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Message framing for smoking cessation: The interaction of risk perceptions and gender

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Abstract

Because quitting smoking is clearly linked to preventing health problems such as lung cancer, research on health message framing based on prospect theory suggests that gain-framed messages (i.e., emphasizing the benefits of quitting smoking) would be more persuasive in promoting cessation than loss-framed messages (i.e., emphasizing the costs of continuing to smoke). However, because women tend to anticipate greater perceived risk from quitting smoking than men, this may affect how receptive they are to specific message framing interventions. Data from 249 participants (129 females, 120 males) in a clinical trial of message framing for smoking cessation with bupropion were used to examine how gender differences in perceptions of the risks associated with quitting influence the effects of framed interventions using number of days to smoking relapse as the criterion. Perceived risk of quitting scores were dichotomized using a median split for the entire sample. Women reported a higher perceived risk of cessation than men. Participants who anticipated high risks associated with quitting smoking reported fewer days to relapse. Further, females in the gain-framed condition who reported low perceived risks of cessation had a greater number of days to relapse, as opposed to females in the loss-framed condition. These findings suggest that message framing interventions for smoking cessation should consider the influence of gender and risk perceptions associated with quitting on the effectiveness of framed interventions.

Introduction

Prospect theory describes the nonlinear relationship between gains and losses in objective outcomes and one's subjective reactions to them (Tversky & Kahneman, 1981). The framing implications of prospect theory suggest that individuals respond differently to factually equivalent messages depending on whether they are framed to emphasize either benefits (gain-framed) or costs (loss-framed). This concept applies to messages intended to promote health (Rothman & Salovey, 1997). For smoking cessation, "You will save money if you quit smoking" is a gain-framed message, and "You will lose money if you continue smoking" is a loss-framed message. Prospect theory suggests that when gains are salient, people are averse to risk, and when losses are prominent, individuals seek risk. Even though the messages are factually equivalent, the message frame may influence an individual's willingness to incur risk either to avoid an unwanted outcome or to encourage a desirable outcome (Tversky & Kahneman, 1981).

It appears that gain- and loss-framed messages are differentially persuasive, depending on the health behavior in question (Rothman & Salovey, 1997). Specifically, when behaviors have an outcome with little related risk (in this context, risk might be thought of as uncertainty), individuals are more persuaded by gain-framed messages. For instance, gain-framed messages are more effective in motivating prevention behaviors such as sunscreen use at the beach because these behaviors will very likely prevent health problems (e.g., skin cancer) and incur few risks (i.e., little uncertainty; Detweiler, Bedell, Salovey, Pronin, & Rothman, 1999). In contrast, if behaviors result in an outcome associated with a high level of risk (i.e., considerable uncertainty), loss-framed messages are more persuasive. For example, loss-framed messages are more effective in promoting detection behaviors, such as mammography, given that these behaviors have a potentially risky (i.e., uncertain) outcome (e.g., breast cancer may be detected; Schneider et al., 2001).

As evidence supporting these framing postulates accumulates, investigators have begun to identify the conditions under which framed messages are particularly effective (e.g., Apanovitch, McCarthy, & Salovey, 2003; Mann, Sherman, & Updegraff, 2004; Schneider et al., 2001; Steward, Schneider, Pizarro, & Salovey, 2003). For example, targeted behaviors may be ones that involve little associated risk or considerable risk (e.g., most prevention behaviors versus many detection behaviors). However, some individuals may perceive risk differently than these general expectations. In a study of message framing to motivate HIV testing, gain-framed messages were effective in promoting a detection behavior, HIV testing, for individuals who believed that such testing was not likely to reveal that they were HIV positive, even though, in general, one would hypothesize that a detection behavior like HIV testing would be better promoted by a loss-framed approach (Apanovitch et al., 2003). In this study, loss-framed messages were somewhat more effective than gain-framed messages among those participants who believed that they were at greater risk for HIV.

Gender can also moderate message framing effectiveness (Kiene, Barta, Zelenski, & Cothran, 2005; O'Connor, Ferguson, & O'Connor, 2005; Rothman, Salovey, Antone, Keough, & Martin, 1993). Kiene and colleagues (2005) conducted a study investigating different types of framing (health risks and relationship risks) on participants' evaluation of the content of condom use messages and found a gender by message type by message frame interaction. With regard to ratings of whether the message was convincing, men showed no difference in ratings of framed messages with relation to message content. Women, however, were more convinced by loss-framed messages when the message related to relationship risk and by gain-framed messages when the message related to health risks (Kiene et al., 2005). In an investigation of message framing to promote sunscreen use, women, who were more involved in the issue, were more persuaded by gain-framed messages to request sunscreen, whereas men, who were less involved, were not affected by message frame (Rothman et al., 1993). The observed gender differences in framing may be moderated by potential differences in men's and women's risk perceptions (e.g., women's but not men's perceptions of risk might affect their sensitivity to framed messages), suggesting a possible interaction between the two conditions: gender and risk perceptions.

