Assessing Smoking Cessation Messages with a Discrete Choice Experiment

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Abstract

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Human Subjects Statement

The IRB at the University of South Carolina approved study protocols used in this research.

Conflict of Interest Statement

All authors of this article declare they have no conflicts of interest.

Objectives—Our aim was to identify message characteristics for cigarette pack inserts that aim to help smokers quit.

Methods—US adult smokers from an online consumer panel (N = 665) participated in a discrete choice experiment with a 2x2x2x2x4 within-subjects balanced incomplete block design, manipulating: image (vs no image), text type (testimonial vs informational), cessation resource information (vs none), call to action (vs none), and message topic (well-being, financial benefit, cravings, social support). Participants evaluated 9 choice sets, each with 4 inserts, selecting: (1) the most and least helpful for quitting; and (2) the most and least motivating to quit. Linear models regressed choices on insert characteristics, controlling for sociodemographics and smoking-related variables. We assessed interactions between insert characteristics and smoker attributes (ie, education, quit intention, self-efficacy).

Results—Inserts were most helpful and motivating when they included an image, provided cessation resource information, or referenced well-being and financial benefits. Significant interactions indicated that inserts with cessation resource information were relatively more helpful and motivating among smokers with low self-efficacy, an intention to quit, or lower education.

Conclusion—Cigarette pack inserts with imagery and cessation resource information may be particularly effective in promoting smoking cessation.

In 2000, Canada became the first country to mandate cigarette pack inserts that complemented the pictorial health warnings required on the outside of the packs by elaborating on the risks associated with smoking or providing cessation resource information. Numerous studies have assessed the effects of pictorial warnings[1,2] and over 100 countries require them on cigarette packs.[3] Few studies have explored health-directed cigarette pack inserts, however,[4–6] and Canada remains the only country in which they are required. In 2012, Canada amended its insert requirement, adding color graphics and cessation efficacy messages (www.tobaccolabels.ca/countries/canada). This approach was supported by theory-based research suggesting the importance of complementing fear-arousing messages, such as those that portray warnings about smoking-related harms, and that contain efficacy messages about the benefits of quitting (response efficacy) that increase confidence to quit (self-efficacy).[7,8] Consistent with these expectations, observational studies of Canadian smokers have found that more frequent reading of inserts was positively associated with stronger subsequent self-efficacy to quit and more downstream quit attempts, including attempts sustained for at least a month.[4,5] Little is known about which insert characteristics are most helpful and motivating for smokers to quit, although the Canadian inserts suggest several characteristics to evaluate: cessation message topics, imagery, type of text, and calls to action.

Cessation Message Topics

Some research suggests that health messages are most effective if they promote both response efficacy (ie, benefits of quitting) and self-efficacy (ie, confidence that one can

successfully quit).[8,9] An observational study of Canadian smokers found that those who read inserts that included both types of efficacy messages were more likely than those who did not read them to increase their self-efficacy to quit and to engage in quit attempts that lasted 30 days or more.[4] The researchers were unable to compare the effectiveness of reading inserts with both messages compared to reading inserts with only one or the other; however, an experimental study of cessation advertisements[10] found that those that provided a rationale for quitting (response efficacy) were perceived as more motivating and more likely to encourage quit attempts than those that provided advice for quitting (self-efficacy). There is also evidence that the association between reading inserts and sustained cessation attempts is at least partly independent of individuals' response efficacy or self-efficacy.[5] A goal of our study was to provide further insight into the relationship between types of efficacy message and their impact on recipients.

Text-only versus Text with Images

Cigarette warning research provides abundant evidence for the superior effectiveness of warnings with images compared to text-only warnings in experimental studies,[2,11,20] observational studies,[21–29] and randomized trials.[14,30,31] Warnings with imagery appear to have greater impact among more disadvantaged smokers,[12] which may be because pictures can communicate more effectively than only text with low-literacy audiences.[19,32] However, studies of pictorial warnings have focused primarily on images illustrating the harmful effects of smoking, with considerably less research exploring imagery that could improve messages about the benefits of cessation and strategies for quitting. Some studies have found that messages about cessation are generally perceived as less effective than those about smoking-related risks, perhaps because evocative, graphic imagery does not "fit" with cessation messages.[18,33] In our study we explore the extent to which cessation-specific images can enhance the effectiveness of cessation messages.

