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Cigarette graphic warning labels increase both risk perceptions and smoking myth endorsement

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Abstract

Objective—Cigarette graphic-warning labels elicit negative emotion, which increases risk perceptions through multiple processes. We examined whether this emotion simultaneously affects motivated cognitions like smoking-myth endorsement (e.g., “exercise can undo the negative effects of smoking”) and perceptions of cigarette danger versus other products.

Design—736 adult and 469 teen smokers/vulnerable smokers viewed one of three warning-label types (text-only, low-emotion graphic, or high-emotion graphic) four times over two weeks.

Main Outcome Measures—Emotional reactions to the warnings were reported during the first and fourth exposures. Participants reported how often they considered the warnings, smoking-myth endorsement, risk perceptions, and perceptions of cigarette danger relative to smokeless tobacco and electronic cigarettes.

Results—In structural equation models, emotional reactions influenced risk perceptions and smoking-myth endorsement through two processes. Emotion acted as information about risk, directly increasing smoking risk perceptions and decreasing smoking-myth endorsement. Emotion also acted as a spotlight, motivating consideration of the warning information. Warning consideration increased risk perceptions, but also increased smoking-myth endorsement. Emotional reactions to warnings decreased perceptions of cigarette danger relative to other products.

Conclusions—Emotional reactions to cigarette warnings increase smoking risk perceptions, but also smoking-myth endorsement and misperceptions that cigarettes are less dangerous than potentially harm-reducing tobacco products.

Keywords

Emotions; Risk Perceptions; Smoking Myths; Tobacco Control

Tobacco use causes more than six million deaths each year and is the leading cause of preventable death worldwide (World Health Organization, 2013). Both observational and

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experimental research suggests that requiring graphic warnings on cigarette packaging is an effective way to encourage current smokers to quit and to discourage youth from starting (Hammond, 2011; Noar, Hall, Francis, Ribisl, Pepper, & Brewer, 2016). Brewer et al. (2016), for example, found that graphic warnings vs. current U.S. text warnings caused 6% more quit attempts in a clinical trial. Graphic warnings elicit more negative feelings from smokers than text-only warnings, which generalize to smoking (Kees, Burton, Andrews, & Kozup, 2010; Peters, Romer, et al., 2007). These findings have led to the misperception that graphic warnings work by merely “Browbeat[ing] consumers into quitting” (R.J. Reynolds Tobacco Co. v. Food and Drug Administration, 2012, p. 1216).

Thoughtful processes and decreased vs. increased smoking-myth endorsement

Research suggests that emotional reactions to graphic warnings like worry and cognitive responses like perceptions of believability mediate the warnings’ impact on smokers’ risk perceptions and feelings about quitting (Emery, Romer, Sheerin, Jamieson, & Peters, 2014). A recent randomized clinical trial further demonstrated that the negative emotions elicited by graphic warning labels influenced smokers through three simultaneous but distinct processes (Evans, Peters, Strasser, Emery, Sheerin, & Romer, 2015; Peters, 2006; Peters, Lipkus, & Diefenbach, 2006). In it, smokers who viewed graphic vs. text-only warnings reported more negative feelings about smoking. This negative emotion served as information about the increased health risks posed by smoking and acted to motivate quit intentions. It also served as a spotlight, encouraging smokers to look closely at the risk information on the labels and increasing their perceived credibility, which ultimately led to heightened risk perceptions and quit intentions.

The finding that graphic-warning-elicited emotion can influence risk perceptions and quit intentions by acting as a spotlight (Evans et al., 2015) is important as it represents the first demonstration that graphic warnings elicit “thoughtful” processes. Multi-process theories of attitude change such as the Elaboration Likelihood Model (ELM; Petty & Cacioppo, 1986) hold that evaluations formed after careful consideration of information are more predictive of behavior (Petty, Cacioppo, & Schumann, 1983; Sivacek & Crano, 1982) than those formed in a relatively thoughtless manner, making this spotlight effect potentially important for long-term quitting.

However, thinking carefully about health messages like graphic warnings may not only lead to increased risk perceptions and quit intentions. When people are motivated and able (Petty & Cacioppo, 1986), they scrutinize information more that opposes their viewpoints (Edwards & Smith, 1996), generate more counter-arguments toward these disagreeable messages (Brock, 1967), and identify more alternative explanations for the threatening information (Ditto & Lopez, 1992). Smoking presents an interesting case due to the mixed relationship smokers have with their smoking. Most smokers understand that it is dangerous, they want to quit and, they report that, if given the opportunity, they would not have started smoking in the first place (Slovic, 2001). Thus, the graphic-warning message contains information with which the smoker agrees such that greater scrutiny is likely to increase risk

perceptions (e.g., Evans et al., 2015). However, smoking can also be enjoyable (Fidler & West, 2009) and quitting is remarkably difficult (Centers for Disease Control, 2011). As a result, the graphic-warning message simultaneously contains information that the smoker does not want to hear, potentially increasing feelings of ambivalence. Although ambivalence can motivate careful consideration of information to reduce the ambivalence (Clark, Wegener, & Fabrigar, 2008), no research has examined the possibility that this scrutiny may counter message effectiveness in the context of health messages like cigarette graphic warnings. Thus, although the negative emotions elicited by cigarette graphic-warning labels may encourage smokers to think more carefully and perceive greater risk from cigarettes, it may also motivate cognitions which cause unintended effects. We examined possible unintended effects on beliefs about smoking myths and the relative safety of cigarettes vs other tobacco products.

Smokers tend to be unrealistically optimistic about their chances of experiencing smoking-related negative health effects such as lung cancer (Weinstein, Slovic, & Gibson; 2004; Weinstein, Marcus, & Moser, 2005; Williams & Clarke, 1997). One reason for this finding may be that substantial proportions of smokers endorse various risk-minimizing beliefs about smoking (Weinstein et al., 2005). For example, many smokers believe that exercise and vitamins can undo the negative effects of smoking (Weinstein et al., 2005; Rutten, Augustson, Moser, Beckjord, & Hesse, 2008). To date, no research has explored the impact of cigarette graphic-warning labels on endorsement of smoking myths. Emotional reactions to graphic vs text-only warnings may act as information to directly decrease smoking-myth endorsement. In addition, the negative emotion may act as a spotlight and cause greater scrutiny of the warnings (Evans et al., 2015) which leads smokers to endorse smoking myths as a way to dismiss the threat depicted in the warnings while still believing the warnings (Ditto & Lopez, 1992). Although smoking risk perceptions and myth endorsement should be inversely related because people are motivated to hold consistent attitudes (Festinger, 1957; Heider, 1958), the negative emotion caused by graphic warnings may simultaneously increase smokers' risk perceptions and need to dismiss the threat by endorsing more smoking myths. We hypothesize:

Hypothesis 1 (H1): Cigarette warnings that elicit stronger (vs. weaker) emotional reactions will lead participants to think more often about the risk information they contain.