Smoking cessation provides ideal conditions to examine risk perceptions associated with smoking cessation and gender together. Women tend to perceive risks from quitting smoking differently than men (i.e., they perceive more risks from quitting than men do; McKee, O'Malley, Salovey, Krishnan-Sarin, & Mazure, 2005), which may affect their receptiveness to framed messages. Using data from a smoking cessation trial comparing gain- and loss-framed messages, we examined how gender differences in perceptions of risk of quitting influence the effects of framed interventions. Based on previous research (Apanovitch et al., 2003; Kiene et al., 2005; Rothman et al., 1993), we expected that individuals with low perceived

risk of cessation would be more persuaded by gain-framed messages and that individuals with high perceived risk of quitting would be more influenced by loss-framed messages.

Method

Participants

This report is based on a secondary analysis of data from a randomized controlled trial of message framing for smoking cessation with sustained-release (SR) bupropion (Toll et al., in press). Individuals were eligible for participation if they were at least 18 years of age, smoking 10 cigarettes/day for at least 1 year, and had a baseline expired carbon-monoxide (CO) level of at least 10 parts per million (ppm). Participants were excluded for current serious neurologic, psychiatric, or medical illness and current alcohol dependence. The treatment-seeking sample ($N=249$, 51.8% female) was primarily White (81.9%) with a mean age of 42.65 years ($SD=11.54$). Participants smoked an average of 22.61 cigarettes/day ($SD=9.32$), had smoked for an average of 25.00 years ($SD=2.06$), and had a mean Fagerström Test for Nicotine Dependence (FTND) score of 5.37 ($SD=2.06$). Baseline characteristics by gender and study condition are presented in Table 1. This study was approved by the institutional review board of the Yale University School of Medicine.

Procedure

As part of a smoking cessation clinical trial, all participants received bupropion SR (300 mg daily) for a 7-week period and were randomized to receive gain- or loss-framed messages, with randomization stratified by gender. For 6 weeks after their quit date, participants came to the clinic for research appointments on a biweekly basis. Questionnaires were administered, and framed video and print messages encouraging smoking abstinence (i.e., two short videos, print matter, and a water bottle and air freshener with printed slogans on them) were provided at these appointments. Examples of typical gain- and loss-framed messages provided in the videos are displayed in Table 2. These messages focused on either the benefits of quitting smoking (gain-framed) or the costs of continuing to smoke (loss-framed). Smoking was assessed using timeline followback (TLFB) methodology at each weekly appointment utilizing procedures outlined by Sobell and Sobell (1992,2003). Specifically, baseline TLFB data were gathered for the 30 days prior to the first screening session, and at all weekly appointments individuals were verbally asked to indicate the number of cigarettes they consumed each day for the preceding weeks. The TLFB has been shown to be a reliable and valid method of assessment of smoking behavior (Brown et al., 1998), and it has been shown to have good convergent validity with biochemical markers of cigarette smoking (e.g., CO and cotinine; Brandon, Copeland, & Saper, 1995).

Measures

Perceived risks for smoking cessation—The perceived risk scale of the Perceived Risk and Benefits Questionnaire (PRBQ; McKee et al., 2005) was used to assess risk perceptions associated with smoking cessation. This 18-item measure was used to assess the perceived likelihood (1=no chance, 7=certain to happen) of risks associated with smoking cessation prior to the start of treatment (subscales: weight gain, increases in negative affect, reduced ability to attend or concentrate, social ostracism, loss of enjoyment, craving). Mean values were calculated for individual perceived risk subscales as well as the overall perceived risk scale. This measure has adequate psychometric properties and demonstrated predictive validity with regard to smoking treatment outcome (McKee et al., 2005). For the current sample, Cronbach's alpha for the perceived risk scale was .92.

Decisional balance for smoking—Three items representing cons of smoking (Velicer, DiClemente, Prochaska, & Brandenburg, 1985) were used to assess the perceived costs of

smoking at baseline before participants quit smoking. These items (“I’m embarrassed to have to smoke”; “My cigarette smoking bothers other people”; “People think I’m foolish for ignoring the warning signs about cigarette smoking”) were assessed on a scale from 1 (not important) to 5 (extremely important), and they represent a short form of the cons subscale taken from the 24-item Decisional Balance Scale. This short form of the cons subscale revealed adequate reliability in a large sample of smokers recruited for a smoking cessation study (Ward, Velicer, Rossi, Fava, & Prochaska, 2004).

