



Published in final edited form as:

Commun Res Rep. 2011 ; 28(4): 308–317. doi:10.1080/08824096.2011.616242.

Gain- and Loss-Frame Sun Safety Messages and Psychological Reactance of Adolescents

Hyunyi Cho*,
Purdue University

Laura Sands
Purdue University

Abstract

Adolescents are frequently thought of as having strong desire for independence and defiance of authority. Using psychological reactance theory, this study investigated the effects of gain and loss frame messages advocating sun safety behavior on the perceived threats to freedom of high school-aged adolescents. A loss rather than a gain frame message produced greater perceived threats to freedom among adolescents. Perceived threats to freedom were associated with anger, but anger was not associated with attitudes toward behavior. Perceived threats to freedom were not associated with negative cognitions, but more negative cognitions were associated with less positive attitudes toward behavior. Implications of the findings on future research are explored.

Fostering prevention behavior among adolescents is important to reducing future rates of diseases. Adolescents, however, are frequently thought of as having strong desire for independence and defiance of authority (Elder & Shanahan, 2006). Perhaps due to such sensitivity to threats to freedom, adolescents are also frequently considered a challenging group of individuals to persuade for behavior change (Tilleczek & Hine, 2006). According to psychological reactance theory (Brehm, 1966), persuasion messages that are perceived as a threat to freedom can move the audience to the opposite of the intent of persuasion. Thus, it is important to investigate the types of messages that can produce perceived threats to freedom in adolescents.

A message strategy that may produce perceived behavioral threats to freedom is how the outcome of an advocated behavior is framed. An increasing number of interventions has adopted framing as a message strategy, but some studies showed that message framing may produce undesirable outcomes (Cox & Cox, 2001; Finney & Iannotti, 2002). Using psychological reactance theory, this study investigates whether and how gain and loss framed sun safety promotion messages influence perceived threats to freedom, and whether and how perceived threats to freedom predict negative attitudes toward behavior, of adolescents.

*Corresponding Author: hcho@purdue.edu.

Reactance Theory

Reactance theory (Brehm, 1966; Brehm & Brehm, 1981; Wicklund, 1974) is based on two major assumptions. First, according to the theory, individuals believe that they hold a set of free behaviors that they can engage, at present or in the future. Second, the theory assumes that when individuals sense a threat to any of the free behaviors, they are motivated to reestablish the threatened freedom. Reactance refers to the motivational state in which individuals seek to restore the free behavior that has been threatened (Brehm & Brehm, 1981).

The experience of reactance is considered to be a combination of anger and negative cognitions. Central to the experience of reactance is anger. Brehm (1966), for example, described that freedom-threatened individuals become “hostile and aggressive” (p. 9). In addition to anger, negative cognitions may be an indicator of reactance (Dillard & Shen, 2005). Specifically, in two experiments involving messages using either forceful or mild languages, Dillard and Shen (2005) found that anger and negative cognitions were indicators of an underlying construct, reactance (see also Quick & Stephenson, 2008; Rains & Turner, 2007, Experiment 2). A serious outcome of perceived threat to freedom is the boomerang effect, in which individuals alter their attitudes to being more positive toward the prohibited behavior in an attempt to restore the threatened freedom (Wicklund, 1974). Reactance was negatively related to various indicators of persuasion, including attitudes toward advocated behavior (Dillard & Shen, 2005; Rains & Turner, 2007).

Previous research on reactance examined forceful, explicit, and controlling language as causes of perceived threats to freedom. For example, Worchel and Brehm’s (1970) high threat message contained statements such as “you cannot believe otherwise” and “you have no choice but to believe this,” while the low threat message did not contain any of these sentences (p. 19). Grandpre et al. (2003) found that messages with explicit persuasion intent produced a more negative attitude than messages with implicit persuasion intent. Miller et al. (2007) found that messages containing controlling language such as “ought” and “must” were perceived by college students as a greater threat to freedom than messages containing autonomy-supportive language such as “possibly” and “maybe” (p. 223). By experimentally inducing reactance with these types of messages, previous reactance research focused on the process of reactance. Specifically, with these messages, research found that reactance comprises anger and negative cognitions and that reactance mediates the relation between perceived threats to freedom and attitudes toward behavior (e.g., Dillard & Shen, 2005; Quick & Stephenson, 2007, 2008; Rains & Turner, 2007).