Hypothesis 2a (H2a): Thinking more often about risk information will lead to greater smoking risk perceptions and greater endorsement of smoking myths.

Hypothesis 2b (H2b): Smokers will hold consistent attitudes such that greater endorsement of smoking myths will be associated with lower smoking risk perceptions.

Relative Risks

Although cigarettes are the most frequently used tobacco product in the United States, a variety of non-cigarette products, such as smokeless tobacco and electronic cigarettes, are also available to consumers, are sometimes used as cigarette substitutes, and may be safer

(Agaku et al., 2014). Smokeless tobacco products (e.g., snus, a moist powdered tobacco placed under the upper lip for extended periods) expose users to lower levels of carcinogens than combustible cigarettes (Levy et al., 2004). Electronic cigarettes (aka, e-cigarettes, vape pens) also appear to expose users to lower levels of toxicants than cigarettes and are likely less harmful although their full health implications are unknown (Hajek, Etter, Benowitz, Eissenberg, & McRobbie, 2014). Correct beliefs that these products are less dangerous than cigarettes are associated with interest in switching to them (Gartner, Jimenez-Soto, Borland, O'Connor, & Hall, 2010; Lund, 2012; Pepper & Brewer, 2014). Overall, smokers correctly perceive cigarettes to be more dangerous than e-cigarettes (Pepper, Emery, Ribisl, Rini, & Brewer, 2015), but incorrectly perceive them to be less dangerous than smokeless tobacco (Czoli, Fong, Mays & Hammond, 2016). Although research has examined relative risk perceptions of cigarettes vs these non-cigarette products, it is unknown how exposure to emotional information about cigarettes' risks might affect these relative risk perceptions.

Perceptions of cigarettes compared to alternative products like smokeless tobacco and electronic cigarettes could be driven partly by motivated reasoning. Smokers who perceive their habit as risky might justify their continued smoking by (inaccurately) construing cigarettes to be less dangerous than these alternatives. In this case, to the extent that emotional reactions increase smoking risk perceptions, they may also decrease perceptions of cigarettes' relative danger. Alternatively, increased smoking risk perceptions might increase perceptions that cigarettes are dangerous relative to other tobacco products. In this case, to the extent that emotional reactions increase smoking risk perceptions, they would increase perceptions of cigarettes' relative danger.

Smokers already engaged in motivated reasoning about smoking might be particularly likely to judge cigarettes as less dangerous than smokeless tobacco and/or electronic cigarettes. In this case, to the extent that emotional reactions increase smoking-myth endorsement, they would lead to perceptions that cigarettes are less dangerous than alternative products. Alternatively, endorsing myths about the dangers of smoking might reduce smokers' need to denigrate other tobacco products. In this case, to the extent that emotional reactions to cigarette warnings increase smoking-myth endorsement, they would increase perceptions of cigarette dangerousness relative to these alternative products. Finally, it is possible that smokers perceive all tobacco products to be the same and equally harmful or harmless. In either case, emotional reactions to cigarette warnings would have no effect on perceptions of cigarettes relative to smokeless tobacco or electronic cigarettes. We investigated these possibilities.

Research Question

Do emotional reactions to cigarette graphic-warning labels influence perceptions of the relative risks of cigarettes as compared to smokeless tobacco and electronic cigarettes via effects on cigarette risk perceptions and smoking-myth endorsement and, if so, how?

METHOD

Overview

We compared the effects of text-only cigarette warnings to the effects of graphic warnings with images that varied in emotional content. As detailed in Evans et al. (2016), two preliminary studies were used to identify images that elicited a strong or weak emotional response. These studies revealed that smokers' reports of experienced arousal, but not valence, predicted the impact of warning labels on smokers' risk perceptions (we tested only negatively-valenced warnings). Thus, we operationalized emotional reactions as arousal in the current research.

As reported elsewhere (Evans et al., 2016), low-emotion images elicited less emotion than text-only and high-emotion warnings in the present data sets. Thus, we predicted that high-emotion graphic warnings would be associated with higher levels of risk perceptions and more consideration of warning information relative to text-only warnings whereas low-emotion graphic warnings would relate to lower levels of risk perceptions and less consideration of warning content. By comparing the effects of high-emotion vs. text-only warnings and low-emotion vs. text-only warnings, we can test what drives their effects: The extent of emotional reactions to the warnings or the mere presence vs absence of images; this is an important consideration for FDA as they consider future steps with graphic warnings.

Participants and design

Two U.S. nationally representative samples were recruited through an internet survey company (YouGov). The adult sampling frame was based on the 2014 National Health Interview Survey. Adult participants were 19–64 years old, had smoked 100+ lifetime cigarettes, and currently smoked “every day” or “some days.” The sampling frame for teen smokers/vulnerable smokers was constructed from the 2011–2012 National Health and Nutrition Examination Survey. Teens were 14–18 years old and answered “yes” to “Have you ever tried or experimented with cigarette smoking, even a few puffs?”

Participants were randomly assigned to one cell of a 3 (Warning label: Text-only vs. low-emotion vs. high-emotion) x 2 (Measures delay: Immediate vs. 6-weeks) between-participants experiment. All participants viewed nine cigarette warnings from their experimental condition once at baseline, twice one week later, and once two weeks after baseline. Before exposure two, warning consideration was measured. Either immediately or six weeks after the last exposure, participants responded to other dependent measures including items assessing smoking-myth endorsement, and risk perceptions for cigarettes and alternative tobacco products. A timeline is in the supplemental materials (Figure S1).

Materials and procedure

The nine text warnings used in all three conditions were signed into law in the 2009 Family Smoking Prevention and Tobacco Control Act; they are not yet in use, however, in the U.S. In all three conditions at each timepoint, participants viewed all nine text warnings one at a time. Warning text was formatted to mimic black and white text warnings found on cigarette

packages outside the U.S. and was sized comparably across conditions. Participants in the high-emotion warnings condition viewed the same text warnings, but each warning was paired with an image pre-tested to elicit negative emotions from smokers. Participants in the low-emotion condition viewed the same text warnings, but warnings were paired with images pre-tested to elicit little emotion. See Fig. 1 for examples of each condition and supplemental materials Figs. S2–S4 for complete stimuli.