Data analyses

Baseline characteristics (age, race, cigarettes/day, number of years smoking, and FTND scores) were compared across gender and message framing conditions (gain- vs. loss-framed) using 2×2 univariate analysis of variance or chi-square tests. Multivariate analyses of variance were used to examine gender differences in mean perceived risk of cessation subscale scores, and a separate univariate analysis of variance was conducted for the total scale score. To examine the interactive effects of risk perceptions regarding quitting, message condition, and gender on treatment outcome, we used number of days to first cigarette as the primary outcome variable (possible range=1–42 days). For participants who did not smoke during the treatment phase, this variable was counted as 42 days.

Because perceived risk of quitting scores were found to be normally distributed at the midpoint of the scale ($M=4.04$, $SD=0.97$, $Mdn=4.00$), scores were dichotomized into high and low categories using a median split for the entire sample. A univariate analysis of variance was conducted to examine main and interactive effects of gender, message condition (gain- vs. loss-framed), and perceived risk of quitting (high vs. low) on days to first cigarette. Similar analyses were repeated for each of the risk of cessation subscales. To verify the results of analyses using days to first cigarette as an outcome, we repeated an analysis of the interaction of gender, message condition, and perceived risk of quitting using percentages of continuously abstinent participants as an outcome. Continuous abstinence was defined as reporting abstinence from smoking throughout the 6-week treatment, verified by CO tests of 10 ppm or less. Scores on the cons subscale of the Decisional Balance Scale were compared for women and men using independent-samples t tests, and using this variable, a univariate analysis of variance was conducted to examine main and interactive effects of gender, message condition (gain-vs. loss-framed), and perceived risks of smoking (high vs. low) on days to first cigarette.

Results

Sample demographics are presented in Table 1. A main effect of gender was found for cigarettes per day, $F(1, 245)=9.37$, $p<.01$. Males smoked more cigarettes per day (24.45, $SE=0.84$) than females (20.89, $SE=0.81$). All subsequent analyses examining gender and message framing effects included cigarettes per day as a covariate (Table 3). Analyses of variance examining gender differences in risk perceptions associated with quitting demonstrated a significant effect of gender for the overall perceived risk score, $F(1, 246)=12.69$, $p<.005$, and for the subscales, $F(6, 240)=5.73$, $p<.005$. Females, compared with males, had significantly greater mean scores for the overall perceived risk of quitting scale, as well as the weight gain, negative affect, and loss of enjoyment subscales. We also found nonsignificant differences for the attention/concentration ($p=.066$) and craving subscales ($p=.053$), with females reporting greater perceived risk than males on both of these measures.

Perceived risk was dichotomized into high-risk ($M=4.81$, $SE=.06$) and low-risk groups ($M=3.36$, $SE=.06$) based on a median split. The primary analysis examining main and interactive effects of gender, message condition, and perceived risk of cessation found a significant main effect of risk perceptions, $F(1, 240)=3.78$, $p=.05$, and a three-way interaction, $F(1, 240)=4.55$, $p<.05$, on days to first cigarette. Participants who anticipated high perceived

risk associated with smoking cessation had fewer mean days to their first cigarette ($M=16.35$, $SE=1.70$), compared with participants with low perceived risk ($M=20.85$, $SE=1.57$). Simple effects analyses of the three-way interaction demonstrated that females with low perceived risk of quitting had a longer duration of abstinence (i.e., more days on average to their first cigarette) if they received the gain-framed, as opposed to the loss-framed, intervention, $F(1, 56)=5.33$, $p<.03$, as illustrated in Figure 1. This pattern of findings was similar when we examined total abstinence from smoking, in which females with low perceived risk of quitting in the gain-framed condition had a higher rate of abstinence (68.4%) as compared with those in the loss-framed condition (31.6%), $\chi^2(1)=6.76$, $p<.01$. There were no effects of message condition in females with high-risk perceptions regarding quitting or in males with either low- or high-risk perceptions associated with quitting. Further analyses examining interactive effects of the perceived risk of quitting subscales with gender and message condition on days to first cigarette did not produce any substantive findings. There were no differences between men and women on baseline perceived risks of smoking, as measured by the cons subscale of the Decisional Balance Scale. Furthermore, the univariate analysis examining gender, message condition, and perceived risks of smoking was nonsignificant, suggesting that perceived risks of smoking had no effect on framing effects.