Framing and Reactance

Dillard and Shen (2005) note, however, that the range of message types examined in existing reactance research is rather narrow and that perceived threats to freedom may be caused by other message types. Particularly, research needs to investigate whether messages designed without the intent to induce reactance can produce perceived threats to freedom. One such message type is the gain- and loss-framing. Framed messages present behavioral outcomes from two differential angles (Tversky & Kahneman, 1981). Gain framed

health messages highlight the positive outcomes to be experienced by complying with behavioral recommendations, whereas loss framed health messages emphasize the negative consequences to be experienced by not complying with behavioral recommendations (Rothman & Salovey, 1997).

Unintended effects of message framing have been reported. Specifically, a gain frame message negatively affected attitudes toward mammography and reduced their perceived susceptibility to breast cancer among women age over 50 (Cox & Cox, 2001). Somewhat similarly, gain frame mammography reminder letters produced a lower compliance rate than standard hospital pamphlets among women who were due for annual mammography (Finney & Iannotti, 2002). The mechanisms underlying the boomerang effect were not measured in these studies, however. From the perspective of reactance theory, the findings might be explained in the following way. Gain frames may have produced boomerang effects because the positive outcomes presented in gain frames can be obtained only when individuals comply with message recommendations and thus compromise their behavioral freedom. In comparison, the negative outcomes presented in loss frame messages may still be observed even when individuals do not comply with message recommendations and do not compromise their behavioral freedom.

Research also found loss framing effects on reactance. Specifically, a loss rather than a gain frame message advocating organ donation produced greater reactance among college students (Reinhart, Marshall, Feely, & Tutzauer, 2007). Loss frame messages may be inherently more forceful than gain frame messages. Comparing gain and loss frames, it may take less to reject, or to pass up, a benefit promised in a gain frame message than to deny a cost presented in a loss frame messages. Put differently, a gain frame may be perceived as an offer that may be rejected or not accepted, whereas a loss frame may be perceived as a command that must be answered, obeyed, or react against.

Thus, extant literature is inconsistent about whether gain or loss frames are more prone to producing unintended effects and how the effects come about, although direct evidence of the effect of message framing on reactance was found in the above-discussed organ donation study involving college students (Reinhart et al., 2007). Building on this line of research, this study investigates gain and loss framed sun safety message effects on adolescents' reactance.

Promoting sun safety among adolescents is important because sunburns during adolescence increase the risk of melanoma during adulthood (Elwood & Jobson, 1997). Although sun safety research involving adolescents is increasing (e.g., Andreeva et al., 2008; White, Hyde, O'Connor, Naumann, & Hawkes, 2010), limited research has examined the role of reactance. Buller, Borland, and Burgoon's sun safety study (1998) investigated reactance, but among adults. Examining reactance is important for sun safety behavior of adolescents, who are frequently thought of having desire for independence. This desire may interfere with efforts to foster positive attitudes toward sun safety behavior among adolescents.

RQ1. Does a gain or a loss framed sun safety message produce a greater perceived threat to freedom among adolescents?

H1a. Perceived threats to freedom will be positively associated with reactance (i.e., anger, negative cognitions).

H1b. Reactance will be negatively associated with attitudes toward sun safety behavior.

H1c. The association between perceived threats to freedom and attitudes toward sun safety behavior will be mediated by reactance.

Method

Overview and Participants

This study was conducted as part of a larger project examining effects of message framing on the sun safety behavior of adolescents. A two-group comparison design was employed. One group was exposed to a gain frame message and the other group was exposed to a loss frame message. Participants ($N = 219$) were recruited from high schools in rural Midwest. Participants were recruited with an information packet distributed by teachers. The packet included the researcher's cover letter, parental consent form, adolescent assent form, and an envelope. After briefly introducing the study, the letter asked interested parents to read and complete the consent form. The letter also asked interested adolescents to read and complete the assent form. They were asked to return the signed forms in a sealed envelope to their teacher.

The typical participant was about 16 years old ($M = 15.61$, $SD = 1.34$, range = 13 – 18). Fifty three percent of participants was male. The vast majority, 95.5%, of the sample was White. Both parental consent and adolescent assent were obtained. Each participant received \$5.

