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Effects of gain- and loss-framed messages on the sun safety behavior of adolescents: The moderating role of risk perceptions

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Abstract

This study examined how message framing effects can be moderated by two types of risk: (a) perceived effectiveness in preventing a risk and (b) perceived susceptibility to the risk. The results indicate that the perceived effectiveness moderated framing effects on the intention to use sunscreen such that a loss-framed message was more effective when perceived effectiveness was low, whereas a gain-framed message was more effective when perceived effectiveness was high. In addition, perceived susceptibility to skin cancer moderated framing effects on the intention to use sunscreen and the intention to wear long pants such that a loss-framed message was more effective when perceived susceptibility was high.

Keywords

Information; public health psychology; quantitative methods; risk; social cognitions; verbal communication

A persuasive health message can be framed in terms of a gain or a loss. Gain-framed messages state that one can obtain a desirable outcome by performing a behavior, whereas loss-framed messages state that one can face an undesirable outcome by not performing such a behavior. Rothman and Salovey (1997) distinguished prevention (e.g., using a condom) and detection behaviors (e.g., getting a mammogram) and predicted that framing effects can be moderated by the type of behavior. They suggest that detection behaviors are perceived as more risky and prevention behaviors are perceived as less risky. According to prospect theory (Kahneman and Tversky, 1979), individuals tend to seek risk in the domain of loss, whereas they avoid risk in the domain of gain. Thus, to encourage detection behaviors, health practitioners need to stimulate risk-seeking using loss frames. On the other hand, to encourage prevention behaviors, gain frames that guide risk aversion can be more effective. However, a recent meta-analysis has provided weak support for the proposition that gain-

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framed messages are more persuasive than loss-framed ones in the context of prevention behaviors (O'Keefe & Jensen, 2007).

Previous studies have examined factors moderating framing effects such as self-efficacy (e.g., Verrij et al., 2010). Risk perceptions can also play an important role in framing effects. Rothman and Salovey (1997) have suggested that the relative persuasiveness of gain- and loss-framed messages is proportional to the extent to which a behavior is perceived as risky. Specifically, loss frames are more likely to be effective when a behavior is perceived as risky.

Risk perception is a broad concept, and two types of risk perceptions have been widely examined. One line of research has defined risk as perceived effectiveness (Bartels, Kelly and Rothman, 2010; Block and Keller, 1995), which refers to the extent to which a particular prevention behavior is effective for preventing the undesirable health outcome. Another line of research has focused on perceived susceptibility as a moderator of framing effects (e.g., Gallagher et al., 2011; Gerend and Shepherd, 2007), which refers to the extent to which one is susceptible to an undesirable health outcome. Low perceived effectiveness and high perceived susceptibility, each of which is associated with a high level of risk, can lead to a preference for a loss frame.

This study examines the moderating roles of perceived effectiveness and perceived susceptibility in the context of the promotion of sun safety practices among adolescents. No study has examined the moderating role of perceived susceptibility in this context, although several studies have examined the moderating role of perceived effectiveness (Block and Keller, 1995; Lee, Brown and Blood, 2000). In addition, no published study has investigated the moderating roles of the two types of risk perceptions simultaneously. Risk is a complex concept, and its components are intertwined. Thus, a simultaneous test of the components is necessary to determine the exact component that moderates framing effects. In this regard, this study examines the moderating roles of perceived effectiveness and perceived susceptibility simultaneously. By doing so, we can better understand the role of risk in processing gain- and loss-framed messages.

Rothman and Salovey's (1997) prediction that a gain frame is more persuasive for prevention behaviors and that a loss frame is more persuasive for detection behaviors is based on the assumption that there is a difference in the perceived level of risk between the two types of behaviors. Detection behaviors are considered to be risky because they involve the detection of an illness, which entails psychological and financial costs, whereas prevention behaviors are considered to be less risky because little cost is involved in performing the behavior and not engaging in such behaviors could be risky (Rivers et al., 2005; Rothman and Salovey, 1997). Therefore, a loss-framed message may be more effective than a gain-framed one in encouraging detection behaviors because of its risk-seeking function, whereas a gain-framed message may be more effective than a loss-framed one in encouraging prevention behaviors because of its risk aversion function.

Perceived effectiveness is a key risk component of prevention behaviors (Rothman and Salovey, 1997), and greater perceived effectiveness reduces the perception of risk, and

thus makes a gain frame more persuasive. On the other hand, low perceived effectiveness increases the perception of risk, and thus makes a loss frame more persuasive. Bartels et al. (2010) manipulated the perceived effectiveness of a particular prevention measure (i.e., a vaccine for West Nile virus) by presenting that “prior research suggests that the vaccine will prove effective against contracting West Nile virus for 90 (high-effectiveness condition) [60 (low-effectiveness condition)] percent of people to whom the drug is administered”. They provided the participants with gain- and loss-framed messages (e.g., “by (not) getting vaccinated, people will be able (unable) to take advantage of a way to protect themselves”) and found that the participants in the high-effectiveness condition (low-risk) were more responsive to the gain-framed message, whereas those in the low-effectiveness condition (high-risk) were more responsive to the loss-framed one. In the present study, we replicate their study in the context of sun safety behaviors.

