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Factors Influencing the Effectiveness of Smoking Cessation Messages

by

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Canada

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Abstract

Factors Influencing the Effectiveness of Smoking Cessation Messages

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Abstract: Two studies were conducted to test the effects of need for cognition, self-efficacy, stage of change, and reasons for smoking on the relationships between message framing, intentions to quit and message strength. In the first (pilot) experiment, a sample of 44 non-smokers and 14 smokers completed need for cognition, self-efficacy and stage of change measures and were randomly assigned to either the gain- or loss-framed condition. Although some significant effects were found, none of the hypotheses were supported. In the second study, 39 smokers completed the same measures in addition to a smoking motives and an affect measure. Message framing and perceptions of the prototypical smoker were manipulated, and participants were randomly assigned to one of four conditions. Again, some significant effects were found, but none of the hypotheses were supported. Limitations, including lack of power, and future research directions are discussed.

August 21, 2009

Factors Influencing the Effectiveness of Smoking Cessation Messages

Although the prevalence of smoking has decreased over the past ten years, about

one-fifth (21.8%) of Canadians continue to smoke despite the known risks (Shields,

2007). Not only does smoking affect one's health, it also affects one's performance at

work. In a study comparing smoker and nonsmoker productivity loss, Bunn, Stave,

Downs, Alvir, and Dirani (2006) found that smokers had higher absence rates and were

less productive at work than both former smokers and nonsmokers. Smokers cost

organizations over $1000 more annually than former smokers and about $1800 more than

nonsmokers. It seems obvious that organizations should have an interest in helping

employees quit smoking; one way to do this is to invest in smoking cessation programs.

According to Health Canada (2008), employers should support smoking cessation

in the workplace because it results in: improved employee health; increased productivity;

decreased costs associated with premature death and early retirement; enhanced job

satisfaction; and a better corporate image. Workplaces are effective settings for

conducting smoking cessation programs because people spend a lot of their time at work

and they allow access to a large number of people. Employers can offer comprehensive

smoking cessation programs (those that are offered on-site), facilitated programs (those

offered off-site in conjunction with outside agencies), and education and information

(self-help manuals).

Smedslund, Fisher, Boles, and Lichtenstein (2004) conducted a meta-analysis in

order to determine the effectiveness of workplace smoking cessation programs. The

interventions examined in the meta-analysis included self-help manuals, physician

advice, heath education, cessation groups, incentives, and competitions. The results were

somewhat promising; smoking cessation programs were effective up to six months after being implemented, but after six months their effectiveness decreased. However, they were no longer effective after 12 months. It is important to note however, that the studies included in the meta-analysis varied greatly in terms of quit rates. For example, the quit rates in the intervention groups varied from 6.1% to 30.8% for 6 months and 7% to 50% for 12 months. Given these large ranges in quit rates, it is important to consider what constitutes an effective smoking cessation program versus an ineffective one. Both situational and individual factors can influence the effectiveness of smoking cessation programs.

<div align="center">Situational Factors</div>

The effectiveness and acceptance of smoking-related messages is influenced by the manner in which they are presented. Rothman and Salovey (1997) differentiate between risky behaviours; that is, those that are associated with an unpleasant outcome, and safe behaviours; that is, those that are not considered to be risky. They argue that messages targeting detection behaviours that involve risk, such as mammograms, are more effective when they are loss framed, meaning that the message emphasizes potential losses if one does not engage in the behaviour. On the other hand, messages about prevention behaviors, such as quitting smoking, are more effective when they are gain framed, meaning that the message emphasizes the benefits of engaging in that behaviour (Rothman & Salovey, 1997). In contrast to this argument, current messages about quitting smoking are generally loss-framed; that is, they focus on the harmful effects of continuing to smoke.

Strahan et al. (2002) make recommendations surrounding increasing the effectiveness of tobacco package warning labels. They stress the importance of not only promoting negative attitudes toward smoking, but also promoting positive attitudes toward not smoking. They also recommend using gain-framed messages instead of relying solely on loss-framed messages. Warning labels may also be more effective if they incorporate messages surrounding social norms regarding smoking cessation.

There is empirical evidence for Rothman and Salovey's (1997) proposal that gain-framed smoking cessation messages are more effective than loss-framed messages. For example, Schneider et al. (2001) examined the effects of message framing on beliefs, attitudes, and behaviours related to smoking. They found that gain-framed messages were rated more positively and led to greater acceptance of the message than loss-framed messages. Further, they found that smokers perceived peer situations and positive social situations to be less tempting after receiving gain-framed messages. Gain-framed messages also reduced temptations to smoke when experiencing negative affect and led to the greatest reduction in smoking behaviour over a one month interval. In another study examining the effectiveness of gain- and loss-framed smoking cessation messages, McKee et al. (2004) found that when dental offices contained both gain- and loss-framed brochures, patients were more likely to take gain-framed brochures (59%) versus loss-framed brochures (41%).

<center>Individual Factors</center>

Need for Cognition

Although gain-framed smoking cessation messages appear to be more effective than loss-framed messages, individual differences also play a role in how these messages

are perceived. Steward, Schneider, Pizarro, and Salovey (2003) examined how need for cognition affects message framing responses. Individuals low in need for cognition tend to evaluate a message superficially, whereas individuals high in need for cognition tend to systematically evaluate a message's content and arguments. They found that individuals low in need for cognition had higher intentions to quit than individuals high in need for cognition, and this effect was more pronounced if they read a gain-framed message. They also found that individuals low in need for cognition acknowledged the negative effects of second-hand smoke, expressed more interest in quitting, and had higher self-efficacy after reading gain-framed messages than loss-framed messages. In contrast, individuals high in need for cognition experienced these effects after reading loss-framed messages.

Emotions

Emotions also affect how messages are perceived. Lench and Levine (2005) assigned participants to one of fearful, angry, happy, or neutral emotion-elicitation conditions. They found that participants in the fearful condition were less optimistic about the likelihood of avoiding negative outcomes, felt they had less control over both positive and negative outcomes, and recalled fewer outcomes and made more errors than participants in the other conditions. These results demonstrate the need for caution when using health promotion messages that elicit fear in order to decrease unrealistic optimism (i.e., the tendency for people to think they have a lower risk for negative outcomes than their peers). Although these messages may decrease unrealistic optimism, they may simultaneously increase the likelihood of other negative outcomes which might interfere with the adoption of health promoting behavior. Lench and Levine emphasize the need

for future research to examine how self-efficacy affects the relationship between emotions and message acceptance. Similarly, Wolburg (2004) suggests that messages meant to invoke fear (i.e., loss-framed messages) work best when they are coupled with self-efficacy boosting messages.

Self-efficacy

Recently, Van't Riet, Ruiter, Werrij, and De Vries (2008) examined the effects of self-efficacy and message framing on motivation to quit smoking. They found that participants low in self-efficacy showed no differences in motivation to quit smoking after receiving either a gain-framed, loss-framed, or no message. On the other hand, participants high in self-efficacy showed significantly higher motivation to quit smoking after receiving a loss-framed message than after receiving either a gain-framed message or no message. These results suggest that gain-framed messages are not always more effective than loss-framed messages; individual differences that moderate the relationship need to be considered.

Reasons for Smoking

Smokers' reasons for smoking may also affect how they perceive smoking messages and how likely they are to successfully quit. There are several measures to assess reasons for smoking, but the most common smoking motives include: automatic (e.g., smoking without remembering lighting up); sedative (e.g., smoking to calm down); addictive (e.g., feeling a strong desire to smoke after abstaining for a period of time); stimulation (e.g., smoking to stay alert); psychosocial (e.g., smoking to increase confidence); indulgent (e.g., smoking for the pure enjoyment of it); and sensorimotor manipulation (e.g., enjoying the steps to light up; Tate, Pomerleau, & Pomerleau, 1994).

Tate et al. (1994) conducted a principal components analysis on the smoking motives questionnaire (SMQ; Pomerleau et al., 1992) to replicate these seven components. They found support for the seven components; however, after conducting a second-order principal components analysis they found support for two second-order components. They found that the addictive, sedative, automatic, and stimulation items loaded on one component that they named "pharmacological motives", whereas the psychosocial, indulgent, and sensorimotor manipulation items loaded on another component that they named "non-pharmacological motives". The correlation between these two components was low ($r = .15$). Moreover, they found a significant positive correlation between pharmacological motives and age, and a negative (non-significant) correlation between non-pharmacological motives and age, meaning that older smokers reported more pharmacological motives for smoking than younger smokers. Not only do these results allow for a different conceptualization of smoking motives, they also suggest that over time a smoker's reasons for smoking change from non-pharmacological to pharmacological because pharmacological motives were positively correlated with length of time smoking and age. Such results imply that smoking cessation programs should take into account a smoker's reasons for smoking because different reasons may pose different obstacles to successful cessation.

Ikard, Green, and Horn (1969) developed the Reasons for Smoking (RFS) scale and found six factors similar to those in the smoking motives questionnaire: habitual, addictive, negative affect reduction, pleasurable relaxation, stimulation, and sensorimotor manipulation. Because of high correlations found between some of these factors, it is possible that there are higher-order factors for smoking motives.

Battista et al. (2008) conducted a principal components analysis to examine the structure of the Reasons for Smoking items. They found support for a two-component solution that accounted for 41.8% of the variance in the item scores. They labeled the first component as "negative reinforcement motives", which included items from the original negative affect reduction, addiction, habitual, and sensorimotor manipulation scales. They labeled the second component as "positive reinforcement motives", which included items from the original pleasurable relaxation and stimulation scales.

Conceptualizing reasons for smoking in terms of positive and negative reinforcement motives may have important implications for the way smokers respond to gain- and loss-framed messages. Smokers who smoke mainly to enhance positive states (i.e., they smoke for positive reinforcement motives) may respond better to messages that emphasize the benefits of quitting (i.e., gain-framed messages). Smokers who smoke mainly to reduce negative states (i.e., they smoke for negative reinforcement motives) may respond better to messages that emphasize the risks of continuing to smoke (i.e., loss-framed messages). To date, there has been little or no research on the relationship between message framing and smoking motives.

Stages of Change

In addition to considering message framing and individual differences that influence how different smoking-related messages are perceived, it is useful to consider Prochaska and DiClemente's (1983) concept of stages of change to better understand what constitutes an effective smoking cessation program. These researchers argue that there are five stages of change people go through when attempting to modify behaviours such as smoking. The first stage is precontemplation, which consists of the lack of desire

to take action within the next six months (one might argue this is not really a stage of change at all). The second stage is contemplation, which consists of the intention to take action within the next six months. The third stage is preparation and it consists of the intention to take action within the next 30 days. The fourth stage, action, consists of beginning to make overt changes less than six months previous. Finally, the last stage, maintenance, consists of beginning to make overt changes more than six months in the past (Prochaska, Prochaska, & Levesque, 2001).

