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**EFFECTS OF VISUAL IMAGES IN
HEALTH MESSAGE FRAMING**

A Thesis in

Media Studies

by

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ABSTRACT

This study examined the effectiveness of visual images and message frames in communicating health risks. Specifically, an experiment ($N = 95$) was conducted to explore the effectiveness of message frames and message formats on persuasiveness (attitude toward the message, perceived effectiveness, and behavioral intention), fear, and cognitive processing by utilizing a 2 (message frames: gain vs. loss) \times 2 (message formats: verbal vs. visual) \times 2 (health issues: dental flossing vs. sunscreen use) mixed factorial design. Results indicate that significant message frames \times message formats interaction effects on fear and persuasiveness were found with the negative visual conditions generating more fear and persuasiveness. The effects of the message formats on cognitive processing (systematic or heuristic) were not significant. Mediation tests showed that fear mediated the relationship between message format and persuasion. These results suggest that increased fear as generated by negative visual images led to more persuasion rather than increased processing of the messages. Implications and limitations of this study, and the directions for future study were discussed.

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INTRODUCTION

Communication scholars have long sought the most effective message features for persuasion. In health communication, message features such as metaphors, anecdotal messages, figurative language, evidence types, and message framing have been examined for their persuasive effects. Of particular interest to this study is message framing research, which investigates how message effectiveness varies along with methods of presenting possible outcomes of health-related behaviors (Rothman, Martino, Bedell, Detweiler, & Salovey, 1999). Message framing research generally presents either positive or negative outcomes of health-related behaviors to an audience and then examines the different message evaluations corresponding to the different outcomes emphasized in the messages. For example, if people who read or view a positively framed message (a message emphasizing potential positive outcomes of certain health-related behaviors) make different message evaluations from those who read or view a negatively framed message (emphasizing potential negative outcomes), this different message evaluation supposedly results from the contrast in the health outcomes presented in the messages.

There is a body of research on health framing effects, and this data depicts fairly consistent results (Rothman, Bartels, Wlaschin, & Salovey, 2006). However, recent meta-analyses (O'Keefe & Jensen, 2006, 2007, 2008) showed that framing effects did not differ significantly, and that, even in cases of statistical significance, the effect size was quite small. One of the reasons behind these differing results seems to be that previous studies have not paid attention to the potential influences of other elements embedded in framed messages, such as the use of visuals in addition to text.

Indeed, previous studies have employed various media formats in health message framing effect research, including print advertisements and video clips containing both verbal and visual information (e.g., brochures in Detweiler, Bedell, Salovey, Pronin, & Rothman, 1999; McKee et al., 2004; video clips in Apanovitch, McCarthy, & Salovey, 2003; and print ads in Lee & Aaker, 2004). Insofar as visual images can enhance the meanings of verbal texts (Messaris, 1997), the presence of visual images may influence message recipients' evaluations of framed messages. For example, when message recipients read a negatively framed message about skin cancer with an image of the affected areas, people may get a vivid example of health outcomes caused by failing to follow the message's recommendations, whereas a verbal warning alone may have less impact. Therefore, their evaluations of a health message with visuals may be different from those of plain verbal text.

Despite their potential influence on the message evaluations and persuasion, the effects of visual images have not been examined adequately. When designing framed health messages, previous researchers have mainly focused on the underlying mechanism of different message evaluations caused by verbal variations; they have not discriminated between plain verbal texts and verbal texts with visual images and have not examined relative effectiveness. Furthermore, because virtually all contemporary health messages contain visual images, it is essential to examine how visual images affect overall message evaluations.

To this point, only one study (Schneider et al., 2001) has examined the impacts of visuals in health message framing for messages with video clips. Though this study

examined how message framing effects were enhanced by visual materials with corresponding audio materials, the researchers did not measure the pure effects of visuals. Because they did not compare the effects of plain verbal messages with those of verbal-visual messages, the extent of the influence of visuals in message framing effects is still unresolved. Thus, this study aims to contribute to framing research by examining how framed messages are evaluated differently due to the presence of visual images. By comparing the persuasive effects of messages of plain verbal texts and of verbal texts with embedded visual images, this study will investigate whether the presence of visuals affects message recipients' attitudes toward a health message, perceived effectiveness about a message, and behavior intentions.

Along with examining the effects of visual images in health message framing, this study further attempts to investigate the mediational role of message processing or fear on persuasion. A negative visual image is expected to arouse more fear than a solely verbal text, whereas a solely verbal text will likely stimulate more cognitive message processing. Thus, the persuasive results will be varied according to the extent to which people will be influenced by fear versus cognitive message processing. The present study aims to discover, therefore, whether increased message processing or increased fear will mediate the relationship between a health message and effective persuasions.

In the following section, previous literature is reviewed to introduce the theoretical background, research hypotheses, and research question for this study. Broadly, three areas of research are reviewed—message framing effect, fear arousal, and visual information processing.

LITERATURE REVIEW

Message framing effects

In health communication, message framing indicates “the emphasis in the message on the positive or negative consequences of adopting or failing to adopt a particular health-relevant behavior” (Salovey, Schneider, & Apanovitch, 2002, p. 392). The positive or negative consequences have been presented mostly in terms of gain versus loss framing (for a review; Edwards, Elwyn, Covey, Matthews, & Pill, 2001). In gain framing, messages emphasize the advantages of performing recommended health-related behaviors: “if you follow the recommendation, you will *have advantages* (or you will *avoid disadvantages*).” In contrast, loss-framed messages highlight the disadvantages of failing to accept the recommendation: “if you do not follow the recommendation, you will *have disadvantages* (or you will *not achieve advantages*).”

Message framing effects have been explained by several theoretical perspectives, such as prospect theory, negativity bias, positive cue, fear arousal, and the elaboration likelihood model (Smith & Petty, 1996). Among these perspectives, prospect theory is the most frequently adopted theoretical background.

According to prospect theory, people make different decisions according to their risk perceptions of situational outcomes (Tversky & Kahneman, 1981). The risk perception in prospect theory was operationalized as the perception of certainty that a particular outcome will occur, where participants were asked to choose either a certain outcome or an uncertain outcome. Tversky and Kahneman (1981) employed a hypothetical disease that would kill 600 people and asked participants to choose one of

two plans that could relieve the situation. Plan A contained a certain outcome (a non-risky solution), whereas Plan B contained an uncertain outcome (a risky solution). Plan A was presented to participants as either gain framing (“If Plan A is adopted, 200 people will be saved.”) or loss framing (“If Plan A is adopted, 400 people will die.”). Likewise, Plan B was presented as either gain framing (“If Plan B is adopted, there is a one-third probability that 600 people will be saved and a two-thirds probability that no people will be saved.”) or loss framing (“If Plan B is adopted, there is a one-third probability that nobody will die and a two-thirds probability that 600 people will die.”). Throughout these four differently framed messages, the level of risk and message framing were different, but the possible outcomes were identical (no matter what plan is adopted, 200 people will be saved and 400 will not be saved). The findings of this experiment showed that participants preferred Plan A (the non-risky solution) when they read the gain-framed message, whereas participants preferred Plan B (the risky solution) when they read the loss-framed message.

Tversky and Kahneman’s (1981) research suggests that situational decisions depend on perceptions of the affordability of risky outcomes. In other words, when people expect potential gains from a decision, they tend to avoid risks. However, when people consider potential losses from a decision, they tend to take risks. Therefore, a message which emphasizes positive outcomes motivates people to pursue a definite or certain behavior. Conversely, a message which emphasizes negative outcomes motivates people to perform risky or uncertain behaviors (Steward, Schneider, Pizarro, & Salovey, 2003).

When risk perception is applied to health message framing, health-related behaviors can be suggested by their degree of uncertainty (Rothman & Salovey, 1997). The degree of uncertainty has been manipulated in terms of detection behaviors or prevention behaviors. Detection behaviors, such as cancer screening, contain the risk of uncertain outcomes, because a person may find out that he or she is ill (e.g., “if you conduct cancer screening, you may find cancer”) (Steward et al., 2003). Thus, loss-framed messages that emphasize the costs of failing to follow health recommendations are more effective in motivating people to perform detection behaviors (Banks et al., 1995; Meyerowitz & Chaiken, 1987). However, prevention behaviors, such as smoking cessation, contain certain outcomes, and people feel prevention behaviors are relatively less risky (e.g., “if you quit smoking, you will prevent cancer”). Thus, gain-framed messages that emphasize the benefits of following health recommendations are more effective for motivating people to perform prevention behaviors (Detweiler et al., 1999; Schneider et al., 2001; Steward et al., 2003).

This detection-prevention framework has been widely employed in health message framing research, in relation to various health issues and alongside many other variables, and it has led to fairly consistent results (for reviews; Rothman et al., 2006; Salovey et al., 2002). However, scholars also point out the limitations of adopting prospect theory in explaining message framing effect. For example, Nan (2007) suggested two limitations. First, prospect theory primarily focuses on two optional choices or preferences, not on persuasive outcomes, such as attitudes or judgments, as is the case in framing research. Second, riskiness in prospect theory is varied according to

the two options' certainty (one is certain, the other uncertain), whereas in framing research, the relative riskiness of completing or failing to complete recommended health-related behaviors is typically not revealed. In other words, people may perceive a prevention behavior as riskier than a detection behavior.

Additionally, one more limitation can be suggested: Not all health issues can be easily categorized into the detection-prevention framework. Some health issues involve only detection behaviors, whereas others can only be categorized as pertaining to prevention behaviors. For example, health issues such as binge drinking, smoking cessation, and condom use are solely prevention behaviors. If gain-framed messages concerning these issues are evaluated to be more persuasive than loss-framed messages on the grounds that these issues are prevention behaviors, can we be sure that the relative effectiveness of gain framing is caused by the prevention feature of the issues? We cannot, because we still cannot compare these issues using the detection perspective. If these issues are examined with the detection perspective, we may find out that gain-framed messages are still effective, or that gain framing and loss framing do not produce different persuasive effects. To make the detection-prevention framework stand on firm theoretical ground, it is essential to examine these health issues with the detection perspective and to compare the relative effectiveness of different framings. Of course, several studies have examined the detection-prevention framework in regards to one health issue (e.g., gum disease in Rothman et. al., 1999), but such studies are still insufficient to make the detection-prevention framework a strong theory for framing effects.

The present study aims to contribute to our understanding of health message framing by assessing message effects on fear and message processing. The reason for focusing on fear and message processing is to examine framing effects in relation to the effects of visual images in message framing. Because previous framing research has primarily focused on verbal message variations and the cognitive mechanisms underlying different message evaluations, the visual effects in the information processing of framed messages have not received much attention. However, a negative visual image in loss framing may arouse fear by providing realistic images of consequences of unhealthy behaviors, so that loss framing with visual images may be more persuasive than other types of messages. In other words, different message formats (solely verbal or verbal-visual) will differently stimulate fear or message processing. Thus, the present study will investigate different message effects on fear and message processing, ultimately asking how fear or message processing influence persuasive outcomes.