Discussion

In this investigation, women had significantly higher mean perceived risk of quitting scores than men. Moreover, participants who expected that quitting smoking would be associated with high perceived risks reported fewer days to their first cigarette, as compared with those with low perceived risk. These two findings are consistent with prior research documenting that beliefs about the consequences of quitting are associated with smoking cessation and that this effect is more pronounced in women (McKee et al., 2005). In addition, women who received gain-framed messages and who had low perceived risk of cessation had more days to their first cigarette, as opposed to those who received loss-framed messages. Past research has established the importance of perceived risk and gender in moderating the impact of framed messages (e.g., Apanovitch et al., 2003; Kiene et al., 2005). The current investigation extends these findings by demonstrating that perceived risk of smoking cessation and gender interact such that women with low perceptions of risk are particularly sensitive to gain-framed messages. In addition to perceived risk and gender, other moderators of framing effects have been demonstrated (e.g., issue involvement [Rothman et al., 1993] and need for cognition [Steward et al., 2003]), indicating that it will be essential for future studies to test moderators of message framing for smoking cessation.

Information processing research provides a possible explanation for the interaction reported here. Individuals who hold generally positive perceptions of behavior tend to process messages more thoroughly and be sensitive to gain-framed messages (Meyers-Levy & Maheswaran, 2004). Furthermore, women may tend to process health messages more thoroughly than men, making them particularly sensitive to message frame. Taken together, it follows that women (i.e., who might exhibit a tendency to process information thoroughly) with low perceived risk (i.e., positive perceptions) would be persuaded by gain-framed messages (O'Connor et al., 2005).

Alternatively, the message content might not have been equally appropriate for all groups. The loss-framed messages might not have worked for the high-risk group because the messages focused on general outcome expectancies (i.e., the benefits of quitting smoking or the costs of continuing to smoke). Individuals, and in particular women, who view smoking cessation as a risk may need messages that address their specific risks with an additional emphasis on building self-efficacy strategies to overcome the perceived barriers of smoking cessation.

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Figure 1. Days to first cigarette as a function of perceived risk for smoking cessation (high vs. low) and message condition (gain- vs. loss-framed) for females and males.

Table 1

Sample demographics.

Characteristic	Gain		Loss	
	Female	Male	Female	Male
	<i>n</i> =64	<i>n</i> =60	<i>n</i> =65	<i>n</i> =60
Mean age, years (<i>SD</i>)	40.94 (11.83)	43.93 (10.94)	43.12 (11.26)	42.70 (12.17)
Race (% White)	78.1	81.7	84.6	83.3
Mean cigarettes/day (<i>SD</i>)*	20.06 (7.27)	24.33 (10.61)	21.71 (7.63)	24.57 (10.87)
Mean number of years smoking (<i>SD</i>)	22.98 (10.62)	25.86 (10.84)	25.93 (10.68)	24.92 (12.66)
Mean Fagerström Test for Nicotine Dependence score (<i>SD</i>)	5.25 (2.13)	5.39 (2.01)	5.37 (2.02)	5.46 (2.14)

* *Note.* $p < .05$ indicates a significant gender difference.

Table 2

Examples of messages provided in the framed videos.

Gain-framed message	Loss-framed message
<p>Not only will quitting smoking reduce your risk of developing cancer and other diseases, it also saves you money and protects your family and friends from diseases related to second-hand smoke.</p> <p>The more people you tell, the more support you will have. This is quitting smart.</p> <p>Research shows that compared to a smoker, someone who quits smoking will gain the equivalent of nearly two and a half hours of life per day over a 70-year span.</p> <p>Many people already know that quitting smoking significantly lowers the risk of heart attacks, strokes, emphysema, and cancer in the long run.</p> <p>What a lot of people don't realize is that it's not only the long-term benefits, but quitting also has many immediate positive effects on their health.</p>	<p>Not only will continuing to smoke increase your risk of developing cancer and other diseases, it also wastes your money and endangers your family and friends with second-hand smoke and related diseases.</p> <p>If you don't tell enough people, you will have less support. This is not quitting smart.</p> <p>Research shows that compared to someone who quits smoking, a smoker will lose the equivalent of two and a half hours of life per day over a 70-year span.</p> <p>Many people already know that smoking significantly increases the risk of heart attacks, strokes, emphysema, and cancer in the long run.</p> <p>What a lot of people don't realize is that it's not only the long-term drawbacks, but continuing to smoke also has many immediate negative effects on their health.</p>

Table 3

Perceived risk scales by gender (mean values with standard errors).

	Female (n=129)	Male (n=120)
Perceived risk scale	4.25 (.09)	3.81 (.09) ***
<i>Subscales</i>		
Weight gain	4.53 (.11)	4.04 (.12) **
Negative affect	4.27 (.11)	3.59 (.12) ***
Attention/concentration	3.41 (.12)	3.10 (.12) *
Social ostracism	3.78 (.12)	3.62 (.12) ***
Loss of enjoyment	4.97 (.14)	4.11 (.14) ***
Craving	5.21 (.12)	4.88 (.12) *

* Note. $p < .10$;** $p < .01$;*** $p < .001$ indicates a significant gender difference.