Combining approach-gain and avoid-loss frames increases message effectiveness

DISSERTATION

Presented in Partial Fulfillment of the Requirements for the Degree Doctor of Philosophy
in the Graduate School of The Ohio State University

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Graduate Program in Communication

The Ohio State University

2014

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Abstract

Gain-loss framing has produced inconsistent results in communication (O’Keefe & Jensen, 2006, 2007, 2009). Yet, studies from psychology demonstrate consistent gain-loss message effects (Higgins, 1997, 1998, 2000, 2002, 2005). Regulatory focus theory suggests the lack of operational clarity in communication applications may be the one of the reasons for inconsistent results. It is proposed that communication scholars use approach-gain and avoid-loss frames to create effective messages. The dissertation extends regulatory focus theory by arguing (a) frames’ relationship with perceived effectiveness is mediated by attention to the frames, (b) the combination of approach-gain and avoid-loss frames will receive the most attention, when the message has low to moderate arousing content, and (c) the combination of approach-gain and avoid-loss will be most effective. Two within-subjects experiments were conducted, using visual fixations to operationalize attention. Study 1 examined the combination of approach-gain and avoid-loss frames, without manipulating arousing content. Study 2 examined the combination of frames and manipulated arousing content. The two studies revealed that individuals looked the most at approach-gain information, and attention to information did not influence perceived message effectiveness. As predicted, when arousal was controlled for, messages with the combination of approach-gain and avoid-loss frames were perceived as more effective than messages with only one type of frame.
Acknowledgments

I would like to express my deepest appreciation for my advisor, Dr. Joyce Wang, whose kindness, brilliance and mentorship was essential to my growth and success. Dr. Wang’s stewardship and funding has made this dissertation possible. I am also grateful for Dr. Slater and Dr. Bushman’s guidance and wisdom throughout my graduate studies. I am indebted to my committee for developing my tools and skills to creatively solve complex problems.

My love goes to my entire family for their support, through my studies. My parents, Maureen Gales and Bram Solloway, and brother, Dean Solloway, provided the encouragement to succeed and flourish. I am grateful for Gerald and Ruby Gales’ compassionate advice and thoughtful perspective.

All my mentors have shaped me in a way that is reflective in my studies and dissertation. I feel genuine appreciation to: Christopher Langone and Samuel Nelsons for teaching me how to analyze arguments publicly and fostering intellectual curiosity; Dr. Lauren Feldman and Dr. Matthew Nisbet for shaping my thought process and guiding me to OSU’s Doctoral Program; and Christopher Bennett for sparking my interest in communication.
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Fields of Study

Major Field: Communication
Table of Contents

Abstract.................................................................................................................................................. ii

Acknowledgments .................................................................................................................................. iii

Vita......................................................................................................................................................... iv

List of Tables......................................................................................................................................... viii

List of Figures......................................................................................................................................... ix

Literature Review ................................................................................................................................. 1

  Regulatory Focus Theory: Approaching Gains and Avoiding Losses ............................................. 4

  Attention Mediates The Framing Process ......................................................................................... 17

  Attending to Approach-Gain and Avoid-Loss Messages ............................................................. 22

  Coactive Activation: Greater Effectiveness by Using Both Approach-Gain and Avoid-Loss Frames ................................................................................................................................. 28

  Sensation Seeking Moderates the Effects of Arousing Content .............................................. 33

  Trait Aggressiveness Moderates the Effects of Arousing Content ........................................... 34

Study 1: Combining Approach-Gain and Avoid-Loss Messages..................................................... 38

  Hypotheses ......................................................................................................................................... 39

  Procedure .......................................................................................................................................... 41

  Stimuli ............................................................................................................................................... 41
List of Tables

Table 1: Mean arousal scores for less arousing topics in pretest ..................................64

Table 2: Mean arousal scores for more arousing topics in pretest .................................65
List of Figures

Figure 1: Gain-loss frame operationalization in communication and psychology ........5
Figure 2: Illustration of approach-avoid motivation theories ..................................7
Figure 3: Final SEM for Study 1 ..............................................................................48
Figure 4: Final SEM for Study 2 ..............................................................................71
Figure 5: Three-way interaction between arousal, sensation seeking and approach-gain messages on approach-gain total fixation duration ..............................76
Figure 6: BSS’s interaction total effect on avoid-loss total fixation duration .............76
Figure 7: Arousal and prevention focus’ interaction on avoid-loss fixation duration ....77
Figure 8: Total message fixation duration’s mixed regression results ......................78
Figure 9: BAQ and arousal scores on total fixation to approach-gain information .......79
**Literature Review**