The stages of change are based on the transtheoretical model that involves ten processes of change that are applied differentially across the stages of change. These processes of change include: 1) consciousness raising (e.g., looking for information related to smoking); 2) self-liberation (e.g., positive self-talk); 3) social liberation (e.g., noticing that public spaces have non-smoking sections); 4) self-reevaluation (e.g., admission that dependence on cigarettes is disappointing); 5) environmental reevaluation (e.g., considering how smoking affects the environment); 6) counterconditioning (e.g., doing something else to relax instead of smoking); 7) stimulus control (e.g., removing things from the environment that can remind a smoker of smoking); 8) reinforcement management (e.g., being rewarded by others for not smoking); 9) dramatic relief (e.g., being emotionally moved by smoking warnings); and 10) helping relationships (e.g., having someone who listens to smoking concerns). Smokers in the different stages use these processes differentially (Prochaska & DiClemente, 1983).

There is evidence that shows that interventions targeting smokers in specific stages of change are more effective than general interventions. For example, Prochaska, DiClemente, Velicer, and Rossi (1993) looked at smokers in the first three stages of

change and compared the effectiveness of four treatment programs. Standardized treatment involved the use of self-help manuals developed by the American Lung Association, and individualized treatments targeted the specific stages of change. Interactive treatment involved computer-generated progress reports based on participant responses to questionnaires, and included feedback about the participants' stage of change, information about the pros and cons of quitting, information about the processes of change that were being used or misused, and techniques for coping with specific tempting situations. Finally, personalized treatment involved proactive counselor calls. Consistent with the stage of change theory, individualized treatment was more effective than standardized treatment at the 18-month follow-up; however, interactive treatment was the best treatment for smokers across all stages of change.

Armitage and Areden (2008) tested whether stages of change moderate the effectiveness of a brief intervention to reduce smoking. They assigned smokers to one of three conditions: passive control (questionnaire only), active control (questionnaire plus instructions to plan to quit), or the experimental condition (same as active control with additional instructions to pay attention to situations where they can implement their plans to quit). They found that a smoker's motivation to quit increased across the stages of change, providing support for the construct validity of their stage of change measure. They also found that smokers in the experimental group had significantly greater intentions to quit than smokers in the passive control group, and smokers in the experimental group reported more quitting than smokers in both control groups. Finally, they found that although the experimental intervention was effective for smokers in all stages of change, it was most effective for those in the preparation stage. These studies

support the use of the stage of change model for creating individualized smoking cessation programs.

Prototypical Smoker Perceptions

Smokers' perceptions of the prototypical smoker also affect the likelihood that they will successfully quit. People can either compare themselves to others who are better off than them (upward comparison) or to others who are worse off than them (downward comparison). Gibbons and Eggleston (1996) tested the hypothesis that smokers distance themselves from the "typical smoker" when they try to quit and that a negative perception of the smoker prototype is evidence of this distancing. In a previous study (Gibbons, Gerrard, Lando, & McGovern, 1991), the researchers asked smokers about their image of the typical smoker. Most smokers had an idea of what the typical smoker was like and they were able to describe that image in some detail. Rather than considering specific individuals, the smokers appeared to have an image of a smoker prototype based on what most smokers are like. Gibbons and Eggleston assessed smoker prototype perceptions by asking participants to rate the typical smoker on a number of characteristics derived from the previous study. They used these perceptions to predict smoking status at a 6-month follow-up. In line with their expectations, smokers with more favourable perceptions of the typical smoker were more likely to relapse at the follow-up.

Buunk and Gibbons (2007) reviewed different types of social comparison theories and concluded that people may compare themselves to others who are better off to learn from them; however, such comparisons may also induce threats. On the other hand, people who compare themselves to others who are worse off may end up feeling better about themselves. This type of comparison facilitates distancing from those who are

worse off. They theorize that if smokers see themselves as different from the typical

smoker, they are more likely to successfully quit.

In a similar study, Gerrard, Gibbons, Lane, and Stock (2005) asked smokers in a

smoking cessation group to describe their perceptions of and perceived similarity to the

typical smoker. As with Gibbons et al. (1991), they found that smokers who had a

positive perception of the typical smoker at the beginning of the study were more likely

to relapse 6 and 12 months later. They also found that smokers who preferred to be with

others who were successfully quitting had lower perceived similarity to the typical

smoker, and this was associated with successful cessation. Gerrard et al. (2005)

emphasize that "future research should explore the efficacy of encouraging smokers to

consider aspects of the prototypical smoker that are negative and, most important,

different from the self, in order to facilitate distancing from this image" (p. 627). All of

these various studies demonstrate the myriad of factors that influence a smoker's decision

to quit. It is now useful to consider some possible explanations or processes for changing

human behaviour.

<center>Theories of Human Behaviour</center>

Higgins (1997) describes regulatory focus as an explanation for motivation. He

distinguishes between prevention-focused and promotion-focused self-regulation.

Prevention-focused self-regulation is concerned with duties and obligations and with

increasing correct rejections and decreasing false alarms. Promotion-focused self-

regulation, on the other hand, is concerned with hopes and goals and with increasing hits

and decreasing misses. He argues that when individuals attempt difficult tasks,

promotion-focused individuals are more likely to persevere than prevention-focused

individuals because they are more concerned about increasing hits rather than decreasing false alarms. Because quitting smoking can be considered a difficult task, it would make sense to instill a promotion-focus in individuals attempting this task in order to increase the likelihood that they will succeed. Gain-framed messages may instill a promotion-focus by emphasizing the benefits of quitting, while loss-framed messages may instill a prevention-focus by emphasizing the risks of not quitting.

Another explanation for human behaviour is offered by the theory of reasoned action (Ajzen & Fishbein, 1980). This theory states that a person's attitude (i.e., favourable or unfavourable evaluation or appraisal of the behaviour in question) toward a specific behaviour as well as the subjective norm (i.e., the perceived social pressure to perform or avoid that behaviour) surrounding that behaviour influence a person's intention to perform that behaviour. Thus, in order to change a specified behaviour, it is first necessary to change the attitudes and subjective norms that influence the intention to perform that behaviour. In a study on smokers' intentions to quit smoking, Bledsoe (2006) found that the theory of reasoned action accounted for a large portion of the variance in intention to quit smoking and stage of change.

The theory of planned behaviour expands on the theory of reasoned action to include perceived behavioural control (i.e., a person's perception of the degree of ease of performing a behaviour of interest) in influencing a person's intention to perform a specific behaviour (Ajzen, 1991). Therefore, increasing a person's perceived behavioural control over a particular behaviour should increase the chance of performing that behaviour. These theories demonstrate the importance that attitudes, norms, and perceived control can have in influencing the likelihood that a person will quit smoking.

Overview of Research

Evidently, numerous factors influence a person's decision to quit smoking. Initially, Rothman and Salovey (1997) argued that gain-framed messages are more effective in stimulating smokers to quit than loss-framed messages; however, recent research suggests that individual factors need to be considered in order to establish the most persuasive smoking cessation messages. Although some individual differences have begun to be studied in relation to message framing (e.g., self-efficacy, need for cognition), other factors such as stage of change and reasons for smoking could also affect how smokers react to differently framed smoking cessation messages. When the moderators of the relationship between message framing and smoking cessation are better understood, it will be possible to implement individualized smoking cessation messages that have a greater likelihood of helping the smoker quit.

This research will combine previous research on need for cognition, self-efficacy, and stage of change to explore how these variables interact in relation to smokers' perceptions of smoking cessation messages. I will also examine the relationship between message framing and smoking motives. Specifically, this research will examine the effects of need for cognition, self-efficacy, stage of change, and reasons for smoking on people's perceptions of persuasive gain- and loss-framed messages in terms of message strength and intentions to quit.

Overview of Experiments

Experiment 1

The purpose of the first (pilot) experiment was to determine whether smokers report differential message strength and intentions to quit in response to gain- versus loss-

framed messages based on individual difference variables, and to ensure that these

messages could be used in the subsequent study. Furthermore, smokers and non-smokers

should react differently to smoking cessation messages because these messages are more

relevant for smokers because they actually engage in smoking behaviour. To test that

smokers and non-smokers did in fact react differently to the messages, I recruited non-

smokers as well as current smokers and former smokers. In order to verify that

participants react differently to loss- and gain-framed messages, I assessed participants'

need for cognition, self-efficacy, and stage of change to examine how these individual

differences affected how they perceived the messages. To determine the strength of the

messages, I used a thought-listing task (Cacioppo & Petty, 1981). A message can be

considered strong if it elicits more positive thoughts (i.e., supportive arguments) than

negative thoughts (i.e., counterarguments; Cacioppo & Petty, 1981). I also measured

smokers' intentions to quit. I hypothesized that:

    1. Participants low in need for cognition would list more positive than negative

    thoughts and higher intentions to quit after reading the gain-framed message than

    participants high in need for cognition, who would list more positive thoughts and

    higher intentions to quit after reading the loss-framed message.

    2. Participants high in self-efficacy would list more positive thoughts and show

    higher intentions to quit after reading the loss-framed message than the gain-

    framed message.

    3. Participants in higher stages of change would have higher self-efficacy and

    would list more positive thoughts and show higher intentions to quit after reading

    the loss-framed message than the gain-framed message.

Experiment 2

The purpose of the second experiment was to expand on previous research to determine additional factors that influence the effectiveness of differently framed smoking messages. Message framing and social distance to the typical smoker were manipulated, resulting in four conditions to which smokers were randomly assigned: gain-framed message and neutral typical smoker message; gain-framed message and negative typical smoker message; loss-framed message and neutral typical smoker message; or loss-framed message and negative typical smoker message. The same dependent variables (thought listing and intentions to quit) were used as in Experiment 1. I also measured affect to determine whether exposure to gain-framed messages increased positive affect. In addition to measuring need for cognition, self-efficacy, and stage of change, I also measured reasons for smoking. I hypothesized that:

1. Participants in the negative prototypical smoker conditions would show higher intentions to quit than participants in the neutral smoker conditions.

2. Participants who received the gain-framed message would report higher intentions to quit and more favourable thoughts than those who received a loss-framed message.

3. An interaction between need for cognition and message framing would be obtained, such that participants high in need for cognition would experience more positive affect and thus list more positive thoughts after reading the gain-framed message than participants low in need for cognition.

