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Adolescents' Perceptions of Canadian Cigarette Package Warning Labels: Investigating the Effects of Message Framing

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This study investigates gain-framed and loss-framed messages on graphic cigarette warning labels and their effects on adolescents' smoking-related attitudes and behaviors. Canadian cigarette warning labels emphasizing health consequences of smoking (loss-framed) were digitally manipulated into gain-framed versions. High school students ($N = 210$) completed a questionnaire measuring attitudes, perceptions of the warnings, and behavioral intentions. The study used a posttest-only comparison group design with random assignment. The independent variable was message framing (loss-framed, gain-framed avoidance, gain-framed benefits), and the dependent variables were (a) attitudes toward the warning, (b) attitudes toward smoking, (c) effectiveness in reducing smoking levels, (d) intentions to smoke, (e) effectiveness in improving one's ability to quit, and (f) effectiveness in increasing the likelihood of a smoker quitting. Results indicate that adolescents had more favorable attitudes toward the loss-framed warnings and perceived them as more effective than the gain-framed warnings. Further, smokers exposed to the loss-framed version featuring decaying teeth had significantly lower intentions to smoke in the future. Loss-framed warning labels appear to have a positive influence on adolescents' smoking-related attitudes and behavioral intentions.

The number of adolescent smokers has been increasing in recent years, resulting in what the Food and Drug Administration (FDA) has termed a "pediatric disease" (Crawford, Balch, & Mermeistein, 2002). The FDA estimates that approximately 3,000 American children and teenagers begin smoking each day and that at least 1,000 of these individuals will eventually die from tobacco-related illnesses (Hawkins & Hane, 2000). Approximately 90% of smokers begin smoking during their teenage years (Peracchio & Luna, 1999). Fortunately, this indicates that if children and adolescents resist tobacco while they are young, it is highly unlikely that they will begin smoking as adults (U.S. Department of Health and Human Services [USDHHS], 1994).

CIGARETTE PACKAGE WARNING LABELS

Cigarette warning labels are a potentially useful smoking prevention and cessation tool. The United States began placing warning labels on cigarette packages in response to requirements documented in the 1965 Cigarette Labeling and Advertising Act (see Studlar, 2002). The purpose of these warnings was to target smokers and alert them about the hazards of smoking cigarettes. However, in 1967, the Federal Trade Commission announced that there was no evidence that they had an effect. The United States eventually addressed this concern by passing the Comprehensive Smoking Education Act of 1984. This act required four new stronger warning labels, which, although dated, are still in use today (Studlar, 2002).

Canada began placing warning labels on cigarette packages in 1988 in response to the passage of the Tobacco Products Control Act (see Studlar, 2002). In 2000, Canada took ground-breaking actions in cigarette-control with the introduction of 16 full-color graphic warning labels. These labels

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take up 50% of the package and include additional information about smoking on the interior (Studlar, 2002). These warnings are more numerous and more detailed than the warnings used in the United States. Like a lot of antismoking messages, the warnings frame smoking in terms of what one may lose by engaging in the behavior—loss-framed. Research in Canada has suggested that these loss-framed messages have motivated smokers to quit, have helped quitters remain smoke-free, and have provided new information about the health consequences of smoking among adults (see Hammond, Fong, McDonald, Brown & Cameron, 2004; Hammond, Fong, McDonald, Cameron, & Brown, 2003; Hammond, McDonald, Fong, Brown, & Cameron, 2004). However, there is limited empirical research on the effects of the warnings on adolescents. Moreover, no research to date has adequately examined the potential effects of both loss- and gain-framed smoking prevention messages on U.S. adolescents. Accordingly, this study addresses the potential effectiveness of graphic Canadian warning labels in preventing smoking initiation and encouraging smoking cessation among adolescents. The study measures adolescents' perceptions of warning labels based on three versions of message-framing. The first version uses Canada's actual warnings, which emphasize the negative consequences of smoking (loss-framed), the second version emphasizes the threat one can *avoid* by not smoking (gain-framed avoidance) and the third emphasizes the *benefits* of not smoking (gain-framed benefits). Given the lack of documented success of the outdated, text-based U.S. warning labels, it is important to discover if Canada's approach is successful among U.S. adolescents.

Research has shown that cigarette package warning labels face a significant problem of irrelevancy among adolescents. When asked to discuss and critique U.S. warning labels, adolescents stated that they did not find them "informative, impressive or relevant" (Crawford et al., 2002, p. 16). Adolescents generally find the warnings to be irrelevant because in their young age, they feel protected from contracting tobacco-related illnesses (Crawford et al., 2002; Grandpre, Alvaro, Burgoon, Miller, & Hall, 2003; Strahan et al., 2002; USDHHS, 1994). Adolescents have also expressed feelings that they will easily be able to quit before they reach old age. Members of a focus group suggested that future warnings be "direct, realistic, factual and strong" (Crawford et al., 2002, p. 17). They felt that the statement "smoking may kill you," was inadequate and suggested replacing the word "may" with "will" (Crawford et al., 2002, p. 17). In addition, they felt that the warnings should be more visible, graphic, and should provide information about the immediate effects of smoking. Some effects mentioned were the unpleasant smell of cigarettes and the discoloration of teeth (Crawford et al., 2002).

Research assessing the effectiveness of warning labels in persuading adolescents to not smoke is somewhat limited. This problem may exist because warning labels in the

United States do not contain information that is particularly relevant to the concerns of adolescents (Crawford et al., 2002). Moreover, it appears as though the U.S. government has made no specific attempt to reach this group through its warning labels. This is particularly troubling considering that the average smoker begins the behavior before reaching the age of 13 (Peracchio & Luna, 1999). Canada's warning labels faced a similar problem up until 2000, when the government introduced its new graphic warning labels. The new warnings have more diverse antismoking messages and include content that may be more relevant to adolescents, such as the effects of smoking on one's appearance.