The same argument can be phrased in many different ways. This led communication scholars to address how information should be shared and phrased to achieve desired outcomes. Communication scholars largely have explored the relationship between phrasing and outcomes through framing. The concept was initially imported into communication from psychology literature, with greater emphasis on persuasive elements. “Current communications research on framing has largely abandoned the more rigorous (and narrow) definition of frames derived from psychology - frames as informationally equivalent labels – in favor of a much looser definition – stemming from work in sociology – that blurs the distinction between frames and other informational or persuasive features of messages” (Scheufele & Iyengar, 2012). In communication, a frame may focus attention to specific issues or decision attributes (e.g., Iyengar & Simon, 1993), represent specific perspectives concerning the target content (e.g., Nisbet, 2009), and/or state consequences relative to one outcome or another (e.g., Rothman, Bartels, Wlaschin & Salovey, 2006). This dissertation addresses the third focus by investigating how gain and loss scenarios should be framed and their effects. Specifically, it aims to examine three questions: conceptual definitions, attention’s mediating effects and arousing content’s moderating effects.
First, it clarifies the conceptual definition of loss-gain frames in communication research. The framing of gain and loss scenarios is an active research area in communication. Many scholars note different outcomes when emphasizing benefits from taking action or consequences from failing to take action (Rothman et al., 2006). This research is largely based on prospect theory research, which illustrates how individuals react differently to gain and loss scenarios (Kahneman & Tversky, 1976; Tversky & Kahneman, 1992). However, recent meta-analyses by O’Keefe and Jensen (2006, 2007, 2009) raise doubts to the validity of broad theoretical predictions. Their work demonstrates inconsistent effects and results across the health communication literature. The dissertation argues the divergent results are due to the inconsistency between communication gain-loss manipulations and what the foundational theorists conceptualized (i.e., Kahneman & Tversky, 1976). It will be argued scholars are inaccurately asserting that altering end-state focuses (i.e., perceived outcome) actually changes whether it is a gain or loss scenario. Higgins’ (1997) regulatory focus theory is introduced to help explicate the concepts of gains and losses. Regulatory focus theory also highlights a likely overlooked confound in communication gain-loss framing research – individuals’ preferred goal-attainment strategies.

Second, I explore how gain-loss frame’s persuasive effects may be mediated by attention. While scholars regularly acknowledge attention as a prerequisite for persuasion, it has yet to be examined in a communication context (Wedel & Pieters, 2008). Gain-loss frames have been studied in regards to their effectiveness and influence to sway health behaviors (O’Keefe & Jensen, 2006, 2007, 2009; Rothman et al., 2006).
One unexamined explanatory mechanism is how each frame attracts attention, and attention’s subsequent influence on persuasive outcomes. Attention is a likely mediator, because messages with positive and/or negative content have been shown to mobilize attention through distinct motivation systems (Wang, Solloway, Tchernev & Baker, 2012). Additionally in decision making, visual attention is associated with greater weight towards what is being focused on (Roe, Busemeyer & Townsend, 2001). This suggests the more attention a frame attracts, the higher probability it will have an impact on decisions.

Third, arousing content is introduced along with the combination of gain-loss appeals to further the discourse. Arousing content arises as a critical variable for framing research in communication from dual motivation theory (Cacioppo & Berntson, 1994), and its applications in motivated media processing research (Lang, A. 2006; Wang et al., 2012). The theoretical and empirical findings suggest that individuals may have different reactions towards the frames depending on their intensity. The theory suggests lower to moderate levels of arousing content is conducive for information intake, particularly when both motivation systems are activated. The concept of a motivation activation function probably is particularly relevant to communication research that addresses topics from nutrition (calm) to domestic abuse (arousing). Some divergent effects in literature may be explained through the different arousing content used in frame appeals across studies. Furthermore, dual motivation theory suggests that the combination of gain-loss appeals may attract more attention than either one alone (Wang et al., 2012). The idea of using both types of appeals has not yet been explored in this context.
Regulatory Focus Theory: Approaching Gains and Avoiding Losses

Higgins (1997, 1998, 2000, 2002, 2005) suggested regulatory focus theory (RFT) as an explanatory principle for hedonic motivations. He argues self-regulation may motive individuals to approach desired outcomes, minimizing the discrepancy between their actual and desired states. This is called a promotion focus. On the other hand, sometimes self-regulation motivates individuals to avoid undesirable end-states. Here, individuals are motivated to increase the discrepancy between their actual state and the undesirable outcome. Higgins calls this a prevention focus.

