

## **Effects of Message Framing in Anti-Binge Drinking PSAs: The Moderating Role of Counterfactual Thinking**

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*This experiment examined the interaction effects of message framing and counterfactual thinking on attitudes toward binge drinking and behavioral intentions. Data from a 2 (message framing: gain vs. loss) × 2 (counterfactual thinking priming: additive vs. subtractive) between-subjects factorial design showed that a gain-framed message resulted in lower binge drinking intentions than did a loss-framed message after subjects engaged in additive counterfactual thinking. The effects of a loss-framed message on binge drinking intentions occurred when subtractive counterfactual thinking was induced. Theoretical and practical implications for anti-binge drinking public service announcements are discussed.*

Binge drinking, defined as the consumption of five or more drinks in a row for men and four or more for women on at least one occasion within 2 weeks, is one of the most challenging social and health problems facing college campuses today (Turner & Shu, 2004; Wechsler, Lee, Kuo, & Lee, 2000; Wolburg, 2001). According to Wechsler and colleagues (2002), approximately two in five college students (44%) have engaged in binge drinking behavior and 23% of college students are considered frequent binge drinkers. Binge drinking has serious undesirable consequences for college students, including academic difficulties, antisocial behaviors, a variety of health and psychological problems, and unplanned and unsafe sex (e.g., Morawska & Oei, 2005; Turner & Shu, 2004; Wechsler et al., 2000).

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To curb the prevalence of binge drinking, advocacy organizations have turned to media campaigns, and considerable efforts have gone into creating and implementing anti-binge drinking public service announcements (PSAs; e.g., DeJong, 2002). It is unfortunate that many questions remain unanswered about the efficacy of anti-binge drinking PSAs (i.e., if they substantially reduce the overall rate of binge drinking among college students) and about the comparative persuasiveness of different types of message arguments in anti-binge drinking PSAs (i.e., message types may not be equally persuasive). Therefore, a critical issue facing health communication professionals is the identification and diagnostic assessment of the effectiveness of different health message strategies in anti-binge drinking PSAs.

One communication strategy that has received a considerable amount of attention in the persuasion literature is the use of message framing that focuses on either the benefits of adopting a health behavior (i.e., gain-framed appeals) or the costs of failing to adopt a health behavior (i.e., loss-framed appeals). Abundant research has examined the relative effectiveness of gain- and loss-framed messages on health-related decision making, but the findings have been mixed (e.g., Gerend & Cullen, 2008; O'Keefe & Jensen, 2006, 2007, 2009; Salovey, Schneider, & Apanovitch, 2002; Rothman, Bartels, Wlaschin, & Salovey, 2006; Rothman & Salovey, 1997). To determine how and when gain- and loss-framed messages should be used, prior work has focused on dispositional motivations of health message recipients as possible moderators (Latimer, Salovey, & Rothman, 2007; Shen & Dillard, 2007, 2009).

Despite previous research, our understanding of counterfactual thinking as a motivational factor that might affect the persuasiveness of gain- versus loss-framed messages is still relatively limited. According to Krishnamurthy and Sivaraman (2002), counterfactual thinking is defined as "the process of mentally undoing the outcome of an event by imagining alternate antecedent states" (p. 650). Extant literature has opened up the possibility that counterfactual thinking can influence information processing of persuasive ad messages (Krishnamurthy & Sivaraman, 2002; Nan, 2008).

The primary purpose of this study is to examine how counterfactual thinking and message framing interplay in determining anti-binge drinking message persuasiveness. In theory, the findings provide valuable insights into understanding when gain- and loss-framed messages are maximally effective in reducing binge drinking by demonstrating the moderating role of counterfactual thinking. Given that counterfactual thinking could be temporarily primed through situational contexts (Roose, Hur, & Pennington, 1999), the findings should be suggestive of strategic ways for health communication professionals to induce the necessary type of counterfactual thinking within the external contexts (e.g., television programs and magazine articles reflecting fictitious or real-life frustrating situations) in which anti-binge drinking PSAs are placed.

