Published in final edited form as:

J Health Commun. 2020 May 03; 25(5): 361–373. doi:10.1080/10810730.2020.1767236.

“I quit”: Testing the added value and sequencing effects of an efficacy-focused message among cigarette warning labels

Emma Jesch^{a,b}, Jeff Niederdeppe^a, Andy J. King^c, Amelia Greiner Safi^{a,d}, Sahara Byrne^a

^aDepartment of Communication, Cornell University, Ithaca, NY, USA

^bAnnenberg School for Communication, University of Pennsylvania, Philadelphia, PA, USA

^cGreenlee School Journalism/Communication, Iowa State University, Ames, IA, USA

^dDepartment of Population Medicine and Diagnostic Sciences, Cornell University, Ithaca, NY, USA

Abstract

Many emotional appeal theorists argue that negative affect and efficacy work together to promote adaptive behavioral responses to a threat, yet most research on cigarette warning label messages has not examined the intersection between negative affect, hope, and efficacy. The current study tests effects of exposure, at different points in a sequence, to an efficacy-focused warning label in the context of threat-focused warning labels. We conducted an online, between- and within-subjects experiment with 398 adult smokers, testing the effects of warning label exposure on negative affect, hope, efficacy beliefs, and intentions to quit. Exposure to the efficacy-focused “Quit” label aroused higher levels of reported hope and lower levels of reported negative affect than threat-focused labels. Negative affect increased with each additional exposure to a threat-focused warning label, regardless of the order in which respondents saw the “Quit” label. Exposure to the “Quit” label exposure (within a larger set of three threat-focused labels) led to greater self-efficacy but did not influence response efficacy or intentions to quit. We conclude that “Quit” messaging on warning labels can inspire both hopeful feelings and efficacy beliefs. Future research should identify the optimal balance between threat-focused and hopeful quit messages.

Keywords

message effects; efficacy; emotion; warning labels; tobacco control

Introduction

In 2009, the U.S. Congress passed the Family Smoking Prevention and Tobacco Control Act, which gave the Food and Drug Administration (FDA) regulatory authority over tobacco products and mandated prominent, pictorial warning labels (PWLs) on cigarette packages and advertising. Two years later, the FDA proposed a set of nine PWLs that would occupy the top 50% of the front and back of cigarette packages, depicting “the negative health

Corresponding author emma.jesch@asc.upenn.edu, phone number: 607-216-7681.

Declarations of interest

consequences of smoking” (H.R. 1256, Division A, Title 2, Sec. 201(d)). In response to this legislation, several tobacco companies promptly filed suit, arguing that the labels violated their First Amendment Rights. The Court of Appeals agreed and held that the FDA failed to provide evidence that PWLs would lower smoking rates (RJ Reynolds Tobacco Co. v. Food and Drug Administration, 2012). Rather than appealing this decision, the FDA reconsidered the labels, collected more evidence on their potential effects, and released new proposed PWLs in January 2020, which will be required on cigarette packaging and advertising in June 2021 (FDA, 2020a; 2020b).

Research on PWLs is relevant to larger debates about the interplay of emotions and efficacy in influencing behavior. PWLs evoke a variety of negative emotions – including fear, anger, guilt and disgust – as they depict the frightening and visceral consequences of smoking (Brewer et al., 2019; Niederdeppe & Kemp, 2018; Noar et al., 2017; Noar, et al., 2016b). Many theories – including the extended parallel process model, the health belief model, protection motivation theory, and the anger-activism model – argue that appeals to fear and anger are likely to work best when combined with strong efficacy cues (e.g., Boer & Seydel, 1996; Skinner, Tiro, & Champion, 2015; Turner, 2007; Witte, 1992). Other theorists argue that efficacy may be central to understanding responses to other negative emotions like guilt and disgust (e.g., Carcioppolo et al., 2017; Popova, 2012), and that the sequencing of negative and positive emotional appeals merits far greater research attention (e.g., Nabi, 2015). Despite these theoretical claims, however, most research on PWLs has focused exclusively on the role of negative affect; the role of efficacy has received far less attention. Notably, the new FDA-proposed warnings do not include any efficacy-focused messages (FDA, 2020a), perhaps owing to the dearth of available evidence on their effectiveness and previous constitutional challenges to including “1-800-QUIT-NOW” on the previous labels (RJ Reynolds Tobacco Co. v. Food and Drug Administration, 2012). The current paper thus addresses this underdeveloped area of research, focusing on effects of exposure to the lone (original) FDA label focused on promoting quit efficacy at various steps within a sequence of exposure to other threat-focused labels.

Negative Affect

A large body of research has found that PWLs attract attention, increase recall and knowledge of health risks, arouse negative affect, and motivate quitting (Brewer et al., 2019; Ngo et al., 2018; Noar et al., 2017; Noar, et al., 2016a; Noar, et al., 2016b). A near-exclusive focus on threatening content has also led to a parallel emphasis on negative affect as a key factor in shaping warning label success. Indeed, several studies have found that when there is not a direct causal link between PWLs and quit intentions, there is an indirect relationship mediated by negative affect (Hall et al., 2018; Skurka et al., 2018). However, some critics have argued that negative affective responses prompted by PWLs, such as fear, anger, guilt and disgust, may catalyze defensive reactions (e.g., warning avoidance), thus limiting their effectiveness (Peters, Ruiters, & Kok, 2013; Ruiters, Kessels, Peters, & Kok, 2014). Fear appeal theories further contend that threatening appeals that create high levels of perceived risk susceptibility and severity may fail or boomerang if efficacy information – a solution or set of actions to solve the problem – is not offered (e.g., Witte, 1992).

