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How Do Perceptions About Cessation Outcomes Moderate the Effectiveness of a Gain-Framed Smoking Cessation Telephone Counseling Intervention?

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Abstract

The distinction between prevention and detection behaviors provides a useful guideline for appropriately framing health messages in terms of gains or losses. However, this guideline assumes that everyone perceives the outcomes associated with a behavior in a consistent manner, as prevention or detection. Individuals' perceptions of a behavior vary, and so the effects of framed messages may be optimized by considering individuals' perceptions rather than the prevention or detection function of the behavior. The authors tested this message-framing paradigm in a secondary analysis of data from a trial evaluating gain-framed smoking cessation

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counseling delivered through a state quitline (Toll et al., 2010). Smokers ($N = 2,032$) who called a state quitline received either gain-framed or standard care messages. Smokers' beliefs about the positive consequences of stopping smoking (outcome expectancies) were evaluated at baseline. Smoking status and self-efficacy were assessed at 3 months. Outcome expectancies moderated the framing effects among men but not among women. Men in the gain-framed counseling condition who had positive outcome expectancies were more likely to quit and had more confidence in their ability to quit or to remain abstinent than men who were uncertain of the positive outcome of smoking cessation. Among men, self-efficacy mediated the moderated framing effects of the intervention on quit status. These findings suggest that it may be useful to consider sex and individual differences in outcome expectancies when delivering gain-framed smoking cessation messages in the context of a state quitline.

Smoking cessation messages can be framed to emphasize the benefits of quitting smoking (gain-framed) or costs of continuing to smoke (loss-framed). Delivering appropriately framed appeals holds promise for enhancing the effectiveness of smoking cessation interventions. The principles for appropriately framing messages are derived from prospect theory (Tversky & Kahneman, 1981), according to which individuals select a risky or uncertain option when considering the losses associated with options and they select a certain or risk-averse option when considering the gains associated with options. These tenets have been supported in classic decision-making experiments in which participants select between two interventions aimed at managing an epidemic. Both interventions have the same outcome, yet one has certain outcomes (i.e., outcomes are presented as the number of people who will be saved or who will die) and one has uncertain or risky outcomes (e.g., outcomes are presented the probability of saving lives or dying). When the intervention is described in terms of gains (i.e., lives saved), participants tend to select the intervention with a certain outcome. When the intervention is described in terms of losses (i.e., number of people who will die), participants tend to select the intervention with an uncertain outcome.

Rothman and Salovey (1997) developed a taxonomy of health behaviors predicated on the tenets prospect theory that guides when to frame messages in terms of gain or loss to persuade health behavior change. The taxonomy categorizes behaviors according to their function in either detecting or preventing disease. Applying the taxonomy, Rothman and Salovey (1997) proposed that detection behaviors (e.g., breast self-exams) are best promoted using loss-framed messages because behaviors in this category have uncertain outcomes and thus typically are perceived as risky (e.g., individuals could find out that they have breast cancer). In contrast, prevention behaviors (e.g., using sunscreen) are best persuaded using gain-framed messages because behaviors in this category have relatively certain outcomes and thus typically are perceived as risk averse (e.g., risk for skin cancer is greatly reduced). The taxonomy has proven to be a relatively useful for promoting detection behaviors (Meyerowitz & Chaiken, 1987; Rivers, Salovey, Pizarro, Pizarro, & Schneider, 2005; Schneider et al., 2001) and prevention behaviors (Detweiler, Bedell, Salovey, Pronin, & Rothman, 1999; Latimer, Rench, et al., 2007; Toll et al., 2010; Toll et al., 2007).

A number of studies support the prevention=detection dichotomy; however, several studies have failed to support this taxonomy (O'Keefe & Jensen, 2007, 2009). In some cases, null findings are the result of study limitations (e.g., small sample sizes, brief message exposure; Latimer, Salovey, & Rothman, 2007). In other cases, the lack of meaningful effects highlights a constraint of using behavioral function as a determinant of the appropriate message frame. The taxonomy fundamentally assumes that everyone has similar outcome expectancies thus perceiving the risk and the level of outcome certainty associated with a behavior in a consistent manner. Although for some behaviors this assumption is correct, for other behaviors individuals' outcome expectancies may vary. Thus, it may be more effective

to provide framed messages consistent with individuals' outcome expectancies rather than the function of the behavior.

In an experiment examining the effectiveness of framed messages for encouraging vaccination against the West Nile virus, Bartels, Kelly, and Rothman (2010) held the function of the behavior constant and manipulated outcome expectancies by varying the likelihood that an expected outcome would occur. Participants who read a message describing a vaccine with fairly certain outcomes were best persuaded with a gain-framed message; participants who considered a vaccine described as having uncertain outcomes were more persuaded by a loss-framed appeal.

Although this experiment supports the notion of considering individuals' outcome expectancies when selecting an appropriate message frame, the applicability of these findings to practice are limited. In practice, it would be unethical to provide false outcome information to affect outcome expectancies. An alternate strategy to manipulating outcome expectancies entails matching the frame of a message to be congruent with individuals' existing outcome expectancies (Rothman, Bartels, Wlaschin, & Salovey, 2006). As such, outcome expectancies would moderate framing effects; individuals with existing positive outcome expectancies would be persuaded by gain-framed messages and individuals with existing negative outcomes expectancies would be persuaded by loss-framed messages. Outcome expectancies are a suitable moderator to examine because they reflect individuals' beliefs about the certainty that a behavior will lead to a specific outcome (Ajzen & Fishbein, 2005; Bandura, 1997). Thus, the message recipients' outcome expectancies account for the outcome certainty component of decision making specified in prospect theory.