Procedure

The study was conducted during general activities hours in classroom settings. The research and a graduate research assistant conducted the study. The study was introduced as an effort to understand teenagers' sun safety practices and to gain their input on a sun safety message that was currently being developed. It was emphasized that participants' honest responses are important. After the introduction, each participant received a packet containing measures and either a gain or a loss frame message.

The packets were randomly assigned to participants. Specifically, prior to the distribution, the packets were stacked in the order generated by a random number generator. All packets were identical in color, size, and shape except for the gain or loss frame sun safety message. Therefore, the participants did not know that different frame messages were distributed. The researchers did not know which frame message that they distributed.

Immediately after reading the message, participants completed an induction check and a thought-listing task, and indicated their perceived threats to freedom, anger, and attitudes toward advocated behavior. These tasks were completed with paper and pencil.

Stimulus Materials

The gain and loss frame messages presented either the positive or negative outcomes to be obtained when a person performs or does not perform sun safety. The sun safety methods advocated were the use of sunscreen, long sleeve shirts, and long pants. Both messages were titled as “a message about sun protection.” This heading was followed by the subheading of “when you use sun protection, you will gain benefits!” or “when you do not use sun protection, you will pay costs!” The body of the message was comprised of three major 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 ☺,” “you look red ☹”). The second part presented the benefits or costs of using or not using protective clothing (long sleeve shirts, long pants/skirts) when in the sun (e.g., “no red, burnt shoulders ☺,” “red, burnt shoulders ☹”). The third part asked participants to think about how they would feel when they use or do not use sun protections next time when in the sun: (“you get to enjoy the outdoors more ☺,” “you get to enjoy the outdoors less ☹”). Both messages closed with the tag line “protect yourself from the sun!”¹ The messages were also equivalent in length. Gain frame message contained 356 words, and loss frame 361.

Measures

Induction check: The effectiveness of the message framing treatment was gauged with three pairs of bipolar adjectives given on a response scale ranging from 1 to 7. The pairs were: “costs/benefits,” “losses/gains,” and “negative outcomes/positive outcomes” ($\alpha = .92$).

Perceived threats to freedom were assessed with Dillard and Shen’s (2005) four-item scale. Items included: “this message tried to make a decision for me,” “this message tried to manipulate me,” “this message tried to pressure me,” and “this message threatened my freedom to choose” ($M = 2.77$, $SD = 1.46$, $\alpha = .84$). The response scale ranged from 1 “strongly disagree” to 7 “strongly agree.”

To measure anger, participants were asked how much the message made them feel irritated, angry, and annoyed. The response scale ranged from 1 “not at all” to 7 “very much” ($M = 2.06$, $SD = 1.36$, $\alpha = .88$). This three-item measure was taken from Dillard and Shen (2005).

Negative cognitions were measured with the thought-listing technique of Cacioppo and Petty (1981; Petty & Cacioppo, 1977). Participants were asked to write down the thoughts that they had while reading the message, and to write down one thought in one box. Two trained coders coded the data, following Dillard & Shen’s (2005, p. 153–154) procedure. About 20% of the sample (43 cases or 152 thoughts) were randomly selected to assess reliability. First, two or more thoughts expressed in one box were separated. The agreement rate was 100%. Second, Shaver, Schartz, Kirson, and O’Connor’s (1987) list of feeling terms was used to remove affective responses ($k = 1.00$). Third, the remaining data were categorized into (1) positive, (2) neutral or irrelevant, or (3) negative thoughts ($k = .82$). Positive thoughts were defined as the responses that expressed agreement with the advocacy and intentions to comply with the advocacy. Neutral or irrelevant thoughts were defined as the responses that expressed neither an agreement nor a disagreement with the advocacy. Negative thoughts were defined as the responses that indicated disagreement with

the advocacy and negative intentions to comply with the advocacy. These definitions are consistent with Dillard and Shen's (2005, p. 154) and Cacioppo and Petty's (1981). Only the negative thoughts were used in subsequent analyses. On average, participants generated 1.41 negative thoughts ($SD = .80$).