THEORETICAL FRAMEWORK

Message Framing

Canada's cigarette warning labels use loss-framed messages. However, health-related messages can either focus on the negative consequences of continuing or adopting a behavior—loss-framed, or they can focus on the positive aspects of abstaining from a behavior—gain-framed (Schneider et al., 2001). Interestingly, although antismoking messages tend to emphasize the costs of failing to quit smoking, the literature generally suggests that smoking cessation is better promoted by emphasizing the benefits of quitting (see Rothman & Salovey, 1997; Schneider et al., 2001).

Questions about whether health messages are more effective when they are framed in terms of gains or losses arise from prospect theory (Tversky & Kahneman, 1981). According to this theory, when people focus on potential gains, they are not motivated to take risks or face uncertainty. Rather, they choose a definite gain over a potentially uncertain gain. However, when focusing on a loss, people are more likely to accept risk and uncertainty when the risk includes the possibility of avoiding a loss. When looking at health issues, early detection behaviors, such as breast self-examinations and HIV testing can be associated with high levels of risk. These risks include the possibility of discovering that one is ill. On the other hand, prevention behaviors such as not smoking or wearing sunscreen during periods of exposure to the sun are associated with considerably certain outcomes, including a decreased risk for illness and improved health (Rothman & Salovey, 1997; Schneider, 2006; Schneider et al., 2001). Because smoking prevention and cessation are seen as disease prevention behaviors, this theory suggests that antismoking messages should be more successful if they are framed in terms of gains rather than losses (Rothman & Salovey, 1997; Salovey, Schneider, & Apanovitch, 2002; Schneider et al., 2001; Strahan et al., 2002).

Loss-framed messages. A number of studies have found empirical support for the ideas presented in prospect theory. For example, some studies suggest that loss-framed messages are more effective than gain-framed messages in

promoting detection health behaviors such as breast self-examinations (Meyerowitz & Chaiken, 1987) and mammography use (Banks et al., 1995; Finney & Iannotti, 2002). Meyerowitz and Chaiken (1987) discovered that the loss-framed version of a message advocating breast self-examination among young women was more successful than the gain-framed version. Banks et al., (1995) also found similar results. The researchers used messages intended to persuade women to obtain mammography screening. Results show that women who were exposed to the loss-framed version of the message were more likely to have obtained a mammogram within a year than those who were exposed to the gain-framed version (Banks et al., 1995). Loss-framed messages have also been more successful than gain-framed messages in persuading individuals to engage in illness detection behaviors such as prostate cancer screenings (Cherubini, Rumiati, Rossi, Nigro, & Calabro, 2005), and HIV screenings (Apanovitch, McCarthy, & Salovey, 2003).

Gain-framed messages. A number of message-framing studies looking at prevention health behaviors have also found support for the ideas presented in prospect theory. For example, some studies suggest that gain-framed messages are more effective than loss-framed messages in promoting prevention health behaviors such as sunscreen use (Detweiler, Bedell, Salovey, Pronin, & Rothman, 1999; Rothman, Salovey, Antone, Keough, & Martin, 1993). Detweiler et al. (1999) developed two gain-framed brochures and two loss-framed brochures that attempted to persuade beach-goers to obtain and use sunscreen. In line with the recommendations of prospect theory, it was discovered that both gain-framed messages were more effective than the two loss-framed messages. In particular, participants exposed to the gain-framed messages were more likely to request sunscreen, repeatedly apply it while at the beach, and intend to use sunscreen with a sun protection factor of 15 or higher. Gain-framed messages have also been found to be effective in promoting surgery (see McNeil, Pauker, Sox, & Tversky, 1982; Wilson, Kaplan, & Schneiderman, 1987), and have been found to be more effective than loss-framed messages in encouraging the use of child restraint seats in vehicles to prevent injury or death (see Christophersen & Gyulay, 1981; Treiber, 1986), and encouraging regular physical exercise to prevent future illness (see Robberson & Rogers, 1988).

O'Keefe and Jensen (2006) recently conducted a meta-analysis of 165 studies on gain- and loss-framed messages. The researchers reported that messages advocating prevention health behaviors were more persuasive when they were gain-framed. They conclude that gain-framed appeals should be more effective than loss-framed appeals when advocating a prevention behavior.

Although research addressing the impact of message framing on individuals' smoking-related attitudes and behaviors is limited, we have found two studies addressing

this issue that support the ideas presented in prospect theory. These studies suggest that when looking at a prevention behavior such as smoking cessation, people will be better motivated by gain-framed messages (see Schneider et al., 2001; Steward, Schneider, Pizarro, & Salovey, 2003). Schneider et al. found that when compared to loss-framed messages, gain-framed messages significantly moved smoking-related beliefs, attitudes and behavior toward illness prevention. In particular, nonsmokers exposed to the gain-framed messages felt less tempted to smoke in peer situations, and smokers exposed to the gain-framed messages showed a decrease in their monthly smoking behavior within 6 weeks. (Schneider et al., 2001). However, the Schneider et al. and Steward et al. studies differ from this study in that the researchers looked at adults, rather than adolescents. In addition, Steward et al. looked only at current smokers, particularly individuals who had attempted to quit smoking in the past.

Gain-framed "avoidance" versus gain-framed "benefits". Nearly all research on the framing of health information uses what Rothman and Salovey (1997) refer to as *same consequences manipulation*. This means that the loss frame emphasizes the negative consequences of a behavior and the gain frame emphasizes how one can *avoid* the undesirable outcome. Although rarely utilized, manipulations can also be framed as *different consequences*, whereby the loss frame emphasizes the undesirable outcome that results from continuing the behavior and the gain frame emphasizes the desirable outcome associated with changing one's behavior (Rothman & Salovey, 1997).