Existing evidence supports outcome expectancies as a moderator of framing effects (Apanovitch, McCarthy, & Salovey, 2003; Gerend, Shepherd, & Monday, 2008; Hevey et al., 2010; Kiene, Barta, Zelenski, & Cothran, 2005; O'Connor, Ferguson, & O'Connor, 2005; van't Riet, Ruiters, Werrij, & De Vries, 2010). In a study evaluating the efficacy of delivering framed smoking cessation messages in conjunction with a pharmacotherapy intervention (Toll et al., 2008), women who expected to experience positive outcomes from quitting and received a gain-framed message had a greater number of days to smoking relapse compared with women in the loss-framed condition. However, there were no framing effects among men regardless of their outcome expectancies for quitting.

When examining outcome expectancies as a moderator of the effects of framed smoking cessation messages, it may be important to consider the sex of the message recipient. Men's and women's outcome expectations for quitting differ (Toll et al., 2010). Women tend to perceive greater risk in quitting than do men. These tendencies may affect whether men and women are persuaded differently by a gain- or a loss-framed messages. To explore possibility, we examined outcome expectancies and sex as moderators of a framed smoking cessation intervention.

In addition to identifying moderating factors, researchers also are challenged to identify the factors that mediate the effects of framed messages (Rothman & Updegraff, 2011). In the present study, we examined whether self-efficacy mediated the effects of framed smoking cessation messages that were congruent with men's and women's outcome expectancies. In the context of moderated framing effects, the match between the message frame and characteristics of the message recipient may elicit a feeling of fit (i.e., the behavior "just feels right"; Rothman & Updegraff, 2011). This feeling of fit may manifest in a number of ways, including increased self-efficacy to perform a behavior (Higgins, 2000). Sherman, Mann, and Updegraff (2006) demonstrated this relation in their study evaluating framed flossing messages. Participants who received framed messages congruent with their

motivational orientation were more confident that they could floss regularly and, in turn, were more likely to floss than participants who received incongruent messages.

With the goal of furthering research examining moderators and mediators of framing effects, in the present study we conducted a secondary analysis of data from a message framing smoking cessation trial (Toll et al., 2010). We examined whether participants' outcome expectancies of quitting and their sex moderated the effects of a gain-framed intervention delivered through a state quitline. We hypothesized that outcome expectancies would moderate the impact of the framed quitline counseling, especially among women. We also examined self-efficacy as a potential mediator of the moderated framing effects. We hypothesized that the observed moderated framing effects among women would be mediated by self-efficacy.

Method

The data for this study were collected as part of a randomized controlled trial examining whether delivering gain-framed counseling and print materials enhanced the effectiveness of a state quitline service (Toll et al., 2010). The effectiveness of a gain-framed intervention was compared to standard care. Standard care, rather than a loss-framed intervention, was used as the comparison group because the larger trial ascribed to the traditional prevention=detection taxonomy (Rothman & Salovey, 1997). Consistent with this taxonomy, at the population level, gain-framed messages are best for encouraging a prevention behavior such as smoking cessation. Because the moderating variables that would further optimize the effects of the framed counseling were not considered in the larger trial, we conducted the subsequently described secondary analyses.

Participants

Participants were smokers ($N = 2,031$) who called the New York State Smokers' Quitline (NYSSQL). Eligible participants in the larger trial were English-speaking New York State residents of at least 18 years of age who were (a) current smokers seeking quitting assistance for themselves, (b) not enrolled in the NYSSQL extended callback program, which was intended for Medicaid beneficiaries or the uninsured, and (c) not enrolled in any other special cessation programs through another source. In the present analyses, self-reported sex (male, female) was an additional inclusion criterion. Participants' demographic characteristics and smoking history are described in Table 1. Between-group comparisons revealed some differences in participant characteristics. Women in the standard care condition were less likely to have made an attempt to quit smoking in the past, $\chi^2(1, N = 1,153) = 7.27, p = .01$, and were more likely to be from an ethnic minority group, $\chi^2(2, N = 1,153) = 8.32, p = .02$, compared with women in the gain-framed condition. Men were younger, $F(1, 2015) = 21.48, p < .001$, and had smoked for fewer years, $F(1, 2015) = 9.53, p = .002$, but smoked more cigarettes daily than women, $F(1, 2015) = 24.88, p < .001$. The characteristics that varied between groups were treated as covariates in subsequent analyses.

Measures

To meet the constraints of conducting research within a busy state quitline, each of our measurement instruments was a single-item scale. Administering multi-item measures would have extended the length of each service call and consequently would have increased caller wait times. Although the psychometric properties of single-item measures have been questioned, research indicates that single-item measures of global constructs related to objects or actions that are easily conceptualized by respondents can be as good as multi-item measures (Bergkvist & Rossiter, 2007; Gardner, Cummings, Dunham, & Pierce, 1998). Because we used a broad operationalization of manipulation effects, outcome expectancies,

and self-efficacy and because smoking cessation is a concrete action, the use of single-item measures in this study was appropriate.

Manipulation check items required participants to rate (a) how well the counseling presented the risks of smoking versus the benefits of not smoking (1 = it focused heavily on the costs of continuing to smoke; 5 = it focused heavily on the benefits of quitting smoking) and (b) the tone of the counseling (1 = extremely negative; 5 = extremely positive). These items are sensitive to differences in message framing (e.g., Toll et al., 2007). These items were not correlated, $r = .05$, $p = .026$, and thus were treated as separate indicators of the manipulation effects.

Outcome expectancies were measured using an item from the Benefits subscale of the Perceived Risks and Benefits Questionnaire (McKee, O'Malley, Salovey, Krishnan-Sarin, & Mazure, 2005). Participants rated the certainty of the global outcome of achieving health benefits from quitting smoking on a 7-point scale ranging from 1 (*no chance*) to 7 (*certain to happen*). A face valid item with a high factor loading was selected from the subscale. This measure correlates with intentions to quit smoking and treatment outcomes (McKee et al., 2005).

