Believability of new diseases reported in the 2014 Surgeon General's Report on smoking: Experimental results from a national survey of US adults

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ABSTRACT

Background. Tobacco use is the leading cause of preventable disease and death globally. The 2014 Surgeon General's Report included new diseases linked to smoking, including liver and colon cancer, diabetes and tuberculosis. As more diseases are linked to smoking, which diseases should we communicate to the public and what message source has the most impact?

Methods. Data were collected through a nationally representative phone survey of US adults ($N = 5014$), conducted from September 2014 through May 2015. We experimentally randomized participants to a 2 (new smoking disease messages - liver and colon cancers compared to diabetes and tuberculosis) by 4 (message sources - CDC, FDA, Surgeon General, and none) experiment. The outcome was message believability.

Results. About half the sample was female (51.5%) and 17.8% were a current smoker. Overall, 56% of participants said the messages were very believable. Cancer messages (liver and colon cancer) were significantly more believable than messages about chronic disease (tuberculosis and diabetes), 61% vs. 52%. Smokers were less likely to report both sets of new disease messages as very believable compared to non-smokers. Significantly more smokers intending to quit (44.5%) found the messages to be very believable compared to smokers not intending to quit (22.6%). Believability did not differ by message source.

Conclusion. Important differences exist in believability of disease messages about new tobacco-related information. Messages emphasizing the causal link between smoking and new diseases should be considered for use in mass media campaigns.

1. Introduction

Mass media campaigns are integral to tobacco control efforts, and they have the potential to prevent initiation and reduce the prevalence of tobacco use (US Department of Health and Human Services, 2004; Noar, 2006; McAfee et al., 2013). Research suggests messages about the negative health consequences of smoking can be effective at influencing message processing and quit behaviors (Durkin et al., 2012). Negative health consequences of smoking include diseases such as lung, bladder and stomach cancers, cardiovascular disease, respiratory disease, and reproductive complications (US Department of Health and Human Services, 2004; US Department of Health and Human Services, 2014). Smoking can also exacerbate chronic diseases such as pneumonia and respiratory tract infections (US Department of Health and Human Services, 2004; World Health Organization, 2012). Smoking can further result in increased risk of premature mortality (US Department of Health and Human Services, 2014).

The 2014 Surgeon General's Report included ten new diseases causally linked to smoking, including liver and colon cancers, diabetes and tuberculosis (US Department of Health and Human Services, 2014).[1] While previous Surgeon General's Reports have reviewed some of those diseases (diabetes, for example) (US Department of Health and Human Services, 2004), the 2014 report was the first to establish a

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[1] The Surgeon General's report included new health consequences with causal links to smoking: Liver cancer, colorectal cancer, age-related macular degeneration, congenital defects, tuberculosis, diabetes, ectopic pregnancy, male sexual function, rheumatoid arthritis, and immune function.

direct, causal relationship between those diseases and smoking (US Department of Health and Human Services, 2014). As more diseases are linked to smoking, which diseases should we communicate to the public? Studies from other tobacco prevention research suggests when information about new diseases linked to smoking is communicated to the public, increases in awareness (Miller et al., 2011), smoking-related knowledge (Noar et al., 2016), risk perceptions (Swayampakala et al., 2015), and quit behaviors follow (Swayampakala et al., 2015). Messages about new diseases can potentially draw upon prior knowledge and beliefs to persuade smokers that smoking is even more dangerous than previously thought. Thus, it is important to investigate which messages about new diseases causally linked to smoking the public finds most believable.