Kok and colleagues (2018), in particular, have challenged the body of research on PWLs, expanding on previous critiques (Peters et al., 2013; Ruiter et al., 2014). They argued that there is not sound evidence that pictorial warnings work. Several commentaries countered these claims, arguing (in part) that (a) the critique ignored the vast majority of studies relevant to the question, and (b) while most PWLs do not include robust efficacy information, they remain effective, perhaps because PWLs evoke a variety of negative emotions apart from fear (Borland, 2018; Niederdeppe & Kemp, 2018). Indeed, while the Kok et al. (2018) critique emphasized results from only 6 randomized experiments ($N = 459$ respondents) they deemed relevant to the question, Tannenbaum et al.'s (2015) meta-analysis of 248 independent samples ($N = 27,372$ respondents) found no evidence for the existence of boomerang effects of fear appeals in the absence of efficacy information. The analysis did conclude, however, that fear appeals are more effective when the message includes efficacy statements about how to counter the threat.

Efficacy

In light of these debates and findings, there has been surprisingly little research on the role of efficacy in PWLs. Efficacy can be broken down into two broad categories: response efficacy and self-efficacy. Response efficacy refers to the degree that the proposed action leads to a specific effect, and self-efficacy refers to one's belief (or self-confidence) in their ability to complete this action (Bandura, 1997). In the most basic sense, response efficacy informs, and self-efficacy motivates. As noted above, perceived response and self-efficacy have been identified as central for behavior change, particularly in the context of fear, moving responses from avoidant to adaptive (Lazarus, 1991; Witte, 1992).

A few studies have examined the role of efficacy in cigarette package inserts (leaflets embedded within a cigarette box, requiring smokers to open the package to access it) and found that these inserts can enhance the effectiveness of PWLs (Lambert et al., 2018; Thrasher et al., 2015; Thrasher, Swayampakala, Cummings, et al., 2016b). However, in the vast majority of studies focused solely on PWLs, researchers tend to treat efficacy as a set of preexisting beliefs or traits and use these beliefs as moderators (Fathelrahman et al., 2009; Romer, Peters, Strasser, & Langleben, 2013; Thrasher, Swayampakala, Borland, et al., 2016a). In one of the few studies that directly examines efficacy information presented on the exterior PWLs, Mead and colleagues (2015, 2016) analyzed transcripts from qualitative interviews and concluded that self-efficacy and threat-perceptions worked together to enhance risk perceptions and quit motivations among low-income smokers in Baltimore, MD. This body of work, however, reflects a small evidentiary base from which the field can draw conclusions at scale.

Hope & Emotional Flow

There is also increasing evidence that hope may be an important – yet often overlooked – element of health behavior change (Chadwick, 2017; Nabi & Myrick, 2019; Yang, Liu, & Popova, 2019). Hope – the feeling of relief and a drive toward a positive goal – is closely associated with efficacy; emotional flow research describes hope as a source of motivation, orienting people towards future targets (Nabi, 2015). Hope and self-efficacy amplify each other's effects: efficacy evokes hope, and hope drives action (Nabi & Myrick, 2019). Nabi

(2015) argues that appeals that shift from fear to efficacy might be re-conceptualized as “fear-hope” appeals, as the efficacy information generates hope, particularly in the context – or flow – from fear to relief.

Other recent work has explored the dynamics of emotional responses to messages over time, examining the interplay of fear and disgust (Dillard & Shen, 2018) and the functional form of negative affect after exposure to a threatening message followed by an efficacy message (Dillard et al., 2017). This work highlights the value of studying emotional flow in response to a series of threat and efficacy appeals and underscores the need to understand the potential role of order effects for an efficacy-focused message within a sequence of warning label exposures.

Study Hypotheses and Research Questions

As described above, the current study examines the intersection between negative affect, hope, and efficacy by testing the effects of exposure to an FDA-proposed warning label that promotes quit efficacy within a sequence of exposure to other threat-based warnings. This label states, “Quitting Smoking Now Greatly Reduces Serious Risks to Your Health,” (a text-based message emphasizing response efficacy) and includes an image of a man standing proudly and wearing a t-shirt stating, “I Quit” (a visual message emphasizing self-efficacy).

Within this framework, we offer three hypotheses and two research questions. First, related to emotional responses to individual warning label messages, we hypothesize that an efficacy-focused message will arouse higher levels of hope (H1a) and lower levels of negative affect (H1b) than threat-focused messages. We reason that risk susceptibility and severity-focused warning labels have been shown to promote negative affect (Brewer et al., 2019; Hall et al., 2018; Noar et al., 2017; Skurka et al., 2018), but theories of emotional flow (e.g. Nabi, 2015; Nabi & Myrick, 2019) suggest that an efficacy-focused warning label might reduce negative affect by inducing confidence in the ability to avert a threat, instilling hope.