## Theoretical Background

### *The Relative Persuasiveness of Message Framing*

*Message framing*, which refers to the emphasis in the message on the positive or negative consequences of adopting or failing to adopt an advocated behavior, has proven to be an effective message strategy for promoting health-related behavioral change (e.g., Gerend & Cullen, 2008; Rothman & Salovey, 1997). Gain-framed messages highlight the benefits and desirable outcomes of adopting the advocated

behavior, whereas loss-framed messages focus on the costs and undesirable outcomes of not adopting the recommendation (O'Keefe & Jensen, 2006; Rothman et al., 2006). For example, a gain-framed message might state, "If you follow the Surgeon General's recommendations, you are likely to increase your chances of living a long, healthy life." In contrast, a loss-framed message might note, "If you do not follow the Surgeon General's recommendations, you are likely to increase your chances of dying early" (Detweiler, Bedell, Salovey, & Pronin, 1999).

Past research has addressed the question of the relative persuasiveness of gain-framed and loss-framed messages and documented the mixed findings regarding message framing effectiveness. Some studies have found greater persuasiveness in gain-framed messages (e.g., Maheswaran & Meyers-Levy, 1990; Rothman, Salovey, Antone, Keough, & Martin, 1993); some have indicated greater persuasive power in loss-framed messages (e.g., Kalichman & Coley, 1995; Meyerowitz & Chaiken, 1987). However, research has documented that either message frame is not inherently more persuasive than the other (e.g., Salovey, Schneider, & Apanovitch, 2002; Yan, Dillard, & Shen, 2010). The findings of meta-analytic reviews (O'Keefe & Jensen, 2006, 2007, 2009) tend to indicate that message framing effects depend on certain moderators. Among a variety of moderating factors that influence the relative persuasiveness of gain- and loss-framed messages, significant attention has been paid to the psychological characteristics of individuals, particularly motivational orientation (Lee & Aaker, 2004; Salovey et al., 2002; Shen & Dillard, 2007, 2009). There is evidence that people are more likely to change and maintain their behavior if they are autonomously motivated (Deci & Ryan, 2008; Pelletier & Sharp, 2008; Rothman & Updegraff, 2010).

Theories of motivation have postulated that people tend to regulate their behavior relative to two separate motivational systems: approach motivation (i.e., moving toward something positive) and avoidance motivation (i.e., moving away from something negative; Carver, Sutton, & Scheier, 2000; Elliot, 2008). Research has supported the congruency hypothesis that health messages framed to match people's predominant motivational orientation are more effective than mismatched messages (Mann, Sherman, & Updegraff, 2004; Sherman, Mann, & Updegraff, 2006). The implication of the research is that gain-framed messages should be more persuasive in promoting health behavior change for people predominantly motivated to approach positive outcomes, whereas loss-framed messages should be more effective for people predominantly motivated by avoiding negative outcomes (for reviews, see Updegraff, Sherman, Luyster, & Mann, 2007).

For example, using Gray's (1990) theory of behavioral inhibition system and behavioral activation system, Shen and Dillard (2007) observed that the two motivational systems significantly interact with message framing for the processing of persuasive health messages. It is noteworthy that the primary function of behavioral inhibition system/behavioral activation system activation is to initiate goal-directed behavior that may regulate approach and withdrawal motivations (Sherman et al., 2006; Yan et al., 2010). As suggested by Shen and Dillard (2009), loss-framed messages are more likely to activate behavioral inhibition system relative to situational cues associated with punishment and non-reward, whereas gain-framed messages tend to stimulate behavioral activation system corresponding to cues associated with reward and nonpunishment.

Similar to the conceptualization of approach and avoidance motivation, people tend to regulate their judgment, attitude, and behavior toward desired goals relative

to pursuance of the fundamental needs for nurturance and security. As suggested by Higgins (1997, 2002), regulatory focus theory provides a rich understanding of self-regulatory goals that underlie approach-avoidance motivation because it distinguishes between two types of self-regulatory orientations that adhere to goal pursuits: promotion focus and prevention focus. Specifically, people with a promotion focus are motivated to attain desired end states for nurturance and advancement, whereas those with a prevention focus are motivated to avoid undesired end states for security and safety (e.g., Aaker & Lee, 2001; Higgins, 1987; Lee & Aaker, 2004). It should be noted that promotion focus pertains to people's aspirations, hopes, and accomplishments. In contrast, prevention focus is associated with people's duties, obligations, and responsibilities. Regardless of whether their regulatory orientation can be chronically accessible or situationally primed, promotion-focused people tend to be more sensitive to the presence or absence of positive outcomes (i.e., gains and nongains), whereas prevention-focused people tend to be more sensitive to the presence or absence of negative outcomes (i.e., losses and nonlosses; Aaker & Lee, 2001; Higgins, 1997; Kim, 2006; Lee & Higgins, 2009).