Furthermore, recent meta-analyses provide additional claims for the effects of visual images in message framing effects. According to O’Keefe and Jensen (2006; 2007; 2008), gain-framed and loss-framed messages did not produce different persuasive effects. Moreover, loss-framed messages did not induce more persuasive outcomes than gain-framed messages. The present study will help to explain why this might be. Presumably, the insufficient effect size also came from a lack of understanding of overall message features, such as visual images.

In light of the fact that visual images embedded in health messages may affect information processing, it is necessary to examine the different kinds of information

processing demanded by visual images as opposed to verbal texts. Thus the following section reviews previous studies on visual information processing.

Visual information processing

Visual information processing is defined as “a brain operation producing a localized priority in information processing—an attentional ‘window’ or ‘spotlight’ that locally improves the speed and reduces the threshold for processing events” (Deubel & Schneider, 1993, p. 575). In other words, verbal information and visual information is differently processed, and visual information diminishes the information processing burden by allocating cognitive resources in different places in the brain. Consequently, the effects of the two different information sources tend to be varied.

The different information processing required by verbal and visual information has been explained using dual coding theory. According to Paivio (1990), information processing includes two distinctive mental subsystems: the verbal system, which processes verbal information, and the imaginal system, which processes nonverbal information. The two subsystems are differently activated to respond to an external stimulus and are interconnected by particular sensory systems and also associated with referential connections. When people encounter verbal or visual information, they tend to treat this information with one or two subsystems by experiencing three levels of processing. The first level is “representational processing,” which involves perceiving whether the external stimulus is verbal or visual information and determines consequent distinctive activation of either the verbal or imaginal subsystems. The second level is “referential processing,” which includes establishing connections and interchanging

references between the verbal and imaginal subsystems. The last level is “associative processing,” which involves evaluation of incoming stimuli with previously stored information in the brain. Furthermore, dual coding theory posits that verbal information is sequentially processed, whereas visual information is holistically and simultaneously processed.

Overall findings from previous research on visuals outline the so-called picture superiority effect (Nelson, Reed, & Walling, 1976). In consumer psychology, researchers have found superior effects of visual images in information processing as opposed to plain verbal information (Cautela & McCullough, 1978; MacInnis & Price, 1987). MacInnis and Price (1987) postulated that both verbal and visual information processing effectively formulate problems, but that the different ways of formulating problems between verbal and visual information influenced subsequent problem solving. In brand evaluation, verbal information processing contributed an implicit or explicit summary of brand attributes and features, whereas visual information processing contributed a holistic evaluation of the brand. Furthermore, MacInnis and Price (1987) suggested that visual information processing might generate higher decision outcomes than verbal information processing, because visual images made it easier for people to visualize outcomes of their decisions, and visualization made decisional outcomes realistic. In a similar vein, we can speculate that visual images in health messages make people visualize the decisional outcomes, thus giving them vivid, lifelike expectations for the outcomes of their decisions.

The picture superiority effect has been examined for its effectiveness on attention

(Niederdeppe, Davis, Farrelly, & Yarsevich, 2007; Pieters & Wedel, 2004; Rosbergen, Pieters, & Wedel, 1997), attitude (Edell & Staelin, 1983; Kisielius & Sternthal, 1984; Mitchell, 1986), and memory (Childers & Houston, 1984; Houston, Childers, & Heckler, 1987). For the purpose of the present study, the following literature review will focus on visual attention and visual attitude.

As compared to plain verbal texts, the most prominent feature of visuals is the eye-catching effect. Using eye-tracking equipment in experimental laboratories, consumer psychology research has confirmed that visual images are superior to verbal texts in capturing attention (Deubel & Schneider, 1993). Attention to visual images influences subsequent product involvement, advertised brand attitude, and ad recall (Rosbergen et al., 1997). Furthermore, regardless of size, visual images grasped attention more effectively than verbal texts (Pieters & Wedel, 2004). Stylistic features of visuals, such as cuts, edits, second-half punch, and intense imagery, increased attention as well (Lang, 2000; Lang, Chung, Lee, Schwartz, & Shin, 2005).

An important feature of visual attention is its ability to increase the depth of message processing or message involvement (Rosbergen et al., 1997). Once people get involved with the message, they are more likely to process it systematically. In other words, when people feel that they are involved with the message, they tend to process it more carefully. If people scrutinize and systematically process the message, they are more likely to follow its recommendation.

However, the research also suggests a contradictory assumption about the impact of visual images on message involvement. According to the heuristic-systematic model

(HSM) (Chaiken, 1980, 1987), a visual image acts as a simple heuristic cue and may not influence deep information processing or message involvement. HSM posits that people tend to process information through two basic modes: systematic processing or heuristic processing. When people are sufficiently motivated, they process the information relatively extensively and logically through the systematic route. In contrast, when people are not motivated enough or do not have sufficient cognitive resources, they tend to process information superficially and heuristically with simple message cues, such as visual images, the source of the message, or the length of the message. Kisielius and Sternthal (1984, Experiment 2) found that when people processed the message less systematically, a verbal message with a pictorial presentation produced more favorable attitudes toward an advertised product than a solely verbal message. However, Kisielius and Sternthal (1984, Experiment 1) also found that when people systematically processed the message, a verbal only message induced more favorable attitudes toward the product than a verbal message accompanied by a visual image.

For the present study, these contradicting assumptions about visual effects on message processing need to be understood carefully. Previous studies on the picture superiority effect have mostly been conducted in consumer psychology and have mainly focused on the ability of positive visual images to induce positive attitudes toward the message objects or advertised products. However, the present study employs both positive and negative visual images in accordance with gain framing and loss framing, so whether a visual image is perceived as a systematic cue or heuristic cue needs to be understood in relation to the valence (positive or negative) of the visual image.

Previous studies suggest that negative visual images may induce more persuasive effects than positive visual images. Smith and Petty (1996) posited that negative information was weighted differently than positive information by message recipients. Maheswaran and Meyers-Levy (1990) found that people showed different message evaluations of positive or negative information according to their level of involvement. In the high involvement condition, people were persuaded by negatively framed messages. However, in the low involvement condition, positively framed messages were more effective. Other studies show that negative information tends to induce more attention and is processed more carefully than positive information (Ditto & Lopez, 1992; Homer & Yoon, 1992; Pratto & John, 1991). In line with these findings, if people pay more attention to the negative information of loss framing caused by either a negative visual image or verbal text, causing them to use more cognitive resources on the message processing, they are more motivated to process the message systematically. In contrast, the positive information of gain framing stimulated by either a positive visual image or verbal text may act as a simple heuristic cue, as suggested by the general findings of HSM. Thus, the following hypotheses are suggested:

H1: Loss-framed messages will generate more systematic processing than gain-framed messages.

H2: Gain-framed messages will generate more heuristic processing than loss-framed messages.

Fear arousal

Compared to other emotions, scholars have abundantly examined the persuasive

effects of fear. Fear is “a negatively valenced emotion, accompanied by a high level of arousal” (Witte & Allen, 2000, p. 591) and is generally activated when people perceive a situation as threatening to their physical or psychological selves and as out of their control (Nabi, 2002). Fear and a threat are usually understood as the same concept, but fear is emotionally processed, whereas a threat is cognitively processed (Witte & Allen, 2000).

The persuasive effects of fear need to be understood in relation to the functioning of fear as an emotion. According to functional emotion theories, the fundamental principles of emotions can be summarized as follows: emotions (1) have inherent adaptive functions; (2) are relevant to personal experience; (3) have a unique goal depicted in their state of action readiness or tendency to action; and (4) organize and motivate corresponding behaviors (Nabi, 2002). In the case of fear, when people perceive a situation, an object, or information as threatening, they appraise it with the guidance of prior experience. This appraisal leads to a certain type of action tendency—such as protecting themselves by escaping from the threatening cause—and, finally, motivates people to take an action to avoid threatening causes. For example, when people confront a smoking cessation message, such as “smoking causes lung cancer,” if they appraise this message as fearful based on previous experiences, this appraisal motivates them to avoid a fearful consequence (lung cancer) by eliminating or escaping from the cause of the threat (smoking).

The functional effects of fear in persuasion have been supported by several meta-analyses. Boster and Mongeau (1984) and Mongeau (1998) investigated the influence of

fear manipulations (e.g., strong versus weak fear appeals) on perceived fear, attitude and behavior change. These scholars found correlations between the reported fear and the strength of the fear appeal and discovered positive effects on attitude/behavior change with increasing strength of fear appeals. In addition, Sutton (1982) also found positive correlations between the strength of fear appeals and intentions/behaviors. Witte and Allen (2000) also reported that perceived severity, susceptibility and persuasiveness were greater when fear appeals became stronger. These meta-analyses posit that different levels of fear manipulation generate different levels of fear perception. Moreover, it is interesting to note the growth in attitude/intention/behavior changes as fear appeals become stronger.

Despite the effectiveness of fear appeals in persuasion, exemplified by attitude and behavior change, message framing research has not found supportive evidence for fear appeal effects. In one study, Meyerowitz and Chaiken (1987) employed four fear arousal measures (fearful, anxious, uncomfortable, and nauseated), but did not find different effects of fear for gain-framed versus loss-framed messages. As a result, Meyerowitz and Chaiken suggest that the fear arousal effect was not plausible in the context of message framing research. Moreover, Maheswaran and Meyers-Levy (1990) also revealed this null effect of message framing on fear. Maheswaran and Meyers-Levy examined how threat or fear was differently produced as a function of message framing with several items (fearful, tense, nervous, anxious, reassured, relaxed, and comforted; the last three items were reverse coded), but they did not find significant effects. They argued that there seemed little possibility of different levels of fear being induced, thus

affecting persuasiveness, by a different framing.

However, a recent study confirms the effects of message framing on fear arousal. Shen and Dillard (2007) found that different message framings induced different emotions; gain framing evoked positive emotions, and loss framing stimulated negative emotions. Furthermore, emotions aroused by different message framings showed substantial effects on attitude change. In the case of fear, in particular, the emotion was proved to be a strong predictor of attitude and behavioral intention.

Following Shen and Dillard (2007), the present study attempts to examine the effects of message framing on fear in relation to message formats, such as solely verbal messages versus verbal messages with visual images. Previous framing effect studies have mainly focused on fear arousal through verbal information, but the present study puts more emphasis on the ability of visual images to invoke fear. A visual image in a loss-framed message may communicate more vividly possible outcomes of failing to follow health recommendations than a solely verbal message or a message with a positive visual image. Thus, a negative visual image may more effectively arouse fear. The researcher predicts that fear will be differently aroused according to the message framing and message format. This general prediction will be tested using the following hypothesis.

H3: Individuals will report greater fear when exposed to the negative visual images than when exposed to positive visual images or solely verbal messages.

An interaction between message framing and message format on persuasiveness is also anticipated. As reviewed above, according to the prevention-detection framework, for prevention behaviors, gain framing will more effectively persuade people. However,

according to the fear arousal perspective, if fear is sufficiently aroused by a negative visual image, loss framing with a visual image will more effectively persuade people. This prediction prompts the following hypothesis.