Smoking status was measured using a point prevalence abstinence item, a standard definition of quitting for smoking cessation clinical trials (Fiore et al., 2008; Miller et al., 2005). Participants indicated whether they had smoked any cigarettes, even only a puff, in the past 7 days (1 = yes; 2 = no).

Self-efficacy was measured with a single item. Participants rated their confidence to quit smoking or to remain abstinent from smoking on a 10-point scale (1 = not at all confident; 10 = extremely confident). A similar, single item self-efficacy measure has demonstrated predictive validity in smoking cessation studies (Steward, Schneider, Pizarro, & Salovey, 2003).

Procedure

The Yale University and Rosewell Park Cancer Institute Ethics Review Boards approved this study. A full description of the study protocol is available in the original paper (Toll et al., 2010).

At the start of the intake call, callers who consented to participate completed the single-item assessment of outcome expectancies. For the remainder of the intake call participants were exposed to either gain-framed or standard care counseling delivered by a trained NYSSQL information specialist. At the end of the call, participants completed the manipulation check items.

Immediately following the call, clients were mailed the NYSSQL *Break Loose!* booklet and smoking cessation tip sheets framed in accordance with their experimental condition. Medically eligible clients received a 2-week starter pack of nicotine replacement therapy. Callers then received a standard 2-week follow-up telephone call from a NYSSQL information specialist that included framed counseling. Study outcomes were assessed in a 3-month follow-up telephone interview conducted by an independent survey group blind to the callers' experimental condition.

Messages

Standard Care Messages—Messages were delivered throughout the intake and the 2-week follow-up call and in print materials including the *Break Loose!* guide. Before the start of the trial, the message content of standard NYSSQL services was examined (Latimer et al.,

2009). A content analysis of the information specialists' dialogue from six intake calls and six 2-week follow-up calls revealed that approximately one third of the call was dedicated to providing clients with information (e.g., the benefits of quitting, the consequences of secondhand smoke), another third was allocated to information gathering (e.g., how long have you been smoking), and the final third included active listening and collecting demographic information. Only the messages where the information specialist was providing clients with information were amenable to framing. This dialogue did include some gain-framed information (10.2%) and some loss-framed (1.7%) information. The rest of the information had a neutral tone. The print materials included more framed information than the call scripts (21.6% gain framed, 13.8% loss framed) because the primary focus of the print materials was information provision.

Gain-Framed Message Condition—Framed messages were incorporated into standard service. To facilitate message delivery during the intake and 2-week follow-up calls, the standard web forms used to guide the interview and record client information included gain-framed message prompts. These prompts were a series of statements (e.g., “Calling us is a step towards achieving the benefits of a smoke-free lifestyle”) and questions (e.g., “What benefits do you expect to get from quitting smoking?”) that the specialist integrated into the interview. Gain-framed messages were integrated into the print material by reframing all loss-framed information and photos in the standard *Break Loose!* booklet and tip sheets. For example, the loss-framed message included in the standard materials “Smokers are more likely to have shortness of breath and wheezing ...” was replaced with “If you quit smoking, you will be more likely to breathe easier ...”

Statistical Analyses

Data Treatment—Intention-to-treat principles were applied to the smoking cessation outcome variable. Callers who were not reached at follow-up were considered to be smoking. Given that the dropout rates were similar across experimental conditions (Toll et al., 2010), this was an appropriate approach. Assuming that the intervention was unsuccessful among callers not reached for follow-up is standard in the smoking cessation field and is consistent with smoking cessation randomized controlled trials (Gonzales et al., 2006; Hurt et al., 1997; Jorenby et al., 2006). Self-efficacy data from callers not reached at follow-up were considered missing. We used this approach as opposed to the widely used intention-to-treat method of carrying the last observation forward, which has potential to bias the sample (Lane, 2008). The outcome expectancies variable was zero-centered (Cohen, Cohen, West, & Aiken, 2003), and experimental condition, sex, and smoking status were dummy-coded (standard care = 0, gain-framed condition = 1; men = 0, women = 1; smoking = 0, quit = 1).

Testing Moderated Intervention Effects—We conducted regression analyses to examine the moderated effects of the intervention on the manipulation check items and self-efficacy and quit status at the 3-month follow-up. We conducted separate hierarchical regression analyses for the manipulation check items and self-efficacy. In addition, we conducted binary logistic regression analyses for quit status. In each regression analysis, demographic covariates (smoking and quitting history, age, years smoked, number of cigarettes smoked daily, and race) were entered in the first step of the model. The main effects for experimental condition, outcome expectancies, and sex were entered into the second step of the model. The two-way interaction terms for these predictor variables were entered in the third step. The three-way interaction term for the predictor variables was entered in the final step. These steps are consistent with the protocol for testing interactions using regression models outlined by Cohen and colleagues (2003). Significant three-way interactions were decomposed first by sex (i.e., separate regression models were conducted

for men and women). Significant two-way interactions that emerged were then further decomposed by sex and experimental condition.

Testing for Mediation—The analyses examining self-efficacy as a mediator included only male callers because the moderated intervention effects only emerged for men. The mediational model tested is described in Figure 1. As depicted in Figure 1, *path a* represents the moderated framing effects of the intervention on self-efficacy, and *path b* represents the predictive relationship between self-efficacy and quit status controlling for the effects of the intervention.