Theorists studying approach-avoid motivations agree that gains (vs. non-gains) and non-losses (vs. losses) are desirable end-states (vs. undesirable; Higgins, 1997). The framework of gain and loss scenarios may bring organizational power to this discussion, as theorists use different terms to describe similar inputs (e.g., Cacioppo & Berntson, 1999; Carver 2004; Higgins, 1997). Scenarios with single consequences can be perceived as gains versus non-gains or loss versus non-loss (Kahneman & Tversky, 1976). Gains are positive (i.e., desirable) outcomes and losses are negative (i.e., undesirable). A non-gain is perceived as a negative outcome, because it is compared relative to the alternate outcome of a gain. See Figure 1 for a visual depiction. A non-loss is perceived as a positive outcome, relative to its alternative of a loss. Carver’s behavioral approach and inhibition systems use the terms incentive cues (i.e., rewards and non-punishment) to describe perceived desirable states and threat cues (i.e., punishment and non-reward) to describe undesirable (Carver, 2004; Carver & White, 1994). Cacioppo’s dual motivation theory (DMT) is less concerned with categorizing different inputs (Cacioppo & Berntson,
Figure 1: Gain-loss frame operationalization in communication (top) and psychology (bottom).

<table>
<thead>
<tr>
<th>Gain</th>
<th>Vs.</th>
<th>Loss</th>
</tr>
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<tbody>
<tr>
<td>Desirable outcomes</td>
<td></td>
<td>Undesirable outcomes</td>
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<tr>
<td>&quot;By using this brand of meat, you can cut down your dietary intake of cholesterol and fat.&quot;</td>
<td>By not using this brand of meat, you can fail to cut down your dietary intake of cholesterol and fat.</td>
<td></td>
</tr>
<tr>
<td>By choosing LeanBeef, you will discover a healthier meal option. And you'll enjoy the healthy, protein-rich meal that the meat provides.”</td>
<td>By not choosing LeanBeef, you will discover a healthier meal option. And you'll miss out on the healthy, protein-rich meal that the meat provides.”</td>
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<th>Desirable</th>
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<tr>
<td>Gain</td>
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<td>&quot;By choosing LeanBeef, you will discover a healthier meal option. And you'll enjoy the healthy, protein-rich meal that the meat provides.”</td>
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<tr>
<td>Non-loss</td>
<td>Loss</td>
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<tr>
<td>&quot;By using this brand of meat, you can cut down your dietary intake of cholesterol and fat.”</td>
<td>&quot;By not using this brand of meat, you can fail to cut down your dietary intake of cholesterol and fat.”</td>
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(Meyers-Levy and Maheswaran, 2004)

1994; Cacioppo, Gardner & Berntson, 1999). Rather, stimuli are appraised to have positive and/or negative attributes based on past experiences and contextual factors. For example, smoking cues may be perceived as positive to marijuana users, and negative to 5
non-users (Wang et al., 2012). For example, marijuana users may perceive smoking sensation cues in advertisements positively (e.g., increased relaxation – gain), but non-users may perceive that same cue negatively (e.g., irritated lungs – loss). The framework of gain and loss scenarios adds organizational power to DMT, while remaining consistent with its original postulates.

RFT introduces promotion and prevention focus to distinguish how different end-states with similar desirability and valence influence goal attainment strategies (Higgins, 1997; Idson, Liberman & Higgins, 2000). Generally speaking, Carver’s model and DMT argue individuals approach the positive or incentive cues, and avoid negative stimuli or threats. Higgins (1997, 1998) distinguishes positive and negative end-states by whether it occurs in a gain or loss context. Regardless of the context, the end-state that diverges from the status quo is most salient. Figure 2 illustrates the similarities between approaches. This is consistent with past research that shows people are more sensitive to status quo departures (Boldero & Higgins, 2011) and outcomes that are not neutral (Kahneman & Tversky, 1976; Tversky & Kahneman, 1992). In gain scenarios, the desirable gain end-state is more salient than the non-gain, influencing individuals to focus more on the gain. RFT posits that this causes individuals to be more promotion focused, which is characterized by approach tendencies. Thus, individuals are motivated to approach desirable gain outcomes in gain scenarios. In loss scenarios, the undesirable loss end-state is more salient than the non-loss, prompting more of a prevention focus. A prevention focus leads to avoidance strategies for goal attainment. Here, individuals are not as motivated to approach the desirable non-loss end-state. Rather, they are more
motivated to avoid the undesirable loss. The motivation to avoid a loss is what primarily drives individuals towards the desirable non-loss outcome, in loss scenarios. RFT agrees that gains and non-losses are both desirable end-states that people are motivated to attain. But, it distinguishes the key motivation that leads individuals to desirable outcomes – people approach gains and avoid losses. This distinction highlights a key environmental factor that influences whether people use a promotion or prevention focus – whether the situation is mostly perceived as a gain or loss scenario.

Figure 2: Illustration of approach-avoid motivation theories.