Message believability, a component of the elaboration likelihood model (Chaiken, 1980; Petty and Cacioppo, 1986), has been shown to influence perceived and actual message effectiveness (Cornacchione and Smith, 2012; Kim, 2006). Message believability is also associated with knowledge, attitudes and beliefs (Yale, 2013), and is an important mediator between message exposure and subsequent smoking-related behaviors (Cornacchione and Smith, 2012; Kim, 2006). One study assessing the effects of message believability showed that message believability was associated with intention to engage in smoking cessation behaviors (Cornacchione and Smith, 2012). This suggests that assessing message believability during formative research could aid in the development of better promotion or marketing messages for smoking education campaigns, especially if those campaigns communicate the source or sponsor of the messages (Yale, 2013). Large-scale smoking campaigns, in turn, can impact downstream smokers' behaviors such as cessation and quit behaviors (McAfee et al., 2013; Durkin et al., 2012). Thus, one way to increase message processing is through message believability (Cornacchione and Smith, 2012).

Source factors also affect message effectiveness (Samu and Bhatnagar, 2008; Schmidt et al., 2016). Messages from more believable sources may be more persuasive, and thus have more impact, than those from sources deemed not believable (Petty and Cacioppo, 1986; Schmidt et al., 2016). The processes by which source factors influence message processing are also explicated in the elaboration likelihood model of persuasion (Petty and Cacioppo, 1986). In prior research, message source influenced the perceived impact of tobacco education messages (Bansal-Travers et al., 2011). However, the effect of source factors has mainly been investigated between contrasting sources such as nonprofits and the tobacco industry (Byrne et al., 2012).

So, does source matter in the believability of new information about tobacco-caused chronic diseases? And if so, from which source should messages be attributed in a communication campaign. In this study, we investigated believability of messages communicated from three government sources. The Surgeon General and Centers for Disease Control and Prevention (CDC) have wide-ranging experience communicating smoking health risks to the public (McAfee et al., 2013; US Department of Health and Human Services, 2014; Alberg et al., 2014; Antman et al., 2014). And, while both the CDC and the Food and Drug Administration (FDA) have conducted national mass media campaigns aimed at preventing smoking in the past few years (McAfee et al., 2013), the FDA has only recently started communicating about the health consequences of smoking. Lastly, outside of a few nonprofit organizations, government sources are the ones most likely to communicate about the health consequences of smoking to the wider public (Samu and Bhatnagar, 2008). The public, therefore, may have differing perceptions about messages communicated from these government sources, and this is important to understand to aid government agencies in making their communications as impactful as possible.

We posit that considering information about new diseases was included in the 2014 Surgeon General's Report, the public may be most likely to believe the messages if they were attributed to the Surgeon General (Alberg et al., 2014; Antman et al., 2014; Blum, 2014). It is also possible other sources could be equally or even more persuasive, such as the CDC or FDA (Samu and Bhatnagar, 2008). To that end, we conducted an experiment to 1) determine the believability of messages about new diseases linked to smoking in the 2014 Surgeon General's Report and 2) examine the influence of message source on believability of those messages among US adults.

2. Methods

2.1. Sample and measures

Data were collected through a nationally representative phone survey of US adults, which used two independent and non-overlapping random digit dialing frames (both landline and cell-phone), representing ~98% of total households. The survey was conducted from September 2014 through May 2015, and assessed regulatory constructs such as tobacco product use, tobacco constituent perceptions, and tobacco regulatory agency credibility. Low-income respondents and individuals living in higher cigarette use regions were oversampled. Specifically, both random digit dialing frames were stratified by household income and smoking rates at the county-level, where the poorest counties with the highest smoking rates were oversampled. In addition, to maximize the number of young adults (<25 years), cell phone numbers were oversampled. Within the landline frame, if more than one eligible adult resided in the household, young adults and smokers were sampled at a higher rate than older adult nonsmokers. A total of 5014 participants over the age of 18 completed the survey. The weighted response rate—calculated using American Association for Public Opinion Research (AAPOR) Response Rate 4—was 42%, which is comparable to other national tobacco surveys (Agaku et al., 2014; Behavioral Risk Factor Surveillance System, 2014). Using AAPOR standards, the response rate is the number of respondents who completed the survey as a proportion of all eligible and likely-eligible persons. Sample weights were computed to adjust for non-response and calibrate the sample to population counts on the following variables: census region, age, education, gender, ethnicity, phone type, and regional smoking rates. For more details on the sampling and data collection procedures, please refer to Boynton et al. (2016).