H1: The perceived effectiveness of prevention measures moderates framing effects. Loss frames are more persuasive when perceived effectiveness is low than when it is high

Perceived susceptibility can also moderate framing effects. Previous studies have shown that perceived susceptibility moderates framing effects such that loss-framed messages are more effective for those with a high level of perceived susceptibility. This is because higher perceived susceptibility is associated with greater perceived risk, which makes loss-framed messages more effective. For example, Gallagher et al. (2011) found that women with a high level of perceived susceptibility to breast cancer were more likely to obtain a mammogram when they viewed a loss-framed (vs. gain-framed) video message, whereas those with a low level of perceived susceptibility showed no such difference.

Although perceived susceptibility is a risk concept widely used for detection behaviors, it can also be used to explain risk perceptions in prevention behaviors. This is because risk perceptions include (a) the extent to which an outcome of not performing a prevention behavior is perceived as risky (perceived susceptibility) and (b) the extent to which a behavior is perceived as effective in preventing a negative outcome (perceived effectiveness).

The moderating role of perceived susceptibility in framing effects of prevention behaviors has been indirectly suggested in Gerend and Shepherd’s (2007) study. They examined whether the effects of gain- and loss-framed messages on the participants’ intentions to receive a human papillomavirus (HPV) vaccination would be moderated by the participants’ level of HPV involvement. To measure involvement, they assessed the participants’ past sexual behaviors, including the number of lifetime sexual partners and the use of protection against sexually transmitted infections. They assumed that those participants with a large number of partners and those who engaged in unprotected sex would be more likely to show a high level of HPV involvement, and they found that those participants with a high level of involvement were more likely to be persuaded by a loss-framed message. Although Gerend and Shepherd did not directly examine the role of perceived susceptibility, they provided some evidence for the moderating role of perceived susceptibility in that those participants

with a large number of partners and those who were unlikely to use protection should have a higher level of perceived susceptibility to HPV infection.

However, Gerend and Shepherd's (2007) measures of risk focused on one's objective risk, not on one's subjective risk (i.e., perceived susceptibility to HPV infection). Thus, there is a need for a more direct test of the moderating role of perceived susceptibility in the context of prevention behaviors. The present study provides an initial test of the moderating role of perceived susceptibility in the context of prevention behaviors.

H2: Perceived susceptibility to skin cancer moderates framing effects. Loss frames are more persuasive when perceived susceptibility is high than when it is low

This study tests the hypotheses in the context of the advocacy of sun safety behaviors among high school-aged adolescents. Promoting diverse types of sun safety behaviors is important. Recognizing that sunscreen use alone is not adequate for protecting against the sun, the health science community has recently advocated the use of protective clothing (e.g., long-sleeve shirts and long pants) as the primary means of protection, with the use of sunscreen to ensure sun safety (Saraiya et al., 2004; Vainio and Bianchini, 2001).

Motivating adolescents to engage in sun safety practices is important because unprotected sun exposure during adolescence can significantly increase the risk of skin cancer (Elwood and Jopson, 1997). However, adolescents are less likely to practice sun safety than younger children or adults (Cokkinides et al., 2001; Hill and Dixon, 1999). In addition, high school-aged adolescents are more likely to engage in risky tanning behaviors than middle school-aged ones (Geller et al., 2002). Relatively little prior research examined the effects of gain- and loss-framing on adolescents (see for an exception Cho & Boster, 2008). Therefore, the present study examines how gain- and loss-framed messages influence high school-aged adolescents' sun safety behavioral intentions.

The advocacy of sun safety is particularly important for those residing in rural areas. Adolescents in farm families are at especially high risk of skin cancer because they tend to spend a large amount of time in the sun for farming purposes (Michielutte et al., 1996). Because rural adolescents are more likely to be at risk of skin cancer, the present study focuses on this group. Although limiting the sample to this group may reduce the generalizability, the use of this group has important practical implications.

Method

Overview

An independent-group experiment with a pretest and a posttest was conducted. There were two treatment groups. One group was exposed to a gain-framed message ($N=117$), and the other, to a loss-framed message ($N=102$).

Participants

The participants ($N=219$) were high school students in the rural U.S. Midwest and were members of FFA (Future Farmers of America). Their age ranged from 12 to 18 ($M=15.69$, $SD=1.33$). Among the 219 participants, 98 were female. A vast majority (94.5%) were

white. Each participant received \$5 for participation. Both parental consent and adolescent assent were obtained.

Procedure

The study was conducted during activity hours in classroom settings and was introduced as an effort to understand teenagers' sun safety practices. After the introduction, each participant received a packet consisting of three parts: (1) a pretest questionnaire, (2) a gain- or loss-framed sun safety message, and (3) a posttest questionnaire.

The packets were randomly assigned to the participants. Specifically, before the distribution, the packets were stacked in the order generated by a random number generator. All the packets were identical in their color, size, and shape, except for the gain- or loss-framed message. Upon receiving the packet, the participants answered a set of pretest questions, including perceived susceptibility to skin cancer, the perceived effectiveness of sun safety behaviors, and behavioral intentions to practice sun safety. After completing the pretest questionnaire, they were asked to carefully read the sun safety message. Immediately after reading the message, the participants completed a posttest questionnaire that included a manipulation check and measures of behavioral intentions, which were the same as those in the pretest.