4. An interaction between framing and reasons for smoking would be obtained such that participants who list more negative reinforcement reasons for smoking

(i.e., they smoke to alleviate negative effects) would show greater intentions to quit and more favourable thoughts in the loss-framed condition than in the gain-framed condition, and participants who list more positive reinforcement reasons for smoking would show greater intentions to quit and more favourable thoughts in the gain-framed condition than in the loss-framed condition.

5. An interaction between framing and self-efficacy would be obtained, such that smokers high in self-efficacy would report higher intentions to quit and more favourable thoughts after reading the loss-framed message than the gain-framed message, whereas smokers low in self-efficacy would respond equally regardless of message framing.

6. An interaction between framing and stage of change would be obtained, such that smokers in higher stages of change will report higher intentions to quit and more favourable thoughts after reading the loss-framed message than smokers in lower stages of change.

Experiment 1

Method

Participants and Design

Experiment 1 was a 2 (framing: gain vs. loss) by 3 (smoking status: current smoker vs. former smoker vs. non-smoker) design and it was conducted as part of a larger study on cognitive dissonance and smoking. Participants were recruited through the online bonus point system set up by the Saint Mary's University psychology department. I recruited 44 non-smokers, 14 smokers, and 3 former smokers.

Procedure

At the beginning of the experiment, need for cognition, self-efficacy, and stage of change were assessed in order to examine how these individual differences affect perceptions of smoking cessation messages.

After completing the individual difference measures, participants were asked to evaluate numerous images related to smoking in order to investigate cognitive dissonance-related questions pertaining to the larger study. After participants evaluated the various images, they were randomly presented with one of two messages related to smoking cessation (see Appendices A and B). Based on previous research (e.g., McKee et al., 2004; Rothman & Salovey, 1997), gain-framed messages emphasize the benefits of engaging in a health-promoting behaviour (e.g., quitting smoking), whereas loss-framed messages emphasize the risks of failing to engage in a health-promoting behaviour. The first message (gain-framed) stated: "If you quit smoking, you will notice both immediate and long-term benefits." The second message (loss-framed) stated: "If you continue to smoke, you will be at risk for both immediate and long-term effects." After participants read one of the two messages, they were presented with several facts about smoking and some websites where they could get more information. The facts in both messages were the same; they were simply worded differently.

Once participants finished reading the facts, they completed the dependent variable measures, consisting of a thought-listing task and an intention to continue smoking measure that was only completed by smokers. At the end of the study, participants were debriefed and thanked for their participation.

Measures

Need for cognition. Need for cognition (Cacioppo, Petty, & Kao, 1984) was assessed using an 18-item measure with an alpha value of .86 in this study. Participants indicated the extent to which they agreed with each statement on a scale from 1 to 7, with higher values indicating higher agreement, and higher need for cognition. An example item from this measure is "I would prefer complex to simple problems" (Cacioppo et al., 1984, p. 307). Agreement with this item would be indicative of high need for cognition. Half of the items were reverse-scored so that a high score on the scale indicated high need for cognition. An example of an item that was reverse-scored is "Thinking is not my idea of fun" (Cacioppo et al., 1984, p. 307).

Self-efficacy. Self-efficacy was assessed using a 16-item measure with four factors designed to assess confidence in avoiding smoking in the following circumstances: mood changes, relaxed situations, stressful situations, and concerns about self-image. The four factors in this measure have adequate internal consistency, ranging from .66 to .89 (Badr & Moody, 2005). In this study the alpha values were: .92 for mood changes, .90 for relaxation, .87 for stress, and .83 for self-image. Participants were asked to indicate their degree of confidence in avoiding smoking in each of the situations on a scale from 1 (not at all) to 4 (most of the time). Some example items include being able to resist smoking in uncomfortable situations, or when drinking coffee or tea. All participants completed this measure.

Stage of change. Stage of change (Prochaska, 1991) was measured using a simple algorithm that placed participants in one of five stages based on their current smoking behaviour. All participants were asked if they were current smokers. If they weren't, they simply completed the next measure. If they quit within the last six months, they were

considered to be in the action stage, and if they quit more than six months ago they were

in the maintenance stage. If they still smoked, they were asked if they were seriously

thinking of quitting. If they were thinking of quitting within the next 30 days *and* they

had at least one 24-hour quit attempt within the past year, they were in the preparation

stage. If they were thinking of quitting within the next 30 days but had no quit attempts in

the past year, *or* if they were thinking of quitting within the next six months they were in

the contemplation stage. If they were not thinking of quitting they were in the

precontemplation stage.

Thought-listing task. To assess message strength, participants were asked to list

the thoughts they had while reading the message, and they were asked to rate the thoughts

as positive or negative. According to Cacioppo and Petty (1981), a message can be

considered persuasive—and thus strong—if individuals react to it with favourable

thoughts. Therefore, if one lists more positive thoughts (i.e., supportive arguments) in

response to a message, it can be considered stronger than if one lists more negative

thoughts (i.e., counterarguments). If individuals react with counterarguments, they are

likely to be resistant to the message.

Intentions to continue smoking. Smokers also completed a 3-item measure

assessing intentions to continue smoking (Sterling et al., 2007). The alpha value for this

measure was .58, and deletion of items did not improve this value.

Reasons for not smoking. In addition to the measures described above, non-

smokers were asked to list their reasons for abstaining from smoking, and formers

smokers were asked what made them quit. I analyzed these responses and took note of

common themes to come up with categories into which the responses could be

categorized. Two colleagues then independently coded the responses into one of the categories.

Results

Prior to testing the hypotheses, the data were screened for outliers, data entry errors, and violations of assumptions including heterogeneity of variance and non-normality. All analyses were run using SPSS 15.0 for Windows. According to the Shapiro-Wilk test of normality, thought-listing scores were not normally distributed ($p = .01$); however, the analysis of variance is considered robust to violations of assumptions, especially violations of normality (Howell, 2007). Thus, this was not considered a problematic issue in this data set. To test the hypotheses, regressions analyses and analyses of variance were conducted. The first and second hypotheses included continuous independent variables; therefore, regression analyses were conducted. To reduce multicollinearity, need for cognition and self-efficacy scores were centered prior to analyses (Aiken & West, 1991). The third hypothesis included only categorical independent variables; therefore, analysis of variance (ANOVA) was used. First, the results of the three hypotheses are presented. Next, responses to open-ended questions are presented. Descriptive statistics and intercorrelations for all study variables are presented in Table 1.

To test the first part of the first hypothesis (i.e., that participants low in need for cognition would have higher thought-listing scores after reading the gain-framed message than participants high in need for cognition, who would have higher thought-listing scores after reading the loss-framed message), a regression analysis was conducted with the main effects of framing, smoking status, and need for cognition, the 3 two-way

Table 1

Descriptive statistics and zero-order correlations among experiment 1 variables

Variable	Mean	SD	1	2	3	4	5
1. Stage of Change	2.82	1.40		.34	.13	.30	.03
2. Self-efficacy	3.07	1.01		(.97)	-.05	-.21	.10
3. Need for Cognition	3.18	.62			(.86)	.17	.15
4. Intentions to Quit	2.45	.77				(.58)	.15
5. Thought-listing	2.72	3.21					

Note. Alpha values are on the diagonal in parentheses.

interactions, and the three-way interaction entered as predictors and thought listing scores as the criterion variable. Thought-listing scores were calculated by summing up the number of positive thoughts each participant listed.

There was no main effect of framing, $F (1, 50) = .16, p = .69$, no main effect of smoking status, $F (2, 50) = .72, p = .49$, and no main effect of need for cognition, $F (1, 50) = .40, p = .53$ for thought-listing scores. There was also no significant interaction between smoking status and framing, $F (1, 50) = .56, p = .46$, no significant interaction between smoking status and need for cognition, $F (2, 50) = .57, p = .57$, and no significant interaction between framing and need for cognition, $F (1, 50) = 1.42, p = .24$ for thought-listing scores. The three-way interaction was significant, $F (1, 50) = 8.06, p = .01$. This interaction is illustrated in Figure 1. To interpret this interaction, I split the file on message framing and re-ran the analysis without framing. There was a significant interaction between smoking status and need for cognition when the message was gain-

framed, F (2, 25) = 3.35, p = .05, but not when it was loss-framed, F (1, 25) = 1.93, p = .18. To interpret the significant two-way interaction, I selected only cases in the gain-framed condition, and split the file on smoking status. Need for cognition was a significant predictor of thought-listing scores for smokers, F (1, 4) = 9.87, p = .04, but not for non-smokers, F (1, 21) = .66, p = .43. Because of the limited number of former smokers, the analysis was not conducted for this group.

To test the second part of the first hypothesis (i.e., that participants low in need for cognition would report higher intentions to quit after reading the gain-framed message than participants high in need for cognition, who would report higher intentions to quit after reading the loss-framed message), a regression analysis was conducted with the main effects of need for cognition and framing and the two-way interaction entered as predictors, and intentions to quit as the criterion variable. There was no main effect of framing, F (1, 10) = .83, p = .38, no main effect of need for cognition, F (1, 10) = .01, p = .91, and no significant interaction between framing and need for cognition, F (1, 10) = .55, p = .48.

To test the first part of the second hypothesis, that participants high in self-efficacy would list more positive thoughts after reading the loss-framed message than the gain-framed message, a regression analysis was conducted with the main effects of framing, self-efficacy, and smoking status, the 3 two-way interactions, and the three-way interaction entered as predictors and positive thoughts as the criterion variable. There was no main effect of framing F (1, 39) = .01, p = .93, no main effect of self-efficacy, F (1, 39) = .10, p = .75, and no main effect of smoking status, F (2, 39) = .08, p = .93 for thought-listing scores. There was no significant interaction between smoking status and

Figure 1. The three-way interaction between smoking status, need for cognition, and message framing for thought-listing scores.

