following message from The Real Cost: Smoking is a common way to get gum disease that can cause tooth loss.
5. Imagine seeing or hearing the following message from The Real Cost: There's a toxic mix of over 7,000 chemicals in every puff of cigarette smoke.
6. Imagine seeing or hearing the following message from The Real Cost: The first symptoms of addiction can start before you become a daily smoker.
7. Imagine seeing or hearing the following message from The Real Cost, brought to you by the FDA: Smoking is a common way to get gum disease that can cause tooth loss.
8. Imagine seeing or hearing the following message from The Real Cost, brought to you by the FDA: There's a toxic mix of over 7,000 chemicals in every puff of cigarette smoke.
9. Imagine seeing or hearing the following message from The Real Cost, brought to you by the FDA: The first symptoms of addiction can start before you become a daily smoker.
10. Imagine seeing or hearing the following message: Smoking is a common way to get gum disease that can cause tooth loss.
11. Imagine seeing or hearing the following message: There's a toxic mix of over 7,000 chemicals in every puff of cigarette smoke.
12. Imagine seeing or hearing the following message: The first symptoms of addiction can start before you become a daily smoker.

How believable is this message? Would you say...

- 1= Not at all,
2= Somewhat, or
3= Very?

[8=REFUSED TO ANSWER]

9=DO NOT KNOW]

How much does this message discourage you from wanting to smoke? Would you say...

1= Not at all,

2= A little,

3= Somewhat, or

4= A lot?

[8=REFUSED TO ANSWER

9=DO NOT KNOW]

REFERENCES

- Abel, J. D., & Wirth, M. O. (1977). Newspaper vs. TV credibility for local news. *Journalism and Mass Communication Quarterly*, 54(2), 371.
- Allen, J. A., Duke, J. C., Davis, K. C., Kim, A. E., Nonnemaker, J. M., & Farrelly, M. C. (2015). Using mass media campaigns to reduce youth tobacco use: a review. *American Journal of Health Promotion*, 30(2), e71-e82.
- Appelman, A., & Sundar, S. S. (2015). Measuring Message Credibility Construction and Validation of an Exclusive Scale. *Journalism & Mass Communication Quarterly*, 1077699015606057.
- 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.
- Berlo, D. K., Lemert, J. B., & Mertz, R. J. (1969). Dimensions for evaluating the acceptability of message sources. *Public Opinion Quarterly*, 33(4), 563-576.
- Boynton, M. H., Agans, R. P., Bowling, J. M., Brewer, N. T., Sutfin, E. L., Goldstein, A. O., ... & Ribisl, K. M. (2016). Understanding how perceptions of tobacco constituents and the FDA relate to effective and credible tobacco risk messaging: A national phone survey of US adults, 2014–2015. *BMC Public Health*, 16(1), 516.
- Brennan, E., Momjian, A., Jeong, M., Naugle, D., Parvanta, S., & Hornik, R. C. (2012). Mass media campaigns to reduce smoking among youth and young adults: Documenting potential campaign targets and reviewing the evidence from previous campaigns.
- Brennan, E., Gibson, L. A., Kybert-Momjian, A., Liu, J., & Hornik, R. C. (2017). Promising Themes for Antismoking Campaigns Targeting Youth and Young Adults. *Tobacco Regulatory Science*, 3(1), 29-46.
- Burrell, N. A., & Koper, R. J. (1998). The efficacy of powerful/powerless language on attitudes and source credibility. *Persuasion: Advances through meta-analysis*, 203-215.
- Center for Disease Control and Prevention (CDC) (2015). Current Cigarette Smoking Among Adults in the United States. Retrieved from: https://www.cdc.gov/tobacco/data_statistics/fact_sheets/adult_data/cig_smoking/
- Chaffey, D. (2016). Global social media research summary 2016. Smart Insights: Social Media Marketing.
- Duke, J. C., Alexander, T. N., Zhao, X., Delahanty, J. C., Allen, J. A., MacMonegle, A. J., & Farrelly, M. C. (2015). Youth's awareness of and reactions to the real cost national tobacco public education campaign. *PloS one*, 10(12), e0144827.