Testimonial versus Informative Texts

Messages that build a connection with smokers by presenting personal testimonials from smokers who have quit might be more effective at supporting or prompting cessation than those that merely convey factual information, as warnings commonly do. Testimonials can facilitate information processing, offer social connections, and overcome resistance. [34] Indeed, testimonials have been found to aid information processing among smokers with low education[35,36] and engage smokers with high self-efficacy[37] or intentions to quit.[38] However, research is mixed regarding the effectiveness of testimonials versus didactic messages that convey factual information about the risks of smoking through pictorial warnings.[18,33,36] Our study explores the relative effectiveness of testimonials versus didactic messages in the context of pack inserts.

Cessation Resources

Pictorial warnings in at least 30 countries include information about cessation resources, such as a quitline number and/or a cessation website. By going beyond providing information about smoking-related risks, these warnings not only serve as cues for thinking

about quitting, but also offer resources for help with making the next steps towards cessation. Previous studies have found that provision of cessation resources in warnings can be effective in informing smokers about their existence[4,39] and promoting their use.[40–42] However, cessation-focused warnings can be perceived as less effective than warnings that highlight smoking harms.[18,33,43] Nevertheless, cessation resource information is likely to be particularly relevant for smokers who intend to quit (ie, due to stage of change), with relatively lower self-efficacy (ie, due potential need for assistance), and who have lower educational attainment (eg, due to relatively lower access to cessation resources). Research is needed to explore whether the inclusion of cessation resource information can enhance the effectiveness of cessation messages, and perhaps, even increase the relatively low utilization rates for some cessation assistance resources.[44]

Calls to Action

Warnings in some countries include a "call to action" message that exhorts smokers to engage in a recommended behavior (eg, "Call Quitline" in Australia). Consistent with action identification theory (or construal level theory), a call to action is a concrete, low construal message (as opposed to an abstract, high construal message), which promotes an immediate response.[45] Calls to action are regularly recommended as an accompaniment and closure to public health messages and are common in anti-smoking media campaigns.[4647] However, it appears that no scientific studies have systematically manipulated calls to action to assess their effectiveness, as our study aims to do.

Study Aims

Our study aimed to assess the effects of different insert characteristics on smokers' selections of inserts as helpful or motivating for smoking cessation. The hypotheses, based on the preceding literature review, were: (1) smokers will select inserts with response efficacy messages as more motivating to quit but less helpful than self-efficacy messages; (2) smokers will select inserts with images as more motivating and helpful than those without images, with stronger effects for smokers with relatively lower educational attainment; (3) smokers will select inserts with testimonial messages as more motivating and helpful than those with informative texts, with stronger effects for smokers who intend to quit, have high self-efficacy, or relatively lower educational attainment; (4) smokers will select inserts with cessation resource information as more motivating and helpful than inserts without such information, with stronger effects for smokers who intend to quit, have relatively lower self-efficacy, and with lower educational attainment; and (5) smokers will select inserts with a call to action as more motivating and helpful than those without a call to action.

To test these hypotheses, discrete choice experiments (DCEs) were used. DCEs use fractional factorial designs to determine the independent effects of multiple stimulus characteristics on choice behavior, and are widely used in marketing research about decision making.[48] The tobacco industry uses DCEs in premarket research,[49–51] and tobacco industry experts in tobacco lawsuits claim that DCEs are less biased than other methods used to study tobacco packaging and labeling.[52] By showing participants multiple stimuli and asking them to pick their top choice, DCEs may better represent consumer choices in natural settings.[53]

Previous studies using DCE methods have assessed variations in characteristics of cigarette pack design, health warnings, and cigarette sticks,[54,55] brand variants on cigarette packs,[56] and strategies for communicating harmful cigarette chemicals through package inserts.[57] We applied this approach to evaluate different characteristics on inserts that contain efficacy messages.