Measures

Emotional reaction—The Self-Assessment-Manikin (SAM) for arousal (Bradley & Lang, 1994) was used to rate each warning. This measure uses five stick figures depicting emotions ranging from calm to excited and asks participants to “Select one character to describe how the warning makes you feel from calm, drowsy and peaceful on the left to excited, energized and alert on the right.” (1 *Calm*/5 *Excited*).

Warning consideration—Participants responded to an item which asked “In the past week, how often have you thought about the health warnings we showed you?” (1 *Not often*/5 *Very often*).

Smoking risk perceptions—Participants responded to three items which asked “Compared to the average nonsmoker your age, gender, and race, how would you rate your chances of getting a life-threatening illness because of smoking?” (–3 *Much lower*/+3 *Much higher*), “Compared to the average nonsmoker your age, gender, and race, how would you rate your chances of getting lung cancer?” (–3 *Much lower*/+3 *Much higher*), and “Compared to the average nonsmoker your age, gender, and race, how would you rate your chances of dying at a younger age than average?” (–3 *Much lower*/+3 *Much higher*). Measures were adapted from past research (Dillard, Ferrer, Ubel, & Fagerlin, 2012).

Smoking-myth endorsement—Participants were asked to rate the extent to which they agreed with the statements “Exercise can undo most of the effects of smoking,” “Vitamins can undo most of the effects of smoking,” and “I can quit smoking at any time and thus avoid any serious health risks before they occur” on a scale from 1 *Completely disagree* to 5 *Completely agree*. These items were adapted from past research (e.g., Weinstein et al., 2005).

Perceptions of cigarette danger vs. alternative tobacco products—Participants rated their comparative risk perceptions for cigarettes vs. alternative tobacco products on two items. Participants read that “Smokeless tobacco refers to chewing or spit tobacco (also twist, plug, scrap, dip, or quid), snuff, and snus.” They were then asked “Compared to smoking cigarettes, do you think that smokeless tobacco is less harmful, more harmful, or no different for health?” (–3 *Smokeless tobacco is much less harmful*/+ 3 *Smokeless tobacco is much more harmful*.) This item was reverse scored so that lower values indicate perceptions that cigarettes are less dangerous than smokeless tobacco and higher values indicate perceptions that cigarettes are more dangerous than smokeless tobacco. Participants read that “Electronic cigarettes [are] often called e-cigarettes, hookah pens, e-hookahs, e-cigars, vape pens, vape sticks, cig-a-likes or vapor pipes. E-cigarettes and these other devices usually look like regular cigarettes, cigars, or pens, but are battery powered and produce vapor

instead of smoke.” They were then asked “Compared to smoking cigarettes, do you think smoking electronic cigarettes is less harmful, more harmful, or no different for health?” (-3 *Electronic cigarettes are much less harmful* / $+3$ *Electronic cigarettes are much more harmful*.) This item was also reverse scored so that lower values indicate perceptions that cigarettes are less dangerous than electronic cigarettes and higher values indicate perceptions that cigarettes are more dangerous than electronic cigarettes.

Quit intentions—Participants responded to a quit-contemplation ladder at baseline and at the study’s conclusion by choosing the number indicating their current thinking about smoking from 0=no thought of quitting to 10=taking action to quit (Biener & Abrams, 1991). At the study’s conclusion, participants also responded to items asking “Thinking about the next week, do you expect your tobacco use to...?” (-3 Decrease a lot / $+3$ Increase a lot; reverse scored) and “How likely do you think it is that you will try to quit smoking within the next 30 days?” (-3 Very unlikely / $+3$ Very likely).

Preliminary analyses and analysis strategy

Preliminary analyses were conducted using STATA (StataCorp, 2011). Emotional reactions to the warnings did not differ significantly between the first and fourth warning exposures. Thus, we used indices of participants’ average reactions to the warning labels at exposure 1 ($\alpha = .94$, $M = 3.17$, $SD = 1.05$) and exposure 4 ($\alpha = .95$, $M = 3.21$, $SD = 1.03$) as indicators of the emotional-reaction construct. Details of these analyses are available in the supplemental materials.

The structural equation model (SEM) we tested was developed from past research demonstrating that emotions are an important mediator of graphic warning labels’ impact on smokers’ risk perceptions (Evans et al., 2015). Our theoretical model allowed us to test our hypotheses and investigate our research question simultaneously. Unstandardized regression coefficients from our final model were used to investigate relations among emotional reaction, warning consideration, risk perceptions, smoking-myth endorsement, and perceptions of alternative tobacco products. To investigate the impact of experimental conditions on risk perceptions and smoking-myth endorsement, we created two dummy variables to represent planned comparisons. One variable compared text-only warnings (coded -1) to low-emotion warnings (coded as 1), coding high-emotion warnings as 0. The second variable compared the text-only warnings (coded -1) to high-emotion warnings (coded as 1), coding low-emotion warnings as 0. These variables simultaneously predicted emotional reaction, and their indirect effects on risk perceptions and smoking-myth endorsement were evaluated. We also investigated the effects of emotional reaction on perceptions of cigarettes relative to other tobacco products. We controlled for measurement timing by including a dummy variable for delay condition in regressions where relationships could vary by delay (immediate = 0 vs. delayed = 1). We controlled for differences between the adult and teen samples by including age group (teen = 0 vs. adult = 1) as a covariate in all regressions. We did not control for demographic variables because this is an experimental study with nationally representative samples.

SEM was carried out in MPlus (Muthén & Muthén, 2012). All analyses incorporated survey weights, allowing for conclusions generalizable to the populations specified above. Although latent variable interactions in SEMs are interpreted in a manner similar to interactions in multiple regression (Aiken & West, 1991), the estimation of such effects is far more complex (Marsh, Wen, & Hau, 2004). MPlus estimation of interaction models uses LMS/QML method of estimation (Klein & Moosbrugger, 2000). Such estimation does not produce model fit estimates or estimates of indirect effects. As recommended by Maslowsky, Jager, and Hemken (2016), to examine the possibility that age group might interact with model components, we first estimated model fit without interaction terms. We then re-estimated the model with interaction terms between age and each dependent variable. A difference test revealed the interaction model provided a better fit to the data than the non-interaction model ($d = 114.73, p < .001$). Maslowsky et al. (2016) demonstrated that the addition of interaction terms has little effect on the values of traditional indices of model fit, so we report fit indices and estimates of indirect effects from the non-interaction model.