In this study, we have used two different versions of gain-framed messages. One version emphasizes the threat one can *avoid* by not smoking (referred to as *gain-framed avoidance*) and the other version emphasizes the pure benefits of not smoking (referred to as *gain-framed benefits*). The gain-framed benefits version was included because we believe that it may more accurately fit the meaning of "gain-framed" than the gain-framed avoidance version.

Research distinguishing between the two types of gain-framed messages is limited. Devos-Comby and Salovey (2002) reported that the empirical research has generally not found any differences between the two ways of operationalizing gain. However, as noted by O'Keefe and Jensen (2006), Devos-Comby and Salovey cited only two studies. Because the research in this area is limited (particularly when looking at the issue of smoking) we have included the two types of gain-framed messages.

The literature provides a great deal of support for the notion that gain-framed messages should be more persuasive than loss-framed messages when addressing the issue of smoking cessation and prevention. Accordingly, the following hypotheses are advanced:

- H1: Adolescents exposed to gain-framed warning labels will have more favorable attitudes toward the

warning than those who are exposed to loss-framed warnings.

- H2: Adolescents exposed to gain-framed warning labels will have more negative attitudes toward smoking than those who are exposed to loss-framed warnings.
- H3: Adolescents exposed to gain-framed warning labels will perceive that the warnings are overall more effective in reducing smoking levels than those exposed to loss-framed warnings.
- H4: Adolescents exposed to gain-framed warning labels will have lower intentions to smoke than those exposed to loss-framed warnings.
- H5: Adolescents exposed to gain-framed warning labels will perceive that these labels are more effective in improving a smoker's ability to quit smoking than those adolescents exposed to loss-framed warnings.

As has been noted previously, there appears to be only one study in the literature addressing differences in the effects of message framing in antismoking messages among smokers and nonsmokers (see Schneider et al., 2001). However, Schneider et al. did not study the effects of message framing on adolescents. Accordingly, the following research questions are advanced:

- RQ1: Which message frame will be most effective in reducing smokers' and nonsmokers' intentions to smoke in the future?
- RQ2: Which message frame will be perceived by smokers and nonsmokers as the most effective in improving a person's ability to quit?
- RQ3: Which message frame will be perceived by smokers and nonsmokers as the most effective in helping a smoker to quit?

METHOD

Participants and Design

High school students ($N = 210$) participated in the study. Participants ranged in age from 15 to 19 years old ($M = 16$; $SD = 0.99$). Thirty-one students were classified as current or regular smokers and 179 were classified as nonsmokers. Forty-four percent of the participants were male and 56% were female. The participants were drawn from a socially and economically diverse public high school in the Midwestern United States.

The study examined the impact of three experimental message-framing conditions on a sample of high school students overall, and then examined the effects of these message frames on adolescent smokers and nonsmokers. The study used a posttest-only comparison group design with random assignment. The experiment investigated the use of warning label message frames on cigarette packages and their effect on adolescents' smoking-related attitudes,

perceptions, and behavioral intentions. The independent variable was message framing (i.e., loss-framed, gain-framed avoidance, gain-framed benefits), and the dependent variables were: (a) attitudes toward the warning, (b) attitudes toward smoking, (c) effectiveness of the warning in reducing smoking levels, (d) intentions to smoke in the future, (e) effectiveness of the warning in improving one's ability to quit smoking, and (f) effectiveness of the warning in increasing the likelihood of a smoker quitting. The first round of analyses used a one-way analysis of variance (ANOVA) to assess difference in the dependent variables among participants in the three message frame conditions. The second round of analyses looked at differences between smokers and nonsmokers, using a 2 (Smoking Status: smoker or non-smoker) \times 3 (Message Frame: loss, gain avoidance, gain benefits) between-subjects design.

Procedure

In each questionnaire, adolescents were exposed to two different cigarette packages, one package featuring an image of teeth and one package featuring an image of an older man breathing. Participants completed questionnaire items immediately after viewing each cigarette package. For example, adolescents viewed the first package featuring an image of an older man breathing—which was either loss-framed, gain-framed avoidance, or gain-framed benefits—and then completed the questionnaire items pertaining to that cigarette package and warning. Adolescents then viewed the subsequent cigarette package featuring an image of teeth—which was either loss-framed, gain-framed avoidance, or gain-framed benefits—and then completed the questionnaire items pertaining to that cigarette package and warning. Thus, each participant viewed both cigarette packages (i.e., man breathing and teeth), but each participant was randomly assigned to only one of the three message framing conditions.

Stimulus Materials

Stimuli consisted of full-color photographs (4.1" \times 3.5") of cigarette warning labels.¹ They were the actual size of the warning labels currently being used in Canada. Each participant was exposed to two warning labels from one of three message-framing conditions: loss-framed, gain-framed avoidance, or gain-framed benefits. Each image was placed on a generic cigarette package created by the researchers to avoid brand bias from the participants. Moreover, it prevented the students from being exposed to actual cigarette brands.

Loss-framed warnings. A particular type of loss-framed message is one that uses a fear appeal. A fear appeal is a persuasive message that attempts to scare people by describing frightening things that may happen to them if they

¹Copies of the stimulus materials can be obtained from the first author.

do not follow the recommendations provided in the message (Witte, 1992). Some researchers agree that when creating antismoking messages targeting children and adolescents, messages using fear appeals should generally be avoided. A major point of concern in the use of fear appeals targeting youth is that the messages will create a “dare” reaction (Backer, Rogers, & Sopory, 1992). However, when used carefully, there are several ways in which the use of fear appeals targeting adolescents can be successful. Although fear appeals based on the risk of injury or death are generally not effective with adolescents, the fear of rejection, social embarrassment, and fear of being caught by parents all have the potential for greater effects. Fear appeals based on the present threat of smoking, such as the bad smell, are more likely to be successful than those appealing to future threats, such as cancer or death (Backer et al., 1992).