Stimulus materials

The gain-framed (loss-framed) message presented the positive (negative) outcome of an individual engaging (not engaging) in sun safety practices. The advocated sun safety practices were the use of sunscreen and the use of protective clothing, including long-sleeve shirts and long pants.

The content of the messages was based on the results of an open-ended survey of college students at a large Midwestern university in the U.S. ($N = 127$). The students were asked the following questions: "What may be some of the [good things/bad things] that will happen when you wear [sunscreen] when in the sun?" The positive and negative outcomes that were frequently mentioned were incorporated into the content of the gain- and loss-framed messages.

The experimental material was entitled "a message about sun protection" (Appendix 1). This heading was followed by the subheading "When you use sun protection, you will [gain benefits/pay costs]!" The body of the message was composed of three main parts. The first part presented the benefits or costs of using or not using sunscreen when in the sun (e.g., "You [don't look red ☹/ look red 😊]"; "You [don't get itchiness, irritation ☹/ get itchiness, irritation 😊]").

The second part presented the benefits or costs of wearing or not wearing protective clothing when in the sun (e.g., "no red, burnt shoulders ☹/red, burnt shoulders 😊").

The third part asked the participants to think about how they would feel when they used or did not use sun-safety measures the next time they were in the sun: (e.g., "You [feel protected ☹/don't feel protected 😊]"). Both messages closed with the tag line "Protect

Yourself from the Sun!” The messages were equivalent in length (gain-frame: 356 words; loss-frame: 361 words).

Measures

Manipulation check.—The manipulation check was conducted using three pairs of bipolar adjectives and a response scale ranging from 1 to 7. The pairs were “costs/benefits”, “losses/gains”, and “negative outcomes/positive outcomes” ($\alpha = .92$). The results of a *t*-test indicate that the participants who read the gain-framed message were more likely to perceive that the message suggested gains ($M = 5.38$) than those who read the loss-framed message ($M = 3.37$; $t(206) = 9.18$, $p < .001$). Therefore, the manipulation was successful.

Behavioral intentions.—The sun safety behavior scale (Glanz et al., 2008; see also Weinstock et al., 2000) was adapted to measure the participants’ behavioral intentions. For each of the three behaviors (the use of sunscreen, the use of long-sleeve shirts, and the use of long pants), the participants were asked the question “how often do you plan to wear [sunscreen] when in the sun this summer?” This item was measured using a five-point Likert-type scale ranging from 1 (“never”) to 5 (“always”).

Perceived effectiveness.—For each of the three behaviors, the perceived effectiveness was measured by asking the participants to report the extent to which they agree with the following statement “Wearing [sunscreen] when in the sun is effective in preventing skin cancer” on a seven-point Likert-type scale ranging from 1 (“strongly disagree”) to 7 (“strongly agree”). This measure is consistent with those used in previous studies to assess sun safety-related response efficacy (e.g., Witte et al., 1996).

Perceived susceptibility.—Based on Witte et al. (1996), perceived susceptibility was assessed using the following three items: “My chance of developing skin cancer is slim”, “I am worried about developing skin cancer later in life”, and “The possibility of developing skin cancer worries me”. These items were measured using a seven-point Likert-type scale ranging from 1 (“strongly disagree”) to 7 (“strongly agree”). Cronbach’s alpha was .70, and these three items were averaged.

Analyses

The zero-order correlations among the key variables are presented in Table 1. For analyzing the interaction effects hypothesized in H1 and H2, regression analyses were conducted while controlling for the effects of past behavioral intentions. All the values were z-transformed except for the framing manipulation.

Results

Randomization check

There was no significant difference between the gain- and loss-framed conditions in terms of the participants’ age (gain: $M = 15.70$, $SD = 1.40$, loss: $M = 15.68$, $SD = 1.25$, $t(213) = .13$, $p = .89$), gender (gain: 44% female, loss: 47% female, $\chi^2(1) = .15$, $p = .70$), race (gain: 98% Caucasian, loss: 95% Caucasian, $\chi^2(4) = 4.83$, $p = .31$), and past behavioral intentions

(sunscreen : gain: $M = 2.69$, $SD = 1.06$, loss: $M = 2.89$, $SD = 1.12$, $t(217) = -1.36$, $p = .18$; long-sleeve shirt: gain: $M = 1.63$, $SD = .85$, loss: $M = 1.84$, $SD = .95$, $t(217) = -1.73$, $p = .08$; long pants: gain: $M = 2.67$, $SD = 1.34$, loss: $M = 2.63$, $SD = 1.24$, $t(215) = -1.73$, $p = .83$). Thus, randomization was successful.

Hypothesis testing

As shown in Table 2, the participants' intention to use sunscreen was influenced by the interaction between the framing condition and perceived effectiveness ($B = -.19$, $SE = .08$, $\beta = -.12$, $p < .05$) and by that between the framing condition and perceived susceptibility ($B = .19$, $SE = .08$, $\beta = .13$, $p < .05$). As shown in Figure 1, the loss-framed message was more effective for those reporting a low level of perceived effectiveness than for those reporting a high level of perceived effectiveness, providing support for H1. To put it differently, a gain-framed message was more effective when perceived effectiveness was high than when it was low. In addition, as shown in Figure 2, the loss-framed message was more effective for those reporting a high level of perceived susceptibility than for those reporting a low level of perceived susceptibility, providing support for H2. Further, the participants' intention to use sunscreen was influenced by the perceived effectiveness of wearing sunscreen but not by the framing condition or perceived susceptibility to skin cancer.