The survey included a 2 (disease type) by 4 (source) experiment. For disease type, we tested two new cancers (liver and colon) and two new well-known chronic diseases (diabetes and tuberculosis) reported as causally linked to smoking in the 2014 Surgeon General's Report. Both of these chronic diseases and cancers the public has heard about and likely has concerns (Salinas et al., 2016; Menke et al., 2015; U.S. Cancer Statistics Working Group, 2016). Participants were randomly assigned to one of two messages: Message 1 (The [source] recently linked smoking cigarettes to more diseases, such as liver cancer and colon cancer) or Message 2 (The [source] recently linked smoking cigarettes to more diseases, such as tuberculosis and diabetes).

For source type, messages were from one of four randomly assigned sources: Surgeon General, FDA, CDC, or no source as a control. The no source message began, “Smoking cigarettes was recently linked to more diseases, such as…”. Believability of these messages was assessed with the question, “how believable is this message?” with response options of very (coded as 3), somewhat (coded as 2), or not at all (coded as 1).

Current cigarette use was measured with two items, asking participants “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?”. Participants who reported smoking at least 100 lifetime cigarettes and reported current smoking every day or some days were classified as smokers. Otherwise, participants were classified as non-smokers. Quit intentions were measured with the item “are you planning to quit smoking…” with response options for “within the next month”, “within the next 6 months”, “sometime in the future beyond 6 months”, or “are you not planning to quit”. This item was only asked of smokers. Participants who responded they were planning to quit within the next month

or within the next 6 months were compared with smokers intending to quit sometime in the future and smokers not intending to quit.

Covariates included gender, age, race, ethnicity, education, household poverty status (above or below the 2014 poverty line based on household size and income reported by participants), and smoking status by quit intention.

2.2. Data analysis

We used SAS version 9.4 survey procedures to account for the complex survey design and sampling weights. Since there were three ordered response options to the outcome variable (i.e., very, somewhat, not at all believable), we initially conducted an ordinal logistic regression analysis to assess predictors associated with warning believability. However, since the proportional odds assumption was violated ($X^2 = 148.94$, DF = 20, $p < 0.0001$) and few respondents chose the option "not at all believable" (n = 435, 7.9%) (Stokes et al., 2012), we conducted analyses utilizing a multivariate logistic regression model, comparing adults who reported the warnings to be very believable with adults who reported the warnings to be somewhat or not at all believable. We conducted further analyses comparing smokers intending to quit with smokers not intending to quit.

We entered control variables (i.e., race, ethnicity, age, sex, education, household poverty status, smoking status, quit intentions), message warning, and message source simultaneously in the multivariate logistic regression model. Only individuals with complete data across all relevant variables were included in the analyses. In our final model, 141 observations (approximately 2.8% of the sample) were deleted because they were missing on one or more of the explanatory variables, which resulted in a final sample size of 4873. Results include weighted percentages, adjusted odds ratios (AOR), and confidence intervals (CI). For all analyses, significance was set at $p < 0.05$.

3. Results

Table 1 provides weighted percentages for our sample ($N = 5014$). Most participants were female (51.5%), over the age of 25 (85.1%), White (67.9%) and non-Hispanic (85.8%). Participants tended to have some college education or higher (57.4%) and most were above the poverty line (75.3%). About one sixth reported being a current smoker (17.8%), and among current smokers, 19.5% reported *not* intending to quit.

