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Matching Temporal Frame, Self-View, and Message Frame Valence: Improving Persuasiveness in Health Communications

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This work examines the interplay between temporal frame and one's accessible self-view on consumer response to health communication. We find an independent self-view is more persuasive with a distal temporal frame (versus proximal frame), and an interdependent self-view is more persuasive with a proximal temporal frame (versus distal frame). Message frame valence (gain versus loss) moderates the interplay between temporal frame and self-view. In addition, message concreteness and message persuasiveness are revealed as mediators to the interplay between temporal frame and self-view. Interestingly, the mediating process varies depending on one's accessible self-view. These findings offer guidance for health communication marketers' use of temporal frames and self-view.

Consider a public service announcement (PSA) for heart disease prevention that states "1,644 people die of heart disease every day." In contrast, consider another PSA that states "600,000 people die of heart disease every year." The difference between these two PSAs is the temporal frame (day versus year) used to convey information about heart disease.

Another message strategy used in health communication focuses on one's self-construal (interdependent versus independent). For example, consider a PSA depicting a picture of a adult and two children with text that reads "Depression doesn't just impact you." This strategy activates an interdependent self (focus on others) and is typical of many PSAs asking consumers to think about the consequences of illness on their families and friends. In contrast, a PSA could focus on the reader activating an independent self-view (focus on the self): "Fifteen million Americans experience depression. Do you?"

Finally, consider a PSA for heart disease that reads "A focus on a healthy heart can help you live a long and happy life" versus a PSA that warns the reader to "Avoid heart disease and risk of early death." Both PSAs convey information about heart disease, but one does so by focusing on how to gain a positive outcome while the other focuses on how to avoid a negative outcome.

In sum, PSAs often use message strategies of temporal framing, self-construal, and message frame valence. However, work in health communications has yet to examine the relationship among these constructs or to identify the most effective combination of these message strategies in terms of persuading consumers to engage in healthy behaviors.

Prior health communication findings suggest proximal or day frames are more effective because they are construed concretely and make risk feel "close," whereas distal or year frames are construed abstractly and perceived to be "far" away (Chandran and Menon 2004). However, we expect that the efficacy of temporal frame may depend on one's accessible self-view. For example, recent research has identified self-view as an antecedent to temporal frame and that a match between temporal frame and self-view results in more favorable consumer attitudes toward frozen meals (Spassova and Lee 2013). This suggests one's accessible self-view may influence the way people respond to risk information about health issues conveyed in a proximal or distal temporal frame. In addition, health marketers use message frame valence (gain and loss frames) to convey risk information (O'Keefe and Jensen 2007; O'Keefe and Nan 2012), which has been shown to significantly influence consumers' healthy behaviors depending on temporal frame (Mogilner, Aaker, and Pennington

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2008; Pennington and Roese 2003) or one's accessible self-view (Lee, Aaker, and Gardner 2000). Interestingly, despite their prevalent use in health communication, the interactive effects of these message elements have not been examined collectively. Accordingly, research is needed to investigate the desirable combination of these message elements in the context of conveying health information to effectively persuade people to engage in healthy behaviors.

Furthermore, there is a need to uncover the underlying mechanisms that explain the interplay between temporal frame and self-view on consumer response. Although prior research found consumers better discern message argument strength when the temporal frame and self-view match (Spassova and Lee 2013), a void remains in terms of understanding the specific persuasion process of the match effect. We expect this process is different depending on one's accessible self-view.

In response, this research has two purposes: (1) to examine how temporal frame, self-view, and message frame valence interact to influence consumer response to health-related communications in the form of behavioral intention to engage in healthy behaviors and (2) to identify the underlying persuasion process of the match effect for those with an accessible independent and interdependent self-view, respectively. Two studies help achieve these goals. Study 1 examines the interaction effects between temporal frame, one's accessible self-view, and message frame valence in the context of heart disease prevention. Study 2 extends these findings by examining message persuasiveness and message concreteness as mediators that may facilitate the interaction between temporal frame and self-view in a loss message frame valence within the context of skin cancer prevention.

The results contribute to the persuasion and health communication literature. First, we demonstrate a three-way interaction of these message elements on consumers' intention to engage in healthy behaviors and establish that message frame valence does moderate the interplay between temporal frame and self-view. In addition, message concreteness and message persuasiveness are identified as mediating factors that explain how the match effect between temporal frame and self-view influences behavioral intention. Interestingly, the mediating process differs based on one's accessible self-view. Taken together, these findings confirm temporal frame, self-view, and message frame valence may help shape health communication campaigns that maximize favorable intention to engage in recommended behaviors.

THEORETICAL BACKGROUND

Construal level theory offers an explanation as to why temporal framing influences consumers' evaluations of the message and suggests perceptions of temporal distance systematically alter the way future events are construed (Liberman and Trope 1998). This then influences evaluation and choices related to future events (Trope and Liberman 2000). Temporal distance is defined as the factual distance between the present (a reference point) and the point of a specified event (e.g., tomorrow, next week) (Liberman and Trope 1998). The basic premise of construal theory is the more psychologically distant an event or object is, the more abstract the representation is (Liberman and Trope 1998). According to construal level theory, near-distant events are represented by low-level construals and future-distant events are represented by high-level construals. Low-level construals are characterized as more concrete and specific representations that focus on secondary features, while high-level construals are characterized as abstract and global representations that focus on primary features (Liberman and Trope 1998; Trope and Liberman 2003). For example, when people were asked to describe a future event (e.g., moving into a new house), they thought about more concrete information (e.g., packing boxes) in the near-future frame but thought about more abstract information (e.g., starting a new life) in the distant-future frame (Liberman and Trope 1998).

Empirical evidence in psychology literature demonstrates that the relationship between temporal distance and construal level is reciprocal (Liberman et al. 2007; Trope and Liberman 2010). Specifically, when people were provided with specific contextualized information, they perceived the event as occurring in the near future, whereas when people were provided with abstract and schematic information, they perceived the events to occur in the more distant future. Prior work has demonstrated that communicating information about health hazards using different temporal framing mimics the temporal distance effects discussed here; information presented in proximal (day) frames are perceived as more concrete and contextual than those presented in a distal (year) frame (Chandran and Menon 2004).

Self-Construal

Self-construal is described as a collection of feelings, thoughts, and behaviors regarding the self as distinct from others (Singelis 1994). Research in self-construal focuses on the distinction between an independent and interdependent construal of the self (Fiske et al. 1998; Markus and Kitayama 1991). People with an accessible independent self tend to place high value on independence, are motivated by promotion goals, and place importance on being unique from others. On the other hand, people with an accessible interdependent self-view tend to place importance on relationships with others, view the self as part of a social group, and place importance on belonging. They tend to think and behave under the consideration of "we" rather than "I," and group interests often override individual concerns (Aaker and Williams 1998; Kitayama, Markus, and Matsumoto 1995).