Because emotional reaction, risk perceptions, and smoking-myth endorsement were non-normally distributed, maximum likelihood parameter estimates with standard errors and a chi-square test statistic robust to non-normality were used. We used multiple fit indices to determine model fit with cutoff values recommended in the literature (Hu & Bentler, 1999). The values we used were: Root Mean Square Error of Approximation [RMSEA] ≤ 0.05 with 90% Confidence Intervals of the RMSEA = 0.00–0.08, Comparative Fit Index [CFI] ≥ 0.95 , and Standardized Root Mean Square Residual [SRMR] ≤ 0.08 . Estimated indirect effects and their associated p-values were calculated using robust standard errors. Using robust standard errors yields accurate estimates of sampling variability when the distribution of model parameters is non-normal (Finch, West, & MacKinnon, 1997).

It would be ideal to assess relationships between variables in our model and quit intentions within a single SEM. However, items used to assess smoking-myth endorsement and quit intentions share variance, resulting in poor measurement model fit when both constructs are in a single model. A table of correlations between measures of smoking-myth endorsement and measures of quit intentions is available in the supplemental materials (see Table S1). Nevertheless, it is important to understand how other constructs in our model affect quit intentions. To investigate this, we examined correlations between model components and quit intentions.

Results

736 adults and 469 teens completed the study. Weighted and unweighted participant demographics are available in the supplemental materials, Table S2.

Measurement model

To assess the fit of our measurement model (emotional reaction, risk perceptions, smoking-myth endorsement), we conducted confirmatory factor analyses. Our hypothesized three-factor structure fit the data well ($\chi^2[17]=26.64, p=.064$; RMSEA=.02 [CI90: .00 to .04]; CFI = .99; SRMR = .03).

Total effects

Prior to constructing structural equation models, we investigated the total effects of our experimental-condition contrasts on participants' average emotional reaction ($\alpha = .78$), warning consideration, average risk perceptions ($\alpha = .90$), average smoking-myth endorsement ($\alpha = .68$), and quit intentions ($\alpha = .69$) using weighted regressions. Details of these analyses are available in the supplemental materials.

Structural equation model

Our theory-based model fit the data well ($\chi^2[70] = 121.32, p < .001$; RMSEA = .03 [CI90: .02 to .03]; CFI = .98; SRMR = .03; BIC = 40,338.01). All model coefficients are available in the supplemental materials, Table S3. Teens reported higher levels of emotional reaction than adults ($b = -.17, p = .009$), but lower levels of smoking risk perceptions ($b = .79, p = .008$). Teens also perceived cigarettes as less dangerous relative to smokeless tobacco than adults ($b = .32, p = .044$). Additionally, age group interacted with smoking-myth endorsement to predict perceptions of cigarettes' danger relative to smokeless tobacco ($b = -.40, p = .009$); greater smoking-myth endorsement was associated with misperceptions that cigarettes are less dangerous than smokeless tobacco for adults, but not for teens (see supplemental materials, Figures S5 and S6).

Participants in the high-emotion warnings condition reported more emotional reaction to the warnings than participants in the text-only condition ($b = .32, p < .001$). Participants in the low-emotion warnings condition reported less emotional reaction than participants in the text-only condition ($b = -.25, p = .001$). Consistent with prior research on the Affect Heuristic (Slovic, Finucane, MacGregor, & Peters, 2004; Slovic & Peters, 2006), participants who experienced stronger emotional reactions to the warnings perceived smoking as more risky ($b = .45, p = .010$). Stronger emotional reaction was associated with less smoking-myth endorsement ($b = -.23, p = .027$). Consistent with H1 and research on emotion promoting greater thinking (Evans et al., 2015; Peters, 2006), those who experienced more emotional reaction also considered the warnings more often ($b = .95, p < .001$). As expected and based on H2a, greater warning consideration was associated with greater smoking risk perceptions ($b = .19, p = .016$) and smoking-myth endorsement ($b = .18, p < .001$). Consistent with H2b, increased smoking-myth endorsement was associated with lower smoking risk perceptions ($b = -.29, p = .014$).

Test of emotion as information

Several indirect effects on smoking risk perceptions were significant (see Table 2). The indirect effect of the high-emotion vs. text-only warnings contrast on risk perceptions via emotional reaction was significant and positive (*Estimated Indirect Effect [IE]* = .10, $p = .001$). The indirect effect of the low-emotion vs. text-only warnings contrast on risk perceptions via emotional reaction was significant and negative (*IE* = $-.08, p = .005$). Thus, although exposure to high-emotion vs. text-only warnings led to greater risk perceptions via emotional reaction, exposure to low-emotion vs. text-only warnings led to lower risk perceptions.

Consistent with emotional reaction directly affecting perceptions that smoking is dangerous, both indirect effects of condition on smoking-myth endorsement via emotional reaction were significant. The indirect effect of the high-emotion vs. text-only warnings contrast on smoking-myth endorsement via emotional reaction was negative ($IE = -.05, p = .031$) and the indirect effect of the low-emotion vs. text-only warnings contrast on smoking-myth endorsement via emotional reaction was positive ($IE = .04, p = .046$). Thus, although exposure to high-emotion vs. text-only warnings led to lower smoking-myth endorsement via emotional reaction, exposure to low-emotion vs. text-only warnings led to higher smoking-myth endorsement.

Tests of Hypotheses 2a (emotion as spotlight) and 2b (motivated to be consistent)

Consistent with H2a, warning consideration predicted risk perceptions. The indirect effect of high-emotion vs. text-only warnings on risk perceptions via emotional reaction and warning consideration was positive and significant ($IE = .01, p = .032$). The indirect effect of low-emotion vs. text-only warnings on risk perceptions via emotional reaction and warning consideration was negative and significant ($IE = -.02, p = .037$). Thus, emotional reactions to the warnings encouraged smokers to think about the risk information on the warnings and, to the extent that smokers thought about this information, they reported higher smoking risk perceptions.

Also consistent with H2a, the indirect effect of increasing smoking-myth endorsement via emotional reaction and warning consideration was positive and significant ($IE = .04, p = .001$). The indirect effect of low-emotion vs. text-only warnings on smoking-myth endorsement via emotional reaction and warning consideration was significant and negative ($IE = -.05, p = .031$). Thus, emotional reactions to the warnings encouraged smokers to think about information, and (in addition to increasing risk perceptions), this warning consideration led to greater smoking-myth endorsement.

Consistent with H2b (that people are motivated to hold consistent attitudes), increased smoking-myth endorsement was associated with lower smoking risk perceptions ($b = -.01, p = .026$). The indirect effect of high-emotion vs. text-only warning labels on risk perceptions via emotional reaction, warning consideration, and smoking-myth endorsement was significant and negative ($IE = -.01, p = .026$). Thus, part of the positive effects of high-emotion warnings on risk perceptions was reduced by smoking-myth endorsement. The indirect effect of low-emotion vs. text-only warning labels on risk perceptions via emotional reaction, warning consideration, and smoking-myth endorsement was significant and positive ($IE = .01, p = .036$). Thus, part of the negative effects of low-emotion graphic warnings on risk perceptions was offset by the warnings' effect on smoking-myth endorsement. Paths from warning-label condition to risk perceptions via emotional reaction and smoking-myth endorsement that did not include warning consideration were not significant (p 's > .096).