We conducted a Sobel test to determine the significance of the mediation effects (Mackinnon, 2000; Mackinnon & Dwyer, 1993). The Sobel test determines statistical significance by dividing the product of the unstandardized regression coefficients of *paths a* and *b* by the pooled standard error of *paths a* and *b*. The unstandardized regression coefficients for *paths a* and *b* were determined in three phases. In the first phase, *coefficient a* was determined by regressing self-efficacy at 3 months on the two-way experimental condition \times outcomes expectancies interaction term, controlling for covariates and the main effects of experimental condition and outcomes expectancies. *Coefficient b* was determined in the second step. Quit status at 3 months was regressed on self-efficacy at 3 months, controlling for covariates and the main effects of experimental condition and outcomes expectancies and their interaction. In the third phase, we standardized the coefficients because *coefficient a* was determined using multiple regression and *coefficient b* was determined using logistic regression. To standardize the coefficients, each coefficient was multiplied by the standard deviation of the predictor variable and divided the standard deviation of the outcome variable. The standard deviation were determined from the regression models used to calculate the coefficient initially. Equations derived from MacKinnon and Dwyer (1993) were used to solve the variance of the variables in the logistic regression used to determine coefficient *b*.

Results

Manipulation Check

We conducted two hierarchical regression analyses to determine whether outcome expectancies and sex moderated the evaluation of the counseling content, $F_{\text{tone}}(12, 1692) = 1.80, p = .043$; $F_{\text{emphasis}}(12, 1700) = 4.06, p < .001$. As indicated by Toll and colleagues (2010), participants in the gain-framed condition reported that the counseling had a more positive tone, $\beta = .14, p < .001$, and placed more emphasize on the benefits of quitting, $\beta = .16, p < .001$, than did participants in the standard care condition. It is interesting that a main effect for sex and a sex \times experimental condition interaction emerged for message tone, $p < .006$. Overall women rated the tone of the counseling more positively than did men regardless of counseling condition, $\beta = .12, p < .001$. Separate regression analyses for men and women revealed that men considered the tone of the gain-framed counseling to be more positive than the tone of the standard care counseling, $F_{\text{men}}(6, 738) = 2.39, p = .027, \beta = .13, p = .001$. Women rated the tone of the standard care and the gain-framed counseling as equally positive, $F_{\text{women}}(6, 975) = 1.00, p = .42, \beta = .03, p = .93$. No additional interactions emerged for either manipulation check item.

Moderated Framing Effects at the 3-Month Follow-Up

We conducted regression analyses to examine outcomes expectancies and sex as moderators of framing effects on self-efficacy and quit status at the 3-month follow-up. The results of these analyses are presented in Tables 2 and 3.

In the model predicting self-efficacy, $F(12, 1113) = 4.19, p < .001$, the main effect for sex emerged as a significant predictor, $\beta = -.12, p = .03$. Men had greater self-efficacy than women. The two-way experimental condition \times outcome expectancies interaction also was significant, $\beta = .18, p = .001$. Separate analyses for the gain-framed condition, $F(6, 470) = 4.55, p < .001$, and standard care condition, $F(6, 642) = 2.16, p = .045$, revealed that increased outcome expectancies were associated with greater self-efficacy in the gain-framed condition, $\beta = .17, p < .001$, but not the standard care condition, $\beta = .03, p = .42$. These effects were superseded by a significant the three-way experimental condition \times outcome expectancies \times sex interaction, $\beta = -.11, p = .047$. To decompose the three-way interaction, first we conducted separate regression analyses for men, $F(8, 469) = 3.91, p < .001$, and women, $F(8, 639) = 2.63, p = .008$. The experimental condition \times outcome expectancies interaction was significant for men only, $\beta = .17, p = .002$. To decompose the two-way interaction, next we tested the simple effects for men in the gain-framed condition and men in the standard care condition. These analyses revealed that gain-framed counseling was most effective in enhancing self-efficacy as men's outcome expectancies became more positive, $F(6, 189) = 4.31, p < .001, \beta = .25, p < .001$ (see Figure 2). Outcome expectancies were not a significant predictor in the standard care model. We repeated these final analyses for women as well. Outcome expectancies were not a significant predictor in either model.

In the model predicting smoking status at follow-up, $\chi^2_{\text{model}}(14, N = 1,848) = 42.38, p < .001$, Hosmer and Lemeshow $\chi^2(48, N = 1,848) = 10.66, p = .22$, the main effects for sex and outcome expectancies were significant. Men were more likely to quit than were women, odds ratio = .66, 95% CI [0.48, 0.93], $p = .016$. Higher outcome expectancies were associated with a decreased likelihood of quitting, odds ratio = .69, 95% CI [0.48, 0.93], $p = .016$. The three-way interaction between experimental condition \times outcome expectancies \times sex was significant, odds ratio = .22, 95% CI [0.06, 0.81], $p = .023$. In decomposing the three-way interaction by sex, we determined that the experimental condition \times outcome expectancies interaction was only significant for men, $\chi^2_{\text{model}}(10, n = 791) = 23.60, p = .009$, Hosmer and Lemeshow $\chi^2(8, n = 791) = 6.14, p = .63$, odds ratio = 4.00, 95% CI [1.30, 12.10], $p = .015$. The test of simple effects revealed that in the gain-framed counseling condition the likelihood of men quitting increased as their outcome expectancies became more positive, odds ratio = 2.53, $p = .08$, 95% CI [0.89, 7.15], $\chi^2_{\text{model}}(8, n = 309) = 11.75, p = .16$. In the standard counseling condition, the likelihood of men quitting increased as their outcome expectancies decreased, odds ratio = .67, $p = .032$, 95% CI [0.46, 0.97], $\chi^2_{\text{model}}(8, n = 482) = 22.89, p = .004$. Quit rates are depicted in Figure 3. The simple effects of the intervention were not significant among the women in the study.

Mediation

The analyses examining self-efficacy as a mediator only included male callers because the moderated framing effects were significant for men only. Coefficient *a* was determined from the model regressing men's self-efficacy at follow-up on the two-way outcome expectancies \times experimental condition interaction term. This model was previously described in the "Self-Efficacy Results" section.