Temporal Frame and Self-Construal

Several literature streams have uncovered a relationship between temporal distance and self-view. Prior research on self-construal in the cultural literature suggests a link between self-view and the type of construal used to process information about the self, others, and events. For example, those with an independent self-view are more likely to represent information about the self, others, and events in more abstract and schematic terms, while those with an interdependent self-view are more likely to represent information about the self, others, and events in more contextualized and specific terms (Cross, Hardin, and Gercek-Swing 2011; Kanagawa, Cross, and Markus 2001). In addition, previous studies in attribution also support the notion that self-construal is tied to construal theory and temporal distance. Those with a more accessible independent self-view are more likely to make attributions for behavior based on abstract enduring dispositions, whereas those with a more accessible interdependent self-view are more likely to attribute behavior to circumstantial and temporary influences (Morris and Peng 1994). Finally, prior work in construal level theory also suggest a relationship between temporal distance and self-view; Wakslak and colleagues (2008) found people provided more abstract self-descriptions when they referred to a distant-future self than to a near-future self.

Recently, Spassova and Lee (2013) identified one's self-view as an antecedent to temporal construal. More specifically, people with an accessible independent self-view construe information more abstractly and schematically, which is consistent with how people process distal information. In contrast, people with an accessible interdependent self-view construe information more concretely (Spassova and Lee 2013), which is consistent with how people view information that is framed proximally. In other words, when one has an accessible independent (interdependent) self-view and the information is framed distally (proximally), it results in a match between the way the information is construed and the information presented. In addition, research has demonstrated that such a match can result in favorable outcomes in the context of persuasion. Spassova and Lee (2013) found individuals with an accessible independent self-view have more favorable attitudes when they are exposed to ads that convey distant product benefits, whereas individuals with an accessible interdependent self-view have more favorable attitudes when exposed to ads that convey immediate product benefits. In addition, a match between temporal frame and self-view also produced greater message argument discernment. Better understanding this match effect in health communication is particularly crucial given how many health behaviors and issues can be presented through different temporal frames and self-views; understanding how to more effectively combine these message elements through matching on a thoughtful manner could lead to stronger health communication campaigns.

In sum, those with an independent self-view perceive information more abstractly, which is consistent with distal temporal frames, whereas those with an interdependent self-view perceive information more concretely, which is consistent with proximal temporal frames. Thus, a match effect exists when an individual with an independent self-view encounters information framed distally. In contrast, a match effect occurs in the converse condition, namely when an individual with an interdependent self-view encounters information framed proximally. Previous studies suggest that match effects among elements in the message can positively impact consumer response to health information through increased behavioral intention to engage in the advocated behaviors (Chang 2009; Latimer et al. 2005; O'Keefe and Nan 2012). Accordingly, we predict those with an accessible independent self-view will elicit greater behavioral intention to engage in the promoted healthy behaviors using a distal temporal frame (year frame), whereas those with an accessible interdependent self-view will elicit greater behavioral intention to engage in the promoted healthy behaviors using a proximal temporal frame (day frame). Thus, we formally predict the following:

H1a: Individuals with an accessible independent self-view will report greater behavioral intention to engage in healthy behaviors when exposed to a distal frame (versus proximal frame).

H1b: Individuals with an accessible interdependent self-view will report greater behavioral intention to engage in healthy behaviors when exposed to a proximal frame (versus distal frame).

Message Frame Valence

Message frame valence is an important variable in the context of health communication (i.e., Block and Keller 1995; Chandran and Menon 2004; O'Keefe and Nan 2012). Message frame valence is often investigated within the theoretical framework of regulatory focus (Higgins 1997, 2006), which states an individual's self-regulation strategy can be either promotion focused (e.g., exercise to live longer), which is sensitive to the pursuit of gains, or prevention focused, which is sensitive to avoiding loss (e.g., exercise to reduce risk of heart disease). It has been widely established that individuals with a promotion focus respond more favorably to information presented in gain frames, while individuals with a prevention focus respond more favorably to information presented in loss frames (Avnet and Higgins 2006; Kees, Burton, and Tangari 2010).

Aaker and Lee (2001) reveal a relationship between message frame valence and self-construal. Specifically, they demonstrate messages that emphasize potential gains (i.e., win) are more persuasive when individuals have an active, independent self-view, whereas messages that focus on potential losses (i.e., lose) were more persuasive when individuals have an active, interdependent self-view. In addition, prior research

has shown that people with an independent self see potential gains as more important and respond to such events with relatively greater happiness, whereas those with a dominant interdependent self-view consider potential losses to be more important and respond to such events with relatively greater anxiety (Avnet and Higgins 2006). The theoretical rationale for these findings is goal compatibility: Individuals with an independent self-view have goals that are more compatible with a promotion focus because they are related to autonomy and achieving success, while those with an interdependent self-view have goals are related to a desire to belong and fulfilling one's obligations and responsibilities. Prior work supports this notion. For example, Lee, Aaker, and Gardner (2000) provide evidence that promotion-focused (versus prevention-focused) strategies are perceived to be more important for individuals with an accessible independent self, and the converse is true for those with an accessible interdependent self. These findings demonstrate that individuals with a more accessible independent self-view are characterized as promotion focused, and those with a more accessible interdependent self-view are characterized as prevention focused. Therefore, independent people, who are characterized as promotion focused, should respond better to gain frames; whereas interdependent people, who are characterized as prevention focused, should respond better to loss frames.

Research has also indicated that message frame valence is related to temporal distance. For example, Pennington and Roese (2003) found what people "want" (i.e., promotion) versus "don't want" (i.e., prevention) is associated with a distal versus proximal outlook. Specifically, when people have temporally distant goals, a promotion focus tends to be dominant, whereas when people have proximal goals, a balance of both promotion and prevention focus is dominant. This is consistent with research in construal theory, which has demonstrated people give less weight to promotion-focused goals, such as desirability, when making decisions for temporally proximal (versus distal) events (Liberman and Trope 1998).

Collectively, these findings suggest message frame valence should moderate the match effect of temporal frame and self-view. Given ads are more persuasive when elements of the message fit together (Aaker and Lee 2001), a gain frame should be more effective for those with an accessible independent self-view, whereas a loss frame should be more effective for those with an interdependent self-view. Accordingly, we predict that greater behavioral intention to engage in the promoted health behaviors should emerge when a gain frame is used in conjunction with the independent self-view and distal temporal frame match, and when a loss frame is used with the interdependent self-view and proximal temporal frame match. More formally, we posit:

> **H2:** Message frame valence will moderate the interplay between temporal frame and self-view. Specifically, behavioral intention will be greater in (a) a gain message frame for the match between an independent self-view and a distal temporal frame (compared to a loss frame) and (b) a loss message frame for the match between interdependent self-view and a proximal temporal frame (compared to a gain frame).