Durkin, S., Brennan, E., & Wakefield, M. (2012). Mass media campaigns to promote smoking cessation among adults: an integrative review. *Tobacco Control*, 21(2), 127-138.

Eastin, M. S. (2001). Credibility assessments of online health information: The effects of source expertise and knowledge of content. *Journal of Computer-Mediated Communication*, 6(4).

Farrelly, M. C., Davis, K. C., Duke, J., & Messeri, P. (2009a). Sustaining 'truth': Changes in youth tobacco attitudes and smoking intentions after 3 years of a national antismoking campaign. *Health Education Research*, 24(1), 42-48.

Flanagin, A. J., & Metzger, M. J. (2000). Perceptions of Internet information credibility. *Journalism & Mass Communication Quarterly*, 77(3), 515-540.

Gallopel-Morvan, K., Gabriel, P., Le Gall-Ely, M., Rieunier, S., & Urien, B. (2011). The use of visual warnings in social marketing: The case of tobacco. *Journal of Business Research*, 64(1), 7-11.

Gass, R.H. and J.S. Seiter (1999) *Persuasion, Social Influence and Compliance Gaining*. Boston, MA: Allyn and Bacon.

Gaziano, C., & McGrath, K. (1986). Measuring the concept of credibility. *Journalism and Mass Communication Quarterly*, 63(3), 451.

Goldsmith, R. E., Lafferty, B. A., & Newell, S. J. (2000). The impact of corporate credibility and celebrity credibility on consumer reaction to advertisements and brands. *Journal of Advertising*, 29(3), 43-54.

Gotlieb, J. B., Gwinner, R. F., Schlacter, J. L., & St. Louis, R. D. (1988). Explaining consumers' reactions to price changes in service industries: The effects of the location of the service provider, the credibility of the information source and the importance of the service to the consumer. *Journal of Professional Services Marketing*, 3(1-2), 19-33.

Haley, E. (1996). Exploring the construct of organization as source: Consumers' understandings of organizational sponsorship of advocacy advertising. *Journal of Advertising*, 25(2), 19-35.

Hamilton, M. A. (1998). Message variables that mediate and moderate the effect of equivocal language on source credibility. *Journal of Language and Social Psychology*, 17(1), 109-143.

Hammond, S. L. (1987). Health advertising: The credibility of organizational sources. *Annals of the International Communication Association*, 10(1), 673-628.

Harakeh, Z., Engels, R. C. M. E., Vohs, K., van Baaren, R. B., & Sargent, J. (2010). Exposure to movie smoking, antismoking ads and smoking intensity: An experimental study with a factorial design. *Tobacco Control*, 19(3), 185-190.