Coefficient *b* was determined from an additional logistic regression analysis. In this model predicting smoking status, self-efficacy, odds ratio = 1.51, $p < .001$, 95% CI [1.34, 1.70], was a significant predictor after controlling for covariates and the main effects and the interaction of outcome expectancies and experimental condition, $\chi^2_{\text{model}}(11, n = 791) = 84.51, p < .001$, Hosmer and Lemeshow $\chi^2(8, n = 791) = 6.73, p = .57$.

The Sobel test was significant indicating that self-efficacy mediated the moderated framing effects on smoking cessation, Sobel value = 2.85, $p = .004$.

Discussion

We examined whether participants' outcome expectancies of quitting and sex moderated the effects of quitline-delivered gain-framed smoking cessation counseling and printed materials on their quit behavior and confidence to quit or to remain abstinent. Contrary to existing research (Toll et al., 2008) and our hypotheses, moderated framing effects emerged among men but not among women. In the gain-framed condition men who were more certain that quitting would impart health benefits were more likely to quit and had more confidence in their ability to quit or to remain abstinent than men who were less certain about the outcomes of smoking cessation. These findings support in part the emergent perspective (Bartels et al., 2010; Rothman et al., 2006; Rothman & Updegraff, 2011) that expectancies about the certainty of an outcome should be considered at the individual level rather than only as a property of the behavior itself. This support is limited to gain-framed messages for behavior traditionally classified as having a prevention function. Whether this emergent perspective is supported for behaviors with a detection function and for loss-framed messages requires additional research.

Findings from the present study suggest that this emergent perspective may hold for loss-framed messages. Men in the standard message condition who were less certain about the outcomes of quitting were more likely to quit than men who were more certain. The men also found the tone of the standard service less positive than the gain-framed service. We know from our previous evaluation of message content (Latimer et al., 2010) that the standard care messages include primarily neutral information with some gain-framed messages and some loss-framed messages. Together, these findings suggest that messages with a less positive tone and possibly even a loss-framed tone may be more persuasive for men with lower outcome expectancies.

In addition to affecting quit behavior, the gain-framed counseling led to greater self-efficacy to quit or to remain abstinent among men with positive outcome expectancies. This finding is notable because self-efficacy is an important predictor of initiation and maintenance of quit attempts (Baldwin et al., 2006). Thus, among callers who had not quit at follow-up, having higher self-efficacy increases the likelihood that they will quit in the future. Among callers who had quit, having higher self-efficacy may contribute to behavioral maintenance.

Self-efficacy also emerged as a mediator of the moderated framing effects. Congruency between male callers' outcome expectancies and the frame of the counseling they received led to increased self-efficacy, which, in turn, led to increased likelihood of quitting. Self-efficacy has been demonstrated as a mediator in previous framing studies (Meyerowitz & Chaiken, 1987; Sherman et al., 2006). It may be that the feeling of fit that results from receiving a congruent message leads to increased self-efficacy and in turn behavior change (Higgins, 2000).

Alternately, the content of the message may have affected self-efficacy and subsequently led to behavior change. By nature framed messages emphasize attitude-related information. Increases in attitudes have been demonstrated to lead to enhanced self-efficacy to quit smoking (Corcoran & Rutledge, 1989). Future research should examine changes in attitudes as a precursor to changes in self-efficacy. Also to consider, the counseling and accompanying materials provided information about how to quit and eligible participants were provided with nicotine patches to aid in quitting. Perhaps this type of self-efficacy enhancing

information is more persuasive or attended to more fully when embedded in a framed message congruent with the message recipient's outcome expectancies.

Contrary to hypothesis, moderated framing effects did not emerge for women. This finding may be attributable to the callers' perceptions of the counseling. Men tended to be sensitive to the framing whereas women considered the standard and the framed counseling to have a similar tone. Women's lack of sensitivity to the message tone may have led them to process the gain-framed information with similar depth regardless of their outcome expectancies. Being sensitive to the counseling content, men with positive outcome expectancies may have been cued to process the gain-framed message more thoroughly than men for whom the message was incongruent (Shen & Dillard, 2009).

The absence of moderated framing effects among women is contrary to our findings in a previous smoking cessation trial (Toll et al., 2007). Of note, outcome expectancies were operationalized differently in each study. In our initial study, outcome expectancies were operationalized in terms of the risks associated with quitting (e.g., weight gain, loss of enjoyment) that align with women's concerns related to smoking cessation (Reid, Pipe, Riley, & Sorensen, 2009). In the present study, outcome expectancies were operationalized in terms of the health benefits associated with quitting. There is some evidence that health effects are endorsed more strongly by men as a reason to quit than by women (Reid et al., 2009). Thus, the moderator in the present study may have been more relevant to men than women. A comprehensive measure that reflects men's and women's outcome expectancies of smoking cessation may produce a consistent moderation effect for both sexes.

Study limitations included (a) the use of brief measurement tools as a result of constraints of conducting research in a busy state quitline service, (b) our reliance on self-reported smoking status to accommodate the wide geographic area from which participants were drawn, (c) the concurrent assessment of the mediator and the outcome variable, and (d) the limited generalizability of study finding to the larger population of non-treatment-seeking smokers who potentially could respond very differently to message framing.

Our support for the emerging message framing paradigm emphasizing individuals' perceptions was limited by the lack of a loss-framed message condition and our focus on a behavior with a prevention function. To support this paradigm fully, it is necessary to demonstrate that loss-framed messages are more effective for people who perceive greater risk and that the effects can be replicated for other types of behaviors.

Despite these limitations, this field experiment using a novel mode of message delivery and a large participant sample demonstrates the importance of considering characteristics of the message recipient when delivering framed health messages. This study also addresses the gap in our understanding of the mechanisms underlying the effects of framed messages.