The participants' intention to wear a long-sleeve shirt was not influenced by the interaction between the framing condition and perceived effectiveness ($B = .15$, $SE = .10$, $\beta = .10$, $p = .15$). Although the participants' intention to use a long-sleeve shirt generally increased as the level of perceived effectiveness increased and the slope was steeper for the loss-framed message than for the gain-framed message, none of the main effects of perceived effectiveness or the interaction effects were significant. In addition, the participants' intention to wear a long-sleeve shirt was not influenced by the interaction between the framing condition and perceived susceptibility ($B = .13$, $SE = .10$, $\beta = .09$, $p = .22$). Although the participants' preference for the loss-framed message over the gain-framed message generally increased as the level of perceived susceptibility increased, this effect was non-significant. Thus, the results for the intention to wear a long-sleeve shirt provide no support for H1 and H2. This intention was influenced by framing but not by perceived susceptibility.

Finally, the participants' intention to wear long pants was influenced by the interaction between the framing condition and perceived susceptibility ($B = .19$, $SE = .09$, $\beta = .14$, $p < .05$). The loss-framed message was more effective for those reporting a high level of perceived susceptibility than for those reporting a low level of perceived susceptibility, providing support for H2, as shown in Figure 3. However, the interaction between the framing condition and perceived effectiveness did not influence their intention to wear long pants ($B = -.02$, $SE = .09$, $\beta = -.02$, $p = .78$), providing no support for H1. The participants' intention to wear long pants generally increased as the level of perceived effectiveness, but there was no difference in the slope between the message frames. The constant and slope of the loss-framed message were almost the same as those of the gain-framed message. The participants' intention to wear long pants was not influenced by framing or perceived susceptibility to skin cancer.

H1 predicted that the perceived effectiveness would moderate framing effects such that loss frames would be more persuasive for a low (vs. high) level of perceived effectiveness, and H2 predicted that perceived susceptibility would moderate framing effects such that loss frames would be more persuasive for a high (vs. low) level of perceived susceptibility. In sum, the results provide partial support for both H1 and H2. Although H1 was supported for the intention to use sunscreen, it was not supported for the other two intentions. In addition, although H2 was supported for the intention to use sunscreen and the intention to wear long pants, it was not supported for the intention to wear a long-sleeve shirt.

Discussion

This study predicted that a lower level of perceived effectiveness of skin cancer prevention and a higher level of perceived susceptibility to skin cancer would increase the effectiveness of loss frames. Of the three types of behavioral intentions considered in this study, perceived effectiveness moderated the framing effects on the intention to use sunscreen, and perceived susceptibility moderated the framing effects on the intention to use sunscreen and the intention to wear long pants. Although the results do not provide consistent support for all behaviors, they indicate that perceived effectiveness and perceived susceptibility can moderate framing effects for certain types of behavioral intentions.

It should be noted that the moderating role of perceived effectiveness received different levels of support across the three types of behaviors. The moderating role was found only for sunscreen use, for which the participants reported the highest level of perceived effectiveness. On the other hand, framing had a main effect on the use of a long-sleeve shirt, for which the participants showed the lowest level of perceived effectiveness. This indicates that when the level of perceived effectiveness was not high enough and the perceived level of risk was high (the use of a long-sleeve shirt), framing had a main effect. On the other hand, when the level of perceived effectiveness was high and the perceived level of risk was low (sunscreen use), an interaction effect was found. This suggests that perceived effectiveness may moderate framing effects only when it is high enough. In fact, Bartels et al. (2004) may have found the moderating role of perceived effectiveness because the levels of perceived effectiveness manipulated in the study were generally high.

Although prior research has suggested perceived susceptibility as a risk perception relevant to detection behaviors (Gallagher et al., 2011), this study is the first to suggest that it can moderate the framing effects of prevention behaviors. Furthermore, the moderating effect of perceived susceptibility was stronger than that of perceived effectiveness. Thus, the results of this study suggest that both perceived susceptibility and perceived effectiveness are relevant for understanding the framing effects of prevention behaviors.

This study found an absence of framing effects or even stronger effects of the loss-framed message. Although the result is somewhat inconsistent with Rothman and Salovey's (1997) prediction, it can be explained by the characteristics of this study's participants. Because the participants were future farmers, their perceived susceptibility to skin cancer might have exceeded that of general adults. Although the findings of this study are inconsistent with the findings of previous studies reporting significant positive effects of gain-framed messages on

sun safety behaviors (e.g., Detweiler et al., 1999; Rothman et al., 1993), they are consistent with the findings of those studies reporting no framing effects (e.g., Hevey et al., 2010; Hoffner and Ye, 2009). In fact, O’Keefe and Jensen’s (2007) meta-analysis have found no preference for gain frames with regard to sun safety behaviors. Thus, the results of the present study are not completely inconsistent with previous studies.