The loss-framed condition consisted of two different warning labels that are currently being used in Canada. One of the loss-framed messages focuses on a visible and potentially embarrassing threat. The warning says, “cigarettes cause mouth diseases” and shows a mouth with yellow teeth and blackened gums. The other graphic warning was intentionally used to provide consistency with the variety of warning labels used in Canada. This warning label shows an older man coughing and holding an oxygen mask. The text reads “cigarettes leave you breathless.”

Gain-framed avoidance and gain-framed benefits warnings. To test the effects of the different message frames on adolescents, two Canadian cigarette warning labels were digitally modified using computer software. These modifications consisted of positive images and text, making the warnings gain-framed. As noted previously, rather than simply testing the difference between gain- and loss-framed messages, the gain-framed warning labels in this study were categorized as being “gain-framed avoidance” or “gain-framed benefits.” The loss-framed warning labels and the gain-framed avoidance warning labels contain the same antismoking messages, but they are framed differently. In the gain-framed avoidance version, the messages discuss the benefits of not smoking by describing the threat the individual can *avoid* by following the recommendations in the message. The warnings state, “by not smoking you can avoid mouth diseases,” and “if you quit smoking you reduce your risk of breathing difficulties.” The gain-framed benefits warnings present the same general messages as the warnings in the two other groups. However, the warnings required slight modifications to emphasize the pure benefits of not smoking, while eliminating any negative or frightening words. For example, all negative words, such as “mouth diseases” and “emphysema” were removed. The gain-framed benefits warnings used in the study state, “by not smoking you improve your health and appearance,” and “if you quit smoking you will breathe easier.”

Measures

The measurement instrument collected information for the six dependent variables: (a) attitudes toward warning labels, (b) attitudes toward smoking, (c) perceived effectiveness in reducing overall smoking levels, (d) intentions to smoke, (e) perceived effectiveness of improving one’s ability to quit, and (f) likelihood of a smoker quitting.

For each stimulus warning label, participants were asked to provide their attitude toward the warning. This index was created by calculating the mean scores of eleven, 7-point semantic differential scales: boring–interesting, bad–good, negative–positive, useless–useful, worthless–valuable, poor–outstanding, not for me–for me, weak–strong, not appealing–appealing, not attractive–attractive, and not likeable–likeable. Cronbach’s alphas were computed for each cigarette package: older man breathing image ($\alpha = .90$), and teeth image ($\alpha = .92$). These semantic differential scales were also used to measure attitudes toward smoking. Cronbach’s alphas were computed for each cigarette package: older man breathing image ($\alpha = .96$), and teeth image ($\alpha = .96$). These scales have been used successfully in previous research (Appiah, 2001a, 2001b).²

Intentions to smoke in the future was measured by a question asking, “In the next year, how likely is it that you will smoke one or more cigarettes?” This question has been used successfully in past research (Carvajal, Hanson, Downing, Coyle, & Pederson, 2004). It was measured using a 7-point Likert-type scale ranging from 1 (*not at all likely*) to 7 (*extremely likely*).

Effectiveness of the warning label in improving a smoker’s ability to quit was measured with an item asking participants to indicate the extent to which they believed that the warning label would improve a smoker’s ability to quit smoking. Effectiveness of the warning label in increasing the likelihood of a smoker quitting was measured with an item asking participants to indicate the extent to which they

²To further confirm the internal reliability of these attitude scales, a principal components factor analysis with a Varimax rotation was conducted. For the attitude toward the warning label items associated with the older man image, two factors emerged. The first factor yielded an eigenvalue of 5.83, accounting for 53% of the item variance, whereas the second factor yielded an eigenvalue of 1.11, accounting for 10% of the item variance. Similarly, the attitude toward the warning label items associated with the teeth image revealed two factors. The first factor yielded an eigenvalue of 6.31, accounting for 57% of the variance, whereas the second factor yielded an eigenvalue of 1.87, accounting for 17% of the variance. However, the attitude toward smoking items for the image of the older man revealed a single-factor solution with an eigenvalue of 7.87, accounting for 72% of the variance. Similarly, the attitude toward smoking items for the image of teeth revealed a single-factor solution with an eigenvalue of 8.00, accounting for 73% of the variance. Therefore, given the low eigenvalues for the second factors for attitude toward the warning labels, the single-factor loadings for attitude toward smoking, the high Cronbach’s alphas across all four indexes, past research using these attitude items to measure one dimension, and the advantage of keeping the measurement composition consistent across all four scales, it seemed reasonable to use the 11 semantic differential items to represent one dimension for each of the four scales.

believed the warning would increase the likelihood of a smoker quitting. These items were adapted from Hammond, Fong, et al. (2004) and have been successfully used in previous research. Effectiveness of the warning label in reducing overall smoking levels was measured with an item asking participants to indicate how effective the warning would be in reducing overall smoking levels. Each of these three items was measured using a 7-point Likert-type scale ranging from 1 (*not at all*) to 7 (*extremely likely*).

These last three items were asked in terms of adolescents' perceptions of how the warnings would influence others rather than themselves for two reasons. First, it was necessary to ask the questions this way because the study included both smoking and nonsmoking adolescents and individuals in both groups were given identical questionnaires. For some items, it would not make sense to ask nonsmokers about the effects of the warnings on them personally. It was of interest to study nonsmokers because their perceptions and attitudes toward the warnings may provide information about how the warnings may serve as a smoking prevention tool. Second, the items were asked in terms of how the warnings would influence others rather than themselves out of concern of a third-person effect (Davidson 1983; 1996). In particular, there was concern that young people would report that the warnings would not impact themselves, but report that others like them would be impacted. A strength of this study is that we ask participants their perceptions of how the warnings affect them personally, as well as their perceptions of how the warnings will influence others.