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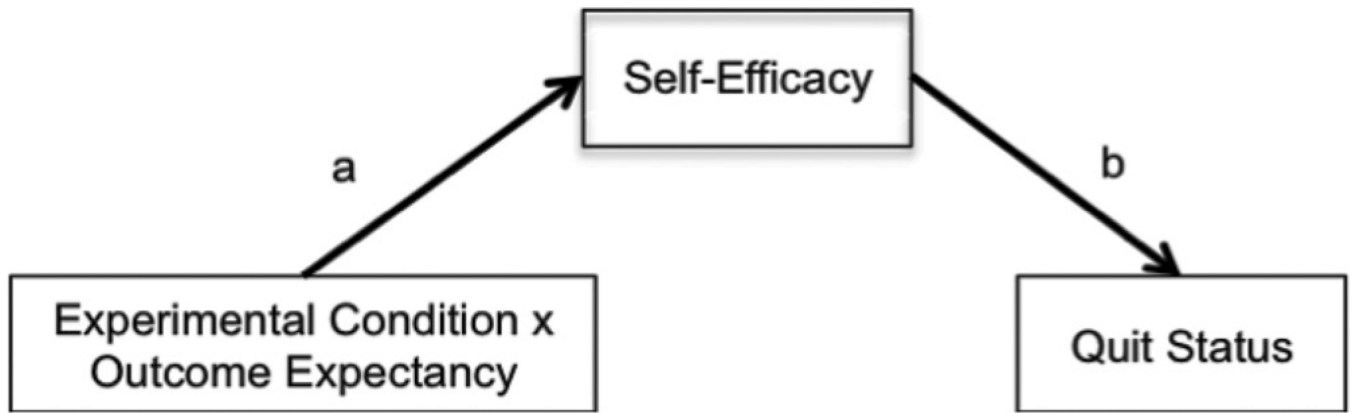


Figure 1.
A schematic diagram of the model testing self-efficacy as a mediator of the moderated framing effects of the intervention on smoking cessation.

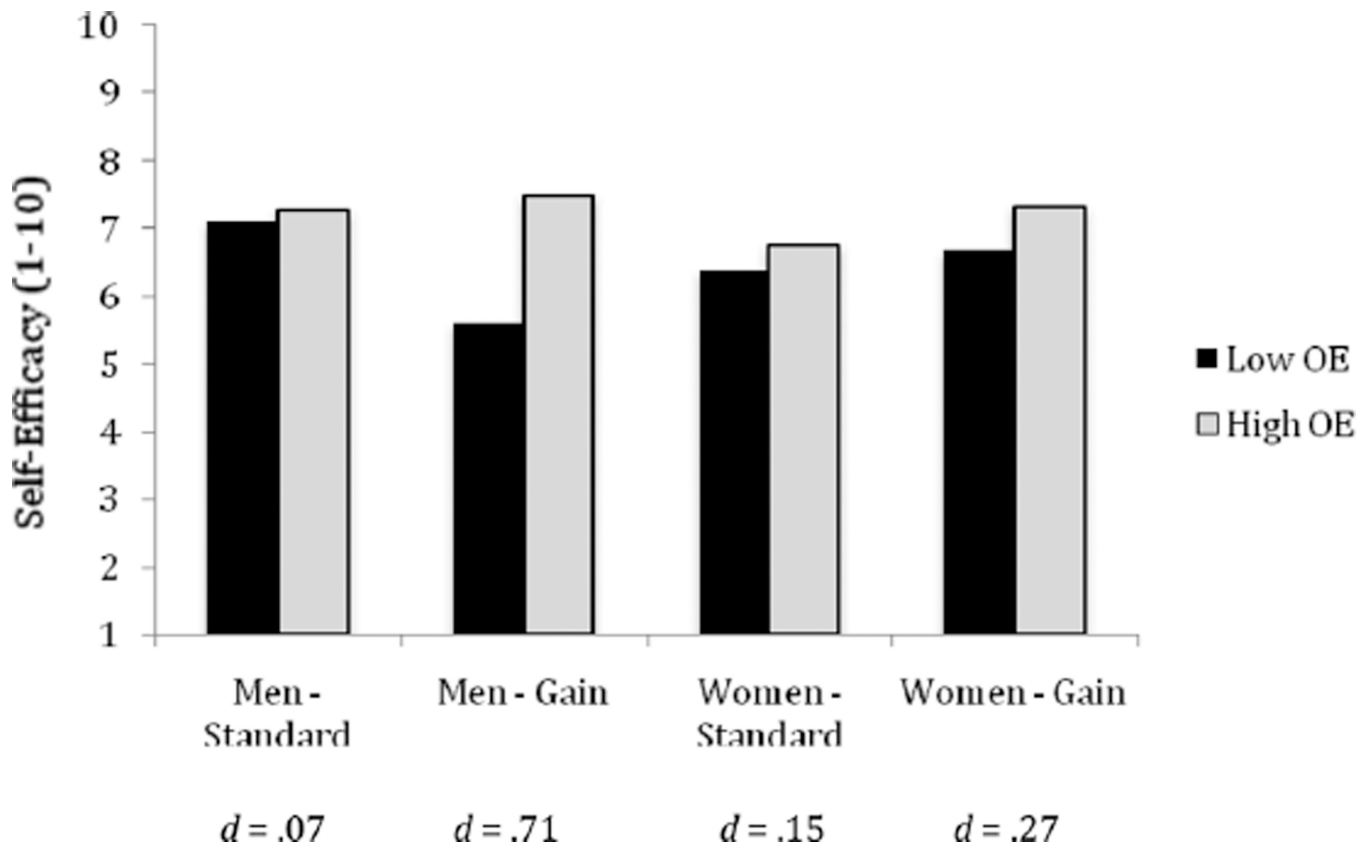


Figure 2. Moderated framing effects on self-efficacy to quit and remain abstinent at the 3-month follow-up. The outcome expectancies variable was dichotomized (high outcome expectancies = 7, low outcome expectancies >7) in this figure. Cohen's *d* effects sizes for within groups comparison are reported below each set of bars. Effect sizes of .20, .50, and .80 are considered small, medium, and large, respectively.