H4: Message framing and message format will have an interactive effect on persuasion.

Finally, the present study proposes to address the following research question: Will message processing or fear more effectively mediate the relationship between health messages and persuasion? As suggested by Hypotheses 1 through 4, if message framing and message format influence fear and message processing, thus affecting persuasion, presumably fear or message processing will mediate the relationship between message framing/message format and persuasion. Because prior research did not examine these mediating roles of fear and message processing caused by message framing and format, the following Research Question is suggested:

RQ1: Will the effects of the message frames and the message formats on persuasion be mediated by fear or message processing?

The following section presents research methods for analyzing the suggested Hypotheses and Research Question.

METHOD

Research design and procedure

A laboratory experiment was conducted to examine the effects of visual images in health message framing. Specifically, this experiment utilized a 2 (message frames: gain vs. loss) \times 2 (message formats: verbal vs. visual¹) \times 2 (health issues: dental flossing vs. sunscreen use) mixed factorial design. The message framing and message format were between-subject factors, and the health issue variable was a within-subjects factor. To avoid order effects on the health issues, the health messages were presented in two orders: half of the participants read the dental flossing message first, while the rest read the sunscreen use message first. Thus, a total of eight stimuli were used.

The health messages were designed as print advertisements to be inserted in the form of web-based surveys. All experimental stimuli and questionnaires were presented on a computer screen. When participants arrived at the laboratory, they were instructed as to how to participate in the present study and asked to read an informed consent form. While participants were reading the consent form, a randomly selected web-survey URL containing one of eight experimental stimuli was sent to their University Webmail accounts. After acknowledging and signing the consent form, participants logged on to their web mail accounts and started the experiment by visiting a web-survey URL. Participants were asked to read their first health message as they normally would and then complete the corresponding questionnaire. Participants were then asked to read the

¹ Henceforth, a verbal condition (or message) means a condition (or message) which contains solely verbal information, and a visual condition (or message) means a condition (or message) which contains both verbal and visual information.

second health message as they normally would and fill out the corresponding questionnaire and demographic information. A participant could complete this entire process in approximately 20 minutes.

Participants

A total of ninety five ($N = 95$) undergraduate students at the Pennsylvania State University participated in the present study in exchange for class extra credits. Of the 95 subjects, two did not provide demographic information. All participants signed an informed consent form before participating in the experiment and were randomly assigned to one of eight conditions. Participants ranged in age from 18 to 27 years ($M = 20.82$, $SD = 1.20$), with 72% describing themselves as Caucasian, 8% as African-American, 7% as Asian-American, 4% as Hispanic, and 6% as Other. Seventy-one percent reported their gender as female and 27% as male. Eleven percent of participants reported themselves as international students.

Message framing manipulation

Each health message consisted of a title, an introduction, health information, a health recommendation, and a web address relevant to the health issue. The messages were developed with actual information from the Centers for Disease Control and Prevention (CDC) website and other websites (<http://www.saveyoursmile.com> and <http://skincarephysicians.com>; URLs of these two websites were used as relevant web addresses in the experimental stimuli). To maintain message coherence, each message was manipulated according to each framing condition, excepting the health information and web address. The gain-framed messages emphasized the benefits of performing

dental flossing or using sunscreen. In the loss-framed conditions, statements emphasized the costs associated with failing to perform dental flossing or use sunscreen. For example, in the flossing message, the introduction of the gain framing occurred as follows:

“Flossing your teeth is the most important way to ensure good oral health... By flossing, you will prevent gum disease and tooth decay.” In contrast, the loss-framed message was presented as: “Not flossing your teeth is the most common cause of bad oral health... Without flossing, you may suffer from gum disease and tooth decay.”

Each message consisted of about 210 words. The manipulated health messages are presented in Appendix A.

Visual image selection

Visual images were carefully selected to avoid potential influences from confounding variables. In gain-framed message conditions, visual images that depicted only a relevant body part (e.g., healthy teeth for flossing and healthy skin for sunscreen use) were picked, to exclude source attractiveness. In loss-framed message conditions, to reduce possible negative reactions caused by extremely negative depictions, relatively mild symptoms of failing to adopt the recommended behaviors were selected. In short, visual images were chosen to be as relevant and realistic as possible. The visual images appear in Appendix B as experiment stimuli.

Dependent variables

The main outcome variable for the present study is message persuasiveness. Message persuasiveness was assessed using three different variables: attitude toward the message, perceived effectiveness, and behavioral intentions. All variables included in this

study were assessed by following measures.

Message manipulation check The message framing manipulation check was assessed by three 7-point semantic differential scales. The participants were asked to judge the message emphasis on the following word pairs: advantages-disadvantages, benefits-costs, and positive outcomes-negative outcomes (Schneider et al., 2001). The mean of these three items was calculated to form an index of manipulation check (Cronbach's $\alpha = .92$).

Thought lists To assess systematic/heuristic processing, participants were asked to list up to four thoughts they had while reading the messages. Participants were instructed to list only one thought per box and that they need not use all of the boxes provided.

Referring to a thought coding scheme employed in Meyers-Levy and Maheswaran (2004) and Maheswaran and Meyers-Levy (1990), two independent judges blind to the experimental design coded participants' responses into the following categories: (1) the total number of thoughts produced; (2) the number of systematic thoughts that included explicit reference to information of the message or intention to conduct health-related behaviors (e.g., "Helped me remember why it's good to floss."); (3) the number of heuristic thoughts that represented global liking of the message or health issue (e.g., "Flossing is good."); (4) the number of other thoughts not relevant to either the message or the information contained therein (e.g., "The girl next me is cute.");, and (5) the number of thoughts about the visual images in the visual image conditions (e.g., "The image on the message is gross."). Inter-coder reliability (Scott's π) was .92.

Perceived risk To measure risk perceptions, participants were asked to report their agreement on 7-point scales with four statements: "I think the outcome of failing to [floss

everyday/use sunscreen before I go outside] is risky;” “If I do not [floss everyday/use sunscreen before I go outside], it can lead to bad results;” “Failing to [floss everyday/use sunscreen before I go outside] makes me feel anxious;” and “Failing to [floss everyday/use sunscreen before I go outside] would make me worry” (Cox & Cox, 2001). A risk perception index was then created by calculating the mean of these four items (Cronbach’s $\alpha = .84$).

Fear Fear was measured using 7-point scales where 1 = *none of this feeling* and 7 = *a great deal of this feeling*. Participants were asked to indicate their fear responses on a statement of “The message on [flossing/sunscreen] that I have just read makes me feel ____.” Three fear items (fearful, afraid, and scared) were adopted from Shen and Dillard (2007) and were averaged into a single fear index (Cronbach’s $\alpha = .89$).

Attitude toward the health issues Participants rated their attitudes toward the health issues on three 7-point scales (ranging from 1 = *Bad* to 7 = *Good*, 1 = *Foolish* to 7 = *Wise*, and 1 = *Harmful* to 7 = *Beneficial*). These items were adopted from Smith and Petty (1996) and collapsed into a single index of attitude toward the health issue by calculating the mean (Cronbach’s $\alpha = .79$).

Attitude toward the health messages To assess participants’ attitudes toward the health messages, three items were adopted from Shen and Dillard (2007): “I support what the message was trying to accomplish;” “I agree with the position advocated in the message;” and “I am favorable toward the main point of the message.” One additional item was added: “[Flossing everyday/Using sunscreen before going outside] is effective to maintain good [oral/skin] health.” Each item was assessed on a 7-point scale ranging

from 1 (*strongly disagree*) to 7 (*strongly agree*). These four items collapsed into a single index representing participants' attitudes toward the health messages (Cronbach's $\alpha = .88$).

Perceived effectiveness The perceived effectiveness of the messages was assessed with three 7-point word pairs. Two of them were adopted from Dillard and Peck (2000; *not at all persuasive-very persuasive*, and *not at all convincing-very convincing*), and one additional item was included (*not at all effective-very effective*). These three items averaged to form a single perceived effectiveness index (Cronbach's $\alpha = .90$).

Behavioral intention Behavioral intention was measured with three 7-point Likert-type questions (1 = *strongly disagree*, 7 = *strongly agree*): "I intend to act in ways that are compatible with the position advocated by the message;" "I plan to act in ways that are consistent with the position advocated by the message;" and "I am going to make an effort to do what the message asked me to do" (Shen & Dillard, 2007). These three items were combined into a single index (Cronbach's $\alpha = .87$).

Control variables

Involvement is one strong predictor for message framing effects (Cox & Cox, 2001; Maheswaran & Meyers-Levy, 1990; Millar & Millar, 2000). Rather than manipulating involvement, this study examined the moderating effects of involvement with two measures—issue involvement and message involvement. In addition to these two involvement measures, the participants' health issue familiarity was also measured to assess its moderating effects.

Issue involvement Participants were asked to indicate whether they felt that the health issues at hand were interesting, involving, and personally relevant to them using 7-

point scales ranging from 1 (*strongly disagree*) to 7 (*strongly agree*) (Maheswaran & Meyers-Levy, 1990). The mean of these three items was calculated to form an index of issue involvement (Cronbach's $\alpha = .82$).

Message involvement Message involvement was measured with four 7-point Likert type questions (1 = *strongly disagree*, 7 = *strongly agree*): “I paid attention to the content of the message;” “I carefully read the content of the message;” “When I saw the message, I concentrated on its contents;” and “I expended effort looking at the content of this message” (Ha, 1996). A message involvement index was created by calculating the mean of these four items (Cronbach's $\alpha = .90$).

Health issue familiarity Health issue familiarity was measured by asking participants to indicate their positioning at or between *not familiar* (1) and *very familiar* (7).

Demographic information Participants were asked to provide information about their age, gender, major(s), ethnic background(s) and whether or not they were international students.

All measures appear in Appendix C as questionnaires.

RESULTS

Manipulation checks

To assess whether the framing manipulation was perceived as intended, a series of one-way analyses of variance (ANOVAs) was conducted with an independent variable of message framing and a dependent variable of manipulation check. For both issues, participants assigned to gain framing reported that the messages emphasized the positive aspects of performing health-related behaviors (flossing: $M = 3.69$, $SD = 1.90$; sunscreen: $M = 3.22$, $SD = 1.89$), whereas participants assigned to loss framing noted that the messages emphasized the negative aspects of not performing health-related behaviors (flossing: $M = 5.33$, $SD = 1.93$, $F(1, 91) = 17.54$, $p < .001$, partial $\eta^2 = .16$; sunscreen: $M = 5.24$, $SD = 1.87$, $F(1, 91) = 27.47$, $p < .001$, partial $\eta^2 = .23$).