Current smoking status was assessed by asking the participants how many cigarettes they had smoked within the past 30 days. Carvajal et al. (2004) define a current smoker as one who has smoked one or more cigarettes in the past 30 days.

Perceptions of health risks and benefits were measured with questions asking (a) how accurately the participants believed that the warning label depicted the health risks of smoking (adapted from Hammond, McDonald, et al., 2004), and (b) how accurately the warning depicted the benefits of *not* smoking. Each item was measured using a 7-point Likert-type scale. These items served as a manipulation check, as it was expected that participants would perceive that the loss-framed messages would more accurately depict the health risks of smoking and that the gain-framed messages would more accurately depict the benefits of *not* smoking.

RESULTS

The first phase of the analysis conducted one-way ANOVAs to determine if adolescents' attitudes toward the warning label and smoking differed based on whether the warning was loss-framed, gain-framed avoidance, or gain-framed benefits. The second phase of the analyses used two-way

ANOVA to determine which message frame was perceived as most effective by both adolescent smokers and nonsmokers.

Manipulation Check

To better ensure that the loss-framed warning labels communicated a message that focused on the negative consequences of smoking and the gain-framed warning labels focused on the positive aspects of abstaining from the behavior, a manipulation check was conducted. A one-way ANOVA indicated a significant difference in participants' perceptions of how accurately the warning labels demonstrated the negative health consequences of smoking, $F(2, 207) = 10.74, p < .001, \eta^2 = .09$, for the warning label featuring an older man breathing. Post hoc comparisons demonstrated that the loss-framed warning label ($M = 4.70, SD = 1.65$) was perceived as more accurately demonstrating the health risks of smoking than both the gain-framed avoidance warning label ($M = 3.88, SD = 1.58$) and the gain-framed benefits warning label ($M = 3.45, SD = 1.62$), all comparisons statistically significant ($p < .01$). This was also consistent for the warning label featuring teeth, $F(2, 207) = 46.56, p < .001, \eta^2 = .31$. This demonstrated that the loss-framed warning label ($M = 5.32, SD = 1.67$) was perceived as more accurately demonstrating the health risks of smoking than both the gain-framed avoidance warning label ($M = 3.56, SD = 1.52$) and the gain-framed benefits warning label ($M = 2.82, SD = 1.52$), all comparisons significant at $p < .001$.

Second, a one-way ANOVA indicated a significant difference in participants' perceptions of how accurately the warning labels depicted the benefits of *not* smoking, $F(2, 207) = 3.49, p < .05, \eta^2 = .03$, for the breathing warning. This demonstrated that both the gain-framed avoidance warning label ($M = 3.73, SD = 1.72$) and the gain-framed benefits warning label ($M = 3.79, SD = 1.72$) were perceived as more accurately depicting the benefits of not smoking than the loss-framed warning label featuring the older man breathing ($M = 3.11, SD = 1.63, p < .05$). Adolescents demonstrated no statistically significant differences in their beliefs of how accurately the teeth warning label depicted the benefits of not smoking based on the type of message-frame.

It should be noted that results indicated that there were no significant differences between the gain-framed avoidance and gain-framed benefits versions of the warning labels. This is consistent with evidence from previous studies suggesting there are no differences between these types of gain-framed messages (Devos-Comby & Salovey, 2002; O'Keefe & Jensen, 2006).

Test of Hypotheses

Attitudes toward warning labels. H1 predicted that adolescents exposed to gain-framed warning labels would

have more favorable attitudes toward the warnings than those exposed to loss-framed warnings. The ANOVA indicated a significant difference, $F(2, 207) = 3.43, p < .05, \eta^2 = .03$, in adolescents' responses for the breathing warning (see Table 1). Follow-up analyses using pairwise comparisons demonstrated that, unexpectedly, adolescents viewed the loss-framed warning label more favorably ($M = 3.74, SD = 1.13$) than the gain-framed avoidance warning label ($M = 3.27, SD = 1.04, p < .05$), but not more favorably than the gain-framed benefits warning ($M = 3.39, SD = 1.19, p < .05$). Similarly, when examining adolescents' responses to the warning label depicting teeth, an ANOVA indicated a significant difference $F(2, 207) = 4.62, p < .05, \eta^2 = .04$ (see Table 2). Follow-up analyses using pairwise comparisons demonstrated that adolescents rated the loss-framed warning label more favorably ($M = 4.42, SD = 1.31$) than both the gain-framed avoidance warning label ($M = 3.84, SD = 1.44, p < .01$) and the gain-framed benefits warning label ($M = 3.80, SD = 1.33, p < .05$).

Attitudes towards smoking. H2 predicted that adolescents exposed to gain-framed warning labels would have more negative attitudes toward smoking than those exposed to loss-framed warnings. The ANOVA indicated no significant differences in adolescents' responses to both the breathing and teeth warning labels. It should be noted that virtually all of the respondents held negative attitudes toward smoking; there was a basement effect for this variable, which left little room for downward movement.

TABLE 1
Adolescents' Mean and Standard Deviation Scores for Warning Label 1 (Breathing)

| | Loss-Framed | Gain-Framed Avoidance | Gain-Framed Benefits |
|---------------------------------|-------------------|-----------------------|----------------------|
| Attitudes toward warning labels | | | |
| <i>M</i> | 3.74 _a | 3.27 _b | 3.39 |
| <i>SD</i> | 1.13 | 1.04 | 1.19 |
| Attitudes toward smoking | | | |
| <i>M</i> | 1.44 | 1.66 | 1.51 |
| <i>SD</i> | 0.91 | 1.05 | 0.88 |
| Reduce smoking levels | | | |
| <i>M</i> | 2.93 | 2.62 | 2.47 |
| <i>SD</i> | 1.12 | 0.95 | 1.10 |
| Intentions to smoke | | | |
| <i>M</i> | 2.03 | 2.23 | 2.25 |
| <i>SD</i> | 1.91 | 2.07 | 2.20 |
| Improve ability to quit | | | |
| <i>M</i> | 2.87 | 2.44 | 2.46 |
| <i>SD</i> | 1.34 | 1.28 | 1.31 |

Note. Means with different subscripts in the same row differ significantly from each other at $p < .05$.