Test of research question

To test whether emotional reaction to warning labels had significant effects on perceptions of cigarettes' dangerousness compared to that of smokeless tobacco, we collapsed across

experimental conditions (see Table 3). The indirect effects of emotional reaction on perceptions of cigarettes' danger relative to smokeless tobacco via risk perceptions ($IE = -.11, p = .001$), warning consideration \rightarrow risk perceptions ($IE = -.03, p = .031$), warning consideration \rightarrow smoking-myth endorsement ($IE = -.06, p = .006$), and warning consideration \rightarrow smoking-myth endorsement \rightarrow risk perceptions ($IE = -.01, p = .029$) were all significant and negative. This indicates that emotional reactions to cigarette warnings labels led to misperceptions that cigarettes are less dangerous than smokeless tobacco through multiple processes. However, the path from emotional reaction \rightarrow smoking-myth endorsement compensated ($IE = .07, p = .037$), offsetting this misperception.

A similar pattern of effects emerged for perceptions of electronic cigarettes. The indirect effects of emotional reaction on perceptions of cigarettes danger relative to electronic cigarettes via risk perceptions ($IE = -.10, p = .008$), warning consideration \rightarrow risk perceptions ($IE = -.03, p = .034$), and warning consideration \rightarrow smoking-myth endorsement ($IE = -.08, p = .003$) were all significant and negative. Thus, emotional reactions to cigarette warnings led to misperceptions that cigarettes are less dangerous than electronic cigarettes through these paths. However, the effects of emotional reaction on perceptions of cigarettes relative to electronic cigarettes via smoking-myth endorsement ($IE = .09, p = .018$) and warning consideration \rightarrow smoking-myth endorsement \rightarrow risk perceptions ($IE = .01, p = .033$) offset this misperception.

Relations to quit intentions

Correlations between indices of key model constructs and quit intentions are reported in Table 4. Greater quit intentions were reported by individuals who reported more emotional reaction to the warnings, considered the warnings more, perceived greater risks from smoking, and perceived cigarettes as less dangerous than smokeless tobacco. Partial correlations controlling for baseline quit intentions are available in supplemental materials, Table S4.

Discussion

Consistent with past research (Emery et al., 2014; Evans et al., 2015; Evans et al., 2016), our findings provide evidence that emotional reactions to cigarette graphic warnings drive their impact on smoking risk perceptions through multiple distinct processes. These effects, however, are psychologically complex with positive and suppressor paths. Consistent with past research, emotion acted as information about risk. Stronger emotional reactions to cigarette warnings for participants in the high-emotion graphic vs. text-only condition led to greater smoking risk perceptions and less smoking-myth endorsement. Weaker emotional reactions for participants in the low-emotion graphic vs. text-only condition led to lower smoking risk perceptions and more smoking-myth endorsement.

Consistent with H1, we found that emotional reactions to graphic vs. text-only warnings encouraged smokers to consider the information provided by the warnings. Consistent with H2a, more warning consideration led to greater smoking risk perceptions. Thus, and consistent with emotion acting as a spotlight, participants in the high-emotion vs. text-only condition reported more emotional reaction to the warnings, which led to more warning

consideration, and (in turn) greater risk perceptions. Participants in the low-emotion graphic vs. text-only condition reported less emotional reaction to the warnings, which led to less warning consideration, and (in turn) lower smoking risk perceptions. Also consistent with H2a, greater warning consideration led to more endorsement of smoking myths. The stronger emotional reaction experienced by participants in the high-emotion graphic vs. text-only condition led to higher levels of warning consideration, which was associated with more endorsement of smoking myths. The lower levels of emotional reaction reported by participants in the low-emotion graphic vs. text-only condition led to lower levels of warning consideration, which were associated with less endorsement of smoking myths.

Consistent with H2b, smokers who expressed stronger endorsement of smoking myths reported lower smoking risk perceptions. For participants in the high-emotion graphic vs. text-only condition, strong emotional reactions to the warnings led them to carefully consider the content of the warnings, resulting in more smoking-myth endorsement and lower smoking risk perceptions in turn. Lower levels of emotional reaction for participants in the low-emotion graphic vs. text-only condition led these smokers to engage in less warning consideration, resulting in less smoking-myth endorsement and, in turn, greater smoking risk perceptions.

Taken together, these data suggest that the relation between emotional reactions to cigarette warning labels and smoking risk perceptions is complicated. This investigation provides the first demonstration that emotional reaction to cigarette warnings labels affect both smoking risk perceptions and smoking-myth endorsement. Smoking-myth endorsement suppressed the total effect of emotional reaction on risk perceptions. Zhao, Lynch, and Chen (2010) suggest that suppressor variables are one common reason that investigators find indirect effects without the presence of total effects. Several past investigations comparing the efficacy of graphic vs. text-only cigarette warnings reported indirect effects on smoking risk perceptions, but no significant total effects (e.g., Emery et al., 2014; Evans et al., 2015; Noar et al., 2015). These data suggest that smoking-myth endorsement is one suppressor variable that investigators should consider measuring and addressing in their analyses. Future research should investigate the possibility that other variables, such as psychological reactance (Hall, Sheeran, Noar, Ribisl, Bach, & Brewer, 2016) and quitting self-efficacy (Strecher, McEvoy, Becker, & Rosenstock, 1986) might also suppress effects of graphic vs. text-only warnings on risk perceptions.

This investigation provides the first data on how emotional reactions to cigarette warning labels influence perceptions of cigarettes relative to alternative tobacco products. If smokers unwilling or unable to end their nicotine addiction were to completely switch to smokeless tobacco or electronic cigarettes, they could substantially reduce their carcinogen exposure. However, smokers may be motivated to find fault with these products which could justify their continued smoking. Consistent with past research (Czoli et al., 2016), participants incorrectly perceived cigarettes to be less dangerous than smokeless tobacco. This belief was amplified through four paths and was suppressed by one. Strong emotional reactions to cigarette warnings led to more erroneous perceptions that cigarettes are less dangerous than smokeless tobacco through their effect on risk perceptions and through three different paths involving warning consideration. The effect of emotional reaction on smoking-myth

endorsement (bypassing warning consideration) attenuated this misperception. Smoking-myth endorsement led to perceptions that cigarettes are less dangerous than smokeless tobacco in adults but not teens. It is possible that teens' attitudes toward smokeless tobacco are more stable than those of adult smokers. Alternatively, because teens in the current research smoked fewer cigarettes than adults, they may have felt less need than adults to justify their continued smoking by derogating other tobacco products.