As our study design measured affective responses after exposure to each discrete warning label, our first research question explores order effects (RQ1). In other words, do emotional responses compound or degrade over subsequent exposures? Furthermore, is there evidence that exposure to an efficacy-focused warning label later in the sequence (e.g., after exposures to threat-focused labels) produces greater hope and lower negative affect (consistent with feelings of relief as predicted by Nabi, 2015 and Nabi & Myrick, 2019) than exposure to the efficacy-focused warning label earlier in the sequence?

Our second hypothesis focuses on efficacy beliefs, measured after exposure to the entire sequence of warning labels. We hypothesize that smokers exposed to an efficacy-centered message (within a sequence of exposure to three other threat-focused messages) will report higher levels of response (H2a) and self-efficacy (H2b) compared to smokers who view only threat-focused messages. This prediction follows directly from the work described above by Lambert et al. (2018), Mead et al. (2015; 2016), and Thrasher et al. (2015; 2016b) on the effect of efficacy-focused messages on quit motivation and efficacy-related beliefs.

Our third hypothesis is that exposure to an efficacy message (again within a sequence of exposure to three other threat-focused messages) will increase intentions to quit (H3) compared to smokers who view threat-only messages. This hypothesis is driven by work on efficacy-specific messages (Lambert et al., 2018; Mead et al., 2015; 2016; Thrasher et al., 2015), research on participant-specific efficacy beliefs (Fathelrahman et al., 2009; Thrasher, Swayampakala, Borland, et al., 2016), and theories of fear appeals (e.g., Popova, 2012; Witte, 1992; Witte & Allen, 2000). Each of these research areas concludes that efficacy information (when accompanying fear-inducing content) can catalyze adaptive responses (e.g., quitting smoking) to minimize a threat to health and well-being (e.g., the health consequences of smoking).

We also include a second research question (RQ2), again informed by previous work: do warning label effects on negative emotions, hope, efficacy beliefs or quit intentions differ depending on whether the labels feature pictorial or text-only messages (RQ1)? Although there is evidence that pictorial labels increase negative affect and motivate intentions to quit (Brewer et al., 2016; Byrne et al., 2017; Noar et al., 2017; Noar, et al., 2016b; Skurka et al., 2018), there is also evidence that text-only warning labels can engender negative affect in the absence of imagery (Byrne et al., 2017). Furthermore, the quit-focused message proposed by the FDA in 2011 conveys response efficacy information via text but self-efficacy information via the picture. We thus examined whether efficacy-focused label effects were contingent upon use of a PWL.

Methods

Overall Study Design and Stimuli

We conducted a randomized, between- and within-subjects online experiment with adult (ages 18 and older) smokers ($N = 398$) from January 23rd to January 30th, 2018 to test study hypotheses and research questions. We randomly assigned participants to view either a set of four PWLs or four text-only warning labels. All labels were images of the front of a branded box of Marlboro, Camel, or Newport cigarettes, with a warning label occupying the top half of the box as required by the U.S. Family Smoking Prevention and Tobacco Control Act (2009).

The PWL condition featured warnings that contained the original FDA-proposed images and text, with two modifications: we resized and changed the original font of some text for consistency across labels, and omitted the quit line number. Although 1-800-QUIT-NOW was originally included on the FDA-proposed packages, we excluded it here because it contains an explicit directive to cease use of a legal product – which is likely unconstitutional – and as such the hotline does not appear in the most recent FDA-proposed labels (see *R.J. Reynolds Tobacco Co. vs United States Food and Drug Administration*, 2011; FDA, 2020a).

The text-only condition used the same text as the pictorial condition, except the picture was removed, and we centered white text on a solid black background (Figures 1 and 2). We modified traditional cigarette brand imagery to fit in the 50% of the image under each

warning label, drawn from three popular cigarette brands. Participants saw a mixture of all three brands; we did not match branding to respondents based on preferences.

Within these PWL or text-only conditions, we randomly assigned participants to view four different warning label messages, sampled from a larger pool of nine FDA-proposed labels (Figure 3). There were no pre-defined or pre-ordered groups of warning labels; participants randomly viewed one of the nine labels from their respective condition and then viewed a randomly selected label from the remaining eight (i.e., from the PWLs not yet displayed) until they had viewed four total labels. Each warning label appeared for 10 seconds and was immediately followed by warning-specific questions about negative affect and hope.

As noted above, one of the nine originally proposed FDA PWLs contains an efficacy message. We coded this warning label as the “Quit” label. The other eight FDA-proposed PWLs contain imagery and text that warn about specific health consequences to the smoker and those around them, such as fatal lung disease, mouth cancer, and lung disease in non-smokers. Based on this randomization design (in which one of the nine labels in the pool was the quit-focused message), 45 percent of respondents ($n = 179$; 90 = text-only, 89 = pictorial) were shown the quit-focused message among their four warning label messages. Following exposure to the stimuli and corresponding warning-specific items, participants completed a posttest gauging quit intentions, efficacy beliefs, and demographics (Figure 4). We report on affective responses for specific warnings. We report on efficacy beliefs and quit intentions for each 4-label set.