- Hornik, R., & Woolf, K. D. (1999). Using cross-sectional surveys to plan message strategies. *Social Marketing Quarterly*, 5(2), 34-41.
- Hovland, C. I., & Weiss, W. (1951). The influence of source credibility on communication effectiveness. *Public opinion quarterly*, 15(4), 635-650.
- Hovland, C. I., Janis, I. L., & Kelley (1953). *Communication and persuasion; psychological studies of opinion change*.
- Huang, L. L., Lazard, A. J., Pepper, J. K., Noar, S. M., Ranney, L. M., & Goldstein, A. O. (2017). Impact of The Real Cost Campaign on Adolescents' Recall, Attitudes, and Risk Perceptions about Tobacco Use: A National Study. *International Journal of Environmental Research and Public Health*, 14(1), 42.
- Jacobson, H. K. (1969). Mass media believability: A study of receiver judgments. *Journalism & Mass Communication Quarterly*, 46(1), 20-28.
- Jain, S. P., & Posavac, S. S. (2001). Prepurchase attribute verifiability, source credibility, and persuasion. *Journal of Consumer Psychology*, 11, 169-180.
- Johnson, T. J., & Kaye, B. K. (1998). Cruising is believing?: Comparing Internet and traditional sources on media credibility measures. *Journalism & Mass Communication Quarterly*, 75(2), 325-340.
- Jurma, W. E. (1981). Evaluations of credibility of the source of a message. *Psychological Reports*.
- Kowitt, S. D., Jarman, K., Ranney, L. M., & Goldstein, A. O. (2016). Believability of Cigar Warning Labels Among Adolescents. *Journal of Adolescent Health*.
- Kumkale, G. T., Albarracín, D., & Seignourel, P. J. (2010). The effects of source credibility in the presence or absence of prior attitudes: Implications for the design of persuasive communication campaigns. *Journal of applied social psychology*, 40(6), 1325-1356.
- Luchok, J. A., & McCroskey, J. C. (1978). The effect of quality of evidence on attitude change and source credibility. *Southern Journal of Communication*, 43(4), 371-383.
- Major, A. M., & Atwood, L. E. (1997). Changes in media credibility when a predicted disaster doesn't happen. *Journalism & Mass Communication Quarterly*, 74(4), 797-813.
- McComas, K. A., & Trumbo, C. W. (2001). Source Credibility in Environmental Health-Risk Controversies: Application of Meyer's Credibility Index. *Risk Analysis*, 21(3), 467-480.
- McCroskey, J. C. (1966). Scales for the measurement of ethos. *Speech Monographs*, 33, 65-72.
- Metzger, M.J., A.J. Flanagin, K. Eyal, D.R. Lemus & R. McCann (2003). Bringing the

concept of credibility into the 21st century: Integrating perspectives on source, message and media credibility in the contemporary media environment. *Communication Yearbook* 27, 293–335.

Newhagen, J., & Nass, C. (1989). Differential criteria for evaluating credibility of newspapers and TV news. *Journalism and Mass Communication Quarterly*, 66(2), 277.

Niederdeppe, J., Farrelly, M. C., & Haviland, M. L. (2004). Confirming "truth": More evidence of a successful tobacco countermarketing campaign in Florida. *American Journal of Public Health*, 94(2), 255-257.

O'Keefe, D. J. (1990). *Persuasion: Theory and research*. Sage Publications.

Paolacci, G., Chandler, J., & Ipeirotis, P. G. (2010). Running experiments on amazon mechanical turk.

Pechmann, C., Zhao, G., Goldberg, M. E., & Reibling, E. T. (2003). What to convey in antismoking advertisements for adolescents: The use of Protection Motivation Theory to identify effective message themes. *Journal of Marketing*, 67(2), 1-18.

Pechmann, C., & Reibling, E. T. (2006). Antismoking Advertisements for Youths: An Independent Evaluation of Health, Counter-Industry, and Industry Approaches. *American Journal of Public Health*, 96(5), 906–913.

Pechman, C., & Wang, L. (2010). Effects of indirectly and directly competing reference group messages and persuasion knowledge: Implications for educational placements. *Journal of Marketing Research*, XLVII, 134-145.

Pepper, J. K., Cameron, L. D., Reiter, P. L., McRee, A. L., & Brewer, N. T. (2013). Non-smoking male adolescents' reactions to cigarette warnings. *PloS one*, 8(8), e65533.

Petty, R. E., & Cacioppo, J. T. (1986). The elaboration likelihood model of persuasion. In *Communication and persuasion* (pp. 1-24). Springer New York.

Pew Research Center (2013). Health Fact Sheet. Retrieved from: <http://1.pewinternet.org/fact-sheets/health-fact-sheet/>

Pew Research Center (2015). Social Media Usage: 2005-2015. Retrieved from: <http://www.pewinternet.org/2015/10/08/social-networking-usage-2005-2015/>

Pierce, J. P., White, V. M., & Emery, S. L. (2012). What public health strategies are needed to reduce smoking initiation? *Tobacco Control*, 21(2), 258-264.