Further analyses were conducted to examine whether the strength of message manipulation significantly differed with the presence of visual images. A 2 (message frames: gain vs. loss) \times 2 (message formats: verbal vs. visual) ANOVA with a dependent variable of manipulation check was employed for both issues. These analyses revealed the following interactions: for flossing, $F(1, 91) = 6.85$, $p < .05$, partial $\eta^2 = .07$; for sunscreen, $F(1, 91) = 4.06$, $p < .05$, partial $\eta^2 = .04$. For both issues, participants assigned to visual loss framed conditions rated that the messages emphasized more negative aspects of not performing health-related behaviors (flossing: $M = 5.94$, $SD = 1.71$; sunscreen: $M = 5.88$, $SD = 1.45$) than did those assigned to verbal loss framed conditions (flossing: $M = 4.72$, $SD = 1.97$; sunscreen: $M = 4.61$, $SD = 2.05$). In gain framing, no

significant difference between verbal and visual conditions was found for both health issues.

These results suggest that the manipulation of message framing on two health issues was successful and that respondents identified the emphasis that the messages were designed to deliver. Furthermore, these analyses show that the existence of a negative visual image in loss framing enhanced participant's perceptions of negative aspects of the messages.

Risk perceptions of two issues

Because the current study employed two health issues, the different ratings of risk perception and three control variables between dental flossing and sunscreen use messages were examined. A series of repeated measure one-way ANOVAs revealed that risk perceptions between the two issues did not differ significantly (mean scores for flossing = 4.07, for sunscreen = 4.22, $p = .29$), and the only significant difference was issue familiarity (Wilks' $\lambda = .89$, $F(1, 94) = 12.22$, $p < .01$, partial $\eta^2 = .12$). For issue familiarity, participants reported higher scores for the sunscreen use issue than for the flossing issue. It should be noted that the two issues were perceived as similarly risky to the participants. According to the detection-prevention framework, the risk perception of health issues moderates message framing effects. Because risk perception between the two health issues did not differ significantly and the two issues involve prevention behaviors, the following analyses were conducted.

Effects on message processing

Hypothesis 1 and 2 posited that, for both issues, loss-framed messages would

generate more systematic processing, whereas gain-framed messages would generate more heuristic processing. To test these hypotheses, a series of one-way ANOVAs was employed with message framing as an independent variable and systematic/heuristic thoughts as dependent variables. For the issue of flossing, participants who read a loss-framed message reported more heuristic thoughts ($M = 2.02$, $SD = 1.25$) than participants who read a gain-framed message [$(M = 1.40$, $SD = 1.25)$, $F(1, 91) = 5.86$, $p < .05$, partial $\eta^2 = .06$]. For the issue of sunscreen, the message framing main effect on heuristic thoughts was marginally significant [$F(1, 91) = 3.90$, $p = .05$, partial $\eta^2 = .04$]. As with the flossing issue, a loss-framed message induced more heuristic thoughts ($M = 2.06$, $SD = 1.19$) than a gain-framed message ($M = 1.53$, $SD = 1.41$).

Further analyses were conducted to examine the message format's main effects on message processing. With an independent variable of message format and dependent variables of systematic/heuristic thoughts, a one-way ANOVA for both issues revealed no significant message format main effects on systematic processing (flossing, $p = .77$; sunscreen, $p = .65$) and heuristic processing (flossing, $p = .18$; sunscreen, $p = .41$).

Contrary to Hypothesis 1 and 2, regardless of message format, the loss-framed messages did not generate systematic thoughts, but rather generated heuristic thoughts, and the gain-framed messages did not influence message processing. Thus, Hypothesis 1 and 2 were not supported. It seems that because the present study did not manipulate message involvement, participants processed the messages through the heuristic route.

Effects on fear

Hypothesis 3 predicted that the visual loss condition would induce more fear than

the other conditions. To test this prediction, a 2 (message frames) \times 2 (message formats) ANOVA on fear was conducted for both health issues. These tests revealed significant message format main effects on fear. For both issues, visual messages induced more fear [flossing: $M = 3.69$ vs. $M = 2.97$, $F(1, 91) = 4.63$, $p < .05$, partial $\eta^2 = .05$; sunscreen: $M = 4.21$ vs. $M = 3.30$, $F(1, 91) = 10.08$, $p < .01$, partial $\eta^2 = .10$] than verbal messages. Furthermore, significant frame \times format interaction effects for both issues were also obtained by these analyses [flossing: $F(1, 91) = 4.19$, $p < .05$, partial $\eta^2 = .04$; sunscreen: $F(1, 91) = 10.64$, $p < .01$, partial $\eta^2 = .11$]. Figures 1 illustrates these interaction effects.

Place Figures 1 about here

Table 1 presents mean and standard deviation scores associated with dependant variables.

Place Table 1 about here

To assess the interaction effects for both issues more closely, Holm's sequential Bonferroni post hoc comparisons were conducted. These analyses showed that, for both issues, the interaction effects occurred because ratings for visual loss messages (flossing: $M = 4.19$, $SD = 1.80$, sunscreen: $M = 4.65$, $SD = 1.31$) were significantly higher than the other three messages. Also, in the case of sunscreen, fear ratings in the verbal loss message ($M = 2.83$, $SD = 1.50$) were significantly lower than fear ratings in the verbal gain ($M = 3.76$, $SD = 1.55$) and visual gain ($M = 3.74$, $SD = 1.10$) messages. Thus, Hypothesis 3 was strongly supported.

Effects on persuasiveness

Message persuasiveness was assessed using three dependant variables: attitude toward the message, perceived effectiveness, and behavioral intention.

Hypothesis 4 predicted an interaction between message framing and message format in regards to persuasiveness. To test this prediction, a 2 (message frames) \times 2 (message formats) multivariate analysis of covariance (MANCOVA) was conducted for both issues with dependant variables of attitude toward the message, perceived effectiveness, and behavioral intention and covariates of issue familiarity and message involvement.

For the issue of flossing, the MANCOVA revealed a significant frame \times format interaction: Wilks' $\lambda = .89$, $F(3, 87) = 3.69$, $p < .05$, partial $\eta^2 = .11$. The univariate analyses of covariance (ANCOVAs) on persuasiveness when controlling for issue familiarity and message involvement also revealed significant frame \times format interaction effects on attitude toward the message ($F(1, 89) = 4.33$, $p < .05$, partial $\eta^2 = .05$) and perceived effectiveness ($F(1, 89) = 8.33$, $p < .01$, partial $\eta^2 = .09$). No interaction was found for behavioral intention. Post hoc comparisons revealed that the visual loss condition led to higher attitude toward the message ($M = 6.19$ vs. $M = 5.74$, $p < .05$) and perceived effectiveness ($M = 5.54$ vs. $M = 4.89$, $p < .01$) than the verbal loss condition.

For the issue of sunscreen, the MANCOVA revealed no significant framing or format main effects nor a frame \times format interaction effect. The ANCOVAs on persuasiveness when controlling for issue familiarity and message involvement revealed significant frame \times format interaction effects on attitude toward the message ($F(1, 89) =$

4.59, $p < .05$, partial $\eta^2 = .05$), perceived effectiveness ($F(1, 89) = 4.17$, $p < .05$, partial $\eta^2 = .05$), and behavioral intention ($F(1, 89) = 4.59$, $p < .05$, partial $\eta^2 = .05$). Post hoc comparisons revealed that the visual loss condition led to higher attitude toward the message ($M = 6.32$ vs. $M = 5.88$, $p < .05$), perceived effectiveness ($M = 5.19$ vs. $M = 4.32$, $p < .01$), and behavioral intention ($M = 5.10$ vs. $M = 4.43$, $p = .06$) than the verbal loss condition. Also, these comparisons showed that the verbal gain condition led to higher attitude toward the message ($M = 6.14$ vs. $M = 5.88$, $p = .06$) and behavioral intention ($M = 5.06$ vs. $M = 4.43$, $p = .06$) than the verbal loss condition.

Table 2 summarizes the results of univariate analyses with covariates of issue familiarity and message involvement for the two health issues.

Place Table 2 about here

As shown in the Table 2, all persuasive outcomes were found as a function of message frame \times message format interaction, except for behavioral intention in the flossing message. Thus, Hypothesis 4 is mostly supported. Figures 2 to 4 illustrate these interaction effects.

Place Figures 2 to 4 about here

Mediator on persuasiveness

Research Question 1 asked whether message processing or fear would mediate the relationship between message frame/format and persuasion. Because the results of Hypothesis 1 and 2 did not reveal significant message format main effects on message

processing, only fear was employed in the mediation tests. Also, because the persuasive effects of visual loss messages significantly differed from verbal loss messages, mediation tests were conducted to see whether the format difference (verbal vs. visual) in loss framing would be mediated by fear. For reasons of parsimony, a Persuasion Index was created by averaging attitude toward the message, perceived effectiveness, and behavioral intention for each issue (Cronbach's $\alpha = .82$).

According to Baron and Kenny (1986), four conditions need to be satisfied to establish mediation. First, the independent variable must affect the mediating variable. Second, the independent variable must affect the dependent variable. Third, the mediating variable must affect the dependent variable. Lastly, if these three conditions are satisfied, the effect of the third condition must be less than the effect of the second condition. Perfect mediation is established if the independent variable does not show an effect when the mediating variable is controlled.

Following this logic, mediation tests were conducted with an independent variable of message format, a mediating variable of fear, and a dependent variable of Persuasion Index. Figures 5 and 6 present the standardized coefficients of these mediation tests for both issues.

Place Figure 5 and 6 about here

For the issue of flossing, Figure 5 displays the message format's direct impact on fear ($\beta = .39, p < .01$) and fear's direct impact on the Persuasion Index ($\beta = .45, p < .01$). The direct impact of the message format on the Persuasion Index was marginally

significant ($\beta = .26, p = .08$). When fear was controlled, the indirect impact of the message format on the Persuasion Index was not significant ($\beta = .10, p = .50$). These results suggest that fear fully mediated the relationship between message format and persuasion for the issue of flossing.

For the issue of sunscreen (see Figure 6), the standardized coefficients for the direct impacts were all significant. The message format had a significant impact on fear ($\beta = .55, p < .001$) and the Persuasion Index ($\beta = .39, p < .01$). Also, fear had a significant impact on the Persuasion Index ($\beta = .54, p < .001$). However, when fear was controlled, the indirect impact of the message format on persuasion became insignificant ($\beta = .13, p = .38$). Thus, for the issue of sunscreen use, fear fully mediated the relationship between message format and persuasion.

In summary, these tests indicate that, for the issues of both flossing and sunscreen, fear fully mediates the effects of message format on persuasion when the message format is applied to loss-framed messages.

DISCUSSION

The present study was motivated by a simple question: “Can visual images in framed messages influence persuasion?” To answer this question, this study utilized a lab experiment comparing solely verbal messages with verbal/visual messages in terms of the message framing effect. Considering health issues relevant to college students, this experiment employed the issues of dental flossing and sunscreen use. Preliminary analyses of the differences between the two issues showed that risk perception did not significantly differ from one to the other.

The overall findings from this study illustrate the picture superiority effect of negative visuals in message framing. The superiority effect was found throughout the analyses. First, in the message manipulation check, the presence of negative visuals enhanced participants’ perceptions of the negative aspects of loss-framed messages. Second, the test on Hypothesis 3 showed that the negative visuals in loss framing effectively aroused more fear than the other three types of messages (verbal gain, visual gain, and verbal loss messages). Third, the test on Hypothesis 4 revealed that negative visuals in loss framing were more effective for persuading people than verbal loss messages. Interestingly, positive visuals in gain framing did not show this picture superiority effect.