TABLE 2
Adolescents' Mean and Standard Deviation Scores for Warning Label 2 (Teeth)

| | Loss-Framed | Gain-Framed Avoidance | Gain-Framed Benefits |
|---------------------------------|-------------------|-----------------------|----------------------|
| Attitudes toward warning labels | | | |
| <i>M</i> | 4.42 _a | 3.84 _b | 3.80 _b |
| <i>SD</i> | 1.31 | 1.44 | 1.33 |
| Attitudes toward smoking | | | |
| <i>M</i> | 1.41 | 1.64 | 1.51 |
| <i>SD</i> | 0.84 | 1.10 | 0.89 |
| Reduce smoking levels | | | |
| <i>M</i> | 4.18 _a | 2.81 _b | 2.64 _b |
| <i>SD</i> | 1.73 | 1.34 | 1.37 |
| Intentions to smoke | | | |
| <i>M</i> | 1.83 | 2.17 | 2.15 |
| <i>SD</i> | 1.66 | 2.09 | 2.06 |
| Improve ability to quit | | | |
| <i>M</i> | 3.86 _a | 2.80 _b | 2.50 _b |
| <i>SD</i> | 1.91 | 1.41 | 1.29 |

Note. Means with different subscripts in the same row differ significantly from each other at $p < .05$.

TABLE 3
Adolescents' Mean and Standard Deviation Responses to Cigarette Warning Labels: Smokers Versus Nonsmokers

| | Loss-Framed | Gain-Framed Avoidance | Gain-Framed Benefits |
|---------------------------------|-------------------|-----------------------|----------------------|
| Smokers | | | |
| Intentions to smoke | | | |
| <i>M</i> | 4.90 _a | 6.55 _b | 5.80 |
| <i>SD</i> | 2.18 | 0.69 | 2.10 |
| Improving one's ability to quit | | | |
| <i>M</i> | 4.70 _a | 2.18 _b | 2.50 _b |
| <i>SD</i> | 2.00 | 1.54 | 1.27 |
| Likelihood a smoker will quit | | | |
| <i>M</i> | 4.80 _a | 2.09 _b | 2.20 _b |
| <i>SD</i> | 1.87 | 1.45 | 1.03 |
| Nonsmokers | | | |
| Intentions to smoke | | | |
| <i>M</i> | 1.33 | 1.37 | 1.52 |
| <i>SD</i> | 0.83 | 0.94 | 1.25 |
| Improving one's ability to quit | | | |
| <i>M</i> | 3.72 _a | 2.92 _b | 2.50 _b |
| <i>SD</i> | 1.88 | 1.37 | 1.30 |
| Likelihood smokers will quit | | | |
| <i>M</i> | 3.72 _a | 2.63 _b | 2.41 _b |
| <i>SD</i> | 1.76 | 1.31 | 1.26 |

Note. Means with different subscripts in the same row differ significantly from each other at $p < .05$.

Effective in reducing smoking. H3 predicted that adolescents would perceive that gain-framed warning labels would be more effective in reducing smoking levels than loss-framed warnings. There were no significant differences in adolescent responses to the warning labels featuring the man breathing. However, there was a significant difference in adolescents' responses to the warnings featuring teeth, $F(2, 207) = 22.40, p < .001, \eta^2 = .18$. Follow-up analyses using pairwise comparisons demonstrated that adolescents believed that the loss-framed warning label featuring the teeth ($M = 4.18, SD = 1.73$) would be more effective in reducing overall smoking levels than the gain-framed avoidance warning ($M = 2.81, SD = 1.34, p < .001$) and the gain-framed benefits warning ($M = 2.64, SD = 1.37, p < .001$).

Intentions to smoke. H4 predicted that adolescents exposed to the gain-framed warnings would have lower intentions to smoke in the future than those exposed to loss-framed warnings. No significant differences were found for either the breathing or teeth warnings.

Ability to quit. Finally, H5 predicted that adolescents would perceive that the gain-framed warning labels would be more effective in improving a smoker's ability to quit smoking than the loss-framed warnings. There was no significant difference in adolescent responses to the warning labels featuring the man breathing. However, there was a significant difference in adolescents' responses to the warnings featuring teeth, $F(2, 207) = 14.57, p < .001, \eta^2 = .12$. Follow-up analyses demonstrated that adolescents perceived that the loss-framed warning would be more effective in improving a person's ability to quit smoking ($M = 3.86, SD = 1.91$) than either the gain-framed avoidance version ($M = 2.80, SD = 1.41; p < .001$) or the gain-framed benefits version ($M = 2.50, SD = 1.29; p < .001$).

Smokers Versus Nonsmokers

The second phase of analyses used a 2 (Smoking Status: smoker, nonsmoker) \times 3 (Message Framing: loss-framed, gain-framed avoidance, gain-framed benefits) between-subjects design. Two-way ANOVAs were conducted to determine which message frame was perceived as most effective by smokers and nonsmokers (see Figure 3). Only findings from the warning label featuring teeth were significant; therefore, only significant results pertaining to the teeth warning label will be discussed.