Attitudes toward behavior were assessed with a semantic differential scale comprising three pairs of bipolar adjectives including "bad/good," "negative/positive," and "unfavorable/favorable." The response scale ranged from -3 to $+3$. The scale assessed attitudes toward using sunscreen ($M = 1.73$, $SD = 1.37$, $\alpha = .83$), long sleeve shirts ($M = .32$, $SD = 1.60$, $\alpha = .79$), and long pants ($M = .78$, $SD = 1.65$, $\alpha = .85$).

Results

Overall, 117 participants were in the gain frame condition, 102 in the loss frame condition. In induction check, a t -test indicated that participants who were in the gain frame message condition had significantly higher perceptions of gain than those in the loss frame condition ($M_s = 5.38$ vs. 3.37 ; $t(206) = 9.18$, $p < .001$, $d = 1.28$). The results show that the induction of the perceptions of gain and loss was successful.

RQ1 asked whether a gain or a loss framed sun safety message would produce a greater perceived threat to freedom among rural adolescents. A t -test indicated that participants who were exposed to the loss frame message indicated a significantly stronger perception of threat to freedom than those who were exposed to the gain frame message ($M_s = 3.02$ vs. 2.56 ; $t(204) = 2.29$, $p = .023$, $d = .31$).

Prior to testing H1, the relation between anger and negative cognitions was examined to determine whether they are indicators of the same construct, reactance. The correlation between anger and negative cognitions was very low ($r = .03$, $p = .74$). Given the lack of evidence of a relation between these two variables, anger and negative cognitions were considered separately in the following analyses.

H1a predicted that perceived threats to freedom would be positively associated with reactance (i.e., anger, negative cognitions). To test the hypothesis, anger and negative cognitions were separately regressed onto perceived threats to freedom. Perceived threats to freedom were significantly associated with anger ($\beta = .47$, $p < .001$), but not with negative cognitions ($\beta = .01$, $p = .78$). H1a was only partially supported.

H1b predicted that reactance would be negatively associated with attitudes toward sun safety behavior. First, each of the attitudes toward the advocated behaviors was regressed onto anger. Anger was not significantly associated with attitudes toward sunscreen use ($\beta = -.11$, $p = .09$), long sleeve shirts use ($\beta = -.11$, $p = .08$), or long pants use ($\beta = -.05$, $p = .39$). Second, each of the attitudes toward the advocated behaviors was regressed onto negative cognitions. Negative cognitions showed a significant inverse association with attitudes toward sunscreen use ($\beta = -.25$, $p = .01$), although not with long sleeve shirts use ($\beta = -.14$, $p = .17$) or long pants use ($\beta = -.12$, $p = .24$). H2b was partially supported.

H2c predicted that the association between perceived threats to freedom and attitudes toward behavior would be mediated by reactance. Because the results of H2a-b indicated that the first three necessary conditions for mediation were not met (Baron & Kenny, 1986), no further analysis of mediation was conducted for H2c.

Discussion

Adolescents are a priority population for various health promotion efforts. Yet, adolescents are frequently thought of as having strong desire for independence and defiance of authority. Ways of addressing this potential should be identified, in order to effectively promote health behaviors among adolescents. Few previous studies, however, have involved adolescents to investigate their psychological reactance and ways of addressing it.

The loss rather than the gain frame message produced a greater perceived threat to freedom in adolescents. This finding suggests that negative valence is another message feature that can provoke perceived threats to freedom. The gain and loss frame messages of this study differed only in terms of desirability. Both the loss and gain frame messages presented the same set of behavioral outcomes, in either a negatively or a positively valenced angle. The loss frame message presented the undesirable outcomes of noncompliance, whereas the gain frame message presented the desirable outcomes of compliance to recommended sun safety behaviors.

Looking at the finding, it may be conjectured that loss frame messages may be inherently more forceful than gain frame messages. Comparing gain and loss frames, it may take less to reject, or to pass up, a benefit promised in a gain frame message than to deny a cost presented in a loss frame messages. Put differently, a gain frame may be perceived as an offer that may be rejected or not accepted, whereas a loss frame may be perceived as an argument or a command that must be answered, obeyed, or rebelled against. This finding on loss framed sun safety message effect on perceived threats to freedom of rural adolescents is similar to the loss framed organ donation messages effect on reactance found in college students (Reinhart et al., 2007).