Seemingly, this relative effectiveness of visual images is caused by the visuals’ ability to provide viewers with holistic and realistic outcomes. Similar to the assertion made by MacInnis and Price (1987), visual images seem to effectively present the outcomes of adopting or failing to adopt health recommendations, so that people could

easily visualize vivid outcomes that might be caused by their decisions. However, this realistic and vivid presentation was differently assessed according to the valence of the visuals. The positive visuals in gain framing did not affect outcome variables, and participants evaluated visual gain messages and verbal gain messages nearly identically. In contrast, the negative visuals in loss framing influenced all outcome variables, and the most distinctive difference was found in the contrasts between visual loss and verbal loss messages.

As suggested by previous studies (e.g., Smith & Petty, 1996; Ditto & Lopez, 1992), this study shows that negative information received more weight than positive information, but this was true only when the messages contained visual images. In the case of solely verbal messages, participants evaluated the negative information almost equally to the positive information. Thus, it should be noted that contrasts between positive versus negative information or employment of negative information need to be considered alongside message format (verbal vs. visual). Furthermore, to induce the intended outcomes of using negative information, generally negative emotions and/or persuasion, a solely verbal message may not be effective enough; such a message will likely need to utilize corresponding negative visual images to enhance the impact of the verbal loss message.

Another reason for the superiority effect of negative visuals seems to be that participants' expectations were violated by a negative visual image. Generally, people expect to receive positive information from a message, and when their expectations are violated by unexpected negative information, they tend to pay more attention to the

message and are thus more likely to be influenced by it (Smith & Petty, 1996).

Presumably, this expectancy violation effect was enhanced by negative visuals, so that participants evaluated visual loss messages as more negative and fear-inducing.

The most appealing finding of this study is that emotion (fear) was proved to be more effective in persuading people, by mediating message format and persuasion, than cognition (systematic/heuristic processing). As shown in the tests on Hypotheses 1 and 2, message format did not reveal main effects on systematic/heuristic processing. However, fear was sufficiently aroused by the message format main effect and the frame \times format interaction effect, effectively influenced persuasion, and was a strong mediator of persuasion. Putting these together, the present study provides a clear example of how an emotion can be more effective for persuading people than cognition.

Like the superiority effect of negative visuals, the persuasive effect of fear in message framing needs to be understood in relation to visual images. This study found that a solely verbal loss message was not effective for arousing fear and persuading people. This result corresponds with the findings of Meyerowitz and Chaiken (1987) and Maheswaran and Meyers-Levy (1990), who did not find evidence supporting fear as a motivator in message framing effects. In addition, the verbal loss message exhibited ratings of fear similar to those of the verbal gain message, and, even for the issue of sunscreen use, the verbal loss message induced significantly lower ratings of fear than the verbal gain message. Contrary to the common belief that, because loss framing emphasizes negative aspects of health issues, it will induce more fear than gain framing, loss-framed verbal messages did not produce more fear than verbal gain or visual

messages. However, when a loss-framed message contained a negative visual, fear was sufficiently aroused, making the loss-framed visual messages more persuasive than the other types of messages. From this result, we can infer that a loss-framed message containing only verbal information may be not enough to induce fear, and, to arouse sufficient fear, visual images should be presented in the messages. Thus, it is reasonable to assume that the fear arousal model is plausible for explaining message framing effects when we consider the influence of message format.

One reason why gain framing induced more fear than verbal loss framing seems to be that participants assigned to gain framing might evaluate the risk of failing to conduct health-related behaviors as fearful. The risk information was identical throughout the different message framing conditions. For example, for the issue of sunscreen, the risk of failing to use sunscreen was stated thusly: “Skin cancer is the most common form of cancer in the United States. In 2004, 50,039 people were diagnosed with skin cancer and 7,952 people died from it.” This risk information seemed to make participants in gain framing more fearful than participants in verbal loss framing. Because the gain-framed messages presented positive aspects of sunscreen use in every aspect except for this risk information, participants might become fearful when they read this information. In other words, participants in gain framing perceived the messages as generally positive, but when they read the risk information, because the risk information was different from the previous positive tone of the message, they became more fearful than the participants in verbal loss framing. In contrast, because loss-framed messages presented the negative aspects of failing to conduct health-related behaviors, participants in verbal loss framing

perceived the overall tone of message as negative and did not pay much attention to the risk information or evaluate the message as more fearful. In practice, some participants in gain framing remembered and wrote down this risk information on their thought list measures.

Another possible reason for this result appears to be that participants might perceive the measure of fear as similar to the other measures. Fear, for example, was measured by asking participants to indicate how the messages on sunscreen use or dental flossing that they had read made them feel. The direct reference to the messages in the statement might have rendered the fear measure too similar to other attitudinal measures. Indeed, participants' evaluations on fear were consistent with other dependent variables of persuasiveness (in other words, verbal gain framing was more persuasive than verbal loss framing).

The mediation tests on fear support the functional effects of fear on persuasion. As suggested by functional emotion theories, it seems that when the study participants in the visual loss condition saw the visual images depicting the consequences of unwise health-related behaviors, they perceived the negative visuals as threatening and became more fearful than the participants in the other conditions. These perceptions and appraisals led them to take action to avoid the threatening causes by following the messages' recommendations. The theoretical assumptions of functional emotion theories on fear were supported in that not only did the visual loss messages show a main effect on persuasiveness, but also the relationships between message format, fear, and persuasion were all significant.

Another interesting finding of this study is that gain framing did not achieve superior persuasion outcomes than loss framing. According to the detection-prevention framework, a gain-framed message is more persuasive when it comes to inspiring prevention behaviors. In the case of verbal messages, especially for the issue of sunscreen use, this study found that the verbal gain message produced higher ratings of attitude toward the message and behavioral intention than the verbal loss message. These findings were marginally significant. However, taking all three persuasive outcomes for both issues together, the most prominent distinction was the difference between the verbal loss message and the visual loss message. Throughout the analyses, the visual loss messages produced the highest ratings, and it significantly differed from the verbal loss message for the three persuasive outcomes. Thus, although verbal gain framing may still be more persuasive than verbal loss framing with regard to prevention behaviors, a visual image seems to be more influential than a solely verbal message.

The present study assessed message persuasiveness using three variables—attitude toward the message, perceived effectiveness, and behavioral intention. These three variables were significantly correlated and showed fairly consistent results. To investigate the effects of message framing and message format more closely, this study included overall outcome variables of persuasion. Furthermore, the present study employed two health issues to increase the applicability of the study's results in health communication research and practice.

Nevertheless, there are some limitations to the present study. First of all, the attention measure seems to lack construct validity. Theoretically, visual images,

especially negative ones, tend to increase attention and influence message involvement, but the analyses on attention and message involvement variables failed to show differences between verbal and visual messages. To capture the attention variable appropriately, more accurate visual attention measures, such as eye-tracking equipment, need to be employed. The second limitation is that this study did not employ a control condition. To assess the effects of message framing and message format on persuasion more accurately, it would be more beneficial to compare the message effects with a non-message recipient group. Lastly, the research participants were college students, and their race and gender were not equally distributed. To apply the study results for a practical purpose, it would be necessary to examine the impacts of visual images in message framing with the general population.

The present study suggests several interesting research topics for future study. First, because this study only utilized prevention behaviors, it will be informative for future studies to employ verbal vs. visual contrasts with detection behaviors to see whether the results of detection behaviors will be replicated or different from the findings of the present study. Second, future studies need to employ more health issues, so that we can understand the roles of visual images in health message framing effects more accurately and speculate more thoroughly about visual images' theoretical and practical implications. Lastly, the roles or effects of other emotions should be tested. The present study only examined the role of fear, but the roles of other negative emotions (e.g., anger and disgust) and positive emotions (e.g., happiness) ought to be examined in relation to message framing and message format.

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Table 1.

Mean and Standard Deviation Scores of Dependant Variables by Issues and Conditions

Dependant variables	Gain		Loss	
	Verbal (N = 24)	Visual (N = 23)	Verbal (N = 24)	Visual (N = 24)
<i>Flossing issue</i>				
Fear	3.13 (1.50)	3.16 (1.60)	2.82 (1.47)	4.19 (1.80)
Attitude toward the message	6.06 (.83)	5.92 (.95)	5.74 (1.07)	6.19 (.78)
Perceived effectiveness	5.40 (.75)	5.00 (1.33)	4.89 (1.32)	5.54 (.93)
Behavioral intention	4.82 (1.09)	4.96 (1.42)	5.01 (1.41)	5.46 (.96)
<i>Sunscreen issue</i>				
Fear	3.76 (1.55)	3.74 (1.10)	2.83 (1.50)	4.65 (1.31)
Attitude toward the message	6.14 (.78)	6.02 (1.01)	5.88 (.90)	6.32 (.75)
Perceived effectiveness	4.69 (1.37)	4.84 (1.40)	4.32 (1.24)	5.19 (.63)
Behavioral intention	5.06 (1.47)	4.75 (1.30)	4.43 (1.21)	5.10 (.88)

Note: Cell numbers are means and numbers in parentheses are standard deviation in each condition.

Table 2.

Two-way ANCOVA of Main and Interaction Effects on Persuasiveness for Flossing and Sunscreen

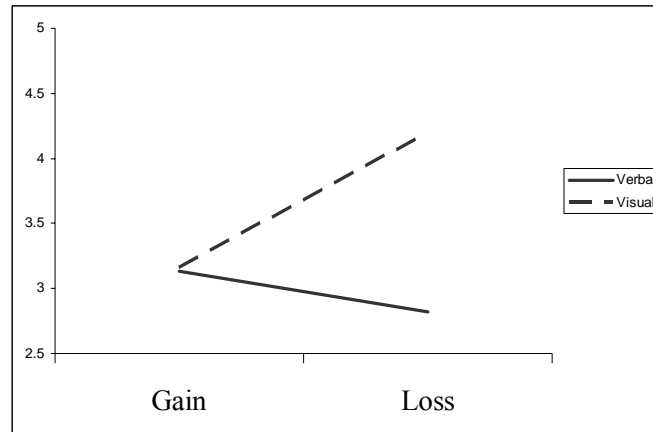
	Persuasiveness		
	AM	PE	BI
<i>Flossing issue</i>	<i>F</i>	<i>F</i>	<i>F</i>
<u>Main effects</u>			
Framing	.02	.07	2.83
Format	1.68	.89	2.39
<u>Interaction</u>			
Frame × Format	4.33*	8.33**	.56
Error	(.58)	(.85)	(1.15)
<i>Sunscreen issue</i>			
<u>Main effects</u>			
Framing	.30	.04	.31
Format	.58	4.22*	.30
<u>Interaction</u>			
Frame × Format	4.59*	4.17*	4.59*
Error	(.59)	(1.02)	(1.41)

Note: AM = attitude toward the message, PE = perceived effectiveness, and BI = behavioral intention. Covariates were issue familiarity and message involvement. Values in parentheses represent mean square errors. In all cases, the degree of freedom is (1, 89).