Intentions to smoke. A two-way ANOVA was conducted to determine which message frame would be perceived as the most effective in reducing both smokers' and nonsmokers' intentions to smoke in the future. Significant main effects were found for version of the warning label, $F(2, 204) = 4.90, p < .01$, and for smoking status,

$F(2, 204) = 377.44, p < .001$. However, this was qualified by a significant interaction $F(2, 204) = 4.40, p < .01, \eta^2 = .04$. A marginally significant, $F(2, 28) = 2.29, p = .10, \eta^2 = .12$, follow-up analysis using one-way ANOVA to compare the simple means indicated that smokers were less likely to intend to smoke after being exposed to the loss-framed warnings ($M = 4.90, SD = 2.18$) than they were after being exposed to the gain-framed avoidance warning ($M = 6.55, SD = .69, p < .05$).

Ability to quit. A two-way ANOVA was conducted to determine which message frame would be perceived by smokers and nonsmokers as the most effective in improving a person's ability to quit. A significant main effect was found for version of the warning label $F(2, 204) = 13.61, p < .001$. This suggests that the loss-framed version of the warning label was perceived by adolescents as being more effective in improving a person's ability to quit smoking ($M = 4.21$) than either the gain-framed avoidance version ($M = 2.55$) or the gain-framed benefits version ($M = 2.50$). However, this main effect is qualified by a marginally significant interaction between warning label version and smoking status, $F(2, 204) = 2.78, p = .068, \eta^2 = .03$. Follow-up analyses demonstrated that smokers were significantly, $F(2, 28) = 7.26, p < .001, \eta^2 = .34$, more likely to believe loss-framed warnings were more effective in improving a person's ability to quit ($M = 4.70, SD = 2.00$) than either the gain-framed avoidance warning ($M = 2.18, SD = 1.54, p < .001$) or the gain-framed benefits warning ($M = 2.50, SD = 1.27, p < .01$). Similarly, nonsmokers were significantly, $F(2, 176) = 9.67, p < .001, \eta^2 = .10$, more likely to believe that the loss-framed warnings were more effective in improving a person's ability to quit ($M = 3.72, SD = 1.88$) than either the gain-framed avoidance warning ($M = 2.92, SD = 1.37, p < .01$) or the gain-framed benefits warning ($M = 2.50, SD = 1.30, p < .001$).

Likelihood smoker will quit. Finally, a two-way ANOVA was conducted to determine which message frame would be perceived by smokers and nonsmokers as the most effective in helping a smoker to quit. A significant main effect was found for warning label version, $F(2, 204) = 19.92, p < .001$. This suggests that the loss-framed version of the warning label was perceived by all adolescents as being more effective in persuading a smoker to quit ($M = 4.26$) than both the gain-framed avoidance ($M = 2.36$) and the gain-framed benefits warnings ($M = 2.31$). However, this main effect was qualified by a significant interaction, $F(2, 204) = 3.00, p < .05, \eta^2 = .03$. Follow-up analyses demonstrated that smokers were significantly, $F(2, 28) = 10.80, p < .001, \eta^2 = .44$, more likely to believe that the loss-framed warnings would be more effective in helping a smoker to quit ($M = 4.80, SD = 1.87$) than either the gain-framed avoidance warning ($M = 2.09, SD = 1.45, p < .001$) or the gain-framed benefits warning ($M = 2.20, SD = 1.03$,

$p < .001$). Similarly, nonsmokers were significantly, $F(2, 176) = 13.71, p < .001, \eta^2 = .14$, more likely to believe loss-framed warnings would be more effective in helping a smoker to quit ($M = 3.72, SD = 1.76$) than either the gain-framed avoidance warning ($M = 2.63, SD = 1.31, p < .001$) or the gain-framed benefits warning ($M = 2.41, SD = 1.26, p < .001$).

DISCUSSION

This study attempted to test whether graphic warning labels on cigarette packages could effectively influence adolescents' smoking-related beliefs, attitudes, and behavioral intentions. This research extends previous studies on smoking by examining graphic warning labels' smoking prevention and cessation potential on adolescents—a group that has recently shown an increase in smoking levels (Krugman, Fox, & Fisher, 1999). This study also extends past work on message framing (e.g., Rothman & Salovey, 1997) by using three different message frames (i.e., loss-framed, gain-framed avoidance, and gain-framed benefits) rather than using simply two (loss-framed, gain-framed). Although there were no differences between the two types of gain-framed messages, the results contribute to the literature by providing additional evidence that these types of message frames may not differ in terms of their effectiveness.

Adolescents were randomly assigned to view one of the three different message frames for each of the two warning labels (i.e., older man breathing and teeth). The first graphic warning label depicting an older man may not have been as relevant to an adolescent audience given that teenagers may not identify with this individual, particularly with the long-term health consequences of smoking depicted in the warning. However, the results from this warning were still informative and yielded some significant findings. Further, these results indicate the importance of including content in antismoking messages that is relevant to young people. Because the results of the teeth warning label were stronger than the results of the warning label featuring the older man, it appears as though the participants viewed the teeth warning label to be more relevant. This is in line with previous research suggesting that young people are concerned about the effects of smoking on their teeth (Crawford et al., 2002).

Results for the warning label featuring the older man breathing indicate that adolescents viewed the loss-framed warning label more favorably than they did the gain-framed avoidance warning label. Also, adolescents believed that health risks were more accurately depicted in the loss-framed message than either gain-framed version. Moreover, the results showed that adolescents believed that the gain-framed message more accurately depicted the benefits of not smoking than did the loss-framed warning.

The findings from the second cigarette warning label depicting teeth were more substantial. This may be in part because adolescents can relate to and may feel susceptible to short- and long-term health consequences of smoking on their teeth. The results indicated that adolescents rated the loss-framed warning label more favorably than either the gain-framed avoidance or gain-framed benefits warning labels. They also found that health risks were more accurately depicted in the loss-framed warning than either gain-framed version. Adolescents also believed that loss-framed warnings vis-à-vis gain-framed warnings were more likely to reduce overall smoking levels and enhance the likelihood smokers would quit.