We programmed the experiment using Qualtrics survey software and used the Qualtrics web panel to recruit participants. We recruited only current smokers and stratified our sample by educational attainment (due to the fact that smoking rates are higher among those with low formal education; Centers for Disease Control and Prevention [CDC], 2016). Half of the sample had a high school diploma or less. We invited participants to participate in a study we described as being about cigarette packaging. We indicated that they would view some images and text and then respond to survey questions. After obtaining informed consent, we first confirmed smoking status by asking participants if they “currently smoke cigarettes every day, some days, or not at all?” (e.g., Hyland et al., 2017). We disqualified those who selected “not at all.”

Label-Specific Measures

Negative Affect and Hope.—After viewing each individual cigarette package, participants reported how strongly they felt five discrete emotions (afraid, angry, grossed-out, guilty, hopeful) on a scale of one (not at all) to five (extremely). This scale is adapted from the PANAS-X scale from Watson and Clark (1999). The four items on negative affect (excluding “hopeful”) were highly correlated; we thus averaged them into a scale (Cronbach’s $\alpha = .90$; $M = 2.39$, $SD = 1.28$). We report separately on the single item measuring hope ($M = 1.87$, $SD = 1.32$).

Post-Exposure Measures

The following measures appeared after the participant viewed all four labels. In one module, participants indicated their agreement or disagreement with six statements gauging both dimensions of efficacy (self- and response-), adapted from previous studies on either models of fear appeals or previous tobacco warning label studies to enhance readability for low literacy respondents (Wauters, et al., 2014; Witte, 1994; Witte, Cameron, McKeon, & Berkowitz, 1996).

Response Efficacy.—Half of these statements concerned participants' degree of response efficacy: "If I quit smoking now...my health would improve right away," "...I would be less likely to have health problems later in life," and "...I would feel better right away," on a five-item Likert scale from "strongly disagree" to "strongly agree". We averaged these items to create a response efficacy scale (Cronbach's $\alpha = .78$; $M = 3.63$, $SD = .96$).

Self-Efficacy.—The other three statements concerned respondents' self-efficacy: "I have everything I would need to quit smoking cigarettes, if I wanted to," "I could quit smoking, if I really wanted to," and "I would have the support of my family and friends if I wanted to quit smoking cigarettes," on a five-item Likert scale from "strongly disagree" to "strongly agree". We averaged these items to create a self-efficacy scale (Cronbach's $\alpha = .67$; $M = 3.59$, $SD = .90$).

Quit Intentions.—We created a yes/no variable to capture quit intentions, gauging if participants had intentions to quit within the next six months, using items from the National Adult Tobacco Survey (CDC, 2016). Consistent with the Transtheoretical Model's concept of distinguishing between those in the "contemplation" stage of quitting versus the "pre-contemplation" stage, we coded those who planned to quit within the next 6 months as "1" (29.9 percent), and coded all others as "0" (70.1 percent) (DiClemente et al., 1991). We conducted post-hoc sensitivity analyses and also explored whether an ordinal version of the variable (based on timeline for quitting) would change interpretations. Results were substantively equivalent; we present results from the analysis involving the dichotomous variable below.

Control Variables.

We included a variety of control variables found in previous work to predict quit intentions, affective response and/or efficacy beliefs, including demographics (age, gender identity, ethnicity, and race), employment status, income, education, political affiliation, and nicotine dependence (Fagerström, 2012). We conducted sensitivity analyses without these controls, and none of the substantive interpretations of results differed. We include them to reduce unobserved heterogeneity in the logistic models as is best practice (Allison, 1999) and retain them in the rest of the models for the sake of consistency in modeling approach across outcomes. A series of preliminary analyses also tested for three-way interactions between demographic variables (gender and education), randomized conditions (both "Quit" label exposure and PWL vs. text-only), and study outcomes, to test for the possibilities that (a) gender matching between the person pictured in the efficacy-focused PWL and

the respondent mattered, or (b) efficacy-focused PWLs might work better than text among less-educated smokers. None of these interactions were statistically significant (not shown), so we do not consider them further.

Analytic Strategy

We used IBM SPSS 20 for data cleaning and restructuring. Prior to any data analysis or interpretation, we excluded twelve participants who wrote nonsensical responses to open-ended questions on label interpretation (e.g., a string of random letters, “WJKgekjm”).

We restructured the data from wide form (one observation per individual) to long form (multiple observations per individual) to account for the fact that there were four different sets of warning label reaction measures that were nested within each unique individual. The restructured dataset thus featured four observations for each participant ($N = 1,591$). We used Stata (version 15) for all analyses. We accounted for non-independence of the restructured dataset by clustering the data by participant ID number and reporting statistical tests with robust standard errors.

We tested study hypotheses and research questions using either multivariable ordinary least squares (OLS) regression models (with hope, negative affect, and efficacy as the dependent variables) or multivariable logistic regression models (for intentions to quit). As negative affect and hope were measured after each discrete warning label, we compare affective responses to each label ($N = 1,591$ for these analyses); as efficacy beliefs and quit intentions were measured post-label exposure, we compare those who saw only threat-focused warnings with those who saw both the quit-focused warning and three other threat-focused warnings ($N = 398$ for these analyses). In all models, we included the aforementioned control variables (though “Quit” label effects are substantively equivalent whether or not controls are included). We also controlled for randomized label condition in substantive tests of H1 through H3 and RQ1, using text-only warnings as the comparison group. We added an interaction term between condition (PWL vs. text only) and the “Quit” label for all outcomes to test for effect moderation as described in RQ2.