Table 2 shows the weighted logistic regression results ($N = 4873$). Overall, 56.4% said the messages were *very believable*; the remainder said the messages were *somewhat (n = 1690, 35.71%)* or *not at all (n = 435, 7.86%)* believable. A higher proportion of participants reported new tobacco-related cancer messages (liver and colon cancer) to be very believable than new tobacco-related disease messages (tuberculosis and diabetes), 61.1% vs. 52.3%. These results were confirmed in our final model where new tobacco-related cancer messages (liver and colon cancer) had significantly higher odds of being reported as very believable compared to other tobacco-related disease messages (tuberculosis and diabetes) (AOR: 1.45, 95% CI: 1.17, 1.80). No significant differences existed in message believability by message source (i.e., Surgeon General, FDA, CDC, no source).

Participants who reported being a high school graduate or having a GED (AOR, 0.54, 95% CI: 0.33, 0.90) or having an associate's degree (AOR, 0.50, 95% CI: 0.29, 0.87) had significantly lower odds of reporting the messages as very believable than individuals with professional or doctoral degrees. There were no statistical differences in message believability by race, ethnicity, age, sex, or household poverty status. There were also no significant interactions between message believability and age, smoking status, or sex.

Current smokers not intending to quit (AOR: 0.22, 95% CI, 0.12, 0.39), smokers intending to quit in the future beyond 6 months (AOR: 0.48, 95% CI: 0.32, 0.71), and smokers intending to quit in the next month or the next 6 months (AOR: 0.57, 95% CI, 0.42, 0.76) had lower odds of reporting messages as very believable, compared to non-smokers. When the *referent group* was changed, smokers intending to quit in the next month or the next 6 months (48%) had significantly higher odds of reporting the messages as very believable compared to smokers not intending to quit (22.6%) (AOR: 3.09, 95% CI: 1.60, 5.95) (data not shown in tables).

Table 1
Unweighted and weighted percentages for demographic and smoking-related variables, n = 5014.

Variable	All adults Unweighted n	All adults Unweighted %	All adults Weighted %
Gender			
Male	2372	47.3	48.5
Female	2640	52.7	51.5
Age			
Young adult, <25 years	809	16.1	14.9
Adult, 25 + years	4205	83.9	85.1
Race			
White	3473	69.6	67.9
Black or African American	978	19.6	18.3
Other or unknown	541	10.8	13.7
Ethnicity			
Hispanic	432	8.6	14.2
Non-Hispanic	4568	91.4	85.8
Education			
12th grade, no diploma or less	524	10.5	11.2
High school graduate or GED	1232	24.7	31.4
Some college	1034	20.7	20.7
Associate's degree	496	9.9	10.5
College degree	1060	21.2	15.7
Master's degree	507	10.2	8.1
Professional or doctoral degree	144	2.9	2.4
Household poverty status			
Below the poverty line	868	17.3	15.9
Above the poverty line	3772	75.2	75.3
Refused to answer	374	7.5	8.8
Smoking status			
Current smoker	1151	23.0	17.8
Not a current smoker	3856	77.0	82.2
Quit intentions [a]			
Current smoker who intends to quit in the next month or 6 months	528	46.4	48.2
Current smoker who intends to quit in the future beyond 6 months	361	31.8	32.3
Current smoker who does not intent to quit	248	21.8	19.5

[a] The percentages for the quit intention items are of smokers.

4. Discussion

Tobacco smoking has been causally linked to a range of diseases, and the 2014 Surgeon General's Report included ten new diseases caused by smoking (US Department of Health and Human Services, 2014). To motivate reduction in smoking behaviors, what new messages should we communicate to the public and from what source? Our results indicate participants found new cancer messages more believable, regardless of message source, with 61% saying a liver/colon cancer message was very believable. The cancer-related messages were one and a half times more believable than the chronic disease messages (tuberculosis and diabetes). This higher believability is likely because smoking's association with cancer is more familiar than with other chronic diseases (McAfee et al., 2013). These results are consistent with communication research which suggests that augmenting prior information with new information influences message processing and beliefs (Noar, 2006).