STUDY 1

The overarching purpose of Study 1 is twofold. First, we seek to examine the interplay of temporal frame and self-view in the context of presenting risk of a health hazard on behavioral intention to engage in healthy behaviors. Second, we examine whether message frame valence moderates the relationship between temporal frame and self-view on behavioral intention.

A 2 (temporal frame: day versus year) $\times$ 2 (self-view: independent versus interdependent) $\times$ 2 (message frame valence: gain versus loss) between-subjects experimental design was employed. Fictitious PSAs for heart disease prevention were created and included a headline, a picture, and brief text regarding heart healthy behaviors such as a healthy diet and exercise (see Appendix 1). Temporal frame was manipulated in the headline of the PSA by stating that a significant number of people suffer from a heart attack every day versus every year. Consistent with prior research, self-view was primed through both the picture featured in the ad (of an individual versus a family) and in the ad copy that asked readers to do what they could to protect "yourself" versus "your family." Message frame valence was manipulated through the ad copy in terms of conveying information about having a lot to "gain by adding a healthy diet and proper exercise" or a lot to "lose by lacking a healthy diet and proper exercise."

The sample consists of 211 online panel participants recruited through Amazon.com's Mechanical Turk platform (60% female; average age 37). Seven participants who failed attention check questions were removed from the sample, leaving a sample size of 204. Participants were randomly assigned to one of eight experimental conditions. After being exposed to the stimuli, participants responded to the dependent measures and manipulation checks. Last, participants were asked to provide demographic information, information pertaining to their medical history, and their family's medical history regarding heart disease; because these variables had no effect on our measures, they are not discussed further.

Behavioral intention was an averaged item consisting of the following six 7-point items measuring participants' intention to engage in various healthy behaviors to prevent heart disease: be careful of what they eat, eat healthier food, work out, lead a more active lifestyle, see a doctor, and learn more about heart disease. Each item was anchored by *Strongly disagree/Strongly agree* ($\alpha = .85$) (Chandran and Menon 2004).

The manipulation of temporal frame was assessed with a proximity index using three 7-point semantic differential items in response to the prompt "The ad you viewed focused on the risk of heart disease": *Now/Later, Today/Sometime over year*,

and *Near future/Distant future*, with a lower number representing a more proximal perception of the event and a higher number representing a more distal perception of the event (α = .93) (Chandran and Menon 2004). Consistent with prior research, the manipulation of self-view was assessed with four 7-point items anchored by *Not at all/A lot*: two items that asked about the extent to which participants focused on and thought about themselves (self-index; α = .86) and two items that measured the extent to which participants focused on and thought about their families (family index; α = .91) (Agrawal and Maheswaran 2005; Spassova and Lee 2013).

The message frame valence manipulation for gains was assessed using the following items: "I thought the ad stressed the positive benefits of a healthy diet and exercise" and "The ad stressed what one has to gain by having a healthy diet and exercising on a regular basis" (gain; α = .88). The loss frame manipulation was assessed using "I thought the ad stressed the negative consequences of not having a healthy diet and exercise" and "The ad stressed what one has to lose by not having a healthy diet and exercising on a regular basis" (loss; α = .82; Duhachek, Agrawal, and Han 2012).

Results

Manipulation check findings. To test the temporal frame manipulation, a 2 (temporal frame: day versus year) × 2 (self-view: independent versus interdependent) × 2 (message frame valence: gain versus loss) analysis of variance (ANOVA) was conducted using the proximity index as the dependent variable. As expected, the main effect for temporal frame was significant, F (1, 196) = 34.87, p < .001, while no other effects were significant. Specifically, participants in the day frame elicited a greater degree of proximity (M = 2.44) than those in the year frame (M = 3.90). To assess the self-view manipulation, 2 (temporal frame: day versus year) × 2 self-view (independent versus interdependent) × 2 (message frame valence: gain versus loss) a multivariate analysis of variance (MANOVA) was conducted using self-index and family index as the dependent variables. As predicted, the results showed a significant multivariate main effect of self-view, Wilks's λ = .881, F (2, 195) = 13.15, p < .001, while no other effects were significant. Univariate results demonstrated participants in the independent self-view condition reported higher on the self-index score, M = 5.18, than those in the interdependent self-view condition, M = 4.84, F (1, 196) = 3.35, p = .07. Further, findings revealed participants in the interdependent self-view condition reported higher on the family index, M = 5.08, than those in the independent condition, M = 4.00, F (1, 196) = 22.18, p < .001. These findings are consistent with previous research demonstrating that when the interdependent self-view is primed among members of an individualist culture, the number of other-focused thoughts increases without surpassing the number of self-focused thoughts (Aaker and Williams 1998; Spassova and Lee 2013).

A three-way MANOVA, 2 (temporal frame: day versus year) × 2 self-view (independent versus interdependent) × 2 (message frame valence: gain versus loss), confirmed a successful manipulation of message frame, Wilks's λ = .871, F (2, 195) = 14.46, p < .001. Specifically, participants in the gain frame indicated the messages focused on gains, M = 5.01, more than those who were exposed to the loss frame, M = 3.87, F (1, 196) = 23.16, p < .001. In contrast, participants in the loss frame indicated the message focused on losses, M = 5.58, more than those exposed to the gain frame, M = 4.65, F (1, 196) = 17.70, p < .001. In sum, all manipulations were successful.

Test of hypotheses. Hypotheses 1a and 1b proposed that when an independent self-view is accessible a distal frame (versus proximal frame) will lead to greater behavioral intention, whereas when an interdependent self-view is accessible a proximal frame (versus distal frame) will lead to a greater behavioral intention. To assess this prediction, a (temporal frame: day versus year) × 2 (self-view: independent versus interdependent) × 2 (message frame valence: gain versus loss) ANOVA was conducted using behavioral intention as the dependent variable. Results indicated a significant two-way interaction between temporal frame and self-view, F (1, 196) = 45.03, p < .001. As shown in Figure 1, and as predicted, participants with an independent self-view reported greater behavioral intention in the year frame, M = 5.19, compared to the day frame, M = 4.23; F (1, 196) = 38.55, p < .001. This was also higher than those with an interdependent self-view who were exposed to the year frame, M = 4.56; F (1, 196) = 17.18, p < .001. In contrast, for participants with an interdependent self-view, a day frame, M = 5.08, produced greater behavioral intention than did a year frame, M = 4.56; F (1, 196) = 10.95, p < .01. This was also higher than those with independent self-view who were exposed to the day frame,

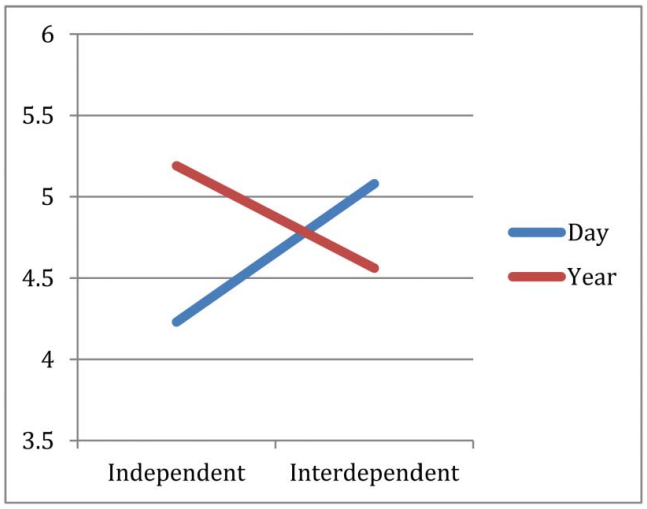

FIG. 1: Study 1: Interaction effects for temporal frame and self-view.