From a theoretical standpoint, the moderating role of risk perception suggests that individuals’ risk perceptions should be taken into account for a more accurate prediction of the relative effectiveness of gain- and loss-framed messages. Previous studies have typically examined the effectiveness of gain- and loss-framed messages based on a distinction between detection and prevention behaviors. However, detection and prevention behaviors are not always perceived as more risky and less risky behaviors, respectively (which is typically anticipated by researchers). For example, Apanovitch et al. (2003) found that a gain-framed (vs. loss-framed) message was more effective for those who were certain that their HIV test result would be negative. Although HIV testing is a detection behavior and a loss-framed message is believed to be more effective based on Rothman and Salovey’s (1997) distinction, Apanovitch et al. suggested that the perceived level of risk can influence the effectiveness of gain- and loss-framed messages. Their findings, together with this study’s results, suggest that a more accurate prediction of the effectiveness of gain- and loss-framed messages is possible by considering the message recipient’s subjective level of risk for a given behavior, although the overall distinction between detection and prevention behaviors can still be useful because of its parsimony.

In addition to theoretical implications, the results have practical implications. The moderating role of risk perceptions suggests that campaign practitioners should consider the level of the target audience’s risk perception when planning health campaigns. This is particularly important when there are diverse target audiences. For example, for the same sun safety behavior, the perceived level of risk may be higher for young farmers than for college students. Thus, campaign messages should employ a loss frame for farmers and a gain frame for college students. This highlights the importance of formative research (Atkin and Freimuth, 2001) in campaign planning.

This study has some limitations. Among diverse conceptualizations of risk perception, only perceived effectiveness and perceived susceptibility were considered in this study. Thus, future research should examine the moderating roles of other conceptualizations of risk perception (e.g., individuals’ construal of health behaviors).

In addition, the homogeneous nature of the sample limits the generalizability of the findings. However, this sample was composed of future farmers, which allowed for important practical implications for the target group. Additionally, this sample is particularly meaningful in that previous sun safety framing research has not investigated effects on adolescents. Also, the results of this study should be applicable to other age groups because previous research (Carmel et al., 1994) has shown that perceived susceptibility and perceived effectiveness do not vary across age groups. In addition, we employed only one health topic.

The size of the interaction effect was not large. However, in O’Keefe and Jensen’s (2007) meta-analysis, the size of the framing effect was not large ($r = .037$). This study found that the inclusion of the interaction effects can explain additional variance in behavioral intentions. In fact, in some cases interactions of risk and framing were observed in the absence of the main effect of framing. This suggests the importance of risk perceptions as a moderator of framing effects.

Finally, we used a single item to measure each behavior, which may be a source of some concern about the reliability.

Despite these limitations, this study suggests that the relative effectiveness of gain- and loss-framed messages can be predicted more accurately by focusing on the target audience’s risk perceptions. It is concluded that the target audience’s level of risk should be taken into account when designing campaign messages.

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Appendix 1.: Gain and Loss Frame Sun Protection Messages

Gain Frame	Loss Frame
<p data-bbox="407 1020 870 1062">A Message about Sun Protection: When You Use Sun Protection, You will Gain Benefits!</p> <p data-bbox="407 1098 870 1140">When you wear sunscreen each time when you are in the sun, you will gain Benefits!</p> <ul style="list-style-type: none"> <li data-bbox="456 1157 870 1199">• What are the Benefits of using sunscreen when in the sun? <ul style="list-style-type: none"> <li data-bbox="548 1213 792 1241">– You don’t look red ☺ <li data-bbox="548 1255 808 1297">– You don’t get itchiness, irritation ☺ <li data-bbox="548 1312 824 1339">– You don’t get sunburns ☺ <li data-bbox="548 1354 862 1396">– No sunburns mean no pain, no hurting ☺ <li data-bbox="548 1411 857 1453">– You don’t get blisters, peeling ☺ <li data-bbox="548 1467 870 1530">– You are not sore for a couple of days, and you don’t lose sleep because of pain ☺ <li data-bbox="548 1545 873 1608">– Your skin do not age quickly—no wrinkles or leathery, dry skin ☺ <li data-bbox="548 1623 854 1686">– You reduce your chance to getting skin cancer, including melanoma ☺ <li data-bbox="548 1701 862 1791">– The more consistently you use sunscreen when in the sun, the more likely you will gain these benefits ☺ 	<p data-bbox="922 1020 1352 1083">A Message about Sun Protection: When You Do Not Use Sun Protection, You will Pay Costs!</p> <p data-bbox="906 1098 1369 1140">When you do not wear sunscreen each time you are in the sun, you will pay Costs!</p> <ul style="list-style-type: none"> <li data-bbox="954 1157 1360 1199">• What are the Costs of not using sunscreen when in the sun? <ul style="list-style-type: none"> <li data-bbox="1047 1213 1239 1241">– You look red ☹ <li data-bbox="1047 1255 1352 1283">– You get itchiness, irritation ☹ <li data-bbox="1047 1297 1276 1325">– You get sunburns ☹ <li data-bbox="1047 1339 1365 1367">– Sunburns mean pain, hurting ☹ <li data-bbox="1047 1381 1328 1409">– You get blisters, peeling ☹ <li data-bbox="1047 1423 1333 1486">– You are sore for a couple of days, and you lose sleep because of pain ☹ <li data-bbox="1047 1501 1352 1564">– Your skin ages quickly—wrinkles, or leathery, dry skin ☹ <li data-bbox="1047 1579 1349 1642">– You increase your chance to getting skin cancer, including melanoma ☹ <li data-bbox="1047 1656 1357 1740">– The less consistently you use sunscreen when in the sun, the more likely you will pay these costs ☹

Gain Frame	Loss Frame
When You Use Sun Protection, You will Gain these Benefits!	When You Do Not Use Sun Protection, You will Pay these Costs!