No effect of source on message believability was detected. The lack of effect could be the result of the somewhat similar sources used (Surgeon General, FDA, CDC) (Samu and Bhatnagar, 2008), the existing credibility of those sources (Schmidt et al., 2016), or data collection mode (sources were heard and not seen). Message source has been

Table 2
Weighted logistic regression results comparing adults who reported the messages to be very believable vs. not at all or somewhat believable, $n = 4873$.

Variable	N (%) Reported very believable	Very believable vs. not at all or somewhat believable Adjusted Odds Ratio (95% CI)
Message		
Message 1: liver cancer and colon cancer	1552 (61.1)	1.45 (1.17, 1.80)
Message 2: tuberculosis and diabetes	1285 (52.3)	REF
Source		
Source 1: FDA	672 (53.7)	0.78 (0.57, 1.06)
Source 2: CDC	747 (58.8)	0.98 (0.72, 1.32)
Source 3: Surgeon General	699 (55.5)	0.85 (0.64, 1.14)
Source 4: no source	719 (58.4)	REF
Gender		
Male	1283 (54.3)	0.85 (0.68, 1.06)
Female	1557 (58.4)	REF
Age		
Young adult, <25 years	449 (55.1)	0.98 (0.73, 1.30)
Adult, 25 + years	2393 (56.7)	REF
Race		
White	1937 (55.0)	REF
Black or African American	586 (57.4)	1.17 (0.88, 1.56)
Other or unknown	304 (59.5)	1.05 (0.74, 1.48)
Ethnicity		
Hispanic	260 (61.8)	1.38 (0.94, 2.02)
Non-Hispanic	2576 (55.5)	REF
Education		
12th grade, no diploma or less	290 (56.8)	0.60 (0.30, 1.20)
High school graduate or GED	656 (52.9)	0.54 (0.33, 0.90)
Some college	579 (58.4)	0.68 (0.41, 1.12)
Associate's degree	263 (51.1)	0.50 (0.29, 0.87)
College degree	636 (58.6)	0.63 (0.39, 1.03)
Master's degree	321 (63.3)	0.77 (0.46, 1.28)
Professional or doctoral degree	87 (67.3)	REF
Household poverty		
Below the poverty line	465 (53.9)	0.93 (0.66, 1.32)
Above the poverty line	2176 (57.5)	REF
Refused to answer	202 (51.5)	0.80 (0.55, 1.17)
Smoking status, by quit intentions		
Current smoker who intends to quit in the next month or 6 months	270 (48.0)	0.66 (0.46, 0.96)
Current smoker who intends to quit in the future beyond 6 months	149 (39.7)	0.48 (0.32, 0.71)
Current smoker who does not intend to quit	55 (22.6)	0.22 (0.12, 0.39)
Non-smoker	2357 (59.6)	REF

found to influence the perceived impact of tobacco education messages in previous studies (Bansal-Travers et al., 2011). However, in some cases this has been between contrasting sources such as a non-profit compared to a tobacco industry source (Byrne et al., 2012). More importantly, in a communication campaign, the source depiction is likely to involve visual imagery that could augment source impact on message outcomes (Schmidt et al., 2016). Future research could compare different types of sources (e.g. government, tobacco industry, individuals impacted by smoking) to further explicate the effect of source attribution on message effectiveness in the context of new and existing tobacco communication. Studies should assess participants' familiarity and prior knowledge of each source in addition to assessing message believability.

Non-smokers found the messages to be more believable than smokers. While expected, emerging research suggests non-smokers play an important role in communicating the effects of campaigns and other tobacco education messages (McAfee et al., 2013). That is, there may be an indirect effect of tobacco education messages on current smokers through important others, some of whom are non-smokers (McAfee et al., 2013; Durkin et al., 2012; Hall et al., 2015; Thrasher et al., 2016). In one study, cessation support behaviors from non-smokers and the prevalence of people talking to family and friends about smoking increased after exposure to the Tips campaign (McAfee et al., 2013). Therefore, influencing non-smokers could not only prompt social interactions and increase cessation support but could also influence quit-related behaviors among current smokers, especially among those intending to quit.