Need for Cognition
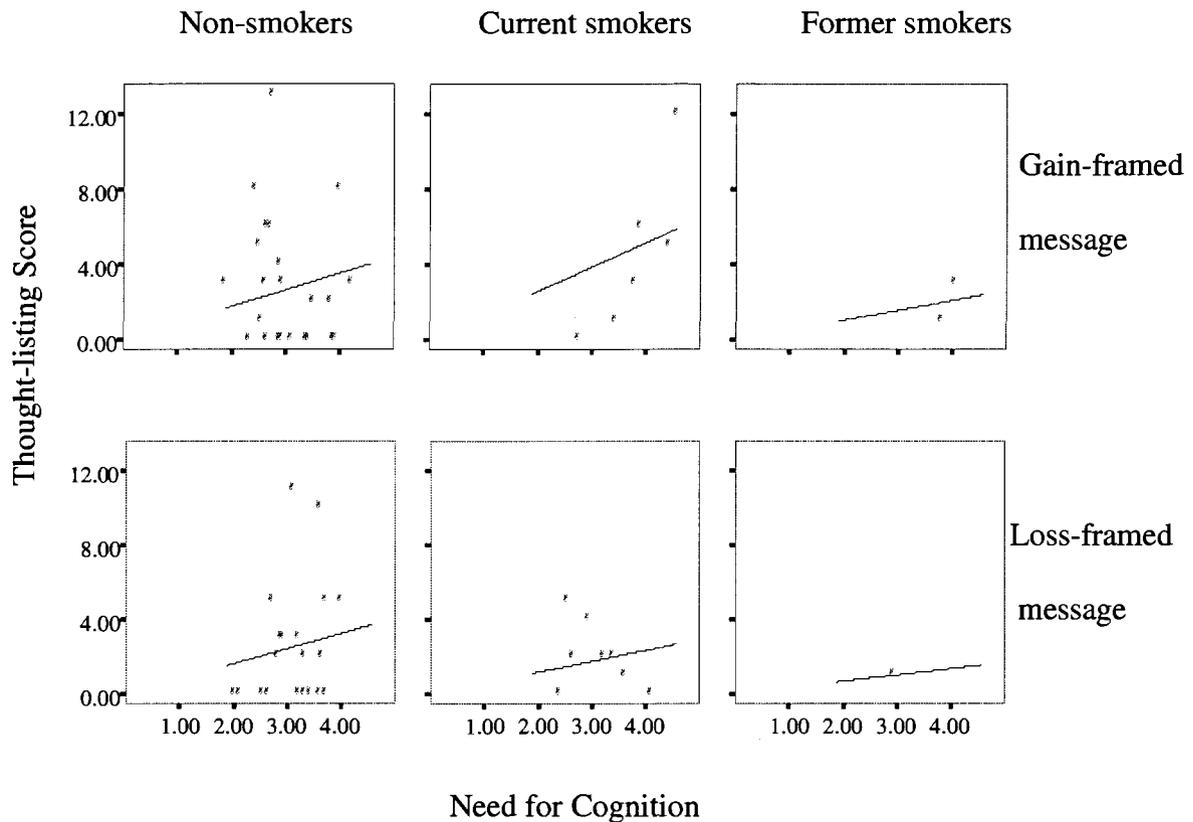
self-efficacy, $F (2, 39) = .09, p = .92$, no significant interaction between smoking status and framing, $F (1, 39) = .02, p = .90$, and no significant interaction between self-efficacy and framing, $F (1, 39) = .00, p = .96$. The three-way interaction was also not significant, $F (1, 39) = .47, p = .50$.

To test the second part of the second hypothesis, that participants high in self-efficacy would report higher intentions to quit after reading the loss-framed message than the gain-framed message, a regression analysis was conducted with the main effects of framing and self-efficacy and the two-way interaction entered as predictors, and intentions to quit as the criterion variable. There was no main effect of framing $F (1, 10)$

= .21, p = .66, and no main effect of self-efficacy, F (1, 10) = .37, p = .56, and no significant interaction, F (1, 10) = .47, p = .51.

To test the third hypothesis that participants in higher stages of change would a) list more positive thoughts and b) show higher intentions to quit after reading the loss-framed message than the gain-framed message, two 2 (framing: gain vs. loss) by 4 (stage of change: precontemplation vs. contemplation vs. preparation vs. action or maintenance) factorial analyses of variance were conducted. Analyses were run only for smokers and former smokers as these are the only group where stage of change is relevant. The action and maintenance stages were combined to include the three former smokers. There were four participants in the precontemplation stage, six participants in the contemplation stage, four participants in the preparation stage, and three participants in the action or maintenance stages. There was no main effect of framing, F (1, 9) = .73, p = .41, no main effect of stage of change, F (3, 9) = 1.20, p = .37, and no significant interaction, F (3, 9) = .68, p = .58 for thought-listing scores. Similarly, there was no main effect of framing, F (1, 8) = .12, = .74, no main effect of stage of change, F (2, 8) = .44, p = .66, and no significant interaction, F (2, 8) = .39, p = .69 for intentions to quit. The mean differences between groups are reported in Table 2 and effect sizes are reported in Table 3.

In addition to answering questions related to the hypotheses, non-smokers also listed reasons why they did not start smoking, and former smokers listed reasons why they quit smoking. Four former smokers listed a total of 24 reasons, and 49 non-smokers listed a total of 377 reasons. However, two non-smokers gave responses unrelated to the question (e.g., "because" and "I do not have enough skill in the modern time" as reasons

Table 2

Mean Differences in Thought-listing Scores and Intentions to Quit Based on Stages of Change and Message Framing

Thought-listing Scores			Intentions to Quit		
Stage of change (I)	Stage of change (J)	Mean Difference (I-J)	Stage of change (I)	Stage of change (J)	Mean Difference (I-J)
Pre-contemplation	Contemplation	-2.08	Pre-contemplation	Contemplation	-.47
	Preparation	-5.00		Preparation	-.58
	Action and Maintenance	-.92	Contemplation	Preparation	-.11
Contemplation	Preparation	-2.92			
	Action and Maintenance	1.17			
Preparation	Action and Maintenance	4.08			
Framing (K)	Framing (L)	Mean Difference (K-L)	Framing (K)	Framing (L)	Mean Difference (K-L)
Gain	Loss	1.99	Gain	Loss	.38

Table 3

Effect Sizes for Variables Predicting Thought-listing Scores and Intentions to Quit

Variable	Effect size (η^2)
Thought-listing Scores	
Stage of Change	.10
Framing	.02
Stage of Change x Framing	.06
Intentions to Quit	
Stage of Change	.01
Framing	.00
Stage of Change x Framing	.01

for not starting smoking) so these responses were deleted, resulting in 47 non-smokers

listing a total of 372 reasons.

Although I had no *a priori* expectations about these open ended responses, they

were analyzed for exploratory purposes. These reasons were grouped by two independent

coders into one of seven categories: health (e.g., "smoking is bad for health");

physical/olfactory appearance (e.g., "smells horrible"); family influences (e.g., "my

parents smoked for years and I hated it"); friend or significant other influences (e.g., "my

boyfriend did not want me to smoke"); societal influences (e.g., "the law today makes it

harder to smoke anyways"); financial cost (e.g., "smoking is too expensive"); or other

("waste of time"). I chose these categories by examining the responses and making a note of reoccurring themes. The two raters adequately agreed on the categorization of these reasons; the kappa value was .78 for ratings of reasons listed by former smokers and .82 for ratings of reasons listed by non-smokers. When raters did not agree, I chose the category that the response fit into best. I agreed equally with the raters for reasons listed by former smokers (kappa = .89 vs. .84; for rater 1 and rater 2, respectively) and reasons listed by non-smokers (kappa = .88 vs .93; for rater 1 and rater 2, respectively).

Former smokers listed reasons related to health as the most frequent reason for quitting (41.7% of all responses given). Societal, financial, and other reasons were listed as the second most frequent reasons for quitting (12.5% each). Reasons that were coded as "other" were related to a lack of understanding of the consequences, no perception of benefits, or wanting to be a good role model for others. Former smokers listed two reasons (8.3%) related to influences from friends and significant others and two reasons related to physical/olfactory appearance as reasons for quitting, and one reason (4.2%) related to family influences.

Non-smokers listed reasons related to health as the most frequent reason for not starting to smoke (33.6%). 24.5% of responses were related to physical/olfactory appearance. 13.7% of responses were related to family influences, 10.5% of responses were related to societal influences, and 7.0% were related to financial reasons. 4.6% of responses were related to influences from friends or significant others, and 6.2% of responses were related to something else. Reasons coded as "other" were typically related to no perception of benefits (e.g., "there's no point") or no interest or need to smoke (e.g., "simply did not want to smoke").

Discussion

A major limitation of the first study was the limited number of smokers, which may have resulted in low power to find the hypothesized effects. This possibility is discussed under the relevant hypotheses.

Hypothesis 1

The first hypothesis was not supported. There was no significant interaction between message framing and need for cognition among non-smokers. Contrary to the hypothesis, smokers high in need for cognition listed more positive thoughts after reading the gain-framed message than smokers low in need for cognition, and after reading the loss-framed message there was no significant difference in thought-listing scores among smokers high in need for cognition and those low in need for cognition. Steward et al. (2003) found that smokers lower in need for cognition reported greater intentions to quit after reading a gain-framed message than a loss-framed message, whereas smokers higher in need for cognition reported similar levels of quit intentions regardless of message framing. Although Steward et al. did not use a thought-listing task in their study, it can be assumed that participants who report higher intentions to quit after reading a particular message will find that message persuasive, and thus should list more positive thoughts in response to it. One possible reason for the opposite result in this study is that smokers high in need for cognition experience more positive affect after reading the gain-framed message than smokers low in need for cognition; thus, they list more positive thoughts than smokers low in need for cognition. This hypothesis will be tested in Experiment 2.

Also contrary to the hypothesis, there was no significant interaction between framing and need for cognition on intentions to quit. This result is likely due to the low

number of smokers in the study. Although Steward et al. (2003) found a significant interaction between need for cognition and message framing on interest in quitting, this effect was quite small (f^2 = .037, calculated using G*Power). With a .80 power level, I would have needed 262 participants to find such a small effect. Thus, it is possible that this was a chance effect in Steward et al.'s (2003) study.

Hypothesis 2

Contrary to the second hypothesis, there was no significant interaction between message framing and self-efficacy scores on thought-listing scores and intentions to quit. This is likely due to a low number of smokers in this study. Because Van't Riet et al. (2008) did not provide the R^2 value of the regressions testing the framing by self-efficacy interaction, it is not possible to calculate the effect size obtained, but with a .80 power level, 67 participants would have been needed to find a medium effect (f^2) of .15, (calculated using G*Power). This hypothesis will be tested in Experiment 2 with a larger number of smokers.

Hypothesis 3

Finally, contrary to the third hypothesis, there was no significant interaction between message framing and stage of change on thought-listing scores and intentions to quit. However, Table 3 shows that stage of change accounted for 10% of the variance in thought-listing scores, and the interaction between stage of change and message framing accounted for 6% of the variance in thought-listing scores. According to Keselman (1975), a small effect accounts for 1% of the variance, a medium effect accounts for 10% of the variance, and a large effect accounts for 14% of the variance; therefore, in this study moderate effects were found. It is likely that a larger number of participants would

have resulted in statistically significant results. Although the effects on thought-listing scores can be considered meaningful, the same cannot be said for the effects on intentions to quit. Stage of change and the interaction between stage of change and message framing only accounted for 1% of the variability in intentions to quit. More research is needed on these variables to determine whether they do indeed produce meaningful results in smoking behaviour.