Some particularly interesting results are found between smokers and nonsmokers. Although the sample of smokers was quite small, the findings provide some evidence of the potential power of loss-framed warning messages on smokers. The results for the warning labels depicting teeth showed that smokers and nonsmokers responded more favorably to loss-framed warning labels than gain-framed warnings. Also noteworthy is that smokers indicated lower intention to smoke in the future after being exposed to the loss-framed warning than they did when exposed to the gain-framed avoidance warning.

These findings demonstrate the potentially strong effects of using graphic warning labels on cigarette packages. Countries such as Canada, Australia, Brazil, Singapore, Thailand, Uruguay, and Venezuela have all adopted stringent policies requiring the placement of graphic warning labels on cigarette packages within the last 6 years (Physicians for a Smoke-Free Canada, 2006). In addition, the European Union has developed 42 different graphic cigarette warning labels that may be voluntarily placed on packages by member states (see Willemsen, 2005). Unfortunately, the United States continues to use the same outdated text-based warning labels, which have shown no evidence of being effective in reducing smoking levels. The findings from this study seem to suggest that new graphic warning labels can have a positive influence on adolescents, particularly when labels use loss-framed messages. These findings are quite important, given that graphic warning labels have been criticized because they were expected to cause smokers to avoid warnings, and possibly lead to other unanticipated adverse effects (Hammond, Fong, et al., 2004). This study seems to contradict these expectations and demonstrates that loss-framed graphic warning labels may be an effective tool in both smoking prevention and smoking cessation efforts aimed at adolescents. In fact, the findings of this study are consistent with studies on Canadian (Hammond, Fong, et al., 2004) and European (Willemsen, 2005) samples that have shown that graphic warning labels have a positive effect on nonsmokers and smokers. Like previous work, the loss-framed warnings seem to make cigarettes less attractive, particularly for smokers, which clearly points out that U.S. legislators should not be reluctant to adopt graphic warnings

out of concern that such labels could have a negative effect on youth.

The results of this study were in the opposite direction of the hypotheses. In addition, they seem to contradict some of the ideas presented in prospect theory (Tversky & Kahneman, 1981), and some of the empirical findings in the literature on message framing because we did not find evidence that gain-framed messages are more attractive or effective among adolescent smokers and nonsmokers. However, we argue that the findings are actually not entirely surprising for the following reasons. First, although a number of message framing studies have looked at prevention health issues, only a few have looked specifically at smoking prevention and smoking cessation. Other prevention health issues studied include sunscreen use (Detweiler et al., 1999), regular physical exercise (Robberson & Rogers, 1988), and the use of child restraint seats (Treiber, 1986), to name a few. However, the results of these studies cannot be easily applied to the prevention behaviors of smoking cessation and prevention, as these types of behaviors are clearly unique. Although all of these behaviors fall into the category of "prevention," the addictiveness of smoking, as well as the cultural and social factors that may encourage its use (particularly among adolescents), suggests that we should apply the results of these other studies to the issue of smoking with great caution.

Second, although several studies looking specifically at the issue of smoking have found support for the use of gain-framed messages (see Schneider et al., 2001; Steward et al., 2003), these studies looked exclusively at adults, and primarily those who were currently smoking. This sample of smoking and nonsmoking high school students is a group that is greatly understudied. Due to the uniqueness of adolescents, it is not entirely surprising that they may respond differently than adults to the warning labels.

Finally, this study brings up some important questions about how well prospect theory applies to the issue of smoking, particularly when looking at adolescents. According to prospect theory, smoking prevention and cessation are seen as prevention behaviors that are "unrisky" because these behaviors are associated with certain outcomes of decreased risk for illness or improved health. However, there is a great deal of evidence suggesting that adolescents are not concerned about the health consequences of smoking (Crawford et al., 2002; Strahan et al., 2002; USDHHS, 1994). Accordingly, this "certain" outcome of a decreased risk for illness may be quite irrelevant to young people. Further, on the contrary, from the perspective of an adolescent who is either currently smoking or at a high risk of smoking initiation, *not* smoking may be seen as somewhat risky and uncertain because such individuals may be concerned about their image, the perception of their peers, and possibly being ostracized by peer group members for not engaging in behavior that is consistent with other group members. Accordingly, this study illustrates

the potential problem of using the reasoning of prospect theory and characterizing behaviors based on their level of risk or uncertainty. As this study seems to demonstrate, not smoking may be perceived as risky or unrisky to different individuals. O'Keefe and Jensen (2006) also note this issue in their recent meta-analysis of message framing.

Limitations

As with any investigation, several limitations should be noted. One limitation of the study is that only adolescents' behavioral intentions were measured, not their actual behaviors. However, the significant relationship between behavior and behavioral intentions has been well documented (e.g., Ajzen, 1991). Unfortunately, this relationship becomes more complicated when dealing with an addictive behavior like smoking because it is not under complete volitional control (Ajzen, 1991). Accordingly, although the smokers in the study had significantly higher intentions to quit when exposed to the loss-framed messages, we cannot assume that they will actually be able to quit. We can, however, assume that the loss-framed warning labels are effective in motivating one to consider quitting. Another limitation of the study was the inadequate number of underage smokers. Although the study had a large number of adolescent respondents in general, it could have been greatly improved with a larger number of smokers. Due to the small number of respondents who smoked, the results based on smokers must be considered with caution.

Directions for Future Research

Results of this study suggest that loss-framed warning labels can be effective in motivating adolescent smokers to quit and in reinforcing antismoking beliefs and attitudes among nonsmoking adolescents. However, differences in the effects of message framing among smokers and nonsmokers are still not well understood. Future research should address this concern by replicating the study with a larger number of underage smokers. In addition, this study should be repeated using adult participants to identify differences in how adolescents and adults respond to the message framing of warning labels.

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