Smokers intending to quit in the next 6 months found the messages much more believable than smokers not intending to quit. Those intending to quit may be in an advanced readiness stage and may be more open to new information (Prochaska et al., 1992), attending to the messages more closely (Moorman and van den Putte, 2008). This in turn, increases message believability. Smokers intending to quit may also find the message more personally relevant than those not intending to quit (Cornacchione and Smith, 2012). This finding bodes well for future smoking prevention campaigns by providing preliminary experimental evidence for possible effective smoking prevention messages targeted at smokers intending to quit.

Individuals with lower levels of education found the messages less believable than those with higher levels of education. Although other studies have found differences in perceived effectiveness of smoking prevention messages by socioeconomic status (measured by education and income) (Niederdeppe et al., 2011), caution should be taken when interpreting these results. As has been suggested, the visual content of the messages may be an important determinant of message believability and effectiveness among those less educated (Niederdeppe et al., 2011). Thus, future studies should consider testing visuals to accompany statements about new diseases caused by smoking.

No differences in message believability were found by race, ethnicity, age, sex, or household poverty status. One potential implication is that messages about new diseases linked to smoking targeted to these groups could work equally well across these sociodemographic characteristics. Further work is needed to fully ascertain which messages about new diseases certain subgroups find most believable. Such research could yield valuable evidence for which messages should be included in larger campaigns targeted at the general public.

Our findings have implications for smoking-related mass media campaigns. New mass media tobacco campaigns should continue to consider messages about newer diseases caused by smoking. Such messages activate a person's prior knowledge, influence message processing and prompt quit behaviors (McAfee et al., 2013). Evaluations of campaigns suggest repeated cycles of messages are necessary to sustain high levels of quit behaviors (Wakefield et al., 2011). For example, the CDC-led Tips from Former Smokers campaign began in 2012 with advertisements depicting patients with smoking-related heart disease, head and neck cancer, and stroke (McAfee et al., 2013). That campaign reached 78% of US smokers and 74% of non-smokers, and quit attempts among smokers (of 1 day or more in the prior three months) increased by 12% (McAfee et al., 2013). To maintain the effects of Tips, the CDC launched additional advertisements in 2013 featuring other negative health consequences of smoking such as chronic obstructive pulmonary disease, and lung and colorectal cancer (McAfee et al., 2013; Huang et al., 2015). Advertisements about new cancers linked to smoking such as those tested in this study could be used to expand the current Tips campaign and might have greater impact, building on public knowledge of smoking as a cause of lung cancer.

The study has some limitations. The phone survey allowed for a nationally representative sample of adults. However, messages were read to participants, and may have been processed differently when heard (versus being viewed). We were not able to assess participants' familiarity or prior knowledge of the diseases or sources. We also did not assess perceived prevalence of the diseases under study among the public. Familiarity, prior knowledge and perceived prevalence are factors that should be considered in future studies. The experiment included four new diseases caused by smoking—two cancers and two other types of diseases—and they were grouped in pairs. For practical reasons, we combined cancer vs. non-cancer conditions. Although not ideal, this

allowed us to test certain cancers compared to other diseases. Further studies are needed on other new health consequences of smoking. In this study, we used the term "linked" to test the messages. It is possible that using more definitive language such as "cause" could have influenced the findings. Research is needed to determine if other types of cancers or diseases provide similar findings. Another limitation is the use of a single item to measure believability. Whenever possible, multi-item measures should be used to evaluate message content, including topic relevance and knowledge about the topic (Chaiken, 1980). Other message effectiveness measures such as cognitive elaboration should also be included in future studies. We did not evaluate full campaign advertisements; rather, this study evaluated believability of specific messages that could later be tested as part of future smoking prevention campaigns. To that end, we used single sentences to describe these new diseases caused by smoking. Our findings can serve as quantitative, experimental formative research to guide future message development. Studies should also be conducted to ascertain the believability and persuasiveness of messages among adolescents.