A substantial body of research has suggested that people experience regulatory fit when they process information that aligns with their regulatory orientation (Aaker & Lee, 2001, 2006; Avnet & Higgins, 2006; Lee & Higgins, 2009). Lee and Aaker (2004) found that gain-framed messages are more persuasive when they are promotion focused, whereas loss-framed messages are more persuasive when they are prevention focused. The evidence is clear that the effectiveness of message framing (gain vs. loss) on persuasion varies as a function of regulatory focus.

Similar effects of regulatory fit on persuasion are documented in the context of health communication. For example, Kim (2006) showed that adolescents view antismoking messages as more believable and persuasive when regulatory focus and message framing are congruent versus incongruent. Zhao and Pechmann (2007) demonstrated that promotion-oriented adolescents are most persuaded by gain-framed antismoking messages, whereas prevention-oriented teenagers are most persuaded by loss-framed messages. As a whole, the cumulative evidence suggests that fit messages should be more persuasive than non-fit messages in the context of anti-binge drinking messaging (Lee & Higgins, 2009).

### ***The Role of Counterfactual Thinking***

As an underlying motivational process, it is a common experience to think about how situations could have turned out differently by imagining alternatives to actual events. Of the influences on counterfactual thinking, there is evidence to suggest that counterfactual thinking may be triggered most often by negative emotional experience (e.g., feelings of regret, frustration, dissatisfaction; Roese, 1994). For example, through counterfactual thinking, people may imagine alternative outcomes to portrayed events (e.g., "That depicted illness could have been avoided by ..."), especially if those portrayed outcomes are negative events (e.g., "Things might have been different if only I had ..."). In light of current knowledge, it would appear counterfactual thinking performs a preparative function for problem solving because problems activate counterfactual thinking that may produce behavior change (Roese, 1994). Counterfactual thinking is viewed as "a form of careful reason-based thinking that influences future problem-solving behaviors" (Krishnamurthy & Sivaraman, 2002, p. 651).

According to Roese and colleagues (1999), counterfactual thinking may be differentiated as to whether it alters a previous action (in which case the action is subtracted from reality) or a previous inaction (in which case the action is added to reality). Stated differently, additive counterfactual thinking adds antecedents to reconstruct reality (e.g., “If I only had bought a new car, I would not be having all kinds of mechanical problems now”), while subtractive counterfactual thinking removes antecedents to reconstruct reality (e.g., “If only I had not purchased this used car, I would not be having all kinds of mechanical problems now”; Roese, 1994).

Studies have suggested that the concepts of counterfactual thinking and self-regulatory goals are intertwined in fundamental ways (e.g., Epstude & Roese, 2008; Nan, 2008; Roese et al., 1999). Simply put, engaging in additive counterfactual thinking tends to activate a promotion focus, whereas engaging in subtractive counterfactual thinking tends to activate a prevention focus (e.g., Epstude & Roese, 2008; Pennington & Roese, 2003; Roese et al., 1999). Evidence has been reported supporting the fact that promotion focus (versus prevention focus) leads to greater additive (versus subtractive) counterfactual thinking that may then trigger specific intentions and goal-directed behaviors (Roese et al., 1999).

Experimental research by Nan (2008, Experiment 2 and 3) provides an interesting empirical demonstration, showing the effect of congruency between counterfactual thinking and regulatory focus-based message on advertising effectiveness. In the research, a promotion-focused ad message was found more persuasive than a prevention-focused ad message when positive counterfactual thinking preceded ad exposure. The reverse effect held true when negative counterfactual thinking preceded ad exposure. The key implication from Nan’s (2008) research is that greater persuasion occurs when matching the valence of counterfactual thinking with regulatory focus-based message.

On the basis of the aforementioned theoretical reasoning and research regarding the congruency/fit effect of message framing and motivational orientations, we predict that additive counterfactual thinking (associated with promotion focus) will make recipients of anti-binge drinking messages more sensitive to the potential benefits/gains of adherence, whereas subtractive counterfactual thinking (associated with prevention focus) will make them more receptive to the potential costs/losses of nonadherence. Thus, it is expected that additive counterfactual thinking coupled with gain framing is more effective in reducing binge drinking than additive counterfactual thinking coupled with loss framing. In contrast, subtractive counterfactual thinking coupled with loss framing is expected to be more persuasive than subtractive counterfactual thinking coupled with gain framing. Therefore, the following hypotheses are proposed.