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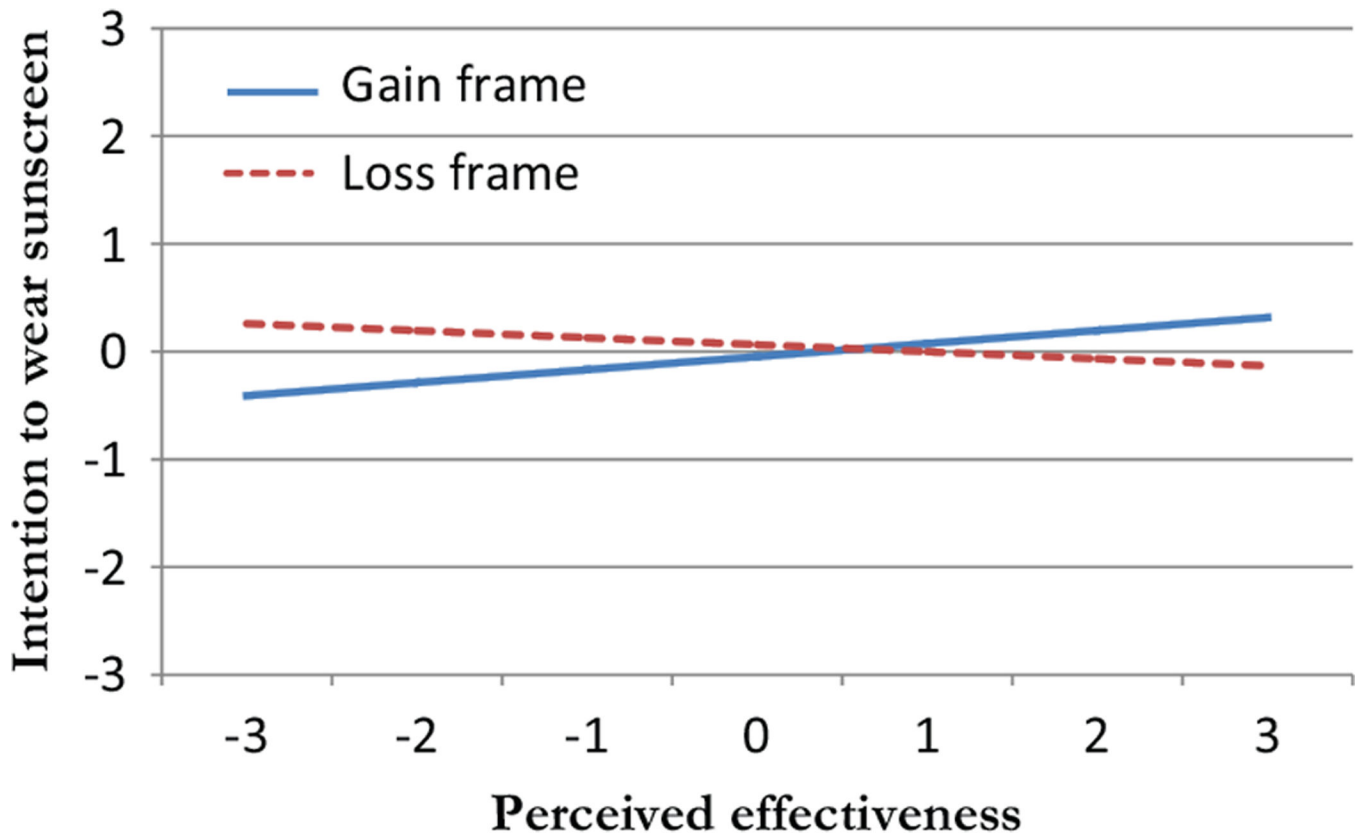


Figure 1.
The Moderating Role of Perceived Effectiveness in the Effects of Framing on the Intention to Use Sunscreen