$M = 4.23$; F (1, 196) = 28.27, $p < .001$. Thus, hypotheses 1a and 1b are supported.

Hypotheses 2a and 2b predicted a three-way interaction between temporal frame, self-view, and message frame valence such that when the match between an independent self-view and the year frame is presented in a gain frame (versus loss frame) people are likely to have greater behavioral intention, whereas when the match between interdependent self-view and the day frame is presented in a loss frame (versus gain frame) people are likely to have greater behavioral intention. The three-way interaction was significant, F (1, 196) = 9.62, $p < .01$. Simple effects revealed the match between an independent self-view and a year frame produced greater behavioral intention in the gain frame, $M = 5.46$, compared to the loss frame, $M = 4.93$; F (1, 196) = 6.30, $p < .05$. Also, as predicted, when there was a match between an interdependent self-view and a day frame, behavioral intention was greater in the loss frame, $M = 5.38$, than in the gain frame, $M = 4.79$; F (1, 196) = 6.91, $p < .01$. Thus, hypotheses 2a and 2b are supported.

Also, as shown in Figure 2, simple tests also revealed that, in the loss frame, individuals with an independent self-view exposed to a year frame yielded greater behavioral intention, $M = 4.93$, than when exposed to a day frame, $M = 3.87$; F (1, 196) = 23.03, $p < .001$. In addition, for those who had an interdependent self-view, a day frame led to greater behavioral intention, $M = 5.38$, than a year frame, $M = 4.27$; F (1, 196) = 27.08, $p < .001$. In the gain frame, for those with an independent self-view, a year frame, $M = 5.46$, yielded significantly greater behavioral intention than a day frame, $M = 4.59$; F (1, 196) = 15.82, $p < .001$. However, for those with an interdependent self-view, there was no significant difference between a day frame, $M = 4.79$, and a year frame, $M = 4.85$; F (1, 196) = .09, $p = .771$.

Discussion

The purpose of Study 1 is to demonstrate how temporal frame operates depending on one's accessible self-view in conveying risk in the context of health communication and to examine whether message frame valence moderates these effects. As predicted, distal frames are more effective for those who have a more accessible independent self-view, whereas proximal frames are more effective for those who have a more accessible interdependent self.

These findings offer important implications for health communication practitioners. Prior research in health communication has suggested using a proximal (day) frame is more effective than using a distal (year) frame because risk that is framed using distal frames is considered to be "far" away and hence less effective (Chandran and Menon 2004). As predicted, our findings suggest this is not necessarily the case and that distal frames can be an effective way to convey risk perceptions for those with an independent self-view. In addition, PSAs and health messages that use the right combination of temporal frame, self-view, and message frame valence are more effective in eliciting intentions to engage in the advocated healthy behaviors. An improved understanding of how to choose the right combination is particularly important given many health issues in the United States (e.g., obesity, cancer, diabetes, arthritis) that lend themselves to variations in temporal frame, self-view, and message frame valence.

In addition, our results suggest message frame valence has a significant influence on the interplay between temporal frame and self-view. The match between an independent self-view and a year frame elicited the greatest behavioral intention with a gain frame, whereas the match effect between an interdependent self-view and a day frame elicited the greatest behavioral intention in a loss frame. Interestingly, when we examined the match effect within the gain and loss conditions, the match effect for interdependent people was not significant in the gain condition. However, the pattern of means was in the predicted direction, and this may be the result of low power (power = .06). In addition, the lack of a match effect between temporal frame and self-view could be the result from the significant interaction between temporal frame and message frame valence, F (1, 196) = 4.588, $p < .05$. Prior research suggests the match between a gain frame and interdependent self-view can increase persuasion (Mogilner, Aaker, and Pennington 2008; Pennington and Roese 2003), which may have lessened

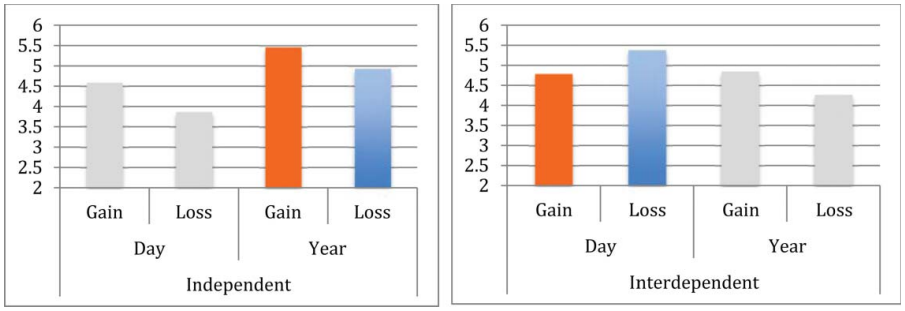

FIG. 2: Study 1: Interaction effects for temporal frame, self-view, and message frame valence.

the effectiveness of a match between temporal frame and self-view among interdependent people in the gain message frame valence condition.

Combined, Study 1 findings and those revealed by Spassova and Lee (2013) demonstrate a match between temporal frame and self-view results in effective message persuasion. However, no work has empirically examined the underlying mechanism(s) and process that explain how the match effect between temporal frame and self-view results in increased persuasion for those with an independent versus interdependent self-view. Accordingly, there is a need to identify potential facilitating mechanisms and processes that explain why and how the match between temporal frame and self-view results in greater behavioral intention. Study 2 examines potential mediators to better understand the match effect between temporal frame and self-view.

STUDY 2

The purpose of Study 2 is twofold. First, we seek to establish ecological validity of the match effect between temporal frame and self-view found in Study 1 in a different health context: skin cancer prevention. Second, we seek to shed light on the underlying persuasion mechanisms that facilitate the match effect for those with an accessible independent and interdependent self-view. Message persuasiveness and message concreteness are examined as potential underlying mechanisms that may explain the match between temporal frame and self-view. Message persuasiveness is defined as the perceived effectiveness of the message (Chandran and Menon 2004), whereas message concreteness is defined as the ease and cognitive vividness with which the content of the health message can be visualized and conceived (Amrhein, McDaniel, and Waddill 2002).