Hypothesis 1: When people engage in additive counterfactual thinking, a gain-framed message will elicit (a) more unfavorable attitudes toward binge drinking and (b) lower binge drinking intentions than a loss-framed message.

Hypothesis 2: When people engage in subtractive counterfactual thinking, a loss-framed message will elicit (a) more unfavorable attitudes toward binge drinking and (b) lower binge drinking intentions than a gain-framed message.

## Method

### *Participants and Design*

A total of 193 college students (37.4% male and 62.6% female) at a major Southeastern university participated in the experiment for extra course credit. The experiment was conducted online and used a 2 (message framing: gain vs. loss)  $\times$  2 (counterfactual thinking priming: additive vs. subtractive) between-subjects design.

Participants were provided with a URL, which they accessed to complete the online experimental tasks. Using the Random Link Generator (Baek, Kim, & Yu, 2010), participants were randomly assigned to one of the four experimental conditions. Even though the degree of control over web-based research is lower than for research conducted in a lab environment, literature (Krantz & Dalal, 2000) has revealed a close comparative match between the results of psychological experiments in lab situations and on the Internet.

Participants first completed a cognitive task designed to induce the different types of counterfactual thinking. Following instruction, they engaged in either additive or subtractive counterfactual thinking. Next, participants were asked to view a print anti-binge drinking PSA, framed with a gain- or loss-framed message. After reading each PSA message, they completed a self-administered questionnaire, which included the dependent variables, manipulation checks, and demographic questions. The entire process took approximately 25 min.

### *Manipulations*

#### *Message Framing*

As noted earlier, two anti-binge drinking PSAs were used: one was a gain-framed message and the other was a loss-framed message. In the gain-framed condition, the message focused on the beneficial outcomes associated with responsible alcohol use. In the loss-framed condition, the message emphasized the harmful outcomes associated with irresponsible alcohol use. The message styles were adopted from Gerend and Cullen (2008), and each condition focused on the alcohol-related health, social, and psychological consequences resulting from binge drinking (see Appendix A and B for descriptions of message framing).

#### *Counterfactual Thinking*

To manipulate additive and subtractive counterfactual thinking and to prime the subjects, we followed the induction procedure used by Roese (1994, Experiment 1) and Roese and colleagues (1999, Experiment 2). To induce counterfactual thinking, participants were first asked to record details about a specific life event: "Please take a moment to think of a single event that occurred sometime in the last year that was especially sad, negative, and/or disappointing. In the space below, please describe this event." The participants recalled a variety of events, such as poor academic performance, deaths and illnesses of friends or family members, romantic relationship breakups, drunk-driving arrests, car accidents, and so forth.

Next, they were instructed to record either additive or subtractive counterfactual thinking that had occurred in response to a life event. In the additive counterfactual thinking condition, participants were asked to "Try to focus on a specific thing that you didn't do, but wish you had done." Then, they were instructed to complete three "If only I had . . . , then" sentences. In the subtractive counterfactual condition, participants were asked to "Try to focus on specific things you did do, but wish you

had not done.” Participants in the subtractive counterfactual thinking condition were instructed to complete three “If only I had not ..., then” sentences (see Appendix C for counterfactual thinking priming).

### *Dependent Measures*

Attitude toward binge drinking was measured using six, seven-point semantic differential items adopted from O’Hara, Harker, Raciti, and Harker (2008): “bad/good,” “not enjoyable/enjoyable,” “unfavorable/favorable,” “unpleasant/pleasant,” “unsatisfying/satisfying,” and “harmful/beneficial.” The Cronbach’s  $\alpha$  was .93 for the attitudinal measure. These six items were averaged to create an index for attitude toward binge drinking.

Behavioral intention to engage in binge drinking was measured by three items adopted from Trafimow (1996). Participants were asked to indicate their opinion with each of the following questions: “How likely would you be to drink five or more alcoholic beverages in a single session in the upcoming two weeks?,” “How likely do you think you would be to avoid binge drinking in the upcoming two weeks?” (reverse coded) and “How likely do you think you would be to make an effort to limit drinking alcoholic beverages in the upcoming two weeks?” (reverse coded). The questions were anchored on a 7-point scale ranging from 1 (*extremely unlikely*) to 7 (*extremely likely*). The Cronbach’s  $\alpha$  was .83 for the behavioral measure. Scores for three items were averaged to form a behavioral intention index. A lower score on this index indicated that an individual had much less intention to binge drink.