* $p < .05$, ** $p < .01$.

Figure 1. Frame \times Format Interaction on Fear

a) The Issue of Dental Flossing



b) The Issue of Sunscreen Use

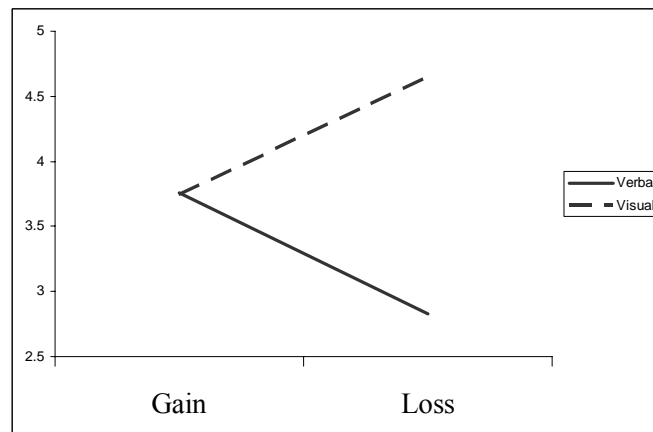
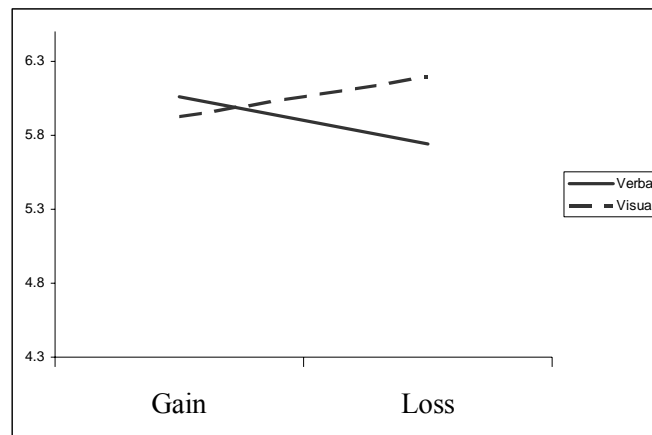


Figure 2. Frame \times Format Interaction on Attitude toward the Message

a) The Issue of Dental Flossing



b) The Issue of Sunscreen Use

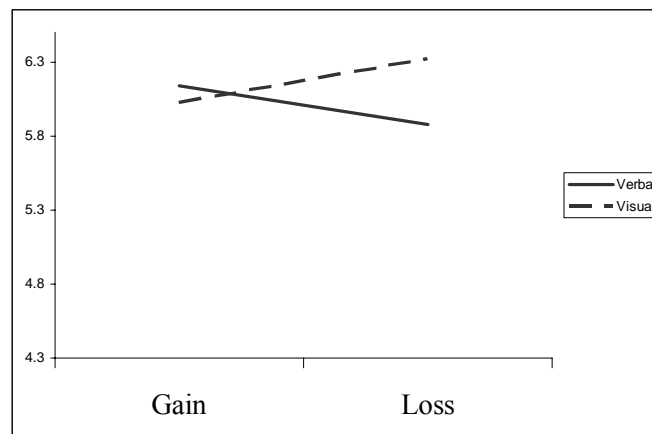
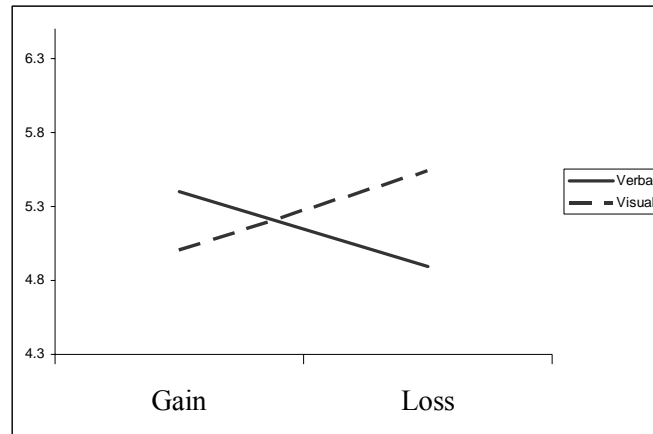


Figure 3. Frame \times Format Interaction on Perceived Effectiveness

a) The Issue of Dental Flossing



b) The Issue of Sunscreen Use

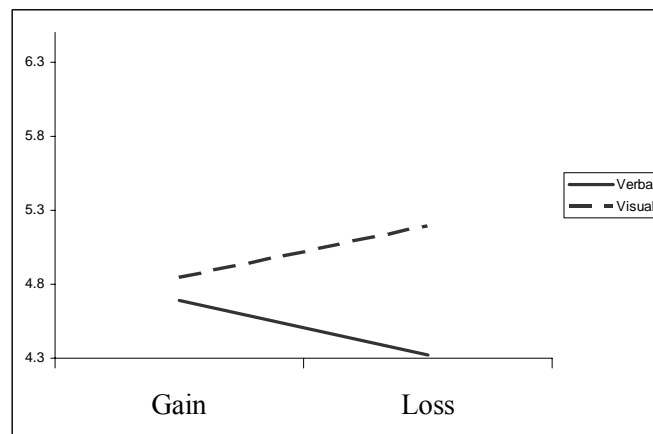
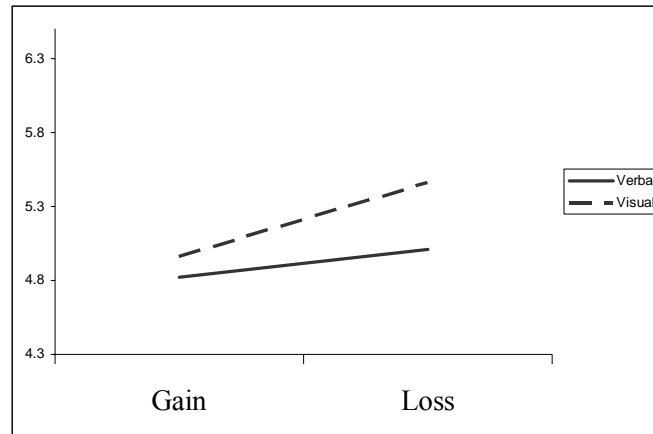


Figure 4. Frame \times Format Interaction on Behavioral Intention

a) The Issue of Dental Flossing



b) The Issue of Sunscreen Use

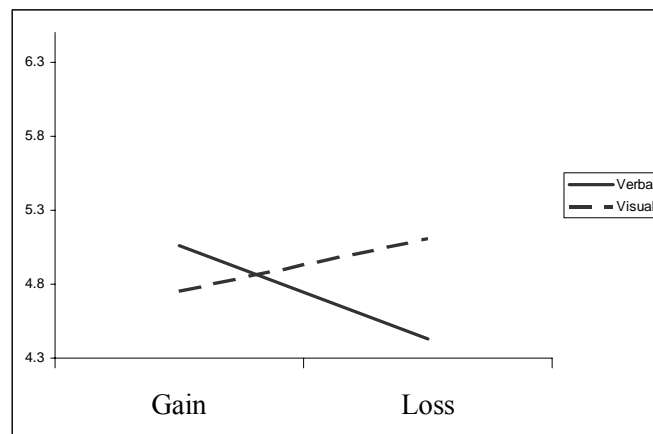
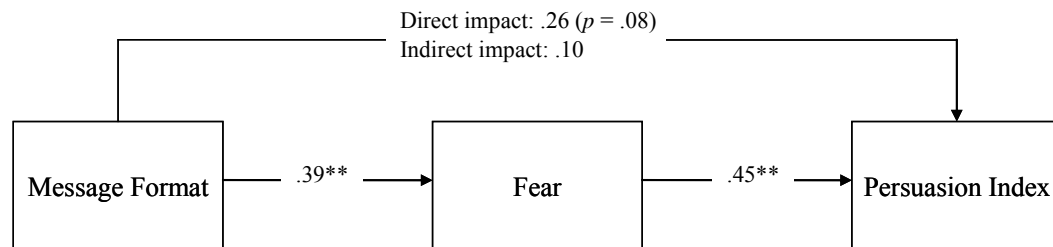
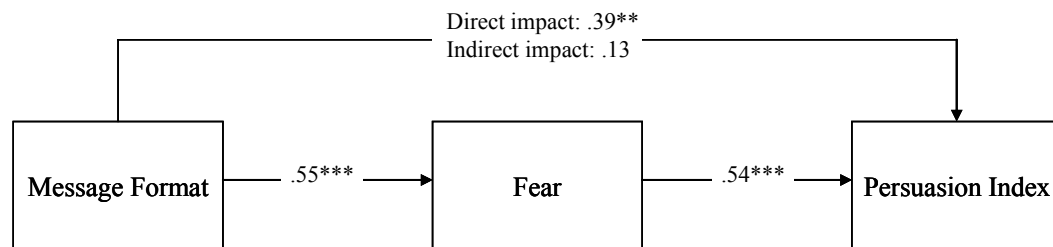


Figure 5. The Mediational Role of Fear on Persuasion for Flossing



Note: Coefficients are standardized partial regression weights. Message Format refers to loss messages dummy coded as either the verbal loss condition = 0 or the visual loss condition = 1. Persuasion Index is an average of three dependant variables—attitude toward the message, perceived effectiveness, and behavioral intention. The relationship between message format in loss framing and persuasion was marginally significant ($p = .08$). ** $p < .01$.

Figure 6. The Mediational Role of Fear on Persuasion for Sunscreen



Note: Coefficients are standardized partial regression weights. Message Format refers to loss messages dummy coded as either the verbal loss condition = 0 or the visual loss condition = 1. Persuasion Index is an average of three dependant variables—attitude toward the message, perceived effectiveness, and behavioral intention. ** $p < .01$, *** $p < .001$.