We expect the persuasion process for the match effect to differ for those with an independent and interdependent self-view. Specifically, for those with an independent self-view, we expect message persuasiveness to mediate the relationship between temporal frame and behavioral intention, and do not expect message concreteness to play a role. However, for those with an interdependent self-view, we expect message concreteness to mediate the relationship between temporal frame and message persuasiveness, and message persuasiveness to mediate the relationship between message concreteness and behavioral intention. We elaborate on this next.

Message persuasiveness refers to how effective the message is in terms of being credible, helpful, and informative (Chandran and Menon 2004) and has been shown to influence subsequent response in terms of behavioral intention (Chandran and Menon 2004; Kees, Burton, and Tangari 2010). Message persuasiveness represents one's subjective evaluation of how effective the messages are (Cesario, Grant, and Higgins 2004) and thus can either increase or decrease people's willingness to engage in the advocated behaviors (Cesario, Grant, and Higgins 2004; Cesario, Higgins, and Scholer 2008). Accordingly, message persuasiveness is a key factor in the process of persuasion that can explain behavioral change (Mogilner, Aaker, and Pennington 2008; Oinas-Kukkonen 2010).

We expect a match between temporal frame and self-view will result in enhanced message persuasiveness for both independent and interdependent people. It is well documented that fit or a match between an element in the ad and some aspect of one's accessible self (e.g., regulatory orientation, self-view) results in more fluent processing of the message (Aaker and Lee 2001; Lee and Aaker 2004; Lee, Keller, and Sternthal 2010), which can result in enhanced persuasion. For example, people presented with health information that fits their accessible regulatory focus perceive the information as easier to process and the arguments as more valid (Lee and Aaker 2004) and perceive the advocated cause to be more believable and worthy of pursuit (Cesario, Grant, and Higgins 2004). Thus, a match effect should result in enhanced fluency, which should result in increased message persuasiveness.

Further, research in the fluency literature suggests that when a message frame is consistent versus inconsistent with the way that individuals naturally construe or process information, individuals "feel right," and this feeling of rightness can be transferred in the persuasion process (Camacho, Higgins, and Luger 2003; Cesario, Grant, and Higgins 2004; Malaviya and Sternthal 2009). For example, the feeling of rightness can be used to determine how credible, informative, or helpful the message is (Cesario, Grant, and Higgins 2004). Therefore, under conditions of a match between temporal frame and self-view, we expect the "feeling right" experience will be transferred directly to one's evaluation of the message, which should result in enhanced message persuasiveness in the form of more message congruent attitudes. We expect this effect to occur for the match effect for both independent and interdependent people.

In addition, for interdependent people, we expect message concreteness to mediate the relationship between temporal frame and message persuasiveness. Message concreteness, which refers to the cognitive vividness with which a person can visualize health information, is one form of perceptual fluency (Amrhein, McDaniel, and Waddill 2002). Message concreteness should be important for those with an interdependent self-view who are exposed to a proximal temporal frame, because it is consistent with both how interdependent people construe information *and* with how proximal temporal frames are perceived. More specifically, prior literature on self-construal suggests people with an interdependent self-view tend to represent future events with low-level construals (Trope and Liberman 2003). For example, interdependent people tend to describe themselves using concrete information in a specific context, such as, "I don't talk very much in an unfamiliar situation" (Cousins 1989). Also, they use a more vivid and concrete mental representation when imaging future events in a message (Liberman and Trope 1998). Thus, the way

interdependent people construe information, vividly and concretely, is consistent with the notion of message concreteness.

In addition, message concreteness is also consistent with how proximal temporal frames are perceived (more concretely). For example, Chandran and Menon (2004) found message concreteness, or cognitive vividness, to be higher for risk information presented in a near temporal distance (e.g., "tomorrow" compared to "year from now") as well as in proximal temporal frames (e.g., "day" frame compared to "year" frame). Accordingly, message concreteness is often used as indicator of how temporal framing is construed such that proximal temporal frames are construed as closer and more concrete compared to distal frames (Chandran and Menon 2004). Thus, people exposed to a proximal temporal frame experience higher message concreteness. In sum, message concreteness is consistent with how interdependent people construe information and is also the result of construing proximal temporal frames. Thus, we expect message concreteness to serve as an underlying mechanism for the match between an interdependent self-view and proximal temporal frame. Specifically, we expect message concreteness to mediate the relationship between temporal frame and message persuasiveness.

Further, for those with an interdependent self-view, we expect message persuasiveness to mediate the relationship between message concreteness and behavioral intention. Message concreteness should evoke a clearer mental image of the outcome associated with the message, making it easier for consumers to evaluate the content of message. This, in turn, should increase message persuasiveness. In addition, increased message persuasiveness should result in stronger intention to engage in healthy behaviors (Kees, Burton, and Tangari 2010). In sum, for people with an accessible interdependent self-view, we predict a three-path mediation between temporal frame and behavioral intention to engage in healthy behaviors, through message concreteness and message persuasiveness.

H3: For those with an interdependent self-view, (a) message concreteness will mediate the relationship between temporal frame and perceived message persuasiveness and (b) message persuasiveness will mediate the impact of message concreteness on intention to engage in healthy behaviors.

In contrast, we do not expect message concreteness to play a mediating role for those with an independent self-view. People with an accessible independent self-view perceive information more abstractly, which is inconsistent with concrete and vivid information processing (Liberman and Trope 1998). Instead, they construe information using high-level construals (Trope and Liberman 2003). For example, people with an independent self-view describe themselves in an abstract manner, such as "I'm shy" (Cousins 1989). In addition, Hong and Chang (2015) confirm that people with an accessible independent self-view rely more on affective feelings and emotion compared to cognition when making judgments and decisions. This suggests that for those with an independent self-view, the persuasion process may be attributed to "feeling right." As discussed, "feeling right" is a part of fluency, the result from the match between the message and a characteristic of one's accessible self. In this case, the result of "feeling right" is a match between a distal temporal frame and an independent self-view. We predict this enhanced fluency will result in greater message persuasiveness, which will serve as a mediator between temporal frame and behavioral intention for those with an independent self-view (Lee and Aaker 2004). In sum, we expect message persuasiveness to mediate the relationship between temporal frame and behavioral intention. More formally, we hypothesize:

H4: For those with an independent self-view, message persuasiveness will mediate the impact of temporal frame on intention to engage in healthy behaviors.

Method

A 2 (temporal frame: day versus year) × 2 (self-construal: independent versus interdependent) between-subjects design was used. Study 1 found that the match effect occurs in all loss frame conditions; accordingly, Study 2 examines the match between temporal frame and self-view only in the loss frame.

The procedure was identical to that used for Study 1, except a fictitious PSA was created for skin cancer prevention (see Appendix 2). The manipulations in the PSA for temporal frame and self-view are the same as those in Study 1, except statistics for risk of skin cancer were provided in the temporal frame manipulation.