### *Covariates*

To control for the influence of extraneous variables,<sup>1</sup> a series of questions about drinking behavior pattern were asked to collect information on covariates that may influence attitude toward binge drinking and behavioral intention (Johnston & White, 2003). The drinking behavior information was collected for (a) “how many days on average did you drink alcoholic beverages during the past two weeks?” (b) “how many times have you had five or more drinks in a row during the past two weeks?” and (c) “how many drinks did you usually have on those occasions when you drank alcohol?” A requirement of covariance analysis is that covariates should correlate with the dependent variables (Hair, Anderson, Tatham, & Hair, 1998). A correlation matrix revealed that each past drinking experience was correlated with the dependent variables (range:  $r = .41$  to  $.74$ ;  $p < .01$ ), and thus were significant covariates.

## **Results**

### *Manipulation Check*

To check the message frame manipulation, participants were asked to make a judgment about the emphasis of the assigned PSA message in accordance with the following word pairs: “costs/benefits,” “losses/gains,” “disadvantages/advantages,”

<sup>1</sup>Post hoc analyses were conducted to test the possibility of gender difference influencing our results by including gender as a covariate. Gender was not correlated with binge drinking intentions ( $r = .03$ ,  $p = .71$ ) and attitude toward binge drinking ( $r = .08$ ,  $p = .24$ ). Furthermore, no significant main effects or interactions were observed, confirming that gender differences did not confound our results.

and “negative outcomes/positive outcomes.” The pairs were anchored and on 7-point scales and the Cronbach’s  $\alpha$  was .97. As we expected, the message in the gain-framed PSA was perceived as emphasizing the benefits/gain of not binge drinking ( $M = 4.73$ ,  $SD = 1.97$ ), while the message in the loss-framed PSA was perceived as focusing on the costs of binge drinking ( $M = 1.37$ ,  $SD = .82$ ). There was a statistically significant difference between the gain- and loss-framed message conditions ( $t = 10.73$ ,  $p < .001$ ). Thus, the message framing manipulation was successful.

To determine whether the different types of counterfactual thinking were primed, the nonparametric manipulation check used by Roese (1994) was used on the basis of a dichotomous classification. Two independent raters identified whether subjects correctly recorded the type of counterfactual thinking in accordance with the assigned experimental conditions. If participants responded with actions that added to their reconstructed realities in the additive condition, they were coded as “correct”; if a participant responded with actions that subtracted from their reconstructed realities in the additive condition, they were coded as “incorrect.” Interrater reliability was high for the task (Cohen’s  $\kappa = .92$ ). Disagreements were resolved through discussion. Six of 193 participants failed to comply with the instructions. The 6 participants were eliminated from all subsequent analyses, yielding a final sample of 187.

### *Hypothesis Testing*

We predicted in additive counterfactual thinking condition, a gain-framed message would elicit more unfavorable attitude toward binge drinking (Hypothesis 1a) and lower binge drinking intention (Hypothesis 1b) than a loss-framed message. In contrast, we hypothesized that a loss-framed message would elicit more unfavorable attitude toward binge drinking (Hypothesis 2a) and lower binge drinking intention (Hypothesis 2b) than would a gain-framed message in the subtractive counterfactual thinking condition.

To test the hypotheses, we performed a two-way multivariate analysis of covariance. The analysis treated the types of counterfactual thinking (additive vs. subtractive) and message framing as the independent variables, attitude toward binge drinking and binge drinking intention as the dependent variables, and prior drinking experience as a covariate. Following Hair and colleagues’ (1998) recommendation, we checked a series of underlying assumptions for a multivariate analysis of covariance. Box’s M test for homogeneity of the variance-covariance matrices revealed no significant differences across treatment groups (Box’s  $M = 4.08$ ,  $p = .91$ ). Furthermore, Bartlett’s test of sphericity was performed to test the correlation of the dependent variables. There was a significance level of intercorrelation between the two dependent variables ( $r = .54$ ,  $p < .01$ ). Thus, the basic assumptions of a multivariate analysis of covariance were considered satisfactory.