Regulatory focus theory

Behavioral approach and avoidance systems


The expression *mostly perceived* is used because some issues could be perceived as either a gain or loss scenario, particularly when the decision is influenced through multiple attributes. Take health detection behaviors for example. Health detection gain and loss framed messages do not show consistent effects (O’Keefe & Jensen, 2009).
Participants’ varying focuses may be the cause of inconsistent observations. A disease test may be perceived as a gain scenario, because early detection typically helps combat the disease or problem. Tests can also reassure individuals of their healthy, or disease-free, status. On the other hand, tests can confirm a problem, like a cancer diagnosis. While this does not change the actual health status, the information forces individuals to confront the problem, which is a loss from their previous uncertainty. Thus, some individuals may view health detection procedures as a loss scenario. The word *mainly* was used to acknowledge that individuals weigh attributes differently when forming decisions (Busemeyer & Townsend, 1993). Understanding how individuals’ primarily perceive a situation is relevant, because it influences their regulatory focus and frame effectiveness – this will be discussed below when addressing regulatory fit.

Regulatory focus is not only influenced by environmental factors, but it is also influenced by individual characteristics (Higgins, 1997, 1998; Higgins et al., 2001). Individuals’ trait regulatory focus is their general predisposition towards promotion or prevention focuses. The predisposition is formulated through individuals’ sense of previous success, or failure, of promotion and prevention goal attainment. Trait regulatory focus is an important concept, because real-life goals and decisions often contain multiple attributes that may have conflicting motivations (Busemeyer & Townsend, 1993). Revisiting the smoking cue example, it might not be that non-smokers experience displeasure from smoking, while smokers experience greater pleasure. Rather, some smokers and non-smokers may agree that the activity generates pleasurable sensations (gain); and they may also agree on its harmful health consequences (loss).
Non-smokers may generally have a prevention focus, which causes them to be more sensitive to the decision’s health loss attribute. Notably, individuals may have a trait regulatory focus in one situation, but have a different level or opposite focus in another. While Higgins and colleagues (2001) tested trait regulatory focus as a general individual difference, they also point out that the sense of history could vary by context or environment (e.g., Boldero & Higgins, 2011). Contextual experience may influence how situations that have both gain and loss attributes are perceived. For instance, some people may exhibit a trait prevention focus regarding smoking and a trait promotion focus regarding academic studies. This makes trait regulatory focus quite similar to reinforcement learning, as it is shaped through learnt utility expectations from past experiences (Bryant & Dunford, 2008).

RFT is relevant to communication (Avnet & Higgins, 2006; Cesario, Grant & Higgins, 2004), because it may contribute organizational clarity to the field’s discussion of gain and loss messaging. O’Keefe and Jensen (2006, 2007, 2009) have summarized the current state of the literature well, and their explication of gain and loss scenarios adheres to literature norms. But, the literature equates all desirable states with gain frames, and undesirable states with losses. For example, “If you have regular skin exams, you will reduce your risk of skin cancer,” is classified as a gain because it emphasizes a desirable outcome (O’Keefe & Jensen, 2009, p. 298). Cancer risk reduction decreases your likelihood of a loss. O’Keefe and Jensen continue by arguing, “A gain-framed appeal thus could be phrased entirely in terms of avoided undesirable outcomes… and a loss-framed appeal could be phrased entirely in terms of foregone desirable outcomes.” Their
characterization is consistent with communication scholars who assert, “the benefits of taking action (i.e., a gain-framed appeal) or the costs of failing to take action (i.e., a loss-framed appeal)” (Rothman et al., 2006, p. S204). We know from RFT that not all desirable and undesirable outcomes trigger the same motivational tendencies. Here, RFT may extend communication gain-loss frame discourse. It may be appropriate to distinguish the different types of desirable and undesirable end-states. Such an explication may not only bring operational clarity, but it may also explain the inconsistent results detected by O’Keefe and Jenson. For instance, Meyers-Levy and Maheswaran (2004) looked at positive (non-loss and gain) and negative (loss and non-gain) frames:

“By using (not using) this brand of meat, you can (fail to) cut down your dietary intake of cholesterol and fat. By choosing (not choosing) LeanBeef, you will (will not) discover a healthier meal option. And you’ll enjoy (miss out on) the healthy, protein-rich meal that the meat provides.”

RFT would suggest a gain frame incites promotion focus and a non-loss frame triggers prevention, which may cause opposing effects in the above example. Isolating each of the four end-states, or organizing by gain-loss scenario, may help the communication literature operationalize the frames consistent with the psychological body the theories are based on (i.e., prospect theory; Kahneman & Tversky, 1976). Figure 1 illustrates how Meyers-Levy and Maheswaran may have miscategorized their frames.