Behavioral intention to engage in healthy behaviors was assessed using an average of the following items: "I would regularly apply sunscreen"; "I will wear sunscreen when I go outside"; "I would encourage my family and friends to wear sunscreen"; "I would see a doctor to have my skin checked"; and "I would learn more about skin cancer from my doctor" ($\alpha = .73$). All items were assessed on a 7-point Likert scale. A message concreteness index was created by combining responses from two 7-point Likert scales anchored at *Strongly disagree* and *Strongly agree*: "I could easily generate a mental picture of the information contained in the ad" and "The message in the ad is hazy and indistinct" (reverse-coded), with higher numbers representing higher levels of concreteness ($\alpha = .65$) (Chandran and Menon 2004). Message persuasiveness was measured using four 7-point items on a semantic differential scale: *Not informative/Informative, Not credible/Credible, Not interesting/Interesting*, and *Not useful/Useful* ($\alpha = .85$) (Chandran and Menon 2004). Participants provided demographic information and information pertaining to their medical history in regard to skin cancer. Consistent with Study 1, these variables did not impact the dependent variables and are not included in the Results section. The sample consisted of

170 members of the Mechanical Turk consumer research panel (58% female; average age 36).

Results

Manipulation check findings. To test the temporal frame manipulation, a 2 (temporal frame: day versus year) × 2 (self-view: independent versus interdependent) was conducted using the same proximity index in Study 1 as the dependent variable. As expected, the main effect for temporal frame was significant, F (1, 168) = 19.78, $p < .001$, while no other effects were significant. Specifically, participants in the day frame elicited a greater degree of proximity, $M = 2.40$, than the year frame, $M = 3.53$. To assess the self-view manipulation, a 2 (temporal frame: day versus year) × 2 (self-view: independent versus interdependent) MANOVA was conducted using the same self-index and family index used in Study 1. As predicted, the results showed a significant multivariate main effect of self-view, Wilks's $\lambda = .907$, F (2, 165) = 8.46, $p < .001$, while no other effects were significant. Specifically, participants in the independent self-view condition thought more about themselves, $M = 4.51$, than those in the interdependent self-view condition, $M = 4.06$, F (1, 169) = 3.88, $p < .05$. In contrast, participants in the interdependent self-view condition thought more about their family, $M = 5.03$, than their independent counterparts did, $M = 4.12$, F (1, 169) = 15.90, $p < .001$.

Preliminary analyses. A (temporal frame: day versus year) × 2 (self-view: independent versus interdependent) ANOVA revealed a significant interaction between temporal frame and self-view on behavioral intention, F (1, 169) = 13.93, $p < .001$. As predicted, and consistent with Study 1 findings, participants with an independent self-view reported a higher behavioral intention in the year frame, $M = 5.33$, than in the day frame, $M = 4.56$; F (1, 169) = 12.98, $p < .001$. In contrast, for participants with an interdependent self-view, a day frame, $M = 4.87$, produced greater behavioral intention than did a year frame, $M = 4.52$; F (1, 169) = 2.78, $p = .09$.

In addition, a 2 (temporal frame: day versus year) × 2 (self-view: independent versus interdependent) ANOVA demonstrated a significant interaction of temporal frame and self-view on message concreteness, F (1, 169) = 7.06, $p < .01$ and perceived message persuasiveness, F (1, 169) = 19.32, $p < .001$. For message concreteness, significant findings were attributed to those with an interdependent self-view. Specifically, participants with an interdependent self-view showed higher message concreteness in the day frame, $M = 5.72$, than in the year frame, $M = 5.05$; F (1, 169) = 8.63, $p < .01$, whereas there was no significant difference between the year frame, $M = 5.72$, and the day frame, $M = 5.51$; F (1, 169) = 0.74, $p = .39$) for those with an independent self-view. Similarly, for participants with an independent self-view, a year frame generated higher message persuasiveness, $M = 5.65$, than did the day frame, $M = 4.77$; F (1, 169) = 11.73, $p < .01$. In contrast, those with an interdependent self-view reported higher message persuasiveness in the day frame, $M = 5.19$, than in the year frame, $M = 4.51$; F (1, 166) = 7.72, $p < .01$.

Moderated mediation analyses. To assess hypotheses 3a, 3b, and 4, we separated our data by self-view and conducted two serial mediation analyses using temporal frame as the independent variable (temporal frame: 1 = day, 0 = year) and the PROCESS SPSS macro for bias-corrected bootstrapping (Model 6, Hayes 2012; Preacher and Hayes 2004). Bootstrapping was used to generate a 95% confidence interval (CI) around the indirect effect of mediators (i.e., message concreteness and message persuasiveness). Successful mediation occurs when the CI does not contain zero (Preacher, Rucker, and Hayes 2007).

First, an analysis was conducted on those with an interdependent self-view. Participants with the interdependent self-view showed significantly higher message concreteness with the day frame (versus year), $\beta = .33$, 95% CI: .09, .56, which significantly increased message persuasiveness, $\beta = .41$, 95% CI: .21, .61. This positively influenced intention to engage in behavior, $\beta = .56$, 95% CI: .40, .73. As predicted and indicated in Figure 3, the indirect path from temporal frame to behavioral intention including both mediators was significant (effect: .08, 95% CI: .02, .19), whereas the direct effects were not significant with the mediators controlled for (effect: .02, 95% CI: −.15, .20). These findings suggest message concreteness mediates the relationship between temporal frame and message persuasiveness, and message persuasiveness mediates the relationship between message concreteness and behavioral intention. This indicates hypotheses 3a and 3b are supported.

The same serial mediation analysis was conducted for those with an independent self-view for behavioral intention. As expected, temporal frame did not significantly predict message concreteness, $\beta = -.11$, 95% CI: −.34, .12. Thus, the indirect path including two mediators was not significant (effect: −.01, 95% CI: −.05, .01, $p > .05$). We next decomposed the mediated effect into three components including message persuasiveness as a single mediator. As expected, message persuasiveness mediated the relationship between temporal frame and behavioral intention (independent of message concreteness) (effect = −.17, 95% CI: −.36, −.06). Specifically, when participants with an independent self-view were exposed to a year frame, message persuasiveness was significantly higher, $\beta = -.41$, 95% CI: −.66, −.15. Message persuasiveness, in turn, fed uniquely into behavioral intention, $\beta = .42$, 95% CI: .26, .57. Results indicated message persuasiveness plays a mediating role in explaining why behavioral intention is increased when there is a match between an independent self-view and a year frame. The direct effect was not significant when the mediators were controlled (effect: −.18, 95% CI: −36, .01). Thus, hypothesis 4 is supported.