Another possible explanation for the lack of support for hypothesis 3 centers around the stage of change measure. Herzog (2008) argues that the stages of change are not qualitatively distinct categories. He evaluates the stage of change model based on Weinstein, Rothman, and Sutton's (1998) criteria for evaluating stage models: 1) Stages should consist of qualitatively different and mutually exclusive categories; 2) The categories should be ordered; 3) Within each stage, there should be similar barriers to change; and 4) Across stages, there should be different barriers to change. According to Herzog (2008), there is no empirical evidence to justify the use of the different timeframes with the stage of change algorithm. As well, when motivation to quit is assessed with alternative measures, it results in within-stage heterogeneity in motivation to quit, in contradiction with the first criterion.

Although the stage of change model partially satisfies the second criterion because it is a significant predictor of smoking cessation, Herzog (2008) argues that in order to fully satisfy it we need to know what the stage sequence probabilities should be according to the transtheoretical model. Thus far the research on this issue is limited.

In order to test the third and fourth criteria, Herzog (2008) gives four recommendations. First, baseline stages of change should be analyzed individually rather

than being combined with other stages. Second, predictors should be assessed before stage transitions to be considered prospective studies. Third, a current and standard version of the algorithm should be used so that studies can be compared. Fourth, the processes of change should be tested as predictors of stage progressions. In addition to these issues, Herzog outlines four additional theoretical issues that should be considered: predictors of each stage transition should be clearly and consistently specified; time intervals shorter than 6 months between baseline and follow-up should be used; studies should assess several stage transitions rather than just one; and those who remain in the same stage should be compared with those who move to the next stage. Until these issues are considered, it is difficult to determine whether the stage of change model meets the third and fourth criteria. Based on Herzog's (2008) evaluation of the stage of change measure, it is possible that this measure does not in fact assess qualitatively distinct stages. Therefore, although smokers are categorized into different stages of change, they may not be different enough to produce significant differences in the outcome variables. Of course, more research is needed to determine whether this is indeed the case.

Exploratory analyses to open-ended questions

Non-smokers and former smokers shared some similarities in their responses to the question about reasons for not smoking; however, there were also some differences that likely stem from the fact that former smokers know more about the details of smoking than non-smokers because they actually engaged in the behaviour. Both non-smokers and former smokers listed reasons related to health as the most frequent reasons for not smoking. Given the amount of information surrounding the health risks of

smoking, it is no surprise that former smokers quit and non-smokers refrain from smoking because they are concerned about their health.

While non-smokers listed reasons related to physical/olfactory appearance as the second most frequent reason for not smoking, former smokers listed societal, financial, and other reasons. In addition to health risks, non-smokers may perhaps associate smoking with an unpleasant smell and appearance, whereas former smokers, because they actually smoked, are more familiar with and place more importance on the financial costs and challenges associated with smoking today. More and more laws are being created that ban smoking in public places, and former smokers are likely more familiar with these laws than non-smokers, and thus quit smoking due to the difficulties surrounding being able to smoke. The responses also indicate that former smokers think about how their smoking affects others and the lack of benefits they receive from smoking when making the decision to quit. Former smokers also consider friends, family, significant others, and physical/olfactory appearance when deciding to quit, but they listed these reasons less frequently than non-smokers.

Non-smokers listed family and societal influences as moderately frequent reasons for not smoking. People are more likely to smoke if there are smokers in their immediate family (Bricker, Peterson, Andersen, Leroux, Rajan, & Sarason, 2006) so it makes sense that non-smokers raised in a family of non-smokers are not willing to start smoking. On the other hand, some participants did indicate that they did not start smoking because they saw the health of family member smokers deteriorate. Thus, family influences appear to work in two different ways for non-smokers. Non-smokers also appeared to be

aware of the difficulty associated with smoking because of current laws, as well as the negative stigma surrounding smoking.

Non-smokers were less likely to list reasons related to financial cost, influences from friends and significant others, and other reasons as reasons for deciding to not smoke. Perhaps they consider these reasons to be less influential than reasons related to health and appearance in their decision to abstain from smoking. Although they know smoking can become an expensive habit, they have not experienced the financial burden of smoking to consider it one of the top reasons to avoid smoking. They are also less likely to have friends who smoke, and thus do not consider influences from friends as a top reason for not smoking.

In summary, the hypotheses were not supported, and this may have been a result of the small number of participants in the study. Although a low number of former smokers participated, the open-ended responses provided additional information about the factors that influence smokers to quit, and the factors that influence non-smokers to abstain from smoking.

Experiment 2

The purpose of Experiment 1 was to test the gain- and loss-framed messages. Smokers should perceive smoking cessation messages differently from non-smokers because the messages are about a behaviour they engage in, so thought-listing scores of smokers and non-smokers should be different from each other in response to the messages. The interaction between message framing and need for cognition was significant for smokers but not for non-smokers, which implies that the message framing manipulation worked because it produced differential results.

A major limitation of the first study was the low number of smokers which resulted in low power; therefore, it is not surprising that the hypotheses were not supported. The main purpose of the second study was to recruit a larger number of smokers and add reasons for smoking as an additional variable that may affect how the gain- and loss-framed messages are perceived. As previously discussed, according to Battista et al. (2008), smoking motives can be categorized into positive reinforcement and negative reinforcement motives, and smokers' thought-listing scores and intentions to quit may depend on the interaction between message framing and reasons for smoking. Experiment 2 tested this hypothesis in addition to the hypotheses tested in Experiment 1, with a larger number of smokers. In addition, Experiment 2 included a measure of affect to determine whether gain-framed messages increased positive affect in smokers high in need for cognition.

Finally, in line with Gerrard et al.'s (2005) recommendations, prototypical smoker instructions were manipulated to emphasize either the negative aspects of the prototypical smoker, or any aspects of the prototypical smoker. Overall, Experiment 2 allowed for a better understanding of why gain-framed messages work best for some smokers while loss-framed messages work best for others.

Method

Participants and Design

Experiment 2 was a 2 (framing: gain vs. loss) by 2 (prototypical smoker message: negative vs. neutral) between-subjects design. Thirty-nine participants (all smokers) were recruited in various ways, including through the online bonus point system set up by the Saint Mary's University psychology department, posters placed around the university and

in various locations around the city, online advertisements, advertisements in a local newspaper, emails to undergraduate professors asking them to forward information about the experiment on to their students, and personal contacts. Even though I used multiple recruitment methods rather than relying solely on the bonus point system as in the first experiment, most (n = 30) of the participants signed up through the bonus point system. As an incentive for participation, all participants other than psychology students were given the option of entering a cash draw, or getting paid $10. Psychology students received bonus points for their participation. The mean age of participants was 23.9 (SD = 7.39) and 51.3% of participants were female. Initial analyses were conducted controlling for age and gender, but as it did not change the results, they will not be discussed further.

Procedure

When participants entered the lab, they were presented with the informed consent form and any questions they had about the experiment were answered. They were asked to provide their names and contact information (phone number and email) if they wished to enter the cash draw. I emphasized that this information could not be linked with their responses to the study questions. Once they signed the form, they were randomly assigned to one of the four conditions.

After completing the predictor measures, participants in the negative prototypical smoker condition were asked to list aspects of the typical smoker that are negative and different from themselves and to list aspects of people who are successfully quitting. This manipulation was intended to distance smokers from their image of the typical smoker. Participants in the neutral condition were asked to list aspects of the typical smoker and

of their professors. Then participants read either the same gain- or loss-framed messages as in the first experiment. They were given the option of receiving a pamphlet with the information contained in the message.

After receiving the manipulations, participants completed the dependent measures including the same thought-listing task (Cacioppo et al., 1979) and intentions to continue smoking measure (Sterling et al., 2007; α = .68) as in the first experiment. To assess whether gain-framed messages increased positive affect, participants also completed a visual analog mood rating scale (Birch et al., 2004).

After completing the mood measure, participants were given the opportunity for a 5-minute break. After the break, they answered questions about what they did during that break, including a question about whether they had a cigarette. This question was used as a measure of the immediate impact of the manipulations on smoking behaviour. The experimenters also discreetly took note of whether the participants smelled like smoke after coming back from the break. I included a filler questionnaire after the break in order to make the study longer and make the option of taking a break reasonable. Participants were then debriefed and thanked for their participation.

Measures

Participants were asked demographic and smoking habit questions first, followed by the following predictor variable measures: self-efficacy (Badr & Moody, 2005; α in this study = .83), need for cognition (Cacioppo & Petty, 1981; α in this study = .86), stage of change (Prochaska, 1991), and reasons for smoking (Ikard, Green, & Horn, 1969).

Reasons for Smoking. The Reasons for Smoking Scale (Ikard et al., 1969) contains 23 items making up six factors and two higher-order factors. Participants were

asked to indicate their level of agreement with the items on a scale from 1 (never) to 5 (always). An example item in this scale is "I smoke cigarettes automatically without even being aware of it" (Battista et al., 2008). Battista et al. found that one item in this scale loaded on both higher-order factors (complex item), and one item did not load on either factor (hyperplane item); these items were not included in the analyses. In this study the alpha value was .84 for the 16 items making up the negative reinforcement factor, and .76 for the 5 items making up the positive reinforcement factor.

Visual analog scale. Participants rated their current mood by marking vertical lines on four positive affect (cheerful, happy, glad, pleased) and three negative affect (sad, depressed, blue) 95-mm continuum scales ranging from *not at all* to *very.* Visual analog scales are often used in mood manipulation research and have been shown to reflect the mood manipulations (Martin, 1990). Scores were calculated by measuring the distance from the beginning of the line to the participants' ratings for all items, resulting in two scores: one for the positive affect scale and one for the negative affect scaleThe alpha value of the negative affect subscale was .94 and the alpha value of the positive affect subscale was .92.