Findings relevant to the relations between perceived threats to freedom and reactance (anger, negative cognitions), and between reactance and attitudes toward behavior, were inconsistent with previous research on the process of reactance (Dillard & Shen, 2005; Quick & Stephenson, 2007, 2008; Rains & Turner, 2007). The difference might stem from the fact that the present and previous research employed different types of messages. Previous studies directly manipulated perceived threats to freedom, by employing messages that are forceful, explicit, and controlling; in contrast, in this study, perceived threats to freedom was not directly manipulated, and both the gain and loss frame messages advocated the same set of sun safety behaviors, including sunscreen use, long sleeve shirts use, and long pants use. Consequently, it might be speculated that different types of messages create differences in the process of reactance.

Specifically, in this study, perceived threats to freedom displayed different relations with anger and negative cognitions. Perceived threats to freedom predicted anger, but anger was

not associated with any of the attitudes toward sun safety behavior. This finding is similar to previous research. For example, Leventhal, Singer, and Jones (1965) found that participants exposed to high threat messages were angrier than those who were exposed to low threat messages, but the former indicated stronger behavioral intentions than the latter. These findings suggest that messages focusing on negative behavioral outcomes (e.g., loss frames, threat appeals) can produce negative emotions such as anger; concurrently, these findings also suggest that the negative emotions may not necessarily impede persuasion.

Whereas anger appears to be an outcome of exposure to a negatively-valenced message, negative cognitions do not. Negative cognitions were not predicted by perceived threats to freedom, which were predicted by the loss frame message. Because more negative cognitions predicted less positive attitudes toward sunscreen use, research needs to identify ways of reducing the negative cognitions.

One limitation of this study is that a specific time limit was not used for the thought-listing task. Future research should ensure that an exact same amount of time is used for this task across participants. Additionally, interpretation of the results should consider the low magnitude of perceived threats to freedom and anger as well as small number of negative cognitions elicited in this study. These may be because of the nature of the gain and loss frame messages employed in this study. The messages were non-forceful, non-explicit, and non-controlling.

Appendix 1: Sample Gain and Loss Frame Sun Safety Messages

Gain Frame	Loss Frame
<p>A Message about Sun Protection:</p> <p>When You Use Sun Protection, You will Gain Benefits!</p> <p>When you wear sunscreen each time when you are in the sun, you will gain Benefits!</p> <ul style="list-style-type: none"> • What are the Benefits of using sunscreen when in the sun? <ul style="list-style-type: none"> - You don't look red ☺ - You don't get itchiness, irritation ☺ - You don't get sunburns ☺ - No sunburns mean no pain, no hurting ☺ - You don't get blisters, peeling ☺ - You are not sore for a couple of days, and you don't lose sleep because of pain ☺ - Your skin do not age quickly—no wrinkles or leathery, dry skin ☺ - You reduce your chance to getting skin cancer, including melanoma ☺ 	<p>A Message about Sun Protection:</p> <p>When You Do Not Use Sun Protection, You will Pay Costs!</p> <p>When you do not wear sunscreen each time you are in the sun, you will pay Costs!</p> <ul style="list-style-type: none"> • What are the Costs of not using sunscreen when in the sun? <ul style="list-style-type: none"> - You look red ☹ - You get itchiness, irritation ☹ - You get sunburns ☹ - Sunburns mean pain, hurting ☹ - You get blisters, peeling ☹ - You are sore for a couple of days, and you lose sleep because of pain ☹ - Your skin ages quickly—wrinkles, or leathery, dry skin ☹ - You increase your chance to getting skin cancer, including melanoma ☹ - The less consistently you use sunscreen when in the sun, the more likely you will pay these costs ☹

Gain Frame	Loss Frame
<p style="text-align: center;">– The more consistently you use sunscreen when in the sun, the more likely you will gain these benefits ☺</p> <p style="text-align: center;">When You Use Sun Protection, You will Gain these Benefits!</p>	<p style="text-align: center;">When You Do Not Use Sun Protection, You will Pay these Costs!</p>