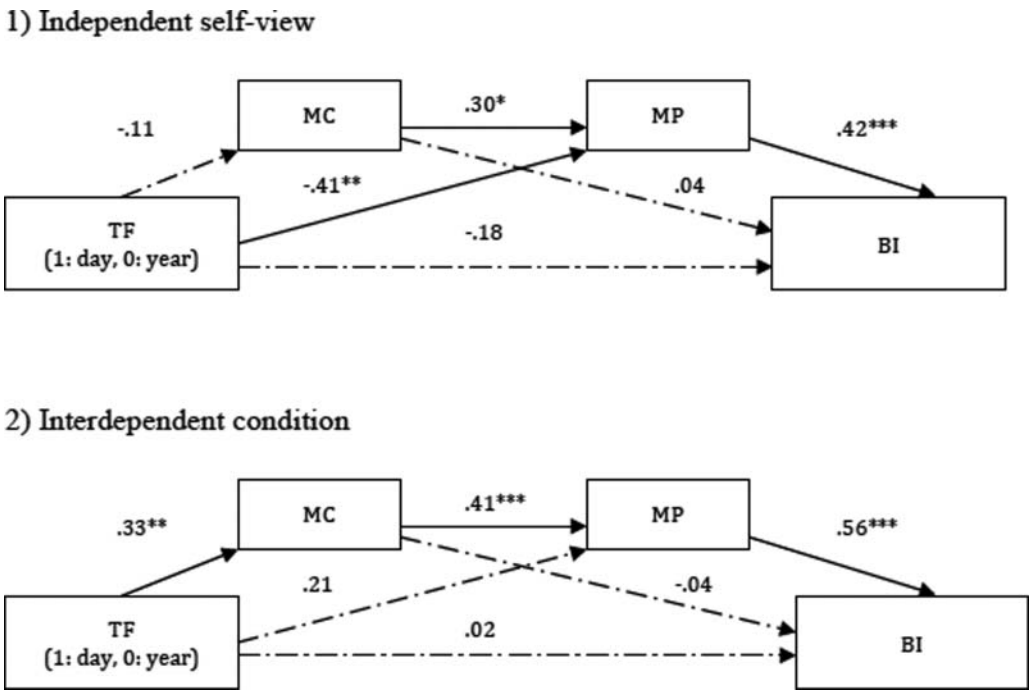

FIG. 3: Study 2: Mediation paths for independent and interdependent conditions. *Note*. Solid lines indicate significant paths; dotted lines indicate insignificant paths. TF = temporal frame; MC = message concreteness; MP = message persuasiveness; BI = behavioral intention. $*p < .05$; $**p < .01$; $***p < .001$.

Discussion

The purpose of Study 2 was to provide ecological validity by replicating the interaction of temporal frame and self-view on behavioral intention to engage in healthy behaviors in the context of skin cancer prevention and to examine message persuasiveness and message concreteness as mediators of the match effect. As predicted, the same pattern of effects found in Study 1 was observed in Study 2; a distal frame elicited higher behavioral intention for those exposed to the independent self-view condition, whereas a proximal frame elicited higher behavioral intention for those exposed to the interdependent self-view condition.

As we predicted, message persuasiveness and message concreteness served as mediators of the interplay between temporal frame and self-view on behavioral intention. In addition, this process was different for those with an independent and interdependent self-view. For those with an accessible independent self-view, message concreteness did not serve as a mediator. Instead, message persuasiveness mediated the relationship between temporal frame and behavioral intention. However, for those with an interdependent self-view, message concreteness was an important construct in understanding the persuasion process. Specifically, message concreteness mediated the effect of temporal frame on message persuasiveness, which in turn mediated the relationship of message concreteness on behavioral intention.

These findings are important for health marketers and provide further substantiation that a match between temporal frame and self-view is critical for message effectiveness in the health communication domain. More specifically, the findings from Study 2 shed light on the persuasion process for the match effect between temporal frame and self-view. These findings suggest health messages that use a proximal frame to convey risk information and activate an interdependent self-view should use more concrete and vivid health information.

Finally, these findings provide further theoretical support that those with an interdependent self-view construe information concretely and that message concreteness is a particularly important variable to examine in understanding persuasion effects for those with an interdependent self-view. For those with an independent self-view, a match between temporal frame and self-view enhances persuasion but not through perceived message persuasiveness. These findings enhance our understanding of the match between temporal frame and self-view.

GENERAL DISCUSSION

This research has important implications for advertising and health communication. It represents an attempt to better understand the relationship between temporal frame and self-view. Specifically, this work examines the interplay between temporal frame and self-view in the context of conveying health hazard information and finds the match effect is important to consider in the context of health

communication. In addition, we identify that message frame valence impacts the relationship between temporal frame and self-view. Finally, we identify the persuasion process (i.e., message concreteness and message persuasiveness) for the match effect depending on one's accessible self-view. As such, this work provides valuable theoretical and practical guidance to improve the persuasive power of health communication campaigns.

This work makes theoretical contributions to the temporal framing, self-construal, and message frame valence literature streams. Prior research in a health communications context suggests that proximal messages are more effective, as the information is construed more concretely and the health hazard seems closer and more threatening. However, our findings suggest that more proximal frames are not always more effective in delivering health risk and that this depends on one's accessible self-view. Specifically, in Study 1, we found that distal frames are more effective when an independent self-view is accessible, and proximal frames are more effective when an interdependent self-view is accessible. More important, our findings suggest the effectiveness of PSAs can be further enhanced depending on message frame valence. The match between an independent self-view and a distal frame is more pronounced in a gain frame, whereas the match between an interdependent self-view and a proximal frame is more pronounced in a loss frame.

Practically, these findings suggest health communication practitioners can benefit from employing the most desirable combination of message elements to encourage the public to engage in healthy behaviors. For example, based on the match effect between temporal frame and self-view, these findings suggest a campaign to promote mammograms could be designed to focus on a woman's family and genetic issues if the risk is framed as something immediate but highlight a woman protecting herself if the risk is framed as a later risk of developing breast cancer. In addition, these findings suggest messages should highlight what people can gain for PSAs that feature a distal temporal frame and prime an independent self-view. In contrast, PSAs that feature a proximal temporal frame and prime an interdependent self should emphasize what people could lose. This distinction is essential because health marketers can develop more effective health campaigns if they strategically articulate the negative consequences of adverse health outcomes versus positive health outcomes when considering the match effect. Again, the complexity of these findings highlights the potential issue of advertisements where decisions about temporal frame or self-view might be made simply due to what "sounds right" or "looks good" without understanding how these decisions are theoretically linked and how they impact persuasion. Finally, considering these three elements are commonly employed concurrently in PSAs, this study advances the understanding of message persuasion in health communication.