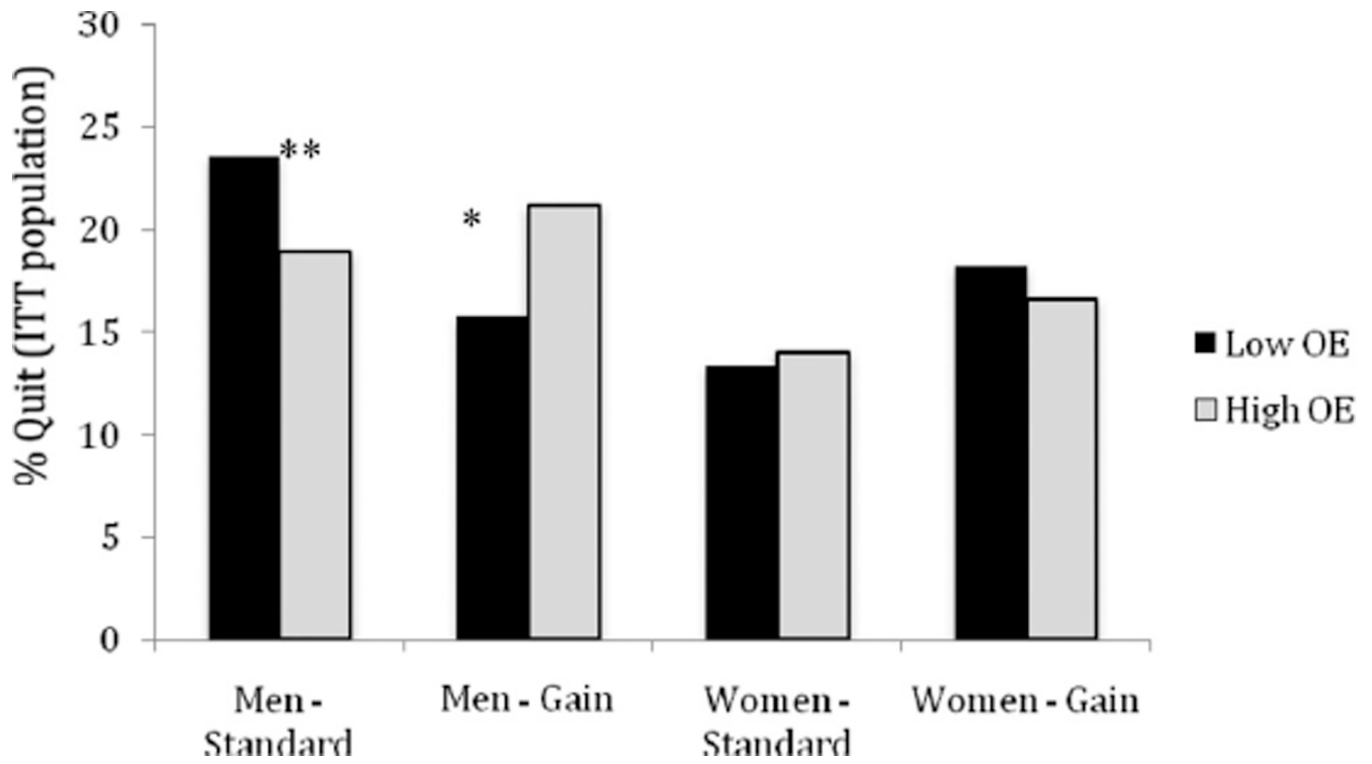


Figure 3. Quit status at the 3-month follow-up in the intent-to-treat population. The outcome expectancies variable was dichotomized (high outcome expectancies = 7, low outcome expectancies >7) in this figure. * $p < .10$ and ** $p < .05$ for within-group comparisons.

Table 1

Participant demographic and smoking history characteristics

	Men		Women	
	Gain framed (n=331)	Standard care (n=547)	Gain framed (n=479)	Standard care (n=674)
Outcome expectancies (<i>SD</i>)	6.86 (0.46)	6.84 (0.55)	6.87 (0.48)	6.86 (0.53)
Age, years (<i>SD</i>)	45.08 (12.93)	45.15 (13.89)	48.66 (13.53)	47.39 (13.91)
Education (<i>n</i>)				
High school or less	40.4% (131)	39.1% (210)	37.4% (176)	32.1% (210)
At least some postsecondary education	32.4% (105)	38.7% (208)	40.0% (188)	39.8% (13.1)
Trade school	25.6% (83)	21.4% (115)	21.7% (102)	26.9% (176)
Other	0.3% (5)	0.7% (4)	0.2% (4)	1.2% (8)
Race (<i>n</i>)				
White	77.9% (258)	78.2% (428)	80.0% (383)*	72.7% (490)
Black	11.5% (38)	8.0% (44)	11.3% (54)	14.4% (97)
Other	10.6% (35)	13.7% (75)	8.8% (42)	12.9% (87)
Number of cigarettes per day	21.09 (11.44)	21.82 (11.50)	19.45 (11.00)	18.80 (10.29)
Years smoked	24.94 (13.83)	24.91 (14.75)	27.92 (13.69)	26.05 (14.36)
Made past quit attempts (<i>n</i>)	88.2% (292)	86.7% (474)	91.9% (440)*	86.8% (585)
Time to first cigarette after waking (<i>n</i>)				
5 min	36.9% (120)	40.9% (217)	42.4% (201)	32.7% (261)
6–30 min	38.2% (124)	33.5% (178)	35.2% (167)	34.0% (223)
31–60 min	10.2% (33)	14.1% (75)	10.1% (48)	14.8% (97)
>60 min	14.8% (48)	11.5% (75)	12.2% (58)	11.3% (74)