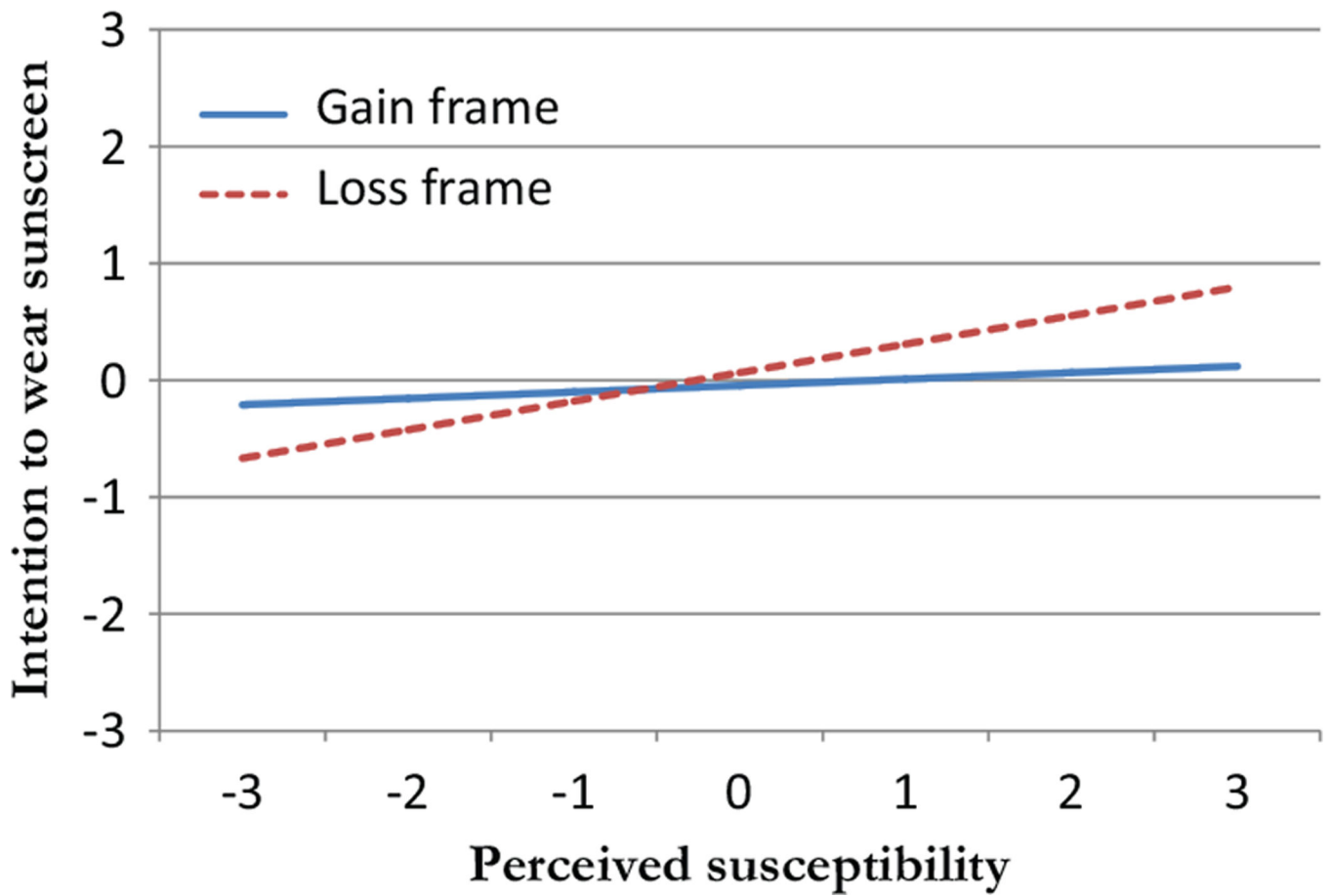


Figure 2. The Moderating Role of Perceived Susceptibility in the Effects of Framing on the Intention to Use Sunscreen