5. Conclusion

This study highlights important differences in the types of information about new diseases caused by smoking that the public finds believable. Smoking as a cause of novel cancers was more believable to smokers and non-smokers. Messages emphasizing the causal link between smoking cigarettes and a variety of new diseases should be considered for use in mass media campaigns, especially those that build on prior knowledge such as novel cancers.

Conflict of interest

The authors report no conflict of interest.

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References

Agaku, I.T., King, B.A., Husten, C.G., Bunnell, R., Ambrose, B.K., Hu, S.S., Holder-Hayes, E., Day, H.R., 2014. Tobacco product use among adults — United States, 2012–2013. MMWR Morb. Mortal. Wkly Rep. 63 (25), 542–547.

Alberg, A.J., Shopland, D.R., Cummings, K.M., 2014. The 2014 Surgeon General's report: commemorating the 50th Anniversary of the 1964 Report of the Advisory Committee to the US Surgeon General and updating the evidence on the health consequences of cigarette smoking. Am. J. Epidemiol. 179 (4), 403–412.

Antman, E., Arnett, D., Jessup, M., Sherwin, C., 2014. The 50th anniversary of the US surgeon general's report on tobacco: what we've accomplished and where we go from here. J. Am. Heart Assoc. 3 (1), e000740.

Bansal-Travers, M., Hammond, D., Smith, P., Cummings, K.M., 2011. The impact of cigarette pack design, descriptors, and warning labels on risk perception in the US. Am. J. Prev. Med. 40 (6), 674–682.

Behavioral Risk Factor Surveillance System, 2014. 2013 Summary Data Quality Report with Response Rates. http://www.cdc.gov/brfss/annual_data/annual_2013.html (Accessed 03/18/2016).

Blum, A., 2014. Blowing smoke: the lost legacy of the 1964 Surgeon General's report on smoking and health. Oncology (Williston Park) 28 (5), 418–422.

Boynton, M.H., Agans, R.P., Bowling, J.M., et al., 2016. Understanding how perceptions of tobacco constituents and the FDA relate to effective and credible tobacco risk messaging: a national phone survey of U.S. adults, 2014–2015. BMC Public Health 16 (1), 516.

Byrne, S., Guillory, J.E., Mathios, A.D., Avery, R.J., Hart, P.S., 2012. The unintended consequences of disclosure: effect of manipulating sponsor identification on the perceived credibility and effectiveness of smoking cessation advertisements. J. Health Commun. 17 (10), 1119–1137.

Chaiken, S., 1980. Heuristic versus systematic information processing and the use of source versus message cues in persuasion. J. Pers. Soc. Psychol. 39 (5), 752.

Cornacchione, J., Smith, S.W., 2012. The effects of message framing within the stages of change on smoking cessation intentions and behaviors. Health Commun. 27 (6), 612–622.

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

Hall, M.G., Peebles, K., Bach, L.E., Noar, S.M., Ribisl, K.M., Brewer, N.T., 2015. Social interactions sparked by pictorial warnings on cigarette packs. Int. J. Environ. Res. Public Health 12 (10), 13195–13208.

Huang, L.L., Thrasher, J.F., Abad, E.N., et al., 2015. The U.S. national tips from former smokers antismoking campaign: promoting awareness of smoking-related risks, cessation resources, and cessation behaviors. Health Educ. Behav. 42 (4), 480–486.

Kim, Y.-J., 2006. The role of regulatory focus in message framing in antismoking advertisements for adolescents. J. Advert. 35 (1), 143–151.

McAfee, T., Davis, K.C., Alexander Jr., R.L., Pechacek, T.F., Bunnell, R., 2013. Effect of the first federally funded US antismoking national media campaign. Lancet.