Appendix A

(Message manipulations)

1. Framed Messages for the Issue of Dental Flossing

Gain	Loss
<p>[Title] Flossing everyday ensures you will be proud of your smile!</p> <p>[Introduction] Flossing your teeth is the most important way to ensure good oral health. It's a convenient and inexpensive way to preserve healthy teeth. By flossing, you will prevent gum disease and tooth decay.</p> <p>[Health information] Flossing loosens food trapped between the teeth, and removes the film of bacteria that forms on your teeth before it has a chance to harden into plaque. Dental floss helps clean hard-to-reach tooth surfaces and reduces the likelihood of gum disease and tooth decay. Recent research indicates that by age 17, 78 percent of young people have had a cavity, and 7 percent have lost at least one permanent tooth. Among adults aged 35 to 44 years, 69 percent have lost at least one permanent tooth. Untreated tooth decay continues to be a problem. About one-third of persons across all age groups have untreated tooth decay. Toothbrush bristles alone cannot clean effectively in the tight spaces between teeth. Brushing without flossing is like washing only 65% of your body. The other 35% remains dirty! The American Dental Association recommends that you floss at least once a day.</p>	<p>[Title] Fail to floss, and you risk being embarrassed of your smile!</p> <p>[Introduction] Not flossing your teeth is the most common cause of bad oral health. Brushing alone is not enough to preserve healthy teeth. Without flossing, you may suffer from gum disease and tooth decay.</p> <p>[Health information] Flossing loosens food trapped between the teeth, and removes the film of bacteria that forms on them before it has a chance to harden into plaque. Dental floss helps clean hard-to-reach tooth surfaces and reduces the likelihood of gum disease and tooth decay. Recent research indicates that by age 17, 78 percent of young people have had a cavity, and 7 percent have lost at least one permanent tooth. Among adults aged 35 to 44 years, 69 percent have lost at least one permanent tooth. Untreated tooth decay remains a problem. About one-third of persons across all age groups have untreated tooth decay. Toothbrush bristles alone cannot clean effectively in the tight spaces between teeth. Brushing without flossing is like washing only 65% of your body. The other 35% remains dirty! The American Dental Association recommends that you floss at least once a day.</p>

<p>[Recommendation]</p> <p>If you floss your teeth every day, you can prevent tooth decay, cavities and gum disease, and save the time and money associated with periodontal diseases. Start flossing everyday and enjoy the benefits of good oral health!</p>	<p>[Recommendation]</p> <p>If you do not floss your teeth every day, you will be at higher risk of tooth decay, cavities and gum disease, and waste the time and money associated with periodontal diseases. Start flossing everyday or suffer from bad oral health!</p>
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2. Framed Messages for the Issue of Sunscreen Use

Gain	Loss
<p>[Title]</p> <p>The benefits of using sunscreen</p> <p>[Introduction]</p> <p>With a little care and time, you can keep your skin healthy, attractive, and young-looking. As you spend more time outdoors during the sunny seasons, your skin gets more sun exposure. By using sunscreen, you can protect your skin from the sun's rays and decrease your risk of skin cancer.</p> <p>[Health information]</p> <p>The CDC (Centers for Disease Control and Prevention) recommends applying sunscreen to protect yourself from the sun's harmful rays before you go outside. The use of sunscreen can reduce the risk of skin cancer as well as other skin damages.</p> <p>Skin cancer is the most common form of cancer in the United States. In 2004, 50,039 people were diagnosed with skin cancer and 7,952 people died from it. Exposure to the sun's ultraviolet rays is the most important environmental factor of developing skin cancer. Using sunscreen with SPF (Sun Protection Factor) 15 or higher is recommended whenever you go outside to protect your skin.</p>	<p>[Title]</p> <p>The costs of not using sunscreen</p> <p>[Introduction]</p> <p>Throughout everyday life, your skin may be in danger without you knowing. As you spend more time outdoors during the sunny seasons, your skin gets more sun exposure. Without using sunscreen, you will expose your skin to the sun's rays which can increase your risk of skin cancer.</p> <p>[Health information]</p> <p>The CDC (Centers for Disease Control and Prevention) recommends applying sunscreen to protect yourself from the sun's harmful rays before you go outside. The use of sunscreen can reduce the risk of skin cancer as well as other skin damages.</p> <p>Skin cancer is the most common form of cancer in the United States. In 2004, 50,039 people were diagnosed with skin cancer and 7,952 people died from it. Exposure to the sun's ultraviolet rays is the most important environmental factor of developing skin cancer. Using sunscreen with SPF (Sun Protection Factor) 15 or higher is recommended whenever you go outside to protect your skin.</p>

[Recommendation]

If you use sunscreen with SPF 15 or higher, you can enjoy outdoor life while keeping your skin healthy, attractive, and young-looking. Protecting yourself with sunscreen is the surest way to prevent skin damage or skin cancer.

Protect your skin from the sun's rays, and enjoy a longer and healthier life!

[Recommendation]

If you don't use sunscreen with SPF 15 or higher, you cannot fully enjoy outdoor life without worrying about making your skin unhealthy, unattractive, and prematurely aged. Not protecting yourself with sunscreen is the surest way to damage your skin or get skin cancer.

Protect your skin from the sun's rays or suffer from potential skin diseases!

Appendix B (Experiment stimulus)

1. The Issue of Dental Flossing

a) Verbal Gain Condition

Flossing Everyday Ensures

You Will Be Proud of Your Smile!

Flossing your teeth is the most important way to ensure good oral health. It's a convenient and inexpensive way to preserve healthy teeth. By flossing, you will prevent gum disease and tooth decay.

Flossing loosens food trapped between the teeth, and removes the film of bacteria that forms on your teeth before it has a chance to harden into plaque. Dental floss helps clean hard-to-reach tooth surfaces and reduces the likelihood of gum disease and tooth decay.

Recent research indicates that by age 17, 78 percent of young people have had a cavity, and 7 percent have lost at least one permanent tooth. Among adults aged 35 to 44 years, 69 percent have lost at least one permanent tooth. Untreated tooth decay continues to be a problem. About one-third of persons across all age groups have untreated tooth decay.

Toothbrush bristles alone cannot clean effectively in the tight spaces between teeth. Brushing without flossing is like washing only 65% of your body. The other 35% remains dirty! The American Dental Association recommends that you floss at least once a day.

If you floss your teeth every day, you can prevent tooth decay, cavities and gum disease, and save the time and money associated with periodontal diseases.


Start flossing everyday and enjoy the benefits of good oral health!

For more information, visit saveyoursmile.com

b) Visual Gain Condition

Flossing Everyday Ensures

You Will Be Proud of Your Smile!



Flossing your teeth is the most important way to ensure good oral health. It's a convenient and inexpensive way to preserve healthy teeth. By flossing, you will prevent gum disease and tooth decay.

Flossing loosens food trapped between the teeth, and removes the film of bacteria that forms on your teeth before it has a chance to harden into plaque. Dental floss helps clean hard-to-reach tooth surfaces and reduces the likelihood of gum disease and tooth decay.

Recent research indicates that by age 17, 78 percent of young people have had a cavity, and 7 percent have lost at least one permanent tooth. Among adults aged 35 to 44 years, 69 percent have lost at least one permanent tooth. Untreated tooth decay continues to be a problem. About one-third of persons across all age groups have untreated tooth decay.

Toothbrush bristles alone cannot clean effectively in the tight spaces between teeth. Brushing without flossing is like washing only 65% of your body. The other 35% remains dirty! The American Dental Association recommends that you floss at least once a day.

If you floss your teeth every day, you can prevent tooth decay, cavities and gum disease, and save the time and money associated with periodontal diseases.

Start flossing everyday and enjoy the benefits of good oral health!

For more information, visit saveyoursmile.com

c) Verbal Loss Condition

Fail to Floss, and You Risk

Being Embarrassed of Your Smile!

Not flossing your teeth is the most common cause of bad oral health. Brushing alone is not enough to preserve healthy teeth. Without flossing, you may suffer from gum disease and tooth decay.

Flossing loosens food trapped between the teeth, and removes the film of bacteria that forms on them before it has a chance to harden into plaque. Dental floss helps clean hard-to-reach tooth surfaces and reduces the likelihood of gum disease and tooth decay.

Recent research indicates that by age 17, 78 percent of young people have had a cavity, and 7 percent have lost at least one permanent tooth. Among adults aged 35 to 44 years, 69 percent have lost at least one permanent tooth. Untreated tooth decay remains a problem. About one-third of persons across all age groups have untreated tooth decay.

Toothbrush bristles alone cannot clean effectively in the tight spaces between teeth. Brushing without flossing is like washing only 65% of your body. The other 35% remains dirty! The American Dental Association recommends that you floss at least once a day.

If you do not floss your teeth every day, you will be at higher risk of tooth decay, cavities and gum disease, and waste the time and money associated with periodontal diseases.

Start flossing everyday or suffer from bad oral health!

For more information, visit saveyoursmile.com

d) Visual Loss Condition

Fail to Floss, and You Risk

Being Embarrassed of Your Smile!

Not flossing your teeth is the most common cause of bad oral health. Brushing alone is not enough to preserve healthy teeth. Without flossing, you may suffer from gum disease and tooth decay.

Flossing loosens food trapped between the teeth, and removes the film of bacteria that forms on them before it has a chance to harden into plaque. Dental floss helps clean hard-to-reach tooth surfaces and reduces the likelihood of gum disease and tooth decay.


Recent research indicates that by age 17, 78 percent of young people have had a cavity, and 7 percent have lost at least one permanent tooth. Among adults aged 35 to 44 years, 69 percent have lost at least one permanent tooth. Untreated tooth decay remains a problem. About one-third of persons across all age groups have untreated tooth decay.

Toothbrush bristles alone cannot clean effectively in the tight spaces between teeth. Brushing without flossing is like washing only 65% of your body. The other 35% remains dirty! The American Dental Association recommends that you floss at least once a day.

If you do not floss your teeth every day, you will be at higher risk of tooth decay, cavities and gum disease, and waste the time and money associated with periodontal diseases.

Start flossing everyday or suffer from bad oral health!

For more information, visit saveyoursmile.com




2. The Issue of Sunscreen Use

a) Verbal Gain Condition

The Benefits of

Using Sunscreen



With a little care and time, you can keep your skin healthy, attractive, and young-looking. As you spend more time outdoors during the sunny seasons, your skin gets more sun exposure. By using sunscreen, you can protect your skin from the sun's rays and decrease your risk of skin cancer.

The CDC (Centers for Disease Control and Prevention) recommends applying sunscreen to protect yourself from the sun's harmful rays before you go outside. The use of sunscreen can reduce the risk of skin cancer as well as other skin damages.

Skin cancer is the most common form of cancer in the United States. In 2004, 50,039 people were diagnosed with skin cancer and 7,952 people died from it. Exposure to the sun's ultraviolet rays is the most important environmental factor of developing skin cancer. Using sunscreen with SPF (Sun Protection Factor) 15 or higher is recommended whenever you go outside to protect your skin.

If you use sunscreen with SPF 15 or higher, you can enjoy outdoor life while keeping your skin healthy, attractive, and young-looking. Protecting yourself with sunscreen is the surest way to prevent skin damage or skin cancer.


Protect your skin from the sun's rays, and enjoy a longer and healthier life!

For more information, visit skincarephysicians.com

b) Visual Gain Condition

The Benefits of

Using Sunscreen



With a little care and time, you can keep your skin healthy, attractive, and young-looking. As you spend more time outdoors during the sunny seasons, your skin gets more sun exposure. By using sunscreen, you can protect your skin from the sun's rays and decrease your risk of skin cancer.

The CDC (Centers for Disease Control and Prevention) recommends applying sunscreen to protect yourself from the sun's harmful rays before you go outside. The use of sunscreen can reduce the risk of skin cancer as well as other skin damages.