Results

Prior to testing the hypotheses the data were screened for outliers, data entry errors, and violations of assumptions including heterogeneity of variance and non-normality. All analyses were run using SPSS 15.0 for Windows. According to the Shapiro-Wilk test of normality, thought-listing scores ($p = .001$) and intention to quit

Table 4

Descriptive statistics and zero-order correlations among experiment 2 variables

Variable	Mean	SD	1	2	3	4	5	6	7	8	9
1. Stage of Change	1.85	.75		-.15	-.15	.02	-.16	-.56**	.10	-.10	.12
2. Self-efficacy	2.58	.56		(.83)	.11	-.38*	-.12	.29	-.18	.17	.02
3. Need for Cognition	3.44	.63			(.86)	-.24	.16	.07	-.03	.49**	.47**
4. Negative RFS	2.79	.73				(.87)	.71**	-.03	.04	-.38*	-.21
5. Positive RFS	3.03	.85					(.76)	.05	-.02	-.10	.00
6. Intentions to Quit	2.45	.79						(.68)	-.25	-.15	-.32
7. Thought-listing	1.59	1.58								.09	.09
8. Positive affect	374.83	134.58								(.92)	-.59**
9. Negative affect											(.94)

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Note. RFS = Reasons for Smoking. Alpha values are on the diagonal in parentheses.

scores ($p=$ .04) were not normally distributed; however, the analysis of variance is considered robust to violations of assumptions, especially violations of normality (Howell, 2007). Thus, this was not considered a problematic issue in this data set. To test the hypotheses, regression analyses and analyses of variance (ANOVAs) were conducted. The third, fourth, and fifth hypotheses included continuous independent variables; therefore, regression analyses were conducted. To reduce multicollinearity, need for cognition and self-efficacy scores were centered prior to analyses. Hypotheses 1, 2, and 6 included only categorical independent variables; therefore, ANOVA was used. Descriptive statistics and intercorrelations for all study variables are presented in Table 4.

To test the first hypothesis that participants in the negative prototypical smoker condition would show higher intentions to quit than participants in the neutral smoker condition, a one-way ANOVA was conducted. There was no main effect of this condition on intentions to quit, F (1, 37) = .14, p = .71. To determine whether number of cigarettes smoked daily and the number of years participants smoked affected this manipulation, these two variables were entered as co-variates and the analysis was conducted again. After accounting for smoking behaviour, there was still no main effect of prototypical smoker message on intentions to quit, F (1, 31) = .14, p = .71. Mean differences between groups are shown in Table 5; effect sizes are shown in Table 6.

To test the second hypothesis that participants who receive the gain-framed message would report higher intentions to quit and more favourable thoughts than those who receive a loss-framed message, two one-way ANOVAs were conducted. There was no main effect of framing on thought-listing scores, F (1, 37) = .72, p = .40, or on

Table 5

Mean Differences in Thought-listing Scores and Intentions to Quit Based on Stage of Change, Framing, and Prototypical Smoker Message

	Thought-listing Scores			Intentions to Quit	
Stage of change (I)	Stage of change (J)	Mean Difference (I-J)	Stage of change (I)	Stage of change (J)	Mean Difference (I-J)
Pre-contemplation	Contemplation	-.68	Pre-contemplation	Contemplation	-.30
	Preparation	.24		Preparation	-1.13
Contemplation	Preparation	.92	Contemplation	Preparation	-.83
Framing (K)	Framing (L)	Mean Difference (K-L)	Framing (K)	Framing (L)	Mean Difference (K-L)
Gain	Loss	.43	Gain	Loss	.30
			Prototypical Smoker Message (M)	Prototypical Smoker Message (N)	Mean Difference (M-N)
			Neutral	Negative	.10

Table 6

Effect Sizes for Variables Predicting Thought-listing Scores and Intentions to Quit

Variable	Effect size (η^2)
Thought-listing Scores	
Stage of Change	.04
Framing	.01
Stage of Change x Framing	.01
Intentions to Quit	
Prototypical Smoker	.00
Stage of Change	.03
Framing	.00
Stage of Change x Framing	.00

intentions to quit, $F = 1.43, p = .24$. Mean differences between groups are shown in Table 5; effect sizes are shown in Table 6.

To test the third hypothesis that an interaction between need for cognition and message framing would be obtained, such that participants high in need for cognition will experience more positive affect and thus list more positive thoughts after reading the gain-framed message (as in Experiment 1) than participants low in need for cognition, two regression analyses were first conducted with the main effects of framing and need for cognition and the two-way interaction entered as predictors and positive affect and

negative affect as the criterion variables. There was a significant main effect of need for

cognition, $F(1, 32) = 9.00$, $p = .01$, partial $\eta^2 = .22$, on positive affect. To determine the

direction of the effect of need for cognition, a scatterplot between need for cognition and

mood scores was created. Smokers high in need for cognition tended to report higher

positive affect than smokers low in need for cognition. There was no main effect of

framing, $F(1, 32) = .57$, $p = .46$, and no significant interaction, $F(1, 32) = .18$, $p = .67$.

There was also a significant main effect of need for cognition, $F(1, 32) = 8.71$, $p = .01$,

partial $\eta^2 = .21$, on negative affect. Smokers high in need for cognition tended to report

lower negative affect than smokers low in need for cognition. There was no main effect

of framing, $F(1, 32) = .00$, $p = .96$, and no significant interaction, $F(1, 32) = .02$, $p = .89$,

indicating that participants high in need for cognition reported low negative affect

regardless of framing.

Two regression analyses were conducted with the main effects of framing and

need for cognition and the two-way interaction between these two factors entered to

determine whether smokers high in need for cognition would list more positive thoughts

and report higher intentions to quit after reading the gain-framed message compared to

the loss-framed message. There was no main effect of framing, $F(1, 35) = .64$, $p = .42$,

no main effect of need for cognition, $F(1, 35) = .00$, $p = .97$, and, contrary to the result of

the first experiment, there was no significant interaction, $F(1, 35) = .00$, $p = .97$ for

thought-listing scores. There was also no main effect of framing, $F(1, 35) = 1.52$, $p =$

.23, no main effect of need for cognition, $F(1, 35) = .12$, $p = .73$, and no significant

interaction, $F(1, 35) = 1.41$, $p = .24$ for intentions to quit.

To test the fourth hypothesis that an interaction between framing and reasons for smoking would be obtained, such that participants who report more negative reinforcement reasons for smoking (i.e., they smoke to alleviate negative effects) would show greater intentions to quit and more favourable thoughts in the loss-framed condition than in the gain-framed condition, two regression analyses were conducted with framing, positive reasons for smoking, negative reasons for smoking and the two-way interactions between framing and reasons for smoking entered. There was no main effect of framing, F (1, 33) = .05, p = .82, no main effect of positive reasons for smoking, F (1, 33) = .11, p = .75, and no main effect of negative reasons for smoking, F (1, 33) = .16, p = .69 on thought-listing scores. There was no significant interaction between positive reasons for smoking and framing, F (1, 33) = .06, p = .81, and negative reasons for smoking and framing, F (1, 33) = .08, p = .78 on thought-listing scores. There was also no main effect of framing, F (1, 33) = 1.35, p = .26, no main effect of positive reasons for smoking, F (1, 33) = .30, p = .59, and no main effect of negative reasons for smoking, F (1, 33) = .94, p = .34 on intentions to quit. There was no significant interaction between positive reasons for smoking and framing, F (1, 33) = .19, p = .66, and negative reasons for smoking and framing, F (1, 33) = .57, p = .46 on intentions to quit.

To test the fifth hypothesis that an interaction between framing and self-efficacy will be obtained, such that smokers high in self-efficacy will report higher intentions to quit and more favourable thoughts after reading the loss-framed message, whereas smokers low in self-efficacy will respond equally regardless of message framing, two regression analyses were conducted with the main effects of framing and self-efficacy and the two-way interaction entered as predictors and positive thoughts and intentions to

quit as the criterion variables. The main effect of self-efficacy on intentions to quit approached significance, F (1, 35) = 3.16, p = .08, partial η^2 = .08. To determine the direction of this effect, a scatterplot of self-efficacy and intentions to quit was created. Smokers with high self-efficacy tended to report higher intentions to quit than smokers with low self-efficacy. There was no main effect of framing, F (1, 35) = 1.07, p = .31 and no significant interaction, F (1, 35) = .30, p = .59 on intentions to quit. There was no main effect of framing, F (1, 35) = .95, p = .38, no main effect of self-efficacy, F (1, 35) = 1.80, p = .19, and no significant interaction, F (1, 35) = .47, p = .50 on thought-listing scores.

To test the sixth and final hypothesis that an interaction between framing and stage of stage would be obtained, such that smokers in higher stages of change will report higher intentions to quit and more favourable thoughts after reading the loss-framed message than smokers in lower stages of change, two 2 (framing: gain vs. loss) by 3 (stage of change: precontemplation vs. contemplation vs. preparation) factorial ANOVAs were conducted to evaluate the relationship between message framing and stage of change on thought-listing scores and intentions to quit. There was a significant main effect of stage of change, F (1, 33) = 8.41, p = .001 on intentions to quit. Because of unequal sample sizes in the three groups, the Games-Howell post hoc test was used to determine which groups were significantly different from each other. Smokers in the preparation stage reported higher intentions to quit (M = 3.05, SD = .68) than smokers in the contemplation (M = 2.22, SD = .61) and pre-contemplation (M = 1.92, SD = .73) stages. The difference in intentions to quit scores between those in the contemplation and pre-contemplation stages was not significantly different. There was no main effect of

framing, F (1, 33) = .18, p = .67 and no significant interaction, F (1, 33) = .38, p = .69 on

intentions to quit. There was no main effect of framing, F (1, 33) = .55, p = .46, no main

effect of stage of change, F (1, 33) = 1.49, p = .24, and no significant interaction, F (1,

33) = .44, p = .65 on thought-listing scores. Mean differences between groups are shown

in Table 5; effect sizes are shown in Table 6.

In addition to these hypotheses, I noted whether participants had a cigarette

during the break, and whether they took a paper copy of the information presented in the

messages. Only five participants left the room during the break, and none had a cigarette.

Only four participants took a pamphlet; two were in the gain-framed condition and two

were in the loss-framed condition.

<center>Discussion</center>

As in the first study, a major limitation of this study was the low number of

smokers, which may have resulted in low power to find the hypothesized effects. This

issue is discussed under the relevant hypotheses.

Hypothesis 1

The first hypothesis that participants in the negative prototypical smoker

condition would show higher intentions to quit than participants in the neutral smoker

condition was not supported. Gerrard et al. (2005) found that smokers in smoking

cessation groups who preferred to associate with smokers who were successfully quitting

had decreased perceived similarity to the typical smoker, and were more likely to

successfully quit. Based on their findings, they suggested that future research should

encourage smokers to think of aspects of the typical smoker that are negative and

different from themselves to decrease perceived similarity to the typical smoker. In this

experiment, there was no difference in intentions to quit among participants who were asked to list aspects of the typical smoker that are negative and different from themselves compared with those who were simply asked to list aspects of the typical smoker. Low power was not likely a reason for failing to find the hypothesized effect, as Table 6 shows that the manipulation had no effect on intentions to quit.