Although participants correctly perceived cigarettes to be more dangerous than electronic cigarettes (Hajek et al., 2014), strong emotional reactions to cigarette warnings can undermine this belief. Stronger emotional reactions were associated with misperceptions that cigarettes are less dangerous than electronic cigarettes. The effects of emotional reaction via risk perceptions, warning consideration -> risk perceptions, and warning consideration -> smoking-myth endorsement strengthened this misperception. The effects of emotional reaction via smoking-myth endorsement and warning consideration-> smoking-myth endorsement -> risk perceptions attenuated this effect.

One limitation of the present research is that we did not examine the effects of warning labels on smoking behavior. To regulate for the protection of public health, policy makers need to know how interventions like graphic vs. text-only warnings will affect smoking behavior after implementation. Future research should examine the impact of these warnings on cessation. Although not ideal from a regulatory perspective, behavioral intentions are a strong predictor of health behavior (Webb & Sheeran, 2006). In the current research, stronger emotional reactions to the warnings, warning consideration, smoking risk perceptions, and perceptions of cigarettes as less dangerous than smokeless tobacco were positively correlated with quit intentions. This suggests that these constructs should be of particular interest to policy makers. Smoking-myth endorsement was not correlated with quit intentions. This is likely an artifact of shared variance between measures of smoking-myth endorsement and measures of quit intentions. Some of these relationships were positive, and some were negative, resulting in a net correlation of zero between the indices. The FDA should nevertheless consider the impact of graphic vs. text-only warning labels on smoking-myth endorsement because reducing misinformation about smoking risks is consistent with their mission to help educate the public about the dangers of regulated tobacco products. FDA could consider addressing these myths directly in the form of communication campaigns, or could develop emotional warnings that do not increase smoking-myth endorsement. For example, emotional warnings with a strong quit-efficacy component might be more effective in increasing risk perceptions without also increasing smoking-myth endorsement.

Another limitation of the present research is that participants were only exposed to one set of graphic or text-only warnings. Graphic images were selected on the basis of their ability to elicit either a strong or modest emotional reaction from pre-test participants. However, it is possible that the warnings also differed in some other important way. For example, the high-emotion warnings might have been perceived as more personally relevant (Petty, Cacioppo, & Goldman, 1981) or more credible (Priester & Petty, 2003) than the text-only warnings, whereas the low-emotion warnings might have been perceived as less so. It is possible that these or other differences in perceptions of label content might partially drive the warnings'

effects on risk perceptions and smoking-myth endorsement. This investigation should be replicated using different warnings to rule out stimulus sampling effects.

Finally, the current research only examined negatively-valenced warnings. The circumplex model of affect proposes that all emotions arise from two neurophysiological systems, related either to valence (pleasure-displeasure) or arousal (aka, alertness; Russell, 1980). Because arousal drives people to prepare for action (Bradley, Codispoti, Cuthbert, Lang, 2001), we focused on arousal in the context of negatively-valenced warnings. However, positively-valenced warnings also exist (e.g. Canada's "drooping ash" cigarette warning, which conveys that smoking can cause impotence). It is possible that valence of emotional responses might also be an important predictor of such warnings impact on risk perceptions and smoking-myth endorsement. For example, positive valence may act as information about the risks, decreasing risk perceptions so that participants understand presented risks better but feel that their personal risks are lower.

Taken together, this investigation replicates past research showing that emotional reactions to graphic warnings drive their impact on risk perceptions and extends this past research through a demonstration that the effects of high-emotion graphic warnings are not uniformly positive. Although graphic warnings appear to increase quit intentions and quit attempts at the population level (Brewer et al., 2016; Hammond, 2011), their effects are small to medium in magnitude (Noar et al., 2016). The potential exists to use psychological theory to develop warnings that more effectively increase risk perceptions without also increasing smoking-myth endorsement. For example, including text that boosts smokers' quitting self-efficacy (Strecher et al., 1986; Witte & Allen, 2000) or elicits self-affirmation (Harris, Mayle, Mabbott, & Napper, 2007) might encourage smokers to think about the warnings without eliciting defensive reactions like smoking-myth endorsement or construing cigarettes as less dangerous than alternative tobacco products, thereby increasing warning effectiveness. It is also possible that, although the graphic warning literature supports the efficacy of negative-emotional warnings (Hammond, Thrasher, Reid, Driezen, Bordreau, & Santillán, 2012), gain-framed messages could be more effective in encouraging careful scrutiny and increased smoking risk perceptions than loss-framed messages (Gallagher & Updegraff, 2012). Thinking about potential gains from quitting (vs. losses from not quitting) may make smokers look more favorably upon alternative tobacco products that could facilitate cessation (Bullen et al., 2013). We hope that future research will use psychological theory to develop warning labels that harness the power of emotional images without increasing smoking-myth endorsement.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Figure 1. Example warning labels by experimental condition. Note that, although the size of the text was comparable across experimental conditions, the total size of warnings viewed by participants in the text-only condition was smaller than that of participants in the graphic image conditions. Centre image purchased via [iStockphoto.com/Dmytro Sobko](https://www.iStockphoto.com/Dmytro-Sobko); Right image courtesy of FDA Center for Tobacco Products.