A confounding operationalization may lead to inaccurate theoretical predictions. Authors may be unaware they are triggering the same process with both frames. Cho and Boster (2008, p. 433) published a gain-loss study in the Journal of Communication. The
gain frame’s manipulation check included “this ad focused on the advantages of not doing drugs?” The loss frame’s manipulation check included “this ad focused on the disadvantages of doing drugs?” Their manipulation check has non-loss and loss questions. Both questions address whether the frame is a loss scenario. Since it is the loss end-state that motivates prevention focus in loss scenarios, we would expect the loss frame in this study to have a greater persuasive effect (Higgins, 1997). Cho and Boster found a relationship consistent with RFT’s predictions. Those that have higher exposure to drug use were more persuaded by loss framed messaging. A possible problem arises, however, when scholars attribute the effects to loss frames being more persuasive to gain frames, when a gain frame was not used and approach tendencies were not triggered in an equal fashion.

Operational confounds also might be due to communication scholars’ focus on linguist manipulations, rather than objective manipulations. The notion of gain and loss frames arise from psychology, where descriptive stimuli like gambles and event outcome evaluations are used (e.g., Kahneman & Tversky, 1976; Tversky & Kahneman, 1992; Idson, Liberman & Higgins, 1999; Lee & Aiker, 2004; Brockner, Paruchuri, Idson & Higgins, 2004; Higgins, 2005). The value of a gamble can be objectively evaluated and manipulated. Its perceived utility also remains mostly consistent across participants. Communication scholars, in contrast, typically use linguistic manipulations, like (not) doing X (decreases) increases Y. For example, Umphrey (2003, p. 105) examined how gain and loss frames influenced testicular self-examination using the following manipulation: “Gain [loss] frame manipulation: By [not] doing a monthly TSE, you will
[not] know what your normal, healthy testicle feels like and will be [unaware] able to recognize any changes… Remember, [late] early detection can [end] save your life [prematurely].” Like Cho and Boster (2008), early detection is causing a non-loss outcome, which is desirable but not a gain outcome. Umphrey’s study found the loss frame was most effective, which is consistent with RFT. However, participants may recognize the ability to detect testicle changes as desirable, and that ability is a gain; yet, the ability can lead to testicular cancer detection, which is a loss. Given the subjective nature of the content, it is not always clear whether the content is a gain or loss scenario, if both are properly manipulated.

Gain-loss framing in communication includes normative behavioral instructions along with descriptive outcomes, which departs from the foundational psychology experiments. As noted previously, the research on gains and losses arose from analyzing choices between descriptive gambles and outcomes (Kahneman & Tversky, 1976). Here, investigators did not direct participants on the appropriate action tendency. Message framing literature, on the other hand, often includes normative messages to either approach or avoid specific outcomes (e.g., Kim, 2006; Liu, 2008; Kees, Burton & Tangari, 2010). The departure is often warranted, as the goal of many of these studies to motivate people to make more optimal choices. Cumulative prospect theory does not provide theoretical predications for how prescriptive action tendencies may interact with gain and loss frames. This may be why O’Keefe and Jensen (2006, 2007, 2009) have found inconsistent effects across the literature.
RFT may explain how prescriptive action tendencies may interact with gain and loss frames, through regulatory fit. Regulatory fit occurs when the advocated goal pursuit strategy matches the regulatory focus (Cesario, Grant & Higgins, 2004; Higgins, 1997, 2000, 2002, 2005). RFT argues messages can either advocate for an eager or a vigilant means to goal attainment. Eager means are strategies to attain advancement, which other scholars may classify as approach strategies (e.g., Cacioppo & Berntson, 1999; Carver 2004). RFT relates it to ensuring hits and minimizing errors of omission, in signal detection theory (Higgins, 2000). Individuals with a promotion focus should prefer eager means, because approach goal pursuit strategies align with a regulatory orientation that triggers approach tendencies. RFT even acknowledges eager and vigilant means are synonymous to approach and avoid strategies, yet continues to use the different terms (Higgins, 2000). Vigilant means are strategies to minimize harms or threats, which others call avoidance strategies. In signal detection terms, vigilant means would ensure correct rejections and minimizing false-positives. Vigilant means are favored by individuals with a prevention focus, as avoidance strategies facilitate the focus’ avoidance tendencies. Regulatory fit sustains the focus, rather than disrupting it, strengthening individuals’ engagement in message processing and motivational tendencies (Cesario et al., 2004). Strengthened motivation and engagement influence those processing the message to find it more persuasive.