As expected, we found a significant interaction between counterfactual thinking and message framing: Wilks’s  $\lambda = .94$ ,  $p < .01$ . To further investigate the simple effects on each dependent variable, separate univariate tests were performed. The means and standard deviations for each dependent variable are shown in Table 1.

For attitude toward binge drinking, there were no significant interaction effects of counterfactual thinking and message framing,  $F(1, 180) = .91$ ,  $p = .34$ . Specifically, we found no significant difference between gain and loss frame in the additive counterfactual thinking condition ( $M_{\text{gain}} = 2.28$  vs.  $M_{\text{loss}} = 2.37$ ,  $t = .41$ ,  $p = .67$ ) or

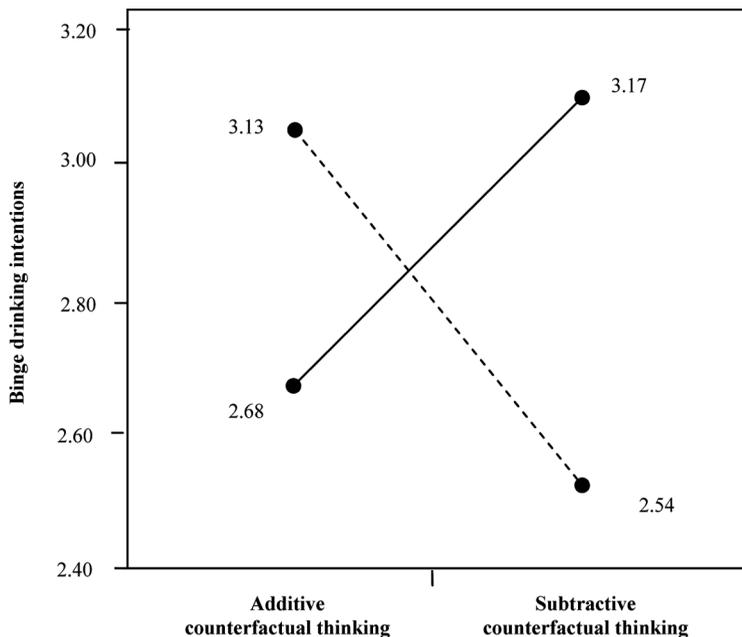
**Table 1.** Means and standard deviations of dependent variables

	Additive counterfactual thinking		Subtractive counterfactual thinking	
	Gain frame ( <i>n</i> = 46)	Loss frame ( <i>n</i> = 47)	Gain frame ( <i>n</i> = 43)	Loss frame ( <i>n</i> = 51)
Attitudes toward binge drinking	2.28 (1.23)	2.37 (1.23)	2.24 (1.24)	2.04 (1.04)
Binge drinking intentions	2.68 (1.59)	3.13 (1.75)	3.17 (1.68)	2.54 (1.54)

*Note.* All means are based on scales with values ranging from 1 to 7; numbers in parentheses represent standard deviations.

in the subtractive counterfactual thinking condition ( $M$  gain = 2.24 vs.  $M$  loss = 2.04,  $t = .94$ ,  $p = .35$ ). Thus, Hypothesis 1a and Hypothesis 2a were rejected.

However, the interaction between counterfactual thinking and message framing was statistically significant for binge drinking intention:  $F(1, 180) = 12.08$ ,  $p < .01$ . No main effects were significant. As is evident from Figure 1, planned contrasts revealed that when subjects engaged in additive counterfactual thinking, the gain-framed message led to lower binge drinking intention as compared with the loss-framed message ( $M$  gain = 2.68 vs.  $M$  loss = 3.13,  $t = 2.03$ ,  $p < .05$ ). As we predicted, the loss-framed message resulted in lower binge drinking intention than the gain-framed



**Figure 1.** Interaction effect of counterfactual thinking and message framing on binge drinking intentions: ———, gain frame; - - - - -, loss frame.

message in the subtractive counterfactual thinking condition ( $M$  gain = 3.17 vs.  $M$  loss = 2.54,  $t = 2.88$ ,  $p < .05$ ). Hence, these findings provide support for Hypothesis 1b and Hypothesis 2b.

Overall, the analyses indicate that the two message frames do not differ in their persuasiveness on attitude toward binge drinking by type of counterfactual thinking (additive vs. subtractive). On the other hand, compared with the loss-framed message, the gain-framed message resulted in lower binge drinking intention for subjects who engaged in additive counterfactual thinking. In contrast, the effects of the loss-framed message on binge drinking intention occurred when subtractive counterfactual thinking preceded exposure to the anti-binge drinking PSA.