References

- Andreeva VA, Reynolds KD, Buller DB, Chou C, & Yaroch AL (2008). Concurrent psychosocial predictors of sun safety among middle school youth. *Journal of School Health*, 78, 374–381.
- Baron RM, & Kenny DA (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic and statistical considerations. *Journal of Personality and Social Psychology*, 51, 1173–1182. [PubMed: 3806354]
- Bensley LS, & Wu R (1991). The role of psychological reactance in drinking following alcohol prevention messages. *Journal of Applied Social Psychology*, 21, 1111–1124.
- Brehm JW (1966). A theory of psychological reactance. New York: Academic Press.
- Brehm SS, & Brehm JW (1981). Psychological reactance: A theory of freedom and control. New York: Academic Press.
- Buller DB, Borland R, & Burgoon M (1998). Impact of behavioral intention on effectiveness of message features: Evidence from the family sun safety project. *Human Communication Research*, 24, 433–453.
- Cacioppo JT, & Petty RE (1981). Social psychological procedures for cognitive response assessment: The thought-listing technique. In Merluzzi TV, Glass CR, & Genest M (Eds.), *Cognitive assessment* (pp. 309–342). New York: Guilford.
- Cox D & Cox AD (2001). Communicating the consequences of early detection: The role of evidence and framing. *Journal of Marketing*, 65, 91–103.
- Dillard JP & Shen L (2005). On the nature of reactance and its role in persuasive health communication. *Communication Monographs*, 72, 144–168.
- Elder GH, & Shanahan MJ (2006). The life course and human development. In Damon W & Lerner RM (Eds.), *Handbook of child psychology* (pp. 665–715). Hoboken, NJ: Wiley.
- Elwood JM, & Jopson J (1997). Melanoma and sun exposure: An overview of published studies. *International Journal of Cancer*, 73, 198–203. [PubMed: 9335442]
- Finney LJ, & Iannotti RJ (2002). Message framing and mammography screening: A theory-driven intervention. *Behavioral Medicine*, 28, 5–14. [PubMed: 12244644]
- Grandpre J, Alvaro EM, Burgoon M, Miller CH, & Hall JR (2003). Adolescent reactance and anti-smoking campaigns: A theoretical approach. *Health Communication*, 15, 349–366. [PubMed: 12788679]
- Leventhal H, Singer RP, & Jones S (1965). Effects of fear and specificity of recommendation upon attitudes and behavior. *Journal of Personality and Social Psychology*, 2, 20–29. [PubMed: 14313839]
- Miller CH, Lane LT, Deatrick LM, Young AM, & Potts KA (2007). Psychological reactance and promotional health messages: The effects of controlling language, lexical concreteness, and the restoration of freedom. *Human Communication Research*, 33, 219–240.
- Petty RE, & Cacioppo JT (1977). Forewarning, cognitive responding, and resistance to persuasion. *Journal of Personality and Social Psychology*, 35, 645–665.
- Quick BL, & Stephenson MT (2007). Further evidence that psychological reactance can be modeled as a combination of anger and negative cognitions. *Communication Research*, 34, 255–276.
- Rains SA, & Turner MM (2007). Psychological reactance and persuasive health communication: A test and extension of the intertwined model. *Human Communication Research*, 33, 241–269.

- Reinhart AM, Marshall HM, Feeley TH, & Tutzauer F (2007). The persuasive effects of message framing on organ donation: The mediating role of psychological reactance. *Communication Monographs*, 74, 229–255.
- Rothman A, & Salovey P (1997). Shaping perceptions to motivate healthy behavior: The role of message framing. *Psychological Bulletin*, 121, 3–19. [PubMed: 9000890]
- Shaver P, Schwartz J, Kirson D, & O'Connor C (1987). Emotion knowledge: Further exploration of a prototype approach. *Journal of Personality and Social Psychology*, 52, 1061–1086. [PubMed: 3598857]
- Tilleczek KC, & Hine DW (2006). The meaning of smoking as health and social risk in adolescence. *Journal of Adolescence*, 29, 273–287. [PubMed: 16125767]
- Tversky A, & Kahneman D (1981). The framing of decisions and the psychology of choice. *Science*, 211, 453–458. [PubMed: 7455683]
- White KM, Hyde MK, O'Connor EL, Naumann L, & Hawkes AL (2010). Testing a belief-based intervention encouraging sun-safety among adolescents in a high risk area. *Preventive Medicine*, 3, 325–328.
- Worchel S, & Brehm JW (1970). Effects of threats to attitudinal freedom as a function of agreement with the communicator. *Journal of Personality and Social Psychology*, 14, 18–22. [PubMed: 5435534]