Regulatory fit helps individuals “feel right,” because the prescribed goal pursuit strategy is parallel to individuals’ predisposition (Higgins, 2005). When regulatory fit does not occur, individuals do not feel as good about the messages because their focus
and action tendencies are presented with the opposing strategy. RFT stipulates feelings are used as information and processing feedback (Cesario et al., 2004). Thus, positive affect from feeling right about the message can be misattributed towards the message as perceived persuasiveness. Misattribution can also raise evaluations of tasks or decisions, independent of the actual outcome (Freitas & Higgins, 2002; Freitas, Liberman, & Higgins, 2002). The positive affect generated from regulatory fit may be misattributed to the prescribed strategy or objective, or the individual’s decision derived from the message frame. Additionally, regulatory fit facilitates processing, as it is consistent with the motivation tendencies caused by the gain or loss scenario. Providing approach strategies in gain scenarios is more effective, because the scenario motivates individuals to focus on that type of actions. The same is true for messages that advocate avoid strategies in loss scenarios.

A goal to receive an “A” in a college class is a good example to illustrate regulatory fit (Cesario et al., 2004). Attaining an A may be perceived as a gain or loss scenario (i.e., non-loss end-state) depending on the student’s personal expectations. Students may view the situation as a gain scenario, because they typically receive lower grades. These students are predicted to have a promotion focus, which may motivate them to start assignments well in advance or go above minimum requirements, like reading supplemental texts. Messages that encourage approach strategies, maybe ones they have not contemplated yet, generate the most amount of engagement because the students are inclined to focus on how to approach their goal. Their focus is aligned with the message’s motivational statements. Others may perceive obtaining an “A” as a loss
scenario. These individuals may be high achieving straight-A students, who regularly receive A’s. An “A” is expected and anything less would be a loss outcome, and thus receiving an “A” grade is a non-loss for them. Here, students may have a prevention focus, and be more engaged by messages with avoidance strategies. Some avoidance strategies may be to carefully adhere to assignment requirements, and to ensure they do assigned readings. However, do remember that the perception of a gain or loss scenario is not the only factor influencing regulatory focus. A student that expects an “A” may still use a promotion focus, due to their chronic regulatory focus. The takeaway from this example is that matching prescriptive actions with individuals’ regulatory focus eases processing and enhances persuasive outcomes. It also illustrates how environments may trigger distinct motivations in different people.

Regulatory fit’s superior effectiveness over mismatched messages is well established (e.g., Avnet & Higgins, 2006; Boldero & Higgins, 2011; Cesario et al., 2004; Lee & Aaker, 2004; Higgins, 2000, 2002, 2005; Idson, Liberman & Higgins, 2004). Some scholars have started to examine solely approach-gain and avoid-loss messaging, when investigating gain-loss framing effects on specific issues (e.g., Kees et al., 2010). The dissertation will only compare the effects of approach-gain and avoid-loss messages, as the two alternatives have shown less effective results. Thus, the first hypothesis aims to replicate previous findings that approach-gain and avoid-loss messages’ influence on perceived message effectiveness is moderated by trait regulatory focus (Hypothesis 1).

Kees and colleagues (2010) argue that effects of regulatory fit should be minimized under conditions of high elaboration. They note that framing and emotional
effects should be hampered, when individuals are engaging in more effortful scrutiny of the messages. Their reasoning is based on the elaboration likelihood model (see Petty & Wegener, 1998). Kees specifically identified temporal orientation as a significant influence to elaboration, when processing future or long-term goal messages. This is specifically important for communication scholars, who often concern their research with longstanding normative public advocacy (e.g., health promotion, public policy debate). Individuals that are more future orientated are generally more concerned with long-term goals, like health and well-being (Joireman, Strathman & Balliet, 2006). Future orientation influences the relevance of messages that address goal pursuit strategies, causing those that are more future orientated to find long-term goal pursuit messages more relevant. As relevance increases, elaboration also increases causing regulatory fit to have less of an effect.

Temporal orientation is particularly relevant for message frame scholars, as the issues they address often concern multiple attribute decisions. These attributes may not only have conflicting gains and losses, as noted previously, but the temporal orientation of each attribute may not be consistent. Revisiting the smoking example above, the relaxation or euphoric sensation a cigarette may cause is immediate, while negative health effects are cumulative and mostly observed in the future. It is important to note that gain attributes are not always immediate, take exercise for example. When someone begins to exercise, the body becomes sore and displeasure may be felt by pushing a lethargic cardiovascular system. Only in the future do people experience the positive impacts to overall health and body image. It is quite possible that O’Keefe and Jensen’s
conflicting results are due to temporal orientation’s confounding effects.

The first study attempts to replicate the hypothesis that consideration of future consequences will moderate chronic regulatory focus’ moderation, decreasing regulatory focus’ effect for participants that highly consider future consequences (Hypothesis 2). The first study uses stimuli from Kees and colleagues (2010), making it a suited setting to confirm their hypothesis. Moreover, their stimuli concerns exercise and nutrition, and both have outcomes with similar timeframes. The second study, however, concerns multiple different topics, where controlling for temporal considerations would be impractical. Each topic could be modeled separately, but that would hinder the power from the within-subject design. The second study will not include H2.