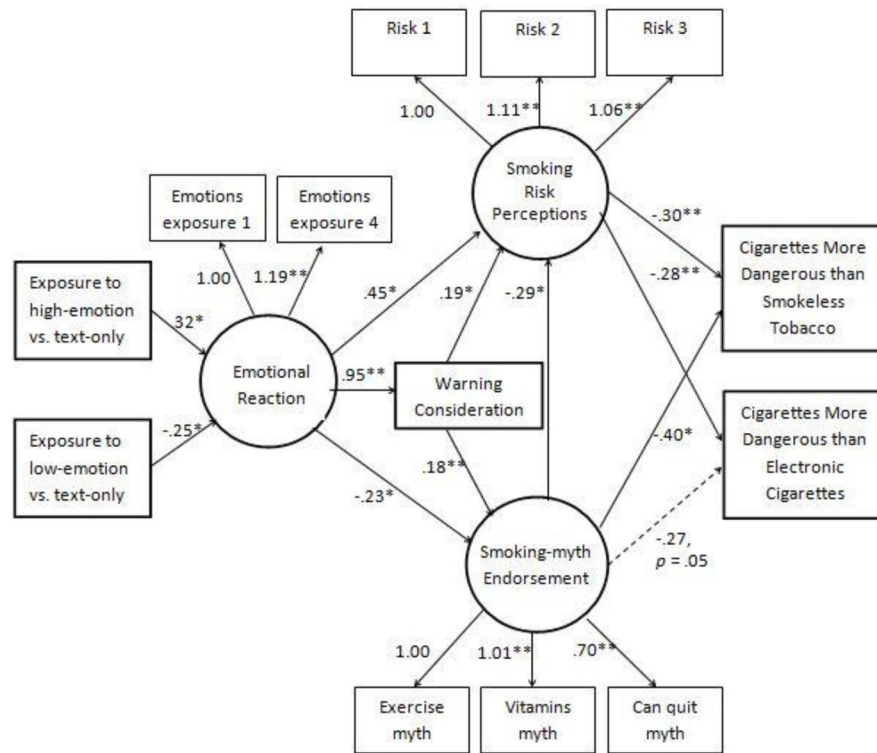


Figure 2. Final structural equation model. Note: Emotional Reaction at exposure 1 = Participants self-reported arousal at exposure 1 (1 Calm/5 Excited); Emotional Reaction at exposure 4 = Participants self-reported arousal at exposure 4 (1 Calm/5 Excited); Warning Consideration = ‘In the past week, how often have you thought about the health warnings we showed you?’ (1 Not often/5 Very often); Risk 1 = ‘Compared to the average nonsmoker your age, gender, and race, how would you rate your chances of getting a lifethreatening illness because of smoking?’ (-3 Much lower/+3 Much higher); Risk 2 = ‘Compared to the average nonsmoker your age, gender, and race, how would you rate your chances of getting lung cancer?’ (-3 Much lower/+3 Much higher); Risk 3 = ‘Compared to the average nonsmoker your age, gender, and race, how would you rate your chances of dying at a younger age than average?’ (-3 Much lower/+3 Much higher); Exercise myth = ‘Exercise can undo most of the effects of smoking’ (1 Completely disagree/5 Completely agree); Vitamin myth = ‘Vitamins can undo most of the effects of smoking’ (1 Completely disagree/5 Completely agree); Can quit myth = ‘I can quit smoking at any time and thus avoid any serious health risks before they occur’ (1 Completely disagree/5 Completely agree); Cigarettes more dangerous than smokeless tobacco = ‘Compared to smoking cigarettes, do you think that smokeless tobacco is less harmful, more harmful, or no different for health?’ (-3 Cigarettes are less dangerous/+3 Cigarettes are more dangerous) Cigarettes more dangerous than electronic cigarettes = ‘Compared to smoking cigarettes, do you think smoking electronic cigarettes is less harmful, more harmful, or no different for health?’ (-3 Cigarettes are less dangerous/ +3 Cigarettes are more dangerous).

Table 1Means (*SD*) by experimental condition.

| | Range | Text-Only Condition | High- Emotion Graphic Condition | Low-Emotion Graphic Condition |
|------------------------------------------------------------|----------|---------------------|---------------------------------|-------------------------------|
| Emotional Reaction | | | | |
| At exposure 1 | 1 to 5 | 3.10 (1.07) | 3.47 (1.04) | 2.95 (.97) |
| At exposure 4 | 1 to 5 | 3.17 (1.00) | 3.49 (1.01) | 2.98 (1.01) |
| Warning Consideration | | | | |
| | 1 to 5 | 2.74 (1.47) | 2.84 (1.39) | 2.59 (1.33) |
| Smoking Risk Perceptions | | | | |
| Risk 1 | -3 to +3 | 1.22 (1.67) | 1.04 (1.55) | 1.27 (1.42) |
| Risk 2 | -3 to +3 | 1.27 (1.64) | 1.20 (1.49) | 1.21 (1.45) |
| Risk 3 | -3 to +3 | 1.12 (1.64) | 1.05 (1.53) | 1.17 (1.43) |
| Smoking-myth endorsement | | | | |
| Exercise myth | 1 to 5 | 2.14 (1.67) | 2.28 (1.24) | 2.23 (1.21) |
| Vitamins myth | 1 to 5 | 1.77 (1.05) | 1.82 (1.09) | 1.89 (1.20) |
| Can quit myth | 1 to 5 | 2.61 (1.36) | 2.75 (1.40) | 2.64 (1.34) |
| Cigarettes more dangerous than alternative products | | | | |
| Smokeless tobacco | -3 to +3 | -.35 (1.49) | -.22 (1.40) | -.13 (1.45) |
| Electronic Cigarettes | -3 to +3 | .31 (1.77) | .64 (1.58) | .42 (1.73) |

Note: Emotional Reaction at exposure 1 = Participants self-reported arousal at exposure 1 (1 *Calm*/5 *Excited*); **Emotional Reaction at exposure 4** = Participants self-reported arousal at exposure 4 (1 *Calm*/5 *Excited*); **Warning Consideration** = "In the past week, how often have you thought about the health warnings we showed you?" (1 *Not often*/5 *Very often*); **Risk 1** = "Compared to the average nonsmoker your age, gender, and race, how would you rate your chances of getting a life-threatening illness because of smoking?" (-3 *Much lower*/+3 *Much higher*); **Risk 2** = "Compared to the average nonsmoker your age, gender, and race, how would you rate your chances of getting lung cancer?" (-3 *Much lower*/+3 *Much higher*); **Risk 3** = "Compared to the average nonsmoker your age, gender, and race, how would you rate your chances of dying at a younger age than average?" (-3 *Much lower*/+3 *Much higher*); **Exercise myth** = "Exercise can undo most of the effects of smoking" (1 *Completely disagree*/5 *Completely agree*); **Vitamin myth** = "Vitamins can undo most of the effects of smoking" (1 *Completely disagree*/5 *Completely agree*); **Can quit myth** = "I can quit smoking at any time and thus avoid any serious health risks before they occur." (1 *Completely disagree*/5 *Completely agree*); **Smokeless tobacco** = "Compared to smoking cigarettes, do you think that smokeless tobacco is less harmful, more harmful, or no different for health?" (-3 *Cigarettes are less dangerous*/+3 *Cigarettes are more dangerous*); **Electronic cigarettes** = "Compared to smoking cigarettes, do you think smoking electronic cigarettes is less harmful, more harmful, or no different for health?" (-3 *Cigarettes are less dangerous*/+3 *Cigarettes are more dangerous*).