Menke, A., Casagrande, S., Geiss, L., Cowie, C.C., 2015. Prevalence of and trends in diabetes among adults in the United States, 1988–2012. JAMA 314 (10), 1021–1029.

Miller, C.L., Quester, P.G., Hill, D.J., Hiller, J.E., 2011. Smokers' recall of Australian graphic cigarette packet warnings & awareness of associated health effects, 2005–2008. BMC Public Health 11, 238.

Moorman, M., van den Putte, B., 2008. The influence of message framing, intention to quit smoking, and nicotine dependence on the persuasiveness of smoking cessation messages. Addict. Behav. 33 (10), 1267–1275.

Niederdeppe, J., Farrelly, M.C., Nonnemaker, J., Davis, K.C., Wagner, L., 2011. Socioeconomic variation in recall and perceived effectiveness of campaign advertisements to promote smoking cessation. Soc. Sci. Med. 72 (5), 773–780.

Noar, S.M., 2006. A 10-year retrospective of research in health mass media campaigns: where do we go from here? J. Health Commun. 11 (1), 21–42.

Noar, S.M., Francis, D.B., Bridges, C., et al., 2016. The impact of strengthening cigarette pack warnings: systematic review of longitudinal observational studies. Soc. Sci. Med. 164, 118–129.

Petty, R.E., Cacioppo, J.T., 1986. The elaboration likelihood model of persuasion. Adv. Exp. Soc. Psychol. 19, 123–205.

Prochaska, J.O., DiClemente, C.C., Norcross, J.C., 1992. In search of how people change. Applications to addictive behaviors. Am Psychol. 47 (9), 1102–1114.

Salinas, J.L., Mindra, G., Haddad, M.B., Pratt, R., Price, S.F., Langer, A.J., 2016. Leveling of tuberculosis incidence - United States, 2013–2015. MMWR Morb. Mortal. Wkly Rep. 65 (11), 273–278.

Samu, S., Bhatnagar, N., 2008. The efficacy of anti-smoking advertisements: the role of source, message, and individual characteristics. Intl J Nonprofit & Voluntary Mark. 13 (3), 237–250.

Schmidt, A.M., Ranney, L.M., Pepper, J.K., Goldstein, A.O., 2016. Source credibility in tobacco control messaging. Tob Regul Sci. 2 (1), 31–37.

Stokes, M.E., Davis, C.S., Koch, G.G., 2012. Categorical Data Analysis Using SAS. SAS Institute.

Swayampakala, K., Thrasher, J.F., Hammond, D., et al., 2015. Pictorial health warning label content and smokers' understanding of smoking-related risks—a cross-country comparison. Health Educ. Res. 30 (1), 35–45.

Thrasher, J.F., Abad-Vivero, E.N., Huang, L., et al., 2016. Interpersonal communication about pictorial health warnings on cigarette packages: policy-related influences and relationships with smoking cessation attempts. Soc. Sci. Med. 164, 141–149.

U.S. Cancer Statistics Working Group, 2016. United States Cancer Statistics: 1999–2013 Incidence and Mortality Web-based Report. Department of Health and Human Services, Centers for Disease Control and Prevention, and National Cancer Institute, Atlanta, GA.

US Department of Health and Human Services, 2004. The Health Consequences of Smoking: A Report of the Surgeon General. Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Atlanta, GA.

US Department of Health and Human Services, 2014. The Health Consequences of Smoking—50 Years of Progress: A Report of the Surgeon General. Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Atlanta, GA.

Wakefield, M.A., Spittal, M.J., Yong, H.H., Durkin, S.J., Borland, R., 2011. Effects of mass media campaign exposure intensity and durability on quit attempts in a population-based cohort study. Health Educ. Res. 26 (6), 988–997.

World Health Organization, 2012. WHO Global Report: Mortality Attributable to Tobacco. Geneva, Switzerland.

Yale, R.N., 2013. Measuring narrative believability: development and validation of the narrative believability scale (NBS-12). J Commun. 63 (3), 578–599.