Attention Mediates The Framing Process

Attention is a necessary component in processing external stimuli, like advertisements (Roser, 1990; Tam & Ho, 2005; Wedel & Pieters, 2008). Attention has traditionally been treated as a precondition to processing, one that can be assumed so that the phenomenon of interests can be examined (Wedel & Pieters, 2008). This assumption may draw inaccurate predictions as message effects are studied in isolation, when truly they are processed in cluttered environments with multiple stimuli competing for attention. Additionally, attention may be more complex than a mere precondition to processing, as it is demonstrated to help maintain goal progression over time (LaBerge, 1995; Rayner, Miller & Rotello, 2008). In communication, more scholars are
operationalizing attention through eye tracking, rather than recall, helping expose this somewhat opaque process (Wedel & Pieters, 2008).

Eye tracking studies typically use fixations to operationalize attention. The relationship between eye fixation on an area and attention allocation is well established (Fischer, 1999; Rayner, 1998). We can shift our attention without moving our eyes, which frequently occurs when two target-objects are close in proximity. However, as the content increases in complexity, people tend to move their eyes so that the object they are processing is centered in their visual space. People do this because it is more efficient to shift one’s visual space, rather than maintaining a constant space and shifting cognitive attention (Rayner, 1998). This is typically the case for primary tasks like reading, scanning and searching (Fischer, 1999). Operationalizing attention through fixations is particularly useful in communication, because an advertisement or stimuli may have multiple attributes or components. Eye tracking can map individuals’ gazes on each of those attributes. This allows investigators to distinguish attention between competing attributes within a stimuli, and competition between stimuli.

In communication, attention operationalized through eye tracking is generally examined as a criterion. Since the measure is novel to our field, scholars are examining how different inputs influence attention – ending the story at that point. For instance, Pieters and Wedel (2004) examined how the size of images and texts influenced eye gaze in print advertisements. Radach and colleagues (2003) used a similar approach and examined how concrete (i.e., explicit) and abstract (i.e., implicit) pictures and text influenced attention within a print ad. Smerecnik and colleagues (2010) examined how
A graphical representation of risk information influenced attention. These examples illustrate the general trend of manipulating message elements to examine attention outcomes. This research is essential in demonstrating the utility of the method, while revealing false assumptions the community previously held concerning attention processes. However, it may be appropriate to begin examining how message elements influence attention, and how attention may influence other cognitive processes.

Decision field theory (DFT) is a probabilistic dynamic computational model of decision making, which describes how individuals make decisions through an evidence accumulation to threshold process (Busemeyer & Johnson, 2004; Busemeyer & Townsend, 1993; Roe et al., 2001). DFT stipulates people make decisions through a diffusion process. A decision can have multiple attributes. Individuals stochastically sample the decision’s attributes at each time moment, producing an affective evaluation. Each attribute’s evaluations integrate over time, creating a preference for each moment. A decision threshold determines the criteria sufficient to make a decision. The threshold incorporates a speed vs. accuracy tradeoff, as lower thresholds are met faster but higher thresholds have stronger preference states (i.e., greater decision certainty). Take choosing between vanilla and chocolate ice cream for example. If an individual wanted to choose quickly, there would be a lower threshold, maybe so low that the first detection of any preference would lead to a choice. A low threshold may have been caused by external factors like time pressure from others standing in line hurrying the decision, or it could have been set internally. In contrast, if individuals set a high decision threshold and there is minimal time pressure to make a decision, a stronger preference state will be generated.
before the decision is made. Here, individuals may weigh how the store actually creates each flavor or become more introspective concerning what they desire. The example illustrates how the threshold influences decisions, and how external time constraints may alter the threshold.

DFT argues the affective evaluation of each option is comprised of three components – subjective attribute evaluations, attention allocation and a comparison process (Roe, Busemeyer & Townsend, 2001). First, individuals evaluate each option and its attributes. For instance, individuals may choose whether or not to smoke based on social and health attributes, in a simplified context. Here, individuals will make subjective evaluations of social and health outcomes if they choose to smoke, and if they choose to abstain. Attention allocation is the other primary input for affective evaluations of choice outcomes. In DFT, attention acts as an attribute weight, where greater time allocation equates to heavier weights on the attribute being attended to. Since evaluations can be negative or positive, the weight can increase or decrease preference for a decision option. In our smoking choice example, if an individual attended more to the health attribute, DFT would predict the health attribute be weighed more in their decision. The final component contrasts the attribute evaluations of all the other options, meaning one’s evaluation of option A is compared to all other perceived options.