METHODS

Sample

We recruited adult smokers 18 to 50 years old in the United States (US) using participants provided by Lightspeed GMI (www.lightspeedresearch.com), a commercial provider of online panels for conducting consumer research. Eligible participants had smoked at least 100 cigarettes in their lifetime and smoked at least once in the past 30 days, comparable to smoker definitions used for the US National Health Interview Survey.[58] Data were collected between November 4 and November 12, 2016. Invitation emails were sent to panel members, which included a link to the online survey. Lightspeed GMI provided standard compensation to panelists for participation in this type of study (ie, baseline range = $0.30 – $0.75; follow-up = $0.50 – $1.00). Sample targets were established to recruit a minimum of 600 participants, 50% of whom intended to quit smoking within the next 6 months, and 50% of whom did not. In DCEs, sample sizes of around 400 typically have adequate power for hypothesis testing around meaningful stimulus attributes, which is consistent with power analyses based in multinomial logit models.[59] This sample size target allowed for expected elimination of observations from the analytic sample of those participants who did not indicate preferences for any inserts. However, the study protocol also required individuals to make choices across multiple-choice sets, increasing statistical power to reject the null. This increase in statistical power was necessary for assessing interactions, where the sample size was less than 400 when running analyses that were stratified along key variables (ie, intention to quit, self-efficacy, education).

Study Design and Protocol

The experiment used a 2x2x2x2x4 within-subjects balanced incomplete block design, which systematically manipulated the following insert characteristics: image provision (vs no image), text type (testimonial vs informative), cessation resource information (vs no information about cessation resources), call to action (vs no call to action), and 4 message topics, including 2 response efficacy messages (benefits of cessation for wellbeing; financial benefits of quitting) and 2 self-efficacy messages (how to deal with cravings; capitalizing on social support when quitting). By testing multiple messages on different topics, the study aimed to produce more insightful and generalizable of findings than those produced through single-message evaluations, as recommended for media effects research.[60]

A team of researchers, health communication experts, and a graphic designer developed the stimuli to be tested, including the selection of texts and images. Text selection was based on a content analysis of efficacy messages in smoking cessation materials (including Canadian inserts), a qualitative pre-test with 20 adult smokers, and a quantitative pre-test with 300 adult smokers. Images were selected from different image databases to match each text. For

testimonial inserts, images showed people who could credibly give the testimonial. For example, a testimonial about social support for quitting used an image of 2 women close together (Figure 1). The text of the testimonial was made as similar as possible in meaning to the didactic version, put into quotes, and attributed the portrayed individual who was given a sex-matched first name. The cessation resource information included a quit line number (1-800-784-8669) and a smoking cessation website URL (http://smokefree.gov). The call to action message was a modification of the informational message (eg, "if you want help to quit, call 1-800-784-8669") that encouraged smokers to engage in the recommended behavior immediately (eg, "Quit Now! Call 1-800-QUIT-NOW"). For these messages, the statement on the banner of the insert was also changed from a factual statement to an exhortatory message (eg, "Quitting is easier with active support" vs "Get support to quit now!").

The full factorial design generated 64 possible combinations of insert characteristics; however, to optimize the design, a balanced incomplete block design was used. As we did not have any *a priori* hypotheses around interactions between insert characteristics, the design was not set up to assess such interactions. This allowed for 16 distinct insert profiles to be used, with each one appearing multiple times in the context of 24 "choice sets" that included 4 different inserts. To reduce response burden, each participant was randomized to evaluate one of 4 blocks that included 9 choice sets, 5 of which were unique to a particular block, and 4 of which were common across all blocks. Within any block, all attribute levels appeared multiple times. The 4 common sets allowed evaluation of possible differences in choices across groups assigned to each of the 4 blocks. To evaluate this, the unique choice sets (training dataset) were cross-validated using data from the common choice sets as the validation dataset (results not shown). Cross-validation showed no significant differences in choices across groups assigned to different blocks.