There are other possible reasons why this manipulation did not produce the hypothesized effects. In Gerrard et al.'s study, the participants had been smoking for 23 years and reported smoking 27 cigarettes per day on average. In this experiment, only three smokers reported that they smoked for over 10 years, and no one reported smoking more than 20 cigarettes per day. Light or moderate smokers may already have negative views of the typical smoker if their perception of a typical smoker is a heavy smoker. However, this is not likely to be the case because adding smoking behaviour as a covariate did not change the result.

Another possible reason why this manipulation did not result in the hypothesized effect may be because in this study the dependent variable was an intention to quit measure, whereas Gerrard et al. measured smoking status 6 months after the intervention. However, according to the theory of reasoned action (Ajzen & Fishbein, 1980) and theory of planned behaviour (Ajzen, 1991), people's intentions to perform a particular behaviour should predict whether or not they engage in that behaviour. Indeed, previous research (e.g., Hu & Lanese, 1998; Norman, Conner, & Bell, 1999) has shown that intention to quit is the most important predictor for future quit attempts. Thus, it is not likely that using a behavioural measure instead of the intention to quit measure would have produced different results in this study. However, it is possible that the manipulation

had effects on implicit cognitive processes, defined by De Houwer (2006) as unconscious effects of attitudes and past experiences on current feelings, thoughts, or actions, which might affect participants' smoking behaviour even though it did not affect their responses on the intentions to quit measure. Waters and Sayette (2006) summarize research on implicit cognition and tobacco addiction and conclude that there is some evidence that attentional bias to tobacco stimuli (i.e., in a modified Stroop task, smokers classify the colours of smoking-related words slower than neutral words) is associated with lack of cessation, but much more research is needed to evaluate the effectiveness of using implicit measures.

Hypothesis 2

The second hypothesis that participants who receive the gain-framed message would report higher intentions to quit and more favourable thoughts than those who receive a loss-framed message was not supported. Perhaps individual differences among participants that were not measured in this study caused some participants to be more receptive to the gain-framed message and others to be more receptive to the loss-framed message, resulting in no main effect of framing. In a study on message framing, intention to quit smoking, and nicotine dependence, Moorman and van den Putte (2008) found that when smokers' pre-message intentions to quit were high and their nicotine dependence was high, the loss-framed message was more effective than the gain-framed message. When either pre-message quit intentions or nicotine dependence were low, the gain-framed message was more effective than the loss-framed message. Finally, when both were low, either message was equally effective. Perhaps measuring participants' nicotine

dependence and intentions to quit at the beginning of the study would have explained why there was no main effect of framing in this study.

Because the framing manipulation had no effect on participants' thought-listing scores or intentions to quit, it is possible that the manipulation simply was not strong enough. The messages contained many facts about smoking, so perhaps participants were overwhelmed with the amount of information presented. From examining participants' thought-listings it was also evident that participants were already aware of the information that was presented, so it may be more beneficial to create messages that are new or unexpected to smokers to increase message effectiveness (Smith & Petty, 1996).

Hypothesis 3

The third hypothesis that participants high in need for cognition would experience more positive affect and thus list more positive thoughts after reading the gain-framed message than participants low in need for cognition was not supported. Smokers high in need for cognition tended to report more positive affect and less negative affect than smokers low in need for cognition, regardless of message framing. In a review of over 100 empirical studies on need for cognition, Cacioppo, Petty, Feinstein, and Jarvis (1996) noted that individuals high in need for cognition tend to respond more positively and less negatively to thought-provoking stimuli. Smoking cessation messages can be considered thought-provoking because they either present the reader with risks associated with continuing to smoke or benefits associated with quitting smoking, which should get the reader thinking about their behaviour. Thus, it would make sense that smokers high in need for cognition would react more positively after reading either message. Furthermore, listing aspects of the typical smoker and listing thoughts one had while

reading the messages can both be considered thought-provoking tasks to which those high in need for cognition should react more positively. Unfortunately, affect was not measured prior to manipulations, therefore it is not possible to determine whether smokers high in need for cognition experienced higher positive mood as a result of the manipulations.

Contrary to the hypothesis, there was no significant interaction between message framing and need for cognition on thought-listing scores and intentions to quit. The effect found in Steward et al.'s (2003) study was quite small (f^2 = .037, calculated using G*Power). With a .80 power level, I would have needed 262 participants to find such a small effect.

In this study I assumed that participants high in need for cognition would evaluate the messages more systematically than participants low in need for cognition, who would evaluate the messages more heuristically. However, it is also possible to manipulate how participants evaluate information, which is what Meyers-Levy and Maheswaran (2004) did by manipulating the personal relevance and risky implications of messages about a product called LeanBeef. They posited that when personal relevance of a message is low, heuristic processing is more likely, and thus gain-framed messages tend to be more persuasive. On the other hand, when personal relevance is high, systematic processing is more likely, and thus loss-framed messages tend to be more persuasive. When the behaviour in question is considered to have high-risk implications, systematic processing occurs and loss-framed messages are more persuasive. When the behaviour is considered to have low-risk implications, heuristic processing occurs and gain-framed messages are more persuasive. However, when personal relevance is high but perceived risk is low,

both types of processing occur and one type of framing is not more persuasive than the other. By measuring judgments toward LeanBeef, the number of message-related thoughts produced, and the number of simple evaluative thoughts, Meyers-Levy and Maheswaran (2004) found support for their hypotheses.

In this experiment, it is possible that participants perceived the messages to be personally relevant (because they were all current smokers), but not high-risk, perhaps because they thought they smoked less than the average smoker, and thus were at lower-risk for the negative effects described in the messages. If this was the case, they would have engaged in both systematic and heuristic processing, making both types of messages equally persuasive and the effect of need for cognition irrelevant.

Hypothesis 4

The fourth hypothesis that participants who list more negative reinforcement reasons for smoking (i.e., they smoke to alleviate negative effects) will show greater intentions to quit and more favourable thoughts in the loss-framed condition than in the gain-framed condition was not supported. Participants who indicated they smoke to alleviate negative effects also indicated they smoke to enhance positive effects, thus it was not possible to properly test this hypothesis. In Battista et al.'s (2008) study, the two subscales were only moderately correlated ($r = .36, p < .001$), so perhaps it would have been possible to test this hypothesis if a similar correlation was obtained in this study.

Hypothesis 5

The fifth hypothesis that smokers high in self-efficacy would report higher intentions to quit and more favourable thoughts after reading the loss-framed message, whereas smokers low in self-efficacy would respond equally regardless of message

framing was not supported. Van't Riet et al. (2008) found that participants with high self-efficacy reported higher levels of motivation to quit smoking after receiving a loss-framed message than either a gain-framed message or no message, whereas participants with low self-efficacy reported similar levels of motivation to quit regardless of the message they received. Van't Riet et al. (2008) recruited 539 smokers; in this study I recruited 39. Therefore, it is possible that this hypothesis was not supported due to insufficient power in the present study. Because Van't Riet did not provide the R^2 value of the regressions, it is not possible to calculate the effect size obtained, but based on a medium effect size (f^2) of .15, 67 participants would have been needed to find an effect with a .80 power level (calculated using G*Power).

Although not hypothesized, smokers high in self-efficacy reported higher intentions to quit than smokers low in self-efficacy. Smokers either felt they could avoid smoking because they were ready to quit, or they were ready to quit because they felt they could avoid smoking, or both.

Hypothesis 6

The final hypothesis that smokers in higher stages of change would report higher intentions to quit and more favourable thoughts after reading the loss-framed message than smokers in lower stages of change was not supported. This may be due to the possibility that the stages of change are not qualitatively different, as previously discussed (Herzog, 2008). Low power was likely not a reason for failing to find the hypothesized effect, since the effects of these variables on intentions to quit and thought-listing scores were small.

Although not hypothesized, smokers in the preparation stage reported higher intentions to quit than smokers in both the contemplation and pre-contemplation stages. Because the stage of change measure places smokers in a stage depending on whether or not they intend to quit in the future, it is not surprising that smokers who intend to quit in the next 30 days (i.e., those in the preparation stage) also score high on the intentions to quit measure. This result provides some validity for the stage of change measure.

Behavioural Measures

A break was given in this study to determine whether message framing would have an effect on participants' likelihood to smoke during the break. Only five participants left the room during the break, and none had a cigarette. Perhaps giving the option of a longer break (e.g., 10 minutes instead of 5) would have encouraged more people to leave the room; however, it appears that most participants preferred to wait and simply finish the study.

Participants were also given the opportunity to take home a paper copy of the messages they received, but only four participants elected to do so. Perhaps the information contained in the messages was familiar to the participants and they did not see the benefit of obtaining an additional copy of the messages.

General Discussion

None of the hypotheses in the first study were supported. Although not hypothesized, there was a main effect of need for cognition such that smokers high in need for cognition tended to list more positive thoughts than smokers low in the need for cognition. There was an interaction between need for cognition and message framing, but in the opposite direction to the hypothesis. A small number of participants, especially

smokers, participated in this study; thus I attempted to recruit an additional number of smokers in the second study by using the online psychology bonus point system, online and print advertisements, posters, and personal contacts. Even with these additional recruitment methods, the majority of participants in the second study signed up through the bonus point system (n = 30).

None of the hypotheses in the second study were supported. Although there were no significant interactions, there were three main effects that were not hypothesized. Smokers high in need for cognition tended to report more positive mood than smokers low in need for cognition, smokers high in self-efficacy tended to report higher intentions to quit than smokers low in self-efficacy, and smokers in the preparation stage tended to report higher intentions to quit than smokers in the contemplation and pre-contemplation stages. These results imply that increasing self-efficacy may be beneficial regardless of message framing. Smokers who feel confident that they can quit may also become more willing to quit (i.e., be in a higher stage of change), which should lead to actual quitting. Future research should examine the effects of self-efficacy boosting messages on quitting behaviour.

Although there was a significant interaction between need for cognition and message framing in the first experiment, this interaction was not replicated in the second experiment. One possible reason for this is that in the first study participants were asked to list the thoughts they had for a full three minutes, but in the second study participants had three minutes to list their thoughts, but they could continue on before the three minutes were up. Participants in the first study listed more thoughts (M = 2.72, SD = 3.21) than participants in the second study (M = 1.59, SD = 1.58), perhaps because of this

difference in the thought-listing task. Maybe if participants thought about the messages more and listed more thoughts, a significant interaction would have been found.