Decision neuroscience scholars support the relationship between fixations and decision making (Krajbich & Rangel, 2011). Krajbich and Rangel’s study modeled how fixations on consumer-packaged goods influenced what goods participants choose. The results showed participants fixated on the option they were going to choose, suggesting
that attention is not independent of the valuation process. Communication scholars also support DFT’s attention weight on decision outcomes. Pieter and Warlop (1999) had participants view images for branded consumer packages. Six branded products of a similar category (e.g., shampoo bottles) were shown at once, and four different categories were used. Participants indicated which branded product they preferred the most within its category. The study found preferred brands received longer fixations than the others. More recently, Glöckner and Herbold (2011) examined how participants process risky information, using gambles with two non-negative outcomes. The study analyzed individuals’ fixations on each outcome and their decisions. The results indicated that fixations were greater on chosen (i.e., favored) options and those outcomes that were objectively the most attractive. The studies support DFT hypothesis that attention allocation on a decision attribute increases its weight in decision making. And since both studies examined attributes with desirable outcomes, the increased weight raised individuals’ preferences towards that attribute. Similar outcomes are expected in this dissertation, because both studies use desirable outcomes.

It is hypothesized that attention to message information mediates evaluations of that information. The relationship between approach-gain and avoid-loss frames on perceived message effectiveness will be mediated by attention allocation to each frame, where greater allocation increases its perceived effectiveness (Hypothesis 3). A positive mediated relationship is posited, because the frames advocate strategies to attain desirable end-states. H3 extends RFT and the communication gain-loss literature by introducing attention as a possible explanatory mechanism for the frames’ perceived effectiveness.
**Attending to Approach-Gain and Avoid-Loss Messages**

If attention to information influences how effective it is, the next natural question to address is how approach-gain and avoid-loss frames attract attention. No research has addressed how promotion-prevention or gain-loss messages may influence attention mobilization. Attention may be a relevant construct to examine, as it is a necessary step in the persuasion process. Neuropsychological research may inform how approach-gain and avoid-loss messaging are attended to, because they have already explored relationships between stimuli and attention. DMT has identified two underlying motivational systems – the appetitive (i.e., approach) and aversive (i.e., avoid) systems (Bradley, Codispoti, Cuthbert & Lang, A. 2001; Cacioppo & Berntson, 1994, 1999). The systems represent the brain’s neural circuits involved in attention and action, and are believed to act in an evolutionary adaptive manner (Berntson & Cacioppo, 2008; Bradley et al., 2001; Bradley, 2009).

The appetitive system is activated by positive stimuli. It is consistent with RFT’s promotion focus, predicting individuals will approach gains. While DMT does not explicate stimuli in great detail – that is one of RFT’s notable contributions – it does conceptualize valence relative to individuals’ perception and standpoint. In DMT, emotions are viewed to be fundamental action dispositions, mobilizing resources to effectively respond to life threatening and sustaining events (Berntson & Cacioppo, 2008; Bradley, 2009; Frijda, 1987; Lang, P. J., 1995). Positive stimuli trigger appetitive activation, which mobilizes attention resources for sensory information intake and
focuses these resources on internally generated stimuli (i.e., self generated thoughts). This facilitates approach behaviors and tendencies (Bradley, 2009; Wang, et al. 2012).

The system aids in encoding and storing information from the target stimuli, and relevant aspects of the surrounding environment. The appetitive system’s structure may explain why approach-gain messages may cause more counter-arguing, in some contexts (e.g., Liu, 2008). The appetitive system not only motivates individuals to attend to the message, it also motivates them to produce relevant thoughts about that message. DMT makes no assumption on what relevant cognitions are generated. The unexpected counter-arguing from approach-motived cognition Liu (2008) found is consistent DMT, and illustrates how the system allocates attention to internally generated stimuli as well.

The aversive system is active by negative stimuli. Its activation facilitates protection (or avoidance) tendencies and behaviors (Bradley, 2009; Lang, A., 2006, Wang et al., 2012). The system aids in identifying and responding to threats in the environment. Again, the aversive system has strong parallels to RFT’s prevention focus, as the system is designed to be vigilant to loss outcomes. With low to moderate aversive activation, the system mobilizes attention resources to external stimuli (i.e., threat identification). This contrasts the appetitive system, which mobilizes attention resources more to internal stimuli. At higher levels of activation, however, resource allocation shifts from information intake to information rejection (Berntson & Cacioppo, 2008; Bradley, 2009; Frijda, 1987). This facilitates adaptive responses to threats, like behavioral preparation and quick decision making (e.g., fight or flight). Wang and colleagues (2012) illustrated demonstrated this shift when manipulating motivation
activation through anti-marijuana public service announcements (PSAs). Participants with little marijuana experience allocated