Table 2

Estimated indirect effects of experimental condition variables on smoking risk perceptions and smoking-myth endorsement.

| Effect | Estimated Indirect Effect | CI 95 | P - value |
|--------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|---------------------|------------------|
| Effects on Risk Perceptions | | | |
| Text-only vs. High-emotion warnings -> Emotional reaction -> Smoking risk perceptions | .10 (.03) | .04 to .15 | .001 |
| Text-only vs. Low-emotion warnings -> Emotional reaction -> Smoking risk perceptions | -.08 (.03) | -.14 to -.03 | .005 |
| Text-only vs. High-emotion warnings -> Emotional reaction -> Warning consideration -> Smoking risk perceptions | .01 (.01) | .00 to .15 | .032 |
| Text-only vs. Low-emotion warnings -> Emotional reaction -> Warning consideration -> Smoking risk perceptions | -.02 (.01) | -.05 to -.00 | .037 |
| Text-only vs. High-emotion warnings -> Emotional reaction -> Smoking-myth endorsement -> Smoking risk perceptions | .01 (.01) | -.02 to .03 | .096 |
| Text-only vs. Low-emotion warnings -> Emotional reaction -> Smoking-myth endorsement -> Smoking risk perceptions | -.01 (.01) | -.02 to .00 | .107 |
| Text-only vs. High-emotion warnings -> Emotional reaction -> Warning consideration -> Smoking-myth endorsement -> Smoking risk perceptions | -.01 (.01) | -.02 to -.00 | .026 |
| Text-only vs. Low-emotion warnings -> Emotional reaction -> Warning consideration -> Smoking-myth endorsement -> Smoking risk perceptions | .01 (.00) | .00 to .02 | .036 |
| Effects on Smoking-myth endorsement | | | |
| Text-only vs. High-emotion warnings -> Emotional reaction -> Smoking-myth endorsement | -.05 (.02) | -.09 to -.00 | .031 |
| Text-only vs. Low-emotion warnings -> Emotional reaction -> Smoking-myth endorsement | .04 (.02) | .00 to .07 | .046 |
| Text-only vs. High-emotion warnings -> Emotional reaction -> Warning consideration -> Smoking-myth endorsement | .04 (.01) | .02 to .07 | .001 |
| Text-only vs. Low-emotion warnings -> Emotional reaction -> Warning consideration -> Smoking-myth endorsement | -.03 (.01) | -.06 to -.01 | .006 |

Table 3

Estimated indirect effects of emotional reaction to warning information on perceptions of cigarettes vs. alternative tobacco products.

| Effect | Estimated Indirect Effect | CI 95 | P - value |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|--------------|-----------|
| Perceptions of Cigarettes vs. Smokeless Tobacco | | | |
| Emotional reaction -> Smoking risk perceptions -> Cigarettes more dangerous than smokeless tobacco | -.11 (.03) | -.18 to -.05 | .001 |
| Emotional reaction -> Smoking-myth endorsement -> Cigarettes more dangerous than smokeless tobacco | .07 (.03) | .00 to .13 | .037 |
| Emotional reaction -> Warning consideration -> Smoking risk perceptions -> Cigarettes more dangerous than smokeless tobacco | -.03 (.02) | -.06 to -.00 | .031 |
| Emotional reaction -> Warning consideration -> Smoking-myth endorsement -> Cigarettes more dangerous than smokeless tobacco | -.06 (.02) | -.10 to -.02 | .006 |
| Emotional reaction -> Warning consideration -> Smoking-myth endorsement -> Smoking risk perceptions -> Cigarettes more dangerous than smokeless tobacco | -.01 (.01) | .00 to .02 | .029 |
| Emotional reaction -> Smoking-myth endorsement -> Smoking risk perceptions -> Cigarettes more dangerous than smokeless tobacco | -.01 (.01) | -.03 to .02 | .092 |
| Perceptions of Cigarettes vs. Electronic Cigarettes | | | |
| Emotional reaction -> Smoking risk perceptions -> Cigarettes more dangerous than electronic cigarettes | -.10 (.04) | -.17 to -.03 | .008 |
| Emotional reaction -> Smoking-myth endorsement -> Cigarettes more dangerous than electronic cigarettes | .09 (.04) | .02 to .17 | .018 |
| Emotional reaction -> Warning consideration -> Smoking risk Perceptions -> Cigarettes more dangerous than electronic cigarettes | -.03 (.01) | -.06 to -.00 | .034 |
| Emotional reaction -> Warning consideration -> Smoking-myth endorsement -> Cigarettes more dangerous than electronic cigarettes | -.08 (.03) | -.14 to -.03 | .003 |
| Emotional reaction -> Warning consideration -> Smoking-myth endorsement -> Smoking risk perceptions -> Cigarettes more dangerous than electronic cigarettes | .01 (.01) | .00 to .02 | .033 |
| Emotional reaction -> Smoking-myth endorsement -> Smoking risk perceptions -> Cigarettes more dangerous than electronic cigarettes | -.01 (.01) | -.03 to .00 | .096 |

Note: Negative values indicate perceptions that cigarettes are safer than alternative tobacco products. Positive values indicate greater perceptions that alternative products are safer than cigarettes.

Table 4

Correlations between variables used in structural equation models.

| | 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. | 9. |
|---------------------------------------------------------|--------|--------|---------|---------|---------|---------|---------|-------|------|
| 1. Text-only vs. low- emotion warnings | 1.00 | | | | | | | | |
| 2. Text-only vs. high- emotion warnings | 0.50** | 1.00 | | | | | | | |
| 3. Emotional reaction | -0.07* | 0.15** | 1.00 | | | | | | |
| 4. Warning consideration | -0.04 | 0.03 | 0.49** | 1.00 | | | | | |
| 5. Risk perceptions | -0.03 | 0.00 | 0.28** | 0.21** | 1.00 | | | | |
| 6. Smoking-myth Endorsement | 0.05 | 0.04 | 0.01 | 0.17** | -0.17** | 1.00 | | | |
| 7. Cigarettes more dangerous than smokeless tobacco | 0.04 | 0.06* | -0.08* | -0.16** | -0.17** | -0.16** | 1.00 | | |
| 8. Cigarettes more dangerous than electronic cigarettes | 0.08* | 0.03 | -0.14** | -0.20** | -0.11** | -0.19** | 0.45** | 1.00 | |
| 9. Quit intentions | 0.01 | 0.03 | 0.37** | 0.36** | 0.24** | 0.00 | -0.12** | -0.04 | 1.00 |

Note:

* $p < .05$;

** $p < .001$;

Emotional reaction, Risk perceptions, Smoking myths, and Quit intentions are averages of standardized responses to each measure. Higher values indicate more emotional reaction, higher risk perceptions, greater endorsement of smoking myths, and higher quit intentions.