Measures

Dependent variables—"Best-worst" scaling was used, in which participants were asked to select messages preferred most and least (rather than selecting just one option), which increases the precision of estimates and statistical power.[61] For each choice set, participants were presented with the 4 images of inserts (Figure 1) and asked: "Which insert would be MOST helpful and which would be LEAST helpful for you if you decided to quit smoking?" after which the participant was able to choose one insert as "most helpful" and one as "least helpful," with only mutually exclusive options allowed. After selecting these, participants were asked: "Thinking about these inserts, do you actually think that: (a) None would be helpful if you decided to quit, or (b) At least one would be helpful if you decided to quit." Then, participants were asked: "Which insert would MOST motivate you and LEAST motivate you to quit smoking?" and asked to indicate which was most and which was least motivating. Afterwards, participants were asked: "Do you actually think that: (a) None would be motivating if you decided to quit, or (b) At least one would be motivating if you decided to quit." Participants could view each choice set for as long as they wished. For each choice set, the insert selected as most helpful/motivating to quit smoking was given a value of 1, the least helpful/motivating to quit was given a value of -1. The remaining inserts in

that set were given a value of 0. If the participant indicated that none would be helpful/ motivating, all inserts in that choice set were assigned a value of 0.

Independent variables—Insert characteristics were effects coded such that coefficients reflected deviations of the group from the grand mean. Participant characteristics were assessed with a self-administered survey. Sociodemographics included age group in years (18–29, 30–39, 40–50), sex (men/ women), race (white, African-American, other), and education (some university or less, completed university or higher). Smoking-related variables included frequency (every day, some days), nicotine dependence, self-efficacy to quit (low, high), intention to quit in the next 6 months (yes/no), and at least one quit attempt in the past 4 months (yes/no). Nicotine dependence was quantified using the heaviness of smoking index (HSI), based on the reported number of cigarettes smoked per day and time to first cigarette.[62] Self-efficacy to quit was measured by asking: "If you decided to give up smoking completely in the next 6 months, how sure are you that you would succeed?" with responses on a 9 point scale ranging from "not at all" to "extremely."[63] Due to the skewed distribution of the responses to this variable, a median split was used to dichotomize the variable into low (ie, 1–6), and high (ie, 7–9).[64–66]

Data Analysis

For each outcome (ie, helpful to quit, motivating to quit), participants indicating that none of the inserts would be helpful/motivating (ie, "no-difference" option) for all 9 choice sets were excluded from the primary analysis as they did not contribute meaningful information for assessing the relative effectiveness of different insert characteristics. Those who selected at least one insert as more or less helpful/motivating were included in the analysis. For choice sets where participants indicated "no difference" (see measurement, above), responses were recoded to "0." Pearson's chi-square tests were used to compare the demographic and smoking-related characteristics of excluded participants with the analytic sample. To assess the impact of each insert characteristic on choice, a utility range (the difference between each characteristic's highest and lowest estimated part-worth utility) was calculated. Part-worth utility refers to the relative contribution of each level of an insert characteristic on choice (ie, as approximated by the estimated coefficients in the model). The relative importance of each characteristic on making a choice was then calculated as the utility range for each characteristic, divided by the sum of all the characteristics' utility ranges for a given outcome.

As recommended for the best-worst scaling approach for DCE, we analyzed data using mixed linear regression to control for repeated measures.[61] Dependent variables were the selection of an insert as motivating to quit and helpful to quit, with each assessed in separate models. Independent variables included insert characteristics, controlling for block, sociodemographics, and smoking-related participant characteristics. Where indicated by related research (see introduction), we also tested for interactions between insert characteristics and key participant characteristics (ie, quit intention, self-efficacy, and education). Interaction terms were entered into the full model (described above) one at a time, after which they were removed, another interaction term included and the model re-estimated. Because models were re-estimated 10 times for each outcome, we used a

Bonferroni correction procedure to determine statistical significance (ie, p < .05/10 = .005). Only significant interactions are reported. When a statistically significant result was found, data were stratified by the participant characteristic and models re-estimated for each group. All data analyses were conducted using Stata v13.1.[67]

RESULTS

Sample Characteristics

Of those completing the study (N = 665), approximately one-fifth selected the no-difference option for all choice sets when evaluating helpfulness for quitting (20%, N = 136) and when evaluating motivation to quit (21%, N = 141). These participants were excluded from the respective analytic samples for evaluating the relative effectiveness of the different insert characteristics. Compared to those retained in the analyses (Table 1), participants who were excluded from either analytic sample were more likely to: be older than 40; be women; have lower education; have low self-efficacy; have no quit intention; and have no recent quit attempt. Most participants in the analytic samples were women (57%), white (79%), and smoked every day in the past 30 days (86%). A high proportion of the sample was 30–39 years old (44%) and completed university or higher (46%).