Skin cancer is the most common form of cancer in the United States. In 2004, 50,039 people were diagnosed with skin cancer and 7,952 people died from it. Exposure to the sun's ultraviolet rays is the most important environmental factor of developing skin cancer. Using sunscreen with SPF (Sun Protection Factor) 15 or higher is recommended whenever you go outside to protect your skin.

If you use sunscreen with SPF 15 or higher, you can enjoy outdoor life while keeping your skin healthy, attractive, and young-looking. Protecting yourself with sunscreen is the surest way to prevent skin damage or skin cancer.

Protect your skin from the sun's rays, and enjoy a longer and healthier life!

For more information, visit skincarephysicians.com

c) Verbal Loss Condition

The Costs of

Not Using Sunscreen

Throughout everyday life, your skin may be in danger without you knowing. As you spend more time outdoors during the sunny seasons, your skin gets more sun exposure. Without using sunscreen, you will expose your skin to the sun's rays which can increase your risk of skin cancer.

The CDC (Centers for Disease Control and Prevention) recommends applying sunscreen to protect yourself from the sun's harmful rays before you go outside. The use of sunscreen can reduce the risk of skin cancer as well as other skin damages.

Skin cancer is the most common form of cancer in the United States. In 2004, 50,039 people were diagnosed with skin cancer and 7,952 people died from it. Exposure to the sun's ultraviolet rays is the most important environmental factor of developing skin cancer. Using sunscreen with SPF (Sun Protection Factor) 15 or higher is recommended whenever you go outside to protect your skin.

If you don't use sunscreen with SPF 15 or higher, you cannot fully enjoy outdoor life without worrying about making your skin unhealthy, unattractive, and prematurely aged. Not protecting yourself with sunscreen is the surest way to damage your skin or get skin cancer.

Protect your skin from the sun's rays or suffer from potential skin diseases!

For more information, visit skincarephysicians.com

d) Visual Loss Condition

The Costs of

Not Using Sunscreen



Throughout everyday life, your skin may be in danger without you knowing. As you spend more time outdoors during the sunny seasons, your skin gets more sun exposure. Without using sunscreen, you will expose your skin to the sun's rays which can increase your risk of skin cancer.

The CDC (Centers for Disease Control and Prevention) recommends applying sunscreen to protect yourself from the sun's harmful rays before you go outside. The use of sunscreen can reduce the risk of skin cancer as well as other skin damages.

Skin cancer is the most common form of cancer in the United States. In 2004, 50,039 people were diagnosed with skin cancer and 7,952 people died from it. Exposure to the sun's ultraviolet rays is the most important environmental factor of developing skin cancer. Using sunscreen with SPF (Sun Protection Factor) 15 or higher is recommended whenever you go outside to protect your skin.

If you don't use sunscreen with SPF 15 or higher, you cannot fully enjoy outdoor life without worrying about making your skin unhealthy, unattractive, and prematurely aged. Not protecting yourself with sunscreen is the surest way to damage your skin or get skin cancer.

Protect your skin from the sun's rays or suffer from potential skin diseases!

For more information, visit skincarephysicians.com

Appendix C
(Questionnaires)

Welcome to the research

You will read the rough drafts of **two health messages** designed by a health communication organization. Please read the first message as you normally would. You will then be asked to complete the first questionnaire. After completing the first questionnaire, you will read another health message. You will then be asked to complete the second questionnaire.

The end of the second questionnaire, you will be asked to provide basic personal information, such as your age, gender, major, and ethnicity.

Please follow the instructions carefully. Do not skip pages or go back to a previous page.

(Questionnaire for the dental flossing message)

Q1. Please write down all of the thoughts and feelings you have after you read the **dental flossing message**. In the lines provided below, please write down the first thought/idea that comes to your mind on the first line, the second thought/idea on the second line, etc. You do not need to fill out every line. Please state your thoughts and ideas as concisely as possible.... a phrase is sufficient. Do not worry about spelling, grammar, and punctuation. There are no right or wrong answers. You will have about 2 minutes to write your thoughts.

1st thought: _____

2nd thought: _____

3rd thought: _____

4th thought: _____

Q2. Please indicate below how you think about flossing after you read the message. You can choose the number that best represents your level of agreement.

a. I think the outcome of failing to floss everyday is risky.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

b. If I do not floss everyday, it can lead to bad results.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

c. Failing to floss everyday makes me feel anxious.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

d. Failing to floss everyday would make me worry.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

Q3. The message on flossing that I have just read makes me feel:

	None of this feeling	←-----→					A great deal of this feeling
Fearful	1	2	3	4	5	6	7
Afraid	1	2	3	4	5	6	7
Scared	1	2	3	4	5	6	7

Q4. Please indicate your assessment of flossing by circling the appropriate number on the following lines.

“I think flossing everyday is _____”

a. Bad 1 2 3 4 5 6 7 Good

b. Foolish 1 2 3 4 5 6 7 Wise

c. Harmful 1 2 3 4 5 6 7 Beneficial

Q5. Please indicate your level of agreement with the following statements:

a. I paid attention to the content of the message.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

b. I carefully read the content of the message.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

c. When I saw the message, I concentrated on its contents.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

d. I expended effort looking at the content of this message.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

Q6. The next set of questions asks you to make judgments about the message that you just read.

a. I support what the message on flossing was trying to accomplish.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

b. I agree with the position advocated in the message on flossing.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

c. I am favorable toward the main point of the message on flossing.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

d. Flossing everyday is effective in maintaining good oral health.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

Q7. Please indicate your evaluation of the message on flossing.**“Overall, the message on flossing I just read was...”**

a. Not at all persuasive 1 2 3 4 5 6 7 Very persuasive

b. Not at all effective 1 2 3 4 5 6 7 Very effective

c. Not at all convincing 1 2 3 4 5 6 7 Very convincing

d. Not at all credible 1 2 3 4 5 6 7 Very credible

Q8. Currently, how often do you floss your teeth? Please choose one of the answers below.

a. everyday

b. once every few days

c. once a week

d. rarely

e. never

Q9. Please indicate how familiar you were with the issue of flossing before you read the message.

Not familiar 1 2 3 4 5 6 7 Very familiar

Q10. Please indicate below your intentions to floss after reading the message. You can choose the number that best represents your level of agreement.

a. I intend to act in ways that are compatible with the position advocated by the message on flossing.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

b. I plan to act in ways that are consistent with the position advocated by the message on flossing.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

c. I am going to make an effort to do what the message on flossing asked me to do.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

Q11. Please indicate below the extent to which the issue of flossing is interesting/involving/relevant to you.

a. I think flossing is interesting to me.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

b. I think flossing is involving to me.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

c. I think flossing is relevant to me.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

Q12. Please indicate your assessment of the message about dental flossing.

“I think this message emphasizes _____”

a. Advantages of flossing 1 2 3 4 5 6 7 Disadvantages of not flossing

b. Benefits of flossing 1 2 3 4 5 6 7 Costs of not flossing

c. Positive outcomes of flossing 1 2 3 4 5 6 7 Negative outcomes of not flossing

(Questionnaire for the sunscreen message)

Q1. Please write down all of the thoughts and feelings you have after you read the **sunscreen message**. In the lines provided below, please write down the first thought/idea that comes to your mind on the first line, the second thought/idea on the second line, etc. You do not need to fill out every line. Please state your thoughts and ideas as concisely as possible.... a phrase is sufficient. Do not worry about spelling, grammar, and punctuation. There are no right or wrong answers. You will have about 2 minutes to write your thoughts.

1st thought: _____

2nd thought: _____

3rd thought: _____

4th thought: _____

Q2. Please indicate below how you think about using sunscreen after you read the message. You can choose the number that best represents your level of agreement.

a. I think the outcome of failing to use sunscreen before I go outside is risky.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

b. If I do not use sunscreen before I go outside, it can lead to bad results.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

c. Failing to use sunscreen before I go outside makes me feel anxious.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

d. Failing to use sunscreen before I go outside would make me worry.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

Q3. The message on sunscreen that I have just read makes me feel:

	None of this feeling	←-----→					A great deal of this feeling
Fearful	1	2	3	4	5	6	7
Afraid	1	2	3	4	5	6	7
Scared	1	2	3	4	5	6	7

Q4. Please indicate your assessment of sunscreen use by circling the appropriate number on the following lines.

“I think using sunscreen before I go outside is _____”

a. Bad 1 2 3 4 5 6 7 Good

b. Foolish 1 2 3 4 5 6 7 Wise

c. Harmful 1 2 3 4 5 6 7 Beneficial

Q5. Please indicate your level of agreement with the following statements:

a. I paid attention to the content of the message.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

b. I carefully read the content of the message.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

c. When I saw the message, I concentrated on its contents.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

d. I expended effort looking at the content of this message.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

Q6. The next set of questions asks you to make judgments about the message that you just read.

a. I support what the message on sunscreen use was trying to accomplish.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

b. I agree with the position advocated in the message on sunscreen use.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

c. I am favorable toward the main point of the message on sunscreen use.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

d. Using sunscreen before going outside is effective in maintaining good skin health.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

Q7. Please indicate your evaluation of the message on sunscreen.**“Overall, the message on sunscreen use I just read was...”**

a. Not at all persuasive 1 2 3 4 5 6 7 Very persuasive

b. Not at all effective 1 2 3 4 5 6 7 Very effective

c. Not at all convincing 1 2 3 4 5 6 7 Very convincing

d. Not at all credible 1 2 3 4 5 6 7 Very credible

Q8. Before reading this message, how often did you use sunscreen? Please choose one of the answers below.

a. always

b. often

c. sometimes

d. rarely

e. never

Q9. Please indicate how familiar you were with the issue of sunscreen use before you read the message.

Not familiar 1 2 3 4 5 6 7 Very familiar

Q10. Please indicate below your intentions to use sunscreen after reading the message. You can choose the number that best represents your level of agreement.

a. I intend to act in ways that are compatible with the position advocated by the message on sunscreen use.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

b. I plan to act in ways that are consistent with the position advocated by the message on sunscreen use.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

c. I am going to make an effort to do what the message on sunscreen use asked me to do.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

Q11. Please indicate below the extent to which the issue of sunscreen use is interesting/involving/relevant to you.

a. I think sunscreen use is interesting to me.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

b. I think sunscreen use is involving to me.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

c. I think sunscreen use is relevant to me.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

Q12. Please indicate your assessment of the message about sunscreen use.

“I think this message emphasizes _____”

a. Advantages of using sunscreen 1 2 3 4 5 6 7 Disadvantages of not using sunscreen

b. Benefits of using sunscreen 1 2 3 4 5 6 7 Costs of not using sunscreen

c. Positive outcomes of using sunscreen 1 2 3 4 5 6 7 Negative outcomes of not using sunscreen

Finally, here are some questions for us to tabulate the results. The information you are providing will be kept confidential and anonymous. Please be completely honest in answering the questions.

Q13. Your age is: _____

Q14. Your gender is: 1. Female 2. Male

Q15. What is your major? _____

Q16. What category best describe your ethnicity? (Please choose only one)

a. Caucasian b. African-American c. Hispanic
d. Asian-American e. Other

Q17. Are you an international student? 1. Yes. 2. No.