## Discussion

This experiment, conducted to gain insight into how counterfactual thinking moderates the influence of message framing on anti-binge drinking PSA persuasion, yielded evidence of strong interaction effects of counterfactual thinking and message framing on binge drinking intention. Specifically, the results suggest that gain-framed messages can be expected to lead to lower binge drinking intention following engagement in additive counterfactual thinking. The effects of loss-framed messages on binge drinking intention can occur when subtractive counterfactual thinking is induced. Accordingly, our experimental findings suggest that counterfactual thinking plays a significant moderating role in affecting the relative effectiveness of message framing on binge drinking intention.

However, no significant interaction effects of counterfactual thinking and message framing regarding attitude toward binge drinking were found. A potential explanation for the absence of the interaction effects on attitude may be that other factors, such as involvement, mood, or affect, could influence attitude toward binge drinking. In this case, perhaps the counterargumentation manipulation evoked a negative affect or heightened involvement with the PSA and thus attitude toward binge drinking was affected by these factors. Another explanation for our nonsignificant interaction effects regarding attitude might be related to framing effects. While gain frame and loss frame mirror different types of self-regulatory goals, they also differ in valence. Gain-framed messages tend to produce more positive affect than loss-framed messages. Future study should explore this possibility of framing effects of attitude toward binge drinking by examining the effects of frames with the same valence but different focus (e.g., gain vs. nonloss; gain vs. loss).

From a theoretical standpoint, the results contribute to knowledge on the moderating role of counterfactual thinking in determining the direction of message framing effects. As detailed previously, research (Nan, 2008) has demonstrated that different types of counterfactual thinking (positive and negative) influence the effect of ad appeals that are compatible with self-regulatory goals (promotion and prevention focus). Along different lines, this research suggests that in the case of binge drinking prevention health-related message persuasion is enhanced when matching rather than mismatching message framing (gain vs. loss) with recipient counterfactual thinking type (additive and subtractive).

On the practical front, our research provides several implications for the design and implementation of effective anti-binge drinking PSAs. Given that the relative persuasiveness of message framing is a crucial issue for communication strategies, the study's results suggest that health communication professionals should carefully

consider framing messages that correspond to type of counterfactual thinking when developing anti-binge drinking PSA campaigns. This is important because matching structure of counterfactual thinking with type of message framing might increase the persuasiveness of anti-binge drinking PSAs on how message targets intend to behave following PSA exposure. Although the findings did not confirm the interaction effects of counterfactual thinking and message framing on attitude toward binge drinking, it seems clear that additive counterfactual thinking induced prior to gain-framed messages can lead to lower binge drinking intention, while subtractive counterfactual thinking induced before loss-framed messages can result in lower binge drinking intention. Because it is widely believed that behavioral intention is more predictive of behavior than cognitive and attitudinal responses, we would argue that our findings on how counterfactual thinking and message framing influence intent to binge drink are especially suggestive for health communicators.

Of special importance, campaign planners must recognize that anti-binge drinking PSAs, as with all advertising messages, are delivered and processed in the editorial and entertainment environments of media. Research has established that these external contexts may induce counterfactual thinking that ultimately influences consumer responses to embedded advertising messages (Nan, 2008). Among the many context options (e.g., advertorials or entertainment education programs), it is important that planners select the ones that are likely to induce the type of counterfactual thinking required for anti-binge drinking PSAs to be most effective. Beyond print PSA copy, for example, a television program such as *Grey's Anatomy* could use storylines of specific fictitious or real-life frustrating situations to affect the way viewers think about how portrayed events could have turned out differently. As suggested by Tal-Or, Boninger, Poran, and Gleicher (2004), people tend to generate spontaneous counterfactual thinking in response to mediated narratives, such as short films. Hence, it is feasible that anti-binge drinking messages could be aired in a television programming to prime a desired type of counterfactual thinking.

### ***Limitations and Suggestions for Future Research***

As with all research, our experiment has limitations that should be acknowledged. First, though binge drinking is a serious public health problem among college students, the problem is not limited to college students only. To generalize our findings, additional research should examine whether other population samples might exhibit patterns similar to our student sample-based results.