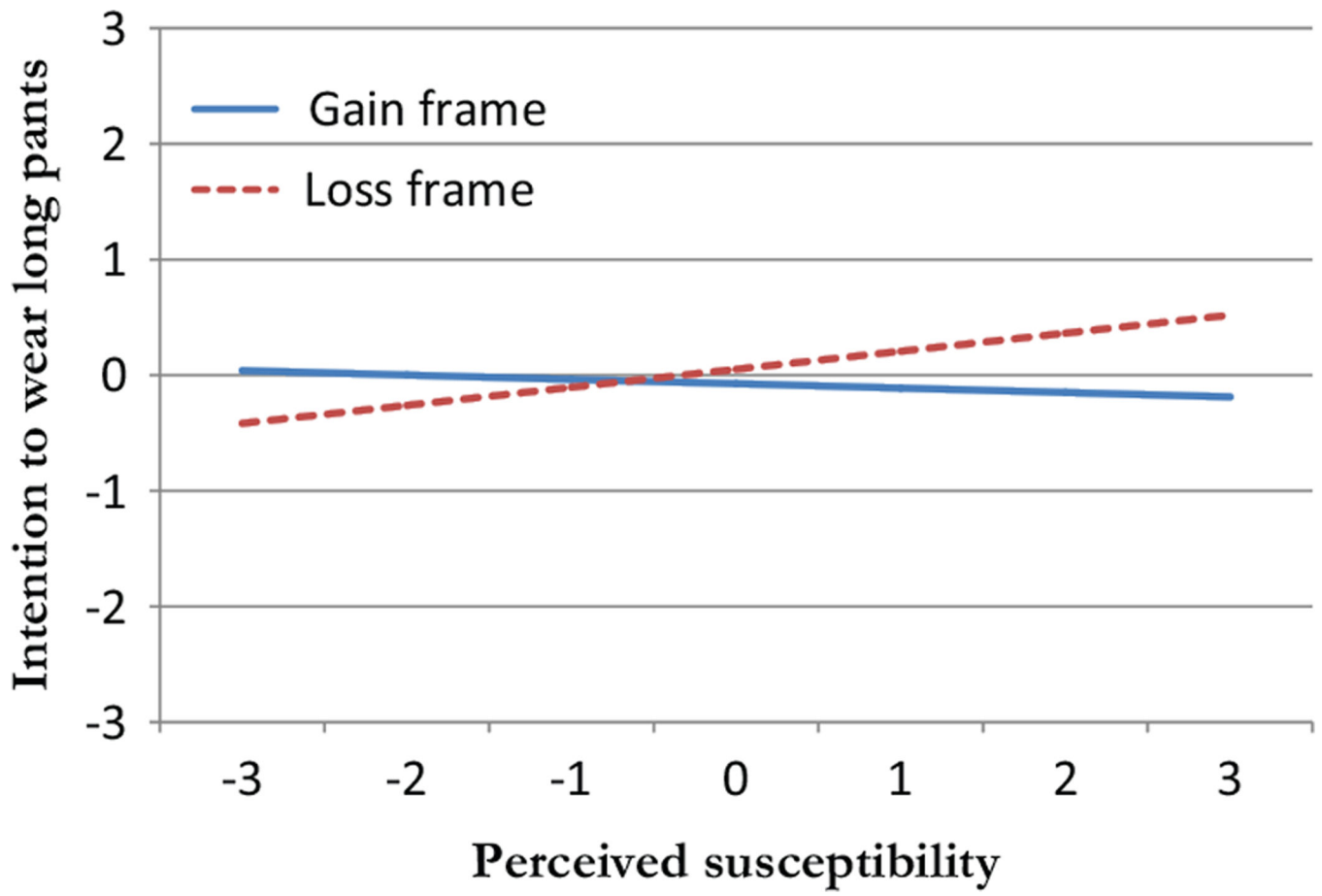


Figure 3. The Moderating Role of Perceived Susceptibility in the Effects of Framing on the Intention to Wear Long Pants

Table 1.

Zero-order correlations

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. Perceived susceptibility	–									
2. Perceived effectiveness (sunscreen)	.27***	–								
3. Perceived effectiveness (shirt)	.26***	.63***	–							
4. Perceived effectiveness (pants)	.25***	.64***	.88***	–						
5. Pre-intention (sunscreen)	.34***	.28***	.16*	.16*	–					
6. Pre-intention (shirt)	.10	.05	.18**	.20**	.29***	–				
7. Pre-intention (pants)	–.02	.07	.11 ⁺	.20**	.03	.35***	–			
8. Post-intention (sunscreen)	.40***	.31***	.19**	.19**	.81***	.26***	–.01	–		
9. Post-intention (shirt)	.14*	.19**	.28***	.29***	.31***	.67***	.22**	.38***	–	
10. Post-intention (pants)	.09	.15*	.18*	.31***	.07	.36***	.78***	.10	.40***	–
Mean	3.60	5.19	4.42	4.50	2.79	1.73	2.65	3.02	1.97	2.78
SD	1.42	1.71	1.87	1.82	1.09	.90	1.29	1.19	.98	1.26

Note:

⁺ $p < .10$.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Table 2.

Regression Results Predicting Behavioral Intentions

	Sunscreen Use		Long-Sleeve Shirt		Long Pants	
	B (SE)	b	B (SE)	b	B (SE)	b
Block 1: Pre-intention						
Pre-intention	.81 (.04)	.81***	.67 (.05)	.67***	.78 (.04)	.78***
Incremental R ² (%)	66.0***		44.6***		60.1***	
Block 2: Main effects						
Pre-intention	.74 (.04)	.75***	.62 (.05)	.62***	.75 (.04)	.75***
Loss frame	.11 (.08)	.05	.28 (.10)	.14**	.13 (.09)	.06
Perceived effectiveness	.06 (.04)	.06	.17 (.05)	.17**	.15 (.04)	.15**
Perceived susceptibility	.13 (.04)	.13**	.01 (.05)	.01	.06 (.04)	.06
Incremental R ² (%)	2.7**		4.5***		3.4***	
Block 3: Interaction effects						
Pre-intention	.74 (.04)	.75***	.63 (.05)	.63***	.75 (.04)	.75***
Loss frame	.11 (.08)	.06	.28 (.10)	.14**	.13 (.08)	.06
Perceived effectiveness	.12 (.05)	.12*	.10 (.07)	.10	.16 (.06)	.16**
Perceived susceptibility	.06 (.06)	.06	-.06 (.07)	-.06	-.04 (.06)	-.04
Loss frame × Perceived effectiveness	-.19 (.08)	-.12*	.15 (.10)	.10	-.02 (.09)	-.02
Loss frame × Perceived susceptibility	.19 (.08)	.13*	.13 (.10)	.09	.19 (.09)	.14*
Incremental R ² (%)	1.2*		1.2 [‡]		0.9 [‡]	
Total R ² (%)	69.8***		50.3***		64.4***	

Note:

[‡] $p < .10$,

* $p < .05$,

** $p < .01$,

*** $p < .001$