** $p < .05$ for within group (sex \times experimental condition).

Table 2

Hierarchical linear regression models predicting self-efficacy and decomposing the three-way Experimental Condition \times Outcome Expectancies \times Sex interaction

	Overall	Men			Women		
		Full	Gain	Standard	Full	Gain	Standard
Step 1	$\Delta R^2=.015^{***}$	$\Delta R^2=.031^*$	$\Delta R^2=.06^*$	$\Delta R^2=.06^{**}$	$\Delta R^2=.04^*$	$\Delta R^2=.01$	
Race	-.02	-.04	-.02	-.08	.07	-.03	
Age	.09	-.003	.20	-.12	.15*	.10	
Number of cigarettes per day	-.08*	-.09*	.05	-.21**	-.07	-.03	
Number of years smoked	-.13*	-.12	-.32**	-.04	-.13*	-.12	
Has tried to quit	-.02	-.01	.10	-.09	-.03	-.02	
Step 2	$\Delta R^2=.015^{***}$	$\Delta R^2=.013^*$	$\Delta R^2=.06^{**}$	$\Delta R^2=.001$	$\Delta R^2=.016^{**}$	$\Delta R^2=.002$	
Outcome expectancies	.03	.03	.25**	.03	.04	.04	
Experimental condition	.002	.005	—	—	.11**	—	
Sex	-.12*	—	—	—	—	—	
Step 3	$\Delta R^2=.010^{**}$	$\Delta R^2=.02^{**}$	—	—	$\Delta R^2=.001$	—	
Outcome expectancies \times experimental condition	.18**	.17*	—	—	.03	—	
Experimental condition \times sex	.10	—	—	—	—	—	
Outcome expectancies \times sex	.008	—	—	—	—	—	
Step 4	$\Delta R^2=.003^*$	—	—	—	—	—	
Outcome expectancies \times experimental condition \times sex	-.11*	—	—	—	—	—	

* $p < .05$.

** $p < .01$.

Table 3

Binary logistic regression models predicting smoking status and decomposing the three-way Experimental Condition × Outcome Expectancies × Sex interaction

	Overall	Men			Women		
		All	Gain	Standard	All	Gain	Standard
Step 1	$\chi^2(7)=22.33^{***}$	$\chi^2(7)=13.70$	$\chi^2(7)=7.21$	$\chi^2(7)=18.25^*$	$\chi^2(7)=16.40^*$	$\chi^2(7)=8.70$	$\chi^2(7)=10.48$
Race							
White	1.19 (0.55-2.61)	2.13 (0.47-9.64)	0.87 (0.17-4.33)	0.87 (0.17-4.33)	0.90 (0.35-2.26)	0.38 (0.09-1.61)	1.47 (0.41-5.21)
Black	.76 (0.32-1.81)	1.39 (0.28-6.99)	0.33 (0.05-2.21)	0.33 (0.05-2.22)	0.58 (0.20-1.64)	0.29 (0.06-1.47)	0.80 (0.19-3.33)
Other	2.01 (0.71-5.67)	3.10 (0.53-18.32)	1.47 (0.20-10.60)	1.47 (0.21-10.60)	2.04 (0.51-8.06)	0.79 (0.09-7.06)	3.36 (0.55-20.61)
Unknown	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Age	1.02 (1.00-1.03)*	1.02 (1.00-1.04)	1.01 (0.97-1.05)	1.02 (1.00-1.05)	1.01 (0.99-1.03)	1.03 (0.99-1.06)	1.01 (0.98-1.03)
Number of cigarettes per day	0.99 (0.98-1.00)	0.99 (0.98-1.01)	1.02 (0.99-1.04)	0.98 (0.96-1.00)	0.99 (0.97-1.00)	0.99 (0.97-1.01)	0.98 (0.96-1.00)
Number of years smoked	0.99 (0.98-1.01)	0.98 (0.96-1.00)	0.99 (0.95-1.02)	0.98 (0.96-1.01)	1.00 (0.98-1.02)	0.99 (0.96-1.03)	1.01 (0.98-1.04)
Has tried to quit	0.52 (0.32-0.84)**	0.45 (0.23-0.89)*	0.63 (0.23-1.74)	0.31 (0.12-0.81)*	0.63 (0.32-1.22)	0.62 (0.21-1.85)	0.64 (0.28-1.47)
Step 2	$\chi^2(3)=9.89^*$	$\chi^2(2)=0.92$	$\chi^2(1)=4.54^*$	$\chi^2(1)=4.64^*$	$\chi^2(2)=1.87$	$\chi^2(1)=0.006$	$\chi^2(1)=0.12$
Outcome expectancies	0.69 (0.48-0.98)*	0.68 (0.48-0.97)*	2.52 (0.89-7.15)	0.67 (0.46-0.97)*	1.10 (0.67-1.81)	0.98 (0.59-1.63)	1.09 (0.66-1.80)
Experimental condition	1.07 (0.74-1.56)	1.08 (0.74-1.57)	—	—	1.27 (0.90-1.79)	—	—
Sex	0.66 (0.48-0.93)*	—	—	—	—	—	—
Step 3	$\chi^2(3)=3.81$	$\chi^2(1)=8.98^{**}$	—	—	$\chi^2(1)=0.10$	—	—

	Overall	Men			Women		
		All	Gain	Standard	All	Gain	Standard
Outcome expectancies × experimental condition	4.08 (1.33–12.56)*	3.97 (1.30–12.10)*	—	—	.89 (0.44–1.81)	—	—
Experimental condition × sex	1.18 (0.71–1.96)	—	—	—	—	—	—
Outcome expectancies × sex	1.61 (0.87–2.96)	—	—	—	—	—	—
Step 4	$\chi^2(1)=6.35^*$	—	—	—	—	—	—
Outcome expectancies × experimental condition × sex	.22 (.06–.81)*	—	—	—	—	—	—

* $p < .05$.

** $p < .01$.