Popova, L., Kostygina, G., Sheon, N. M., & Ling, P. M. (2014). A qualitative study of smokers' responses to messages discouraging dual tobacco product use. *Health education research*, 29(2), 206-221.

- Pornpitakpan, C. (2004). The persuasiveness of source credibility: A critical review of five decades' evidence. *Journal of Applied Social Psychology*, 34(2), 243-281.
- Rieh, S. Y., & Danielson, D. R. (2007). Credibility: A multidisciplinary framework. *Annual review of information science and technology*, 41(1), 307-364.
- Schmidt, A. M., Ranney, L. M., Pepper, J. K., & Goldstein, A. O. (2016). Source Credibility in Tobacco Control Messaging. *Tobacco Regulatory Science*, 2(1), 31-37.
- Slater, M. D., Rouner, D., Domenech-Rodriguez, M., Beauvais, F., Murphy, K., & Van Leuven, J. K. (1997). Adolescent responses to TV beer ads and sports content/context: Gender and ethnic differences. *Journalism & Mass Communication Quarterly*, 74(1), 108-122.
- Sternthal, B., Phillips, L. W., & Dholakia, R. (1978). The persuasive effect of scarce credibility: a situational analysis. *Public Opinion Quarterly*, 42(3), 285-314.
- Stiff, J. B. (1986). Cognitive processing of persuasive message cues: A meta-analytic review of the effects of supporting information on attitudes. *Communications Monographs*, 53(1), 75-89.
- Sundar, S. S., & Nass, C. (2001). Conceptualizing sources in online news. *Journal of Communication*, 51(1), 52-72.
- Terry-McElrath, Y., Wakefield, M. A., Emery, S., Saffer, H., Szczypka, G., O'Malley, P. M., . . . Flay, B. R. (2007). State anti-tobacco advertising and smoking outcomes by gender and race/ethnicity. *Ethnicity and Health*, 12(4), 339-362.
- Umeogu, B. (2012). Source credibility: a philosophical analysis. *Open Journal of Philosophy*, 2(02), 112.
- U.S. Department of Health and Human Services. (2012). Preventing tobacco use among youth and young adults: A report of the Surgeon General. Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 3.
- U.S. Food and Drug Administration (FDA) (2015). Overview of the family smoking prevention and tobacco control act: Consumer fact sheet. Retrieved from: <http://1.fda.gov/tobaccoproducts/guidancecomplianceregulatoryinformation/ucm246129.htm>.
- Wakefield, M. A., Loken, B., & Hornik, R. C. (2010). Use of mass media campaigns to change health behaviour. *The Lancet*, 376(9748), 1261-1271.
- Wathen, C. N., & Burkell, J. (2002). Believe it or not: Factors influencing credibility on the Web. *Journal of the American society for information science and technology*, 53(2), 134-144.
- Westley, B. H., & Severin, W. J. (1964). Some correlates of media credibility. *Journalism & Mass Communication Quarterly*, 41(3), 325-335.

Whitehead Jr, J. L. (1968). Factors of source credibility. *Quarterly Journal of Speech*, 54(1), 59-63.

Worden JK, Flynn BS, Solomon LJ, Secker-Walker RH, Badger GJ, Carpenter JF, (1996). Using mass media to prevent cigarette smoking among adolescent girls. *Health Education Quarterly*, 23, 453-468.

Zagona, S. V., & Harter, M. R. (1966). Credibility of source and recipient's attitude: Factors in the perception and retention of information on smoking behavior. *Perceptual and motor skills*.

Zhao, X., Alexander, T. N., Hoffman, L., Jones, C., Delahanty, J., Walker, M., ... & Talbert, E. (2016). Youth Receptivity to FDA's The Real Cost Tobacco Prevention Campaign: Evidence From Message Pretesting. *Journal of health communication*, 21(11), 1153-1160.