Results

Study Participants

Participants reported their age categorically; the modal category was 25–35 (Table 1). Forty-nine percent identified as male, 81.9 percent White, 12.1 percent Black, 11.8 percent Hispanic, and six percent as another category (these categories were non-exclusive). A majority (66.1 percent) had a total yearly income of < \$50,000 a year and (by design) about half reported their highest level of formal education as a high school diploma or less. The average respondent was near the midpoint of the nicotine dependence scale ($M = 5.00$, $SD = 2.47$, range = 0–10; Fagerström, 2012) and 36.9 percent reported a quit attempt in the last 12 months.

Testing H1: Negative Affect (H1a) and Hope (H1b)

The “Quit” label aroused significantly more hope than the (average) threat-focused label ($b = .75, p < .001$; Table 2), supporting H1a. Post-hoc analyses (not shown) revealed that levels of hope in response to the “Quit” label were higher than all eight of the threat-focused labels. Addressing RQ2, the marginally significant interaction between the PWL condition and the “Quit” label in the second column of Table 2 suggests that these effects may be greater for PWLs than text-only warnings, consistent with other work (interaction $b = .39; p = .065$).

The “Quit” label also aroused significantly less negative affect ($b = -.47, p < .001$) than the (average) threat-focused label, supporting H1b. Post-hoc analyses (not shown) revealed that levels of negative affect in response to the “Quit” label were lower than all eight of the threat-focused labels. The statistically significant interaction between the PWL condition and the “Quit” label indicates that these emotions were stronger for PWLs than for text-only warnings (interaction $b = -.36; p = .026$), addressing RQ2.

Addressing RQ1: Order Effects and Emotional Flow

RQ1 focuses on order effects – whether affective responses compound or degrade over subsequent exposures. To assess these effects, we ran a regression model with warning label order as a predictor (appearing first, second, third or fourth, coded 1–4; alternative categorical variable specifications confirmed that any order effects were best characterized as linear) and negative affect and hope as outcomes. Order did not matter for levels of aroused hope ($b = .03, p = .200$; Table 3). However, negative affect increased linearly over time ($b = .08, p < .001$), such that reported levels of negative affect increased with each subsequent warning label exposure. The non-significant interaction term between order and the “Quit” label indicates that the sequencing of the “Quit” label did not interrupt this process.

To explore these effects further, we limited the sample to only those who saw the “Quit” label and created an additional predictor variable that captured when the “Quit” label appeared in sequence (1–4; $n = 178$). While there was no significant increase in hope ($b = .15, p = .119$; Table 4), there was a significant increase in negative affect ($b = .17, p = .032$), suggesting that the later in the sequence of otherwise threat-focused labels the “Quit” label appears, the higher the aroused negative affect in response to it. Combined, we interpret these results as evidence that the “Quit” label does not interrupt threat-focused warnings’ cumulative generation of negative affect, but that exposure to the “Quit” label does generate hopeful emotional responses in the moments immediately after exposure.

Testing H2: Response Efficacy (H2a) and Self-Efficacy (H2b)

Participants who saw the “Quit” label (within a sequence of exposure to three other threat-focused labels) did not report having greater response efficacy ($b = .02, p = .731$; Table 5) than those who only saw four threat-focused labels (rejecting H2a). Addressing RQ2, however, there was a statistically significant interaction between the PWL condition and “Quit” (interaction $b = .25, p = .035$), indicating that response efficacy was highest among those who saw the pictorial versions of the “Quit” + three threat-focused labels.

Participants who saw the “Quit” label (+ three threat-focused labels) had significantly higher self-efficacy to quit smoking ($b = .14, p = .010$) than those who only saw four threat-focused labels, supporting H2b. The interaction term between the “Quit” label and the PWL condition (vs. text-only) was not statistically significant (addressing RQ2).

Quit Intentions

Participants who saw the “Quit” label (+ three threat-focused labels) did not report having greater intentions to quit smoking than those who only saw only threat-focused labels (Table 6). The interaction between the “Quit” label and PWL (vs. text-only) did not significantly predict quit intentions (again addressing RQ2).

Discussion

This study looked at the impact of a “Quit” warning label message on affect, efficacy beliefs, and quit intentions. The “Quit” label had a significant impact on affect – both positive (e.g., hope) and negative – and self-efficacy, but did not influence response efficacy beliefs or quit intentions. We also found evidence of a cumulative effect of threat-focused warning label exposure on negative affect, but there was no evidence that the order of exposure to the “Quit” label was consequential. We discuss the theoretical and practical implications of these findings below.