Additional research is also needed that examines how long behavioral intention produced by PSA exposure persists by number of exposures and different time intervals. Here, we focused on a single exposure. It would be interesting to investigate behavioral intention patterns, as well memory retention and decay patterns, for anti-binge drinking messages in association with different exposure levels at different points in time. These investigations would also enhance our findings by studying the correspondence between drinking intention and actual drinking behavior.

Further limitations include the need to determine whether the direction of counterfactual thinking can influence the relative effectiveness of message framing in the context of anti-binge drinking PSAs. Although we used types of counterfactual thinking described as additive and subtractive, counterfactual thinking may also be categorized on the functional basis of direction, including upward and downward counterfactual thinking. Upward counterfactual thinking describes alternatives

that are better than reality, whereas downward counterfactual thinking describes alternatives that are worse than reality (Page & Colby, 2003; Roese, 1994). Research has suggested that upward counterfactual thinking is more likely to facilitate positive outcomes of behaviors than downward counterfactual thinking. Therefore, future research is needed to examine the moderating roles of upward and downward counterfactuals in the persuasion process of message framing for anti-binge drinking PSAs.

These limitations notwithstanding, we believe our study's findings help advance the understanding of the influence of counterfactual thinking on message framing persuasiveness in the contexts of health communication designed to reduce binge drinking. The results are especially useful for health communicators interested in leveraging an individual's motivational condition to fine-tune the strategic content of anti-binge drinking messages.

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**Appendix A: Gain-Framed Message**

**Stop Binge Drinking!**



Binge drinking among college students is a serious public health problem in the U.S. If you are going to drink, **responsible alcohol use can help you avoid negative health consequences.** You will increase the likelihood of **driving safely, having a healthy liver, and maintaining a healthy weight.**

Moreover, **people who drink responsibly are less likely to engage in risky sexual behavior** placing them at risk for sexually transmitted diseases (STDs), unintended pregnancy, and regretted sexual experiences.

**Limiting your alcohol use now can help you avoid psychological problems.** Binge drinking may result in impaired judgment, poorer memory, and difficulty concentrating. **Limiting alcohol use may lead to better moods and higher self-esteem in the future.**

**Drink Responsibly**

 For more information, visit [www.antibingedrinking.org](http://www.antibingedrinking.org) or call 1-800-621-4444.

*Note.* Color figure available online.

**Appendix B: Loss-Framed Message**

**Stop Binge Drinking!**



Binge drinking among college students is a serious public health problem in the U.S. If you are going to drink, **irresponsible alcohol use can lead you to experience negative health consequences.** You will increase the likelihood of **driving accidents, having an unhealthy liver, and gaining weight.**

Moreover, **people who drink irresponsibly are more likely to engage in risky sexual behavior** placing them at risk for sexually transmitted diseases (STDs), unintended pregnancy, and regretted sexual experiences.

**Not limiting your alcohol use now can lead you to experience psychological problems.** Binge drinking may result in impaired judgment, poorer memory, and difficulty concentrating. **Not limiting alcohol use may lead to depressed moods and lower self-esteem in the future.**

**Drink Responsibly**

 For more information, visit [www.antibingedrinking.org](http://www.antibingedrinking.org) or call 1-800-621-4444.

*Note.* Color figure available online.

## Appendix C: Counterfactual Thinking

### *Additive Counterfactual Thinking*

People often have thoughts like, “If only ...” after negative events, in that they can see how things might have turned out better. For example, a female college student who recently sustained minor injuries when she was hit by a car told reporters, “If only I had looked down that street a second time, I would have been fine.” Often, we wish we had done something to avoid a negative outcome. **Try to focus only on specific things that you didn’t do, but wish you had done.** In the space below, please list some specific examples of any “If only I had” thoughts that ran through your head after you experienced this negative event.

If only I had \_\_\_\_\_, then \_\_\_\_\_.

### *Subtractive Counterfactual Thinking*

People often have thoughts like, “If only ...” after negative events, in that they can see how things might have turned out better. For example, a female college student who recently sustained minor injuries when she was hit by a car told reporters, “If only I had NOT been in such a rush, I would have been fine.” Often, we wish we had not done something that led to a negative outcome. **Try to focus only on specific things you did do, but wish you had not done.** In the space below, please list some specific examples of any “If only I had not” thoughts that ran through your head after you experienced this negative event.

If only I had not \_\_\_\_\_, then \_\_\_\_\_.

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