Study 2 examines the match effect in the context of a loss frame and demonstrates that message concreteness mediates the effect of temporal frame on message persuasiveness for those with an interdependent self-view, but this is *not* the case for those with an independent self-view. These findings contribute to the temporal frame and self-construal literature by demonstrating that the mediating process for the match between temporal frame and self-view differs based on one's accessible self-view. Even though a day frame is perceived as more proximal, the temporal distance do not influence people with an independent self-view. Instead, they are more influenced and persuaded by temporarily distal frames that match with how they construe the relational distance with others. That is, temporal proximity, a cognitive estimation of time, did not play a pivotal role in evaluating message persuasiveness among people with an independent self-view. Interestingly, recent research (Hong and Chang 2015) revealed those with an independent self-view process information more affectively, whereas those with an interdependent self-view put forth more cognitive effort when processing information and rationally evaluate it. Perhaps there is an affect-based mediator that can further explain the persuasion process for those with an independent self-view. Future research should consider this to see if emotional-based message elements can override the effects of temporal proximity.

These findings have practical implications for advertising researchers and practitioners, as strategies to improve message persuasiveness grounded in advertising literature could make broader contributions to health communication and public health. The importance of message persuasiveness also has broader implications for health communication research. Many health communication theories, such as the health belief model, would not traditionally consider elements of a health communication message such as message concreteness or message persuasiveness; this research thus should encourage health communication scholars and practitioners working with other theories to consider and study messages in a more nuanced manner. Also, given that message concreteness played a significant role in persuasion, when there is a match between interdependent self and proximal frame, health message are recommended to suggest more contextualized and specific health information to increase message concreteness among PSAs targeted to those with an accessible interdependent self-view.

Limitations and Future Research Directions

A limitation of this research is that we studied behavioral intention; research that focuses on actual behaviors would present a stronger case of ecological validity of these findings. In addition, the methodology of both studies required people to focus on the stimuli (i.e., the PSA), whereas in reality

people tend to devote less attention to PSAs while browsing through print media or the Internet. Thus, future research should examine the interplay between temporal frame and self-construal in a more realistic setting. Moreover, while these findings were tested in two different health contexts, work remains to be done to confirm the broader validity of these findings with other health conditions. Considering more acute health conditions or decisions where the "distant" framing is less prevalent—a flu shot before flu season, for example—would be one direction for future research. In addition, the interdependent nature of a flu vaccine—one person's decision to get a flu shot has implications for the health of those around them—could also provide novel opportunities for exploring the relationship between temporal framing and self-view. All of the research in this study was in the context of health promotion, so investigating how these findings hold true in more traditional advertising—selling direct-to-consumer prescription drugs, over-the-counter medication, or other consumer health products—would be another fruitful avenue of investigation. Future research should focus on identifying other underlying mechanisms that may explain these findings, for example, affect-based mechanisms for those with an independent self-view.

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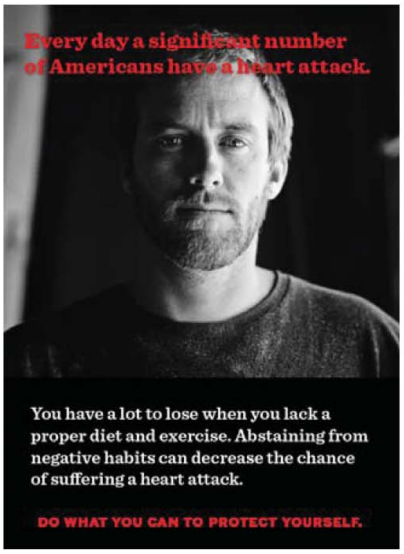
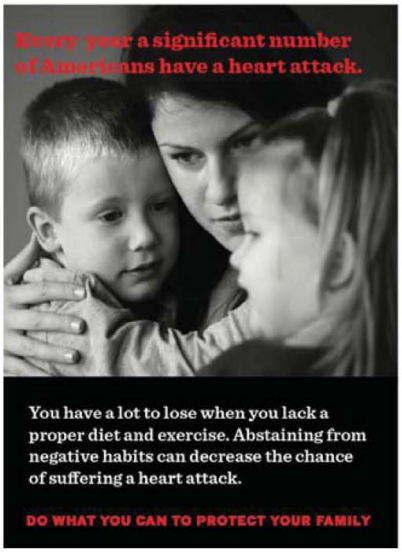
APPENDIX 1

STUDY1 STIMULI

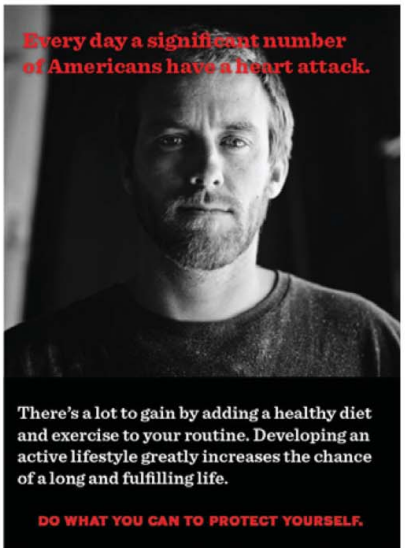
(A) Day Frame/Independent Self-View/Loss



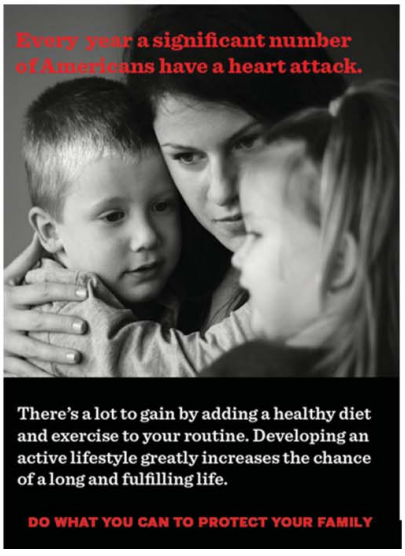
(B) Year Frame/Interdependent Self-View/Loss



(C) Day Frame/Independent Self-View/Gain



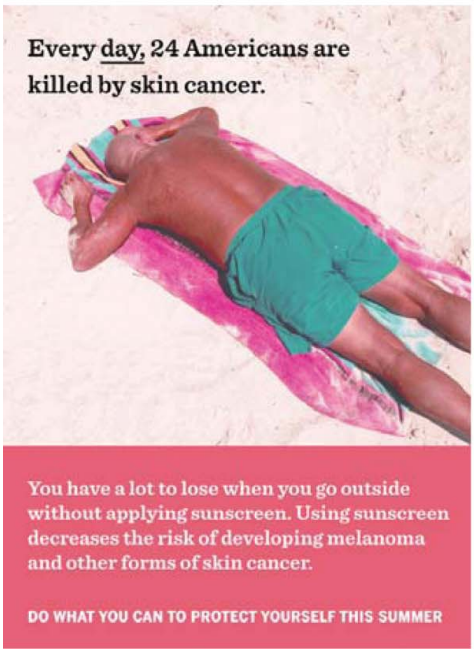
(D) Year Frame/Interdependent Self-View/Gain



APPENDIX 2

STUDY 2 STIMULI

(A) Day Frame/Independent Self-View



(B) Year Frame/Interdependent Self-View

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