Relative Impact of Insert Characteristics on Choices

For both outcomes (ie, perceptions of helpfulness and motivation to quit), message topic (41% and 43%, respectively), provision of image (36% and 31%, respectively), and inclusion of cessation resource information (22% and 22%, respectively) were the most influential insert characteristics on choices (Figure 2). Text type (0% and 3%) and the inclusion of a call to action (1% and 2%) were substantially less influential.

Effects of Message Topic on Choices

The insert message topics on craving and social support (self-efficacy) were evaluated as less helpful and motivating, as their coefficients were both significantly less than 0 (Table 2). The messages on financial benefits and well-being (response efficacy) were evaluated as relatively more helpful and motivating, as their coefficients were significantly greater than 0.

Effects of Imagery on Choices

Inserts with an image present were selected as more helpful and motivating to quit than text alone (Table 2), as coefficients associated with the presence of imagery were significantly greater than 0 and those associated with its absence were significantly less than 0. Interactions between image and education were statistically significant for both outcomes (p < .001). After stratifying models by education, smokers with higher educational attainment selected inserts with an image as more motivating to quit (B = 0.11, p < .001) than smokers with lower educational attainment (B = 0.09, p < .001), but the presence of images positively influenced both groups.

Effects of Textual Type on Choices

Testimonial and didactic text did not differentially influence participant choices (Table 2; Figure 2), as their coefficients were not significantly different from the grand mean of 0. Interactions between text type and smoker characteristics were not statistically significant in any model.

Effects of Cessation Resource Information on Choices

Inserts that included cessation resource information were selected as more helpful and motivating to quit (Table 2; Figure 2). Statistically significant interactions were observed between cessation resource information and all 3 smoker characteristics for both outcomes (p < .001 for all). In stratified models, results indicated that inclusion of cessation resource information was selected as helpful and motivating for all subgroups, but the effect was stronger for those with: no intention to quit (B = 0.09, p < .001 for helpful and B = 0.09, p < .001 for motivating) compared to those with an intention to quit (B = 0.05, p < .001 and B = 0.06, p < 0., respectively); low self-efficacy (B = 0.10, p < .001 and B = 0.09, p < .001, respectively) compared to high self-efficacy (B = 0.03, p < .001 and B = 0.05, p < .001, respectively); and lower education (B = 0.08, p < .001 and B = 0.09, p < .001, respectively) compared to higher education (B = 0.05, p < .001 and B = 0.05, p < .001, respectively).

Effects of Call to Action on Choices

Inserts with a call to action were no more or less likely to be selected than inserts without them (Table 2; Figure 2). There were no significant interactions between call to action and any of the 3 smoker characteristics for both outcomes.

DISCUSSION

This first-time use of DCEs for studying smoking cessation messages found that smokers' selection of messages as helpful and motivating for cessation were primarily driven by message topic (41% and 43% of the variance, respectively), the inclusion of imagery (36% and 31%, respectively), and information about cessation resources (22% and 22%, respectively). As expected, response efficacy messages about enhanced well-being and financial benefits that accompany cessation were perceived by smokers as more motivating to quit than self-efficacy messages that aimed to boost smokers' confidence about quitting by providing tips around dealing with cravings and capitalizing on existing social support. Against our expectations, these response efficacy messages also were selected as more helpful for quitting than self-efficacy messages – which we expected would work by being perceived as helpful. As the general pattern of results was the same for both outcomes, it is possible that participants did not distinguish between what would be helpful if they decided to quit and what is motivating to quit now. Future research in this area may consider asking about each of these outcomes in separate blocks of stimuli, to facilitate distinction between the 2 domains. Also, future studies should consider study designs based in the Extended Parallel Processing Model and Prospect Theory, from which specific hypotheses can be derived around the effectiveness of gain-framed messages, which are like response efficacy messages about benefits of cessation, relative to and in combination with loss-framed messages, which are more akin to the messages about smoking-relevant consequences

portrayed in pictorial warnings on the outside of packs.[68,69] Cigarette packaging may present a unique opportunity for evaluating these theories in the context of repeated exposure. Nevertheless, meta-analyses indicate that these types of messages have additive effects on behavior change,[70,71] suggesting that the assessment of one message type – as was done in this study – is likely to capture message effects that apply in the presence of the other message type.

Our findings are consistent with past studies that have found text with images generally works better than text-only messages,[72,73] including for cigarette warnings.[2,25] We found an interaction between image and educational level, although contrary to expectations, the inclusion of images had a slightly stronger influence among smokers with higher than lower education. This contradicted our hypothesis about stronger effects among smokers with lower education, perhaps because our "low education" group did not have particularly low education. Few people with high school education or less participated, so the low category combined educational attainment up to some college, but without completing it. Therefore, this low education group appears unlikely to adequately represent low-literacy audiences for whom imagery is hypothesized to be most effective. Future research on cessation messages should find ways to recruit smokers from more disadvantaged groups who are less likely to participate in online consumer panels, as smoking is concentrated among these groups.[19]

We found no meaningful difference between the impacts of informational and testimonial textual types on choices (<1% for helpful; 3% for motivating). The literature on the effectiveness of testimonial compared to informational warning labels for cigarette packs is also mixed.[18,33] As in warning label studies, the testimonial messages we used were relatively short. Such brief narratives might not be sufficient to facilitate identification with the characters in the story nor to transport readers into the story, which are 2 key means by which narrative communication is hypothesized to be more effective than other genres.[35,74] The lack of difference in effects by textual type also may be due to the quality of the narratives or the fact that the informational messages addressed the smoker as "you," which might have made the message more personal – one of the key ways that testimonials presumably work. Although interactions with smoker characteristics were not statistically significant, future research could explore ways to improve testimonials, including pairing with different types of imagery, to see if they can be optimally designed to work with more disadvantaged smokers.

Consistent with our hypothesis and past research on the value of including cessation resource information on health warnings,[39–42] we found that smokers perceived inserts with this information (ie, a quit line and smoking cessation website) as more helpful and motivating to quit. As hypothesized, the provision of this information was perceived as even more helpful and motivating among smokers who had lower self-efficacy and lower educational attainment relative to their counterparts. That those who did not intend to quit had stronger responses than those who intended to quit was against our hypothesis. Compared to those who intend to quit, those who do not intend to quit or who had only vague quit intentions may be less likely to attend to information about cessation resources, which are promoted through state and national media campaigns; [75] thus, the relative novelty of the resource information may help account for the greater perceived motivation

and utility associated with cessation support. For all subgroups, however, the inclusion of cessation information enhanced the likelihood that inserts would be chosen as helpful or motivating. Including this information on inserts may be particularly relevant in the US, where a federal appellate court ruling[76] halted implementation of pictorial warnings partly because they included exhortations to quit. Consequently, the US Food and Drug Administration may have to refrain from requiring references to cessation or cessation resource information on any future warnings it requires on the outside of packs. Including such cessation messaging and information in the inserts should face weaker legal constraints.[77]

We found no support for our hypothesis that including a call to action would make inserts more effective – this message attribute explained little variability in insert choices (1%–2%). These low construal messages that urge an immediate response[45] may work best in videos or electronic media that are more engaging than print. Their effects also may be enhanced for messages delivered through channels that facilitate immediately engaging in the recommended behavior (ie, smart-phone to call the provided number; online video to access the provided URL). As described above, messages that do not include exhortations to quit may be easier to implement in the context of the US legal system, where the tobacco industry has used exhortatory language to support its argument that FDA messages go against its rights to avoid compelled speech.[77]

Our findings have several limitations. Insert stimuli were presented to participants on a computer screen, which would be different than their interaction with inserts in real life. To minimize this incongruence, an animated video demonstrating how inserts are found inside of cigarette packs was presented before exposure to the stimuli. Nevertheless, responses to real inserts, which would be delivered in every pack the smoker opens, may be different. Trials that examine smokers' responses to inserts under more natural conditions of exposure are needed to determine their effects. However, recent randomized controlled trials examining the effects of pictorial versus text-only warnings for cigarette pack exteriors have produced results that are consistent with those found in observational studies and short-term experiments.[30,31] Hence, the results here may generalize to other study modalities and more natural conditions of exposure. Although DCE is regarded as a method that reduces demand effects while closely resembling real life choices, the predictive validity of DCE for stimuli like ours remains to be evaluated and should be researched. Nevertheless, identifying insert characteristics that smokers perceive as most helpful and motivating is much like smokers' perceived effectiveness ratings for different anti-smoking media, which studies have linked to actual changes in behavioral intentions and behavior.[78]

Our analytic samples differed on several characteristics from the roughly one-fifth of the total sample that was excluded because they selected "no difference" for all choice sets. However, the sample that opted out was different from the analytic samples in expected ways: smokers who were older and had lower education, lower self-efficacy, lower intention to quit, and had not recently tried to quit were less likely to find any efficacy information helpful or motivating. It is encouraging that relatively lighter smokers, which represent a growing proportion of the smoker population,[79] were no more likely to opt out. Although relatively lighter smokers are likely to purchase packs less often than heavier smokers, it is

not clear how often they purchase packs, if at all. Nevertheless, our results indicate that pack inserts that reach lighter smokers may help motivate them to quit. Indeed, approximately 80% of smokers in our sample found at least one insert to be more helpful or more motivating than others. This result indicates that inserts, especially those with characteristics having stronger influences on choices, could have a significant impact on a large portion of smokers who see them, including those across the spectrum of nicotine dependence.

Receptivity to insert messages could change over time, as observational research in Canada found that smokers' attention to inserts with efficacy messaging increased over time, whereas attention to warnings on the outside of packs decreased.[5] Warnings may become less effective because smokers cannot avoid seeing them repeatedly and becoming habituated to their content, whereas smokers may attend more to inserts when thinking about quitting, making them especially impactful. Future research is needed to test this hypothesis.

Finally, the generalizability of this study may be limited due to differences between our sample of online consumer panelists and US smokers who tend to be more disadvantaged. Some experimental studies of cigarette warning characteristics have found similar patterns of results across study samples from online panels, purposive samples that target more disadvantaged populations, and population-based representative samples.[18,19,33,80] Nevertheless, this effect may not be found when examining cessation efficacy messages. Indeed, we found some evidence that more disadvantaged populations are more likely not to view any message as helpful or useful. Finding messages that work for this group is critical for ensuring the health equity impact of any proposed interventions.

IMPLICATIONS FOR TOBACCO REGULATION

Our study suggests that print messages with imagery and cessation resource information may motivate and help smokers to quit. These findings, along with observational research in Canada and dominant communication theory, indicate that countries could enhance the cessation effects of warnings they require on cigarette packs by also requiring inserts with complementary cessation efficacy messages that include imagery and resource information. Implications of this study are especially relevant to the US, where tobacco industry litigation successfully halted implementation of FDA-proposed warnings. Courts ruled that the emotion-evoking graphic imagery of warnings – and, possibly, their exhortations that smokers quit by offering a 1-800-QUIT-NOW phone number – went beyond providing purely non-controversial, factual information and, therefore, violated applicable First Amendment constraints.[76,81] Requiring inserts with content much like that evaluated in this study likely would be less constrained by the First Amendment. This is because they would provide only factual information about cessation without any exhortations to quit. Also, inserts, unlike external warnings, are not readily seen by non-smokers or smokers prior to purchase and do not prevent cigarette companies from using large portions of the valuable space on their cigarette packs for their own purposes.[77] Moreover, this study suggests that adding a call to action (eg, "1-800-QUIT-NOW") to purely informational cessation assistance information, which could increase their legal vulnerability, does not necessarily increase the inserts' perceived cessation utility or motivational effect. By contrast, this study

indicates that more important content involves imagery with cessation information to enhance the effectiveness of the inserts.

When considered in the context of other available research and communication theory, this study suggests that other countries should learn from and follow the example of Canada (and the tobacco industry) and begin using cigarette inserts to deliver important information and messages to smokers more effectively. Prior research suggests that maximizing the effectiveness of labeling policy will likely require both fear arousing warnings on the outside of packs, as well as inserts with complementary efficacy messages.

Acknowledgments

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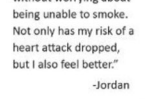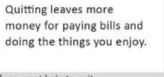
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Figure 1.
Example of a Choice Set Presented to Participants

Figure 2.
Relative Importance of Insert's Characteristics in Selecting Choices

Table 1

Characteristics of the Total, Analytic, and Excluded Samples of Adult Smokers from the United States

Characteristics	Total (N = 665)	Helpful for Quitting			Motivating to Quit		
		Opted out[a] (N = 136)	Analytic (N = 529)	p - value	Opted out[a] (N = 141)	Analytic (N = 524)	p - value
Age (in Years)				.002			< .001
18–29	20%	18%	20%		16%	20%	
30–39	44%	33%	47%		33%	47%	
40–50	36%	49%	33%		50%	33%	
Sex				.021			.013
Men	40%	32%	43%		31%	43%	
Women	60%	68%	57%		69%	57%	
Race				.629			.493
White	79%	82%	79%		82%	79%	
African American	8%	7%	8%		6%	9%	
Other	13%	11%	13%		12%	13%	
Education				< .001			< .001
Less than high school	3%	7%	3%		6%	3%	
Completed high school	20%	25%	19%		26%	19%	
Some university or college	30%	42%	27%		40%	27%	
Completed university or higher	46%	26%	52%		28%	51%	
Smoking Frequency				.624			.403
Every day	86%	85%	86%		84%	86%	
Some days	14%	15%	14%		16%	14%	
HSI [mean (SD)]	2.81 (1.32)	2.89 (1.23)	2.79 (1.35)	.788	2.91 (1.21)	2.79 (1.35)	.824
Self-Efficacy				.003			.006
Low	53%	66%	51%		65%	52%	

Characteristics	Total (N = 665)	Helpful for Quitting			Motivating to Quit		
		Opted out[a] (N = 136)	Analytic (N = 529)	p - value	Opted out[a] (N = 141)	Analytic (N = 524)	p - value
High	45%	34%	49%		35%	48%	
Quit Intention in Next 6 Months				.011			.008
Yes	55%	41%	57%		41%	57%	
No	45%	59%	43%		59%	43%	
Quit Attempt in Past 4 Months				< .001			< .001
Yes	51%	28%	56%		28%	56%	
No	49%	72%	44%		72%	44%	

Note.

HSI – Heaviness of Smoking Index

[a] Opted out indicates that the participant did not choose any options from any of the choice sets in the experiment; all p-values were calculated using chi-square tests for all variables except HSI which was calculated using a t-test.

Table 2

Main Effects of Insert's Characteristics on Outcomes

Insert's Characteristics	Helpful (N = 529) Coef. [95% CI]	Motivating (N = 524) Coef. [95% CI]
Image		
Not present	−0.11 [−0.12, −0.10] ***	−0.10 [−0.11, −0.09] ***
Present	0.11 [0.10, 0.12] ***	0.10 [0.09, 0.11] ***
Text Type		
Informative	0.00 [−0.01, 0.01]	0.01 [−0.00, 0.02]
Testimonial	0.00 [−0.01, 0.01]	−0.01 [−0.02, 0.00]
Cessation Information		
Not present	−0.07 [−0.08, −0.06] ***	−0.07 [−0.08, −0.06] ***
Present	0.07 [0.06, 0.08] ***	0.07 [0.06, 0.08] ***
Call to Action		
Not present	0.00 [−0.01, 0.01]	0.00 [−0.01, 0.00]
Present	0.00 [−0.01, 0.01]	0.00 [−0.00, 0.01]
Message Topic		
Well-being	0.07 [0.05, 0.09] ***	0.07 [0.05, 0.08] ***
Financial	0.14 [0.12, 0.16] ***	0.16 [0.14, 0.18] ***
Craving	−0.10 [−0.11, −0.08] ***	−0.12 [−0.13, −0.10] ***
Social support	−0.11 [−0.13, −0.10] ***	−0.11 [−0.13, −0.09] ***

*
$p < .05$;

**
$p < .01$;

***
$p < .001$

Note.

Models adjust for sociodemographic variables including age, sex, race, education, HSI, self-efficacy, quit intention, and quit attempt.