Potential Limitations

A significant issue in these experiments was the low number of participants, which could have prevented the finding of some, but not all, of the hypothesized effects. Although I attempted to recruit more participants in the second study through online and print advertisements, posters, and personal contacts, the majority were still psychology students who signed up through the bonus point system. A number of participants expressed interest in the study in response to online advertisements, but were no longer interested when they found out they had to come to the university to complete it, even with the option of receiving payment for their time. To give potential participants the option of participating in the study from wherever they liked, it could have been conducted as an online experiment through a service such as Survey Monkey.

Another limitation of the two studies was the uncertainty that participants who participated were in fact current smokers. Previous research has verified the smoking status of participants by asking them to show the experimenter a package of cigarettes (Steward et al., 2003), recruiting participants through smoking cessation clinics or workshops (Battista et al., 2008; Gerrard et al., 2005; Gibbons & Eggleston, 1996), and measuring baseline expired carbon monoxide levels (Toll, Salovey, O'Malley, Mazure, Latimer, & McKee, 2008). In this study, participants could have been asked to show a package of cigarettes; however, this would exclude smokers who had just finished a pack and didn't know they would need to show one. Recruiting participants from smoking cessation workshops could have also been an option; however, this method would likely

result in most participants being in higher stages of change, and thus would not have permitted the testing of the stage of change by framing interaction that was hypothesized.

Future Research and Practical Implications

In order to provide smokers with information that will persuade them to quit, future research should examine other factors that may moderate the relationship between message framing and quit intentions. According to Van't Riet et al. (2008) smokers with low self-efficacy report similar intentions to quit regardless of message framing. Loss-framed messages induce fear in smokers because they focus on the risks of continuing to smoke, and this fear decreases unrealistic optimism (Lench & Levine, 2005). At the same time, fear decreases perceived control over the outcome, which, according to the theory of planned behavior, is an important factor in predicting intentions to perform a given health behaviour like quitting smoking. Indeed, Norman et al. (1999) found that intention to quit smoking was predicted by perceived behavioural control and perceived susceptibility to health problems. Loss-framed messages induce fear and thus decrease unrealistic optimism, which in turn should increase perceived susceptibility; however, smokers, especially those with low self-efficacy, need to feel that they have control over their ability to quit. Lench and Levine (2005) and Wolburg (2004) emphasize the need for health promotion messages to offer encouragement and increase self-efficacy. Future research should examine whether messages that enhance feelings of self-efficacy also enhance the effectiveness of loss-framed messages.

Quitting smoking is typically thought of as a low-risk behaviour; therefore, smokers should be more persuaded to quit by gain-framed messages. However, research shows that women, compared to men, often perceive smoking cessation to be riskier, so

loss-framed messages may in fact be more effective (Toll et al., 2008). Toll et al. (2008) found that women reported a higher perceived risk of cessation than men, and women with low risk perceptions had a greater number of days to relapse in the gain-framed condition than the loss-framed condition. Based on these results, future research should examine how risk perceptions interact with gender to influence the persuasiveness of gain- and loss-framed smoking cessation messages.

Other factors such as nicotine dependence (Moorman & van den Putte, 2008) and personal relevance (Meyers-Levy & Maheswaran, 2004) have been shown to affect the persuasiveness of gain- and loss-framed messages. Future research should continue to examine these factors and how they relate to other individual differences to determine the most effective way of presenting information related to smoking cessation.

Future research should also consider whether smokers today are different from smokers in the past. Given the current regulations and restrictions surrounding smoking, it is likely that smokers today are faced with different challenges to quitting smoking. Smokers who still smoke today may be more physically dependent because they smoke in spite of the increased difficulties surrounding opportunities to smoke. Therefore, practitioners should consider combining individualized information with nicotine replacement therapy or other therapies to increase the likelihood of persuading smokers to quit.

Conclusion

Given the costs—both individual and organizational—associated with smoking (Bunn et al., 2007), employers should provide employees who smoke with persuasive information that will help them quit. The persuasiveness of smoking cessation messages

may depend on a number of factors, including message framing (Rothman & Salovey, 1997), need for cognition (Steward et al., 2003), and self-efficacy (Van't Riet et al., 2008). Some of these effects (i.e., need for cognition) may be small while others (i.e., self-efficacy) may be important regardless of message framing. The two experiments in the present thesis examined the effects of these variables along with stage of change and reasons for smoking to determine their effects on the effectiveness of smoking cessation messages in terms of a thought-listing task and self-reported intentions to quit. A limited number of participants were recruited, which resulted in low power to find some of the hypothesized effects. Other effects were small, so even if a large number of participants would have been recruited and statistically significant effects were found, they may not be practically important. None of the hypotheses were supported, which could be a result of low power, or the effects of additional variables that were not measured that could have affected participants' perceptions of the messages.

Additional research should continue to study self-efficacy and stage of stage to determine whether they produce practically meaningful differences in the effectiveness of gain- and loss-framed messages. The effect of the interaction between need for cognition and framing is significant but small, so it may not be worth further studying these variables. Although it is almost always possible to achieve statistically significant results with enough participants, not all statistically significant results imply practically meaningful effects. To create the most persuasive messages, it is necessary to determine the factors that produce the biggest changes that can be easily implemented in workplace.

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Appendix A

Gain-framed message

If you quit smoking, you will notice both immediate and long-term benefits.

o   You will be no longer be exposed to over 4,000 chemicals found in cigarettes, including: carbon monoxide (found in car exhaust), arsenic (rat poison), ammonia (found in window cleaner), acetone (found in nail polish remover), hydrogen cyanide (gas chamber poison), napthalene (found in mothballs), sulphur compounds (found in matches), lead, volatile alcohol, formaldehyde (used as embalming fluid), and butane (lighter fluid)

o   After 8 hours of quitting, the oxygen levels in your blood will return to normal.

o   After 8 hours, carbon monoxide levels in your body will drop.

o   Within a day, your risk of having a heart attack decreases.

o   After 2 days, your sense of smell and taste will improve. You will enjoy your food more.

o   After 3-4 days, your bronchial tubes will relax and your lung capacity will have increased, making breathing easier.

o   Your smoking will no longer affect the health of people around you – Second-hand smoke has at least twice the amount of nicotine and tar as the smoke inhaled by the smoker, and five times the amount of carbon monoxide. Regular exposure to second-hand smoke increases the risk of lung disease by 25% and heart disease by 10%.

o   You will have more money to spend on other things, or to save.

o   You will set a good example for your family and friends.

o   You will look and feel younger.

o   Your friends and family will be proud of you.

Your risk of the following diseases and problems will be decreased:

o   *Cardiovascular disease* - Smoking has been linked with heart attacks and angina (coronary heart diseases), blockages in the legs (peripheral vascular disease), and strokes (cerebrovascular diseases).

o   *Lung cancer* – Smoking accounts for 85% of new lung cancer cases in Canada
    Other cancers – Smoking has been linked to mouth, throat, larynx, esophageal, bladder, kidney, stomach, pancreas, and cervical cancer

o   *Respiratory diseases* – Smoking has been linked with an increased risk of respiratory symptoms, including coughing, phlegm, wheezing and difficult or laboured breathing (dyspnea).

o   *Gastrointestinal problems*

o   *Kidney damage*

o   *Type 2 diabetes*

o   *Skin conditions*

o   *Cataracts*

o   *Tooth and gum problems*

For more information, visit the following websites:

http://www.canadian-health-network.ca/
http://www.hc-sc.gc.ca/hl-vs/pubs/tobac-tabac/index_e.html
http://www.lung.ca/protect-protegez/tobacco-tabagisme/second-secondaire/index_e.php

Appendix B

Loss-framed message

If you continue to smoke, you will be at risk for both immediate and long term effects.

- o You will be exposed to over 4,000 chemicals found in cigarettes, including: carbon monoxide (found in car exhaust), arsenic (rat poison), ammonia (found in window cleaner), acetone (found in nail polish remover), hydrogen cyanide (gas chamber poison), napthalene (found in mothballs), sulphur compounds (found in matches), lead, volatile alcohol, formaldehyde (used as embalming fluid), and butane (lighter fluid)
- o Oxygen levels in your blood will be lower than if you quit smoking.
- o Carbon monoxide levels in your body rise after smoking.
- o Continuing to smoke will increase your risk of having a heart attack.
- o After smoking, your sense of taste and smell deteriorates. You will enjoy your food less.
- o Smoking constricts your bronchial tubes and decreases your lung capacity, making breathing harder.
- o Smoking affects the health of people around you – Second-hand smoke has at least twice the amount of nicotine and tar as the smoke inhaled by the smoker, and five times the amount of carbon monoxide. Regular exposure to second-hand smoke increases the risk of lung disease by 25% and heart disease by 10%.
- o Smoking prevents your from having more money to spend on other things, or from saving it.
- o You set a poor example for your family and friends.
- o You will look and feel older.
- o Your friends and family will be worried about you.

Your risk of the following diseases and problems will be increased:

- o *Cardiovascular disease* - Smoking has been linked with heart attacks and angina (coronary heart diseases), blockages in the legs (peripheral vascular disease), and strokes (cerebrovascular diseases).
- o *Lung cancer* – Smoking accounts for 85% of new lung cancer cases in Canada
- o *Other cancers* – Smoking has been linked to mouth, throat, larynx, esophageal, bladder, kidney, stomach, pancreas, and cervical cancer
- o *Respiratory diseases* – Smoking has been linked with an increased risk of respiratory symptoms, including coughing, phlegm, wheezing and difficult or laboured breathing (dyspnea).
- o *Gastrointestinal problems*
- o *Kidney damage*
- o *Type 2 diabetes*
- o *Skin conditions*
- o *Cataracts*

o   *Tooth and gum problems*

For more information, visit the following websites:

http://www.canadian-health-network.ca/
http://www.hc-sc.gc.ca/hl-vs/pubs/tobac-tabac/index_e.html
http://www.lung.ca/protect-protegez/tobacco-tabagisme/second-secondaire/index_e.php

Appendix C

REB Certificate of Approval (09-013)

Research Ethics Board Certificate Notice

The Saint Mary's University Research Ethics Board has issued an REB certificate related to this thesis. The certificate number is: ___09-013___ .

A copy of the certificate is on file at:

Saint Mary's University, Archives
Patrick Power Library
Halifax, NS
B3H 3C3

Email: archives@smu.ca
Phone: 902-420-5508
Fax: 902-420-5561

For more information on the issuing of REB certificates, you can contact the Research Ethics Board at 902-420-5728/ ethics@smu.ca .