“Quit” Label Effects on Affective Responses

Observed effects of exposure to the “Quit” label on increased hope and decreased negative affect are consistent with study hypotheses and, at least in the case of negative affect, were amplified when the warning labels also included imagery. Previous work indicates that people who experience higher levels of fear, anger, and disgust in response to PWLs are more likely to report intentions to quit (e.g. Cho et al., 2018; Skurka, et al., 2018). Other work has identified similar relationships between hope and quit intentions (Yang et al., 2019), suggesting that hope and negative affect may be important precursors for quitting. Our results suggest a need to design warning label content with the goal of promoting both negative affect and hope, as both may serve as important motivators of future action.

The complex interplay of positive and negative emotions has been the focus of recent theorizing about the emotional flow of messages (Nabi, 2015; Nabi & Myrick, 2019). These theorists suggest that transitions from one emotion to another may be more important than levels of singular emotions. Nabi (2015) and Nabi and Myrick (2019) have argued that a sequencing of scary to hopeful content may be an optimal combination for maximizing the effectiveness of fear-then-efficacy appeals. We did not find support for these assertions, though we did identify some noteworthy patterns related to the flow of emotion in response to threat-focused messages. Specifically, we found that reported levels of negative affect increased linearly with subsequent exposures to threat-focused warning labels. Importantly, and counter to predictions of fear-hope models of emotional flow (Nabi & Myrick, 2019), including the “Quit” label within this sequence did not interrupt this escalation of negative affect. We also did not observe any compensatory change in hope associated with later

placement in the sequence, though we did not test whether exposure to multiple “Quit” messages could change this dynamic.

From a theoretical perspective, the lack of evidence of a fear-hope model of flow suggests the possibility that such predictions may be context-specific. Tobacco cessation is incredibly difficult due to a variety of biological (addiction) and social/environmental (peer, marketing, availability) factors, and messaging surrounding cigarettes have tended to emphasize consequences of disease and death. It thus may require a much stronger dose of efficacy-focused messaging to relieve the accumulation of negative affect associated with exposure to threat-focused messages.

From an applied perspective, however, the lack of sequencing effects is heartening in light of the practical challenge of ensuring that exposure to threat- and efficacy-focused warning labels appear in any planned sequence. Cigarettes are kept behind the counter in the U.S., so tobacco control advocates and smokers alike are unlikely to have any choice as to which warning label message appears on purchased packages of cigarettes. It appears that an efficacy-focused message can increase hope in any sequence of exposure to multiple warning label messages.

“Quit” Label Effects (or Lack Thereof) on Efficacy and Intentions

As noted above, exposure to the “Quit” label resulted in higher levels of self-efficacy but did not influence response efficacy. The lack of differences on response efficacy could be attributed to the fact that the textual part of this warning, the element emphasizing response efficacy, is identical to the current Surgeon General’s Warning and thus does not offer novel information. The specific “Quit” message proposed by the FDA may not resonate among smokers as well as other possible quit-focused message executions. New messages that offer novel or simply alternative or surprising arguments regarding quit benefits may work differently.

More broadly, while the lack of effects on response efficacy and quit intentions ran counter to study hypotheses, exposure to a single “Quit” warning label may be insufficient to influence these outcomes. We observed immediate effects largely on affective responses, which is consistent with broader work that has found similar patterns of PWL effects on affect but not on risk beliefs (Byrne et al., 2019; Skurka et al., 2018). Future work should test additional quit and efficacy messages on PWLs to determine the consistency of these effects and the optimal mix of threat and efficacy-focused messaging in warning labels. Doing so would further clarify mechanisms through which warning labels may influence quit-related outcomes.

We note here that the most current FDA-proposed cigarette warning labels do not contain any efficacy-focused messaging (FDA, 2020a; 2020b). While we do not provide evidence that inclusion of an efficacy-focused message increases the likelihood of quit intentions, we do find that exposure to a “Quit” message can increase both hope and self-efficacy without disrupting negative affect (which is likely an important component of warning label effectiveness). To the extent to which hope and self-efficacy are important factors in promoting smoking cessation, the omission of efficacy-focused messaging may reflect a

missed opportunity. At a minimum, our findings suggest the need for more work to clarify the potential benefits of including such messaging as part of a broader set of cigarette product warning label content.

Study Strengths and Limitations

Our study offered a strong, randomized experimental test of a “Quit” message on a cigarette warning label. Participants viewed multiple labels, as they might if the labels were implemented and rotated as per the FDA’s original recommendations. The sample used for the study used multiple stages of randomization (into PWL vs. text and then warning label exposure within these conditions) and featured variability by education status.

We nevertheless acknowledge the natural limitations of a web-based study. Most notably, the artificial setting used does not replicate the conditions under which smokers would be exposed to such warning labels. We also used self-reported measures for all study variables including emotions and smoking behavior, without the opportunity for more objective measures of these constructs (e.g., automated facial affect recognition or psychophysiological measures for emotion; biochemical validation of smoking status). Each participant experienced a single 10-second exposure to each message (40 seconds of total stimulus exposure) and we immediately assessed quit intentions. We do not know if our observed results would vary over time, with repeated exposure, and/or in a more naturalistic setting, although other longitudinal and observational studies do find significant effects of adding efficacy messages to cigarette warning labels, both on PWLs (Cho et al., 2018; Hammond, 2011; Noar et al., 2017; Noar, Francis, et al., 2016) and inserts (Lambert et al., 2018; Thrasher et al., 2015; Thrasher et al., 2016). In addition, we only looked at FDA-proposed PWLs and used one quit message/image combination. Current smokers may be desensitized to the “Quit” message, as the text-only version currently sits on the side of the package as a Surgeon General’s Warning. In addition, we acknowledge that showing one efficacy-focused message in a set of four may have limited our sensitivity to detecting effects on downstream outcomes like efficacy beliefs and quit intentions.

Conclusion

The current study provides new evidence that a “Quit” message on cigarette PWLs can influence key variables relevant to quit intentions among current cigarette smokers, including hope and self-efficacy. Results highlight the importance of developing theoretically-informed efficacy messages, drawing on research on efficacy-focused warning labels (Mead et al., 2016), package inserts (Lambert et al., 2018; Thrasher et al., 2015; Thrasher et al., 2016b), and the role of hope in otherwise negative emotional appeals (Nabi, 2015; Nabi & Myrick, 2019). Results suggest that future FDA-proposed warning labels should consider the use of both efficacy- and threat-focused warning label messages and test whether new messages that include hope-inducing information may amplify their effects on key outcomes.

Acknowledgments

Funding support & financial disclosure

This work was supported by the National Institute of Child Health and Human Development (NICHD), the Food and Drug Administration's (FDA) Center for Tobacco Products (CTP) (grant number R01-HD079612), and Texas Tech University. The funders played no role in the study design; collection, analysis and interpretation of data; the writing of the manuscript; or the decision to submit the manuscript for publication. The content of this paper is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health or the FDA. The authors have neither financial conflicts of interest nor relationships with tobacco manufacturing companies to report.

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Figure 1.
Full Set of FDA-Proposed Pictorial Warning Labels (PWLs) in the Current Study

Figure 2.
Full Set of Text-Only Versions of the Warning Labels in the Current Study

	Text-only Warning Labels	Pictorial Warning Labels
Threat-based Warning Labels	<p>Four cigarette packs (Newport, Newport, Camel, Marlboro) with text-only threat-based warnings. The warnings are: "WARNING: Tobacco Smoke Causes Fetal Lung Disease in Nonsmokers.", "WARNING: Tobacco Smoke Can Harm Your Children.", "WARNING: Smoking During Pregnancy Can Harm Your Baby.", and "WARNING: Smoking Can Kill You."</p>	<p>Four cigarette packs (Camel, Newport, Marlboro, Camel) with pictorial threat-based warnings. The warnings are: "WARNING: Cigarettes Cause Fetal Lung Disease" (with image of lungs), "WARNING: Tobacco Smoke Can Harm Your Children" (with image of a child), "WARNING: Smoking Can Kill You" (with image of a person), and "WARNING: Smoking During Pregnancy Can Harm Your Baby" (with image of a baby).</p>
"Quit" + Threat-based Warning Labels	<p>Four cigarette packs (Camel, Newport, Camel, Marlboro) with "Quit" + threat-based warnings. The warnings are: "WARNING: Quitting Smoking Now Greatly Reduces Serious Risks to Your Health." (with image of a person), "WARNING: Tobacco Smoke Can Harm Your Children.", "WARNING: Smoking During Pregnancy Can Harm Your Baby.", and "WARNING: Smoking Can Kill You."</p>	<p>Four cigarette packs (Camel, Newport, Marlboro, Camel) with "Quit" + pictorial threat-based warnings. The warnings are: "WARNING: Quitting Smoking Now Greatly Reduces Serious Risks to Your Health." (with image of a person), "WARNING: Tobacco Smoke Can Harm Your Children" (with image of a child), "WARNING: Smoking Can Kill You" (with image of a person), and "WARNING: Smoking During Pregnancy Can Harm Your Baby" (with image of a baby).</p>

Figure 3.
Examples of Differences between Pictorial vs. Text-Only and Quit-Focused versus Non-Quit-Focused Warning Label Conditions

Figure 4.
Study Flow

Table 1.**Respondent Demographics (*N* = 398)**

	<i>N</i> (valid %)
Age	
18–24	24 (6.0%)
25–34	114 (28.6%)
35–44	111 (27.9%)
45–54	85 (21.4%)
55–64	45 (11.3%)
65+	19 (4.8%)
Sex	
Male	195 (49.0%)
Female	200 (50.3%)
Transgender	3 (0.8%)
Hispanic	47 (11.8%)
Race	
White	326 (81.9%)
Black	48 (12.1%)
Other	24 (6.0%)
Smoking variables	
Nicotine dependence	<i>M</i> = 5.00 (<i>SD</i> = 2.47)
Tried to quit within past 12 months	147 (36.9%)
Income (total yearly household)	
\$0 – \$19,999	93 (23.4%)
\$20,000 – \$49,999	170 (42.7%)
\$50,000+	135 (33.9%)
Education	
High school graduate or less	195 (49%)
Some college	119 (29.9%)
College graduate	84 (21.1%)

Table 2.

Results of Ordinary Least Squares (OLS) Regression Models Testing Effects of Exposure to the “Quit” Message and Condition (Pictorial vs. Text) on Hope and Negative Affect

	Hope	Hope with interaction	Negative affect	Negative affect with interaction
“Quit” label	0.75 (0.11) ***	0.56 (0.15) ***	−0.47 (0.08) ***	−0.29 (0.1) **
Pictorial (vs. text)	0.16 (0.11)	0.12 (0.11)	0.55 (0.11) ***	0.59 (0.11) ***
“Quit” * Pictorial	–	0.39 (0.21) [#]	–	−0.36 (0.16) *
Constant	1.55 (0.20) ***	1.56 (0.20) ***	2.17 (0.22) ***	2.15 (0.22) ***
R^2	0.08	0.08	0.1	0.1
N	1586 (397)	1586 (397)	1591(398)	1591(398)

Notes. Tables present only coefficients for key variables, but models included controls for all demographic variables and smoking-related variables described in Table 1.

[#] denotes $p < 0.1$,

* $p < .05$,

** $p < .01$,

*** $p < .001$.

Table 3.

Results of Ordinary Least Squares (OLS) Regression Models Testing Effects of Label Order, Exposure to the “Quit” Message, and Condition (Pictorial vs. Text) on Hope and Negative Affect

	Hope	Hope with interaction	Negative affect	Negative affect with interaction
Order	0.03 (0.02)	0.01 (0.02)	0.08 (0.02) ***	0.06 (0.02) ***
“Quit” label	0.74 (0.11) ***	0.41 (0.26)	−0.49 (0.08) ***	−0.78 (0.22) ***
Pictorial (vs. text)	0.16 (0.11)	0.16 (0.11)	0.54 (0.11) ***	0.54 (0.11) ***
Order * “Quit”	–	0.13 (0.10)	–	0.12 (0.09)
Constant	1.65 (0.09) ***	1.68 (0.10) ***	1.99 (0.08) ***	2.02 (0.08) ***
R^2	0.04	0.04	0.06	0.06
N	1586 (397)	1586 (397)	1591 (398)	1591 (398)

Notes. Tables present only coefficients for key variables, but models included controls for all demographic variables and smoking-related variables described in Table 1.

denotes $p < 0.1$,

* $p < .05$,

** $p < .01$,

*** $p < .001$.

Table 4.

Results of Ordinary Least Squares (OLS) Regression Models Testing Effects of “Quit” Message Order and Condition (Pictorial vs. Text) on Hope and Negative Affect, Restricted to Participants Who Were Exposed to the “Quit” Message

	Hope	Hope with interaction	Negative affect	Negative affect with interaction
“Quit” label order	0.15 (0.10)	0.16 (0.14)	0.17 (0.08) *	0.17 (0.11)
Pictorial (vs. text-only)	0.51 (0.22) *	0.55 (0.51)	0.21 (0.18)	0.18 (0.41)
“Quit” order * Pictorial	–	–0.02 (0.19)	–	0.01 (0.16)
Constant	1.90 (0.27) ***	1.88 (0.37) ***	1.42 (0.22) ***	1.43 (0.30) ***
R^2	0.04	0.04	0.03	0.03
n	178	178	178	178

Notes. Tables present only coefficients for key variables, but models included controls for all demographic variables and smoking-related variables described in Table 1.

denotes $p < 0.1$,

* $p < .05$,

** $p < .01$,

*** $p < .001$.

Table 5.

Results of Ordinary Least Squares (OLS) Regression Models Testing Effects of Exposure to the “Quit” + Three Threat Messages (versus Threat-Only) and Condition (Pictorial versus Text) on Response Efficacy and Self-Efficacy

	Response efficacy	Response efficacy with interaction	Self-efficacy	Self-efficacy with interaction
“Quit” + three threat labels (vs. threat-only)	0.02 (0.06)	−0.10 (0.08)	0.14 (0.05) **	0.05 (0.08)
Pictorial (vs. text)	0.09 (0.09)	0.06 (0.1)	0.00 (0.09)	−0.02 (0.09)
“Quit + threat” * Pictorial	–	0.25 (0.12) *	–	0.17 (0.11)
Constant	3.36 (0.2) ***	3.38 (0.2) ***	3.94 (0.18) ***	3.95 (0.18) ***
R^2	0.05	0.05	0.06	0.06
N	1592 (398)	1592 (398)	1592 (398)	1592 (398)

Notes. Tables present only coefficients for key variables, but models included controls for all demographic variables and smoking-related variables described in Table 1.

denotes $p < 0.1$,

* $p < .05$,

** $p < .01$,

*** $p < .001$.

Table 6.

Results of Logistic Regression Models Testing Effects of Exposure to the “Quit” + Three Threat Messages (vs. Threat-Only) and Condition (Pictorial vs. Text) on Intentions to Quit Smoking

	Intention to Quit	Intention to Quit with interaction
“Quit” + three threat labels (vs. threat-only)	1.2 (0.16)	1.08 (0.22)
Pictorial (vs. text)	1.26 (0.29)	1.23 (0.28)
“Quit” + threat * Pictorial	–	1.23 (0.33)
Constant	0.56 (0.26)	0.46 (0.26)
R^2	0.04	0.04
N	1592 (398)	1592 (398)

Notes. Tables present only coefficients for key variables, but models included controls for all demographic variables and smoking-related variables described in Table 1.

denotes $p < 0.1$,

* $p < .05$,

** $p < .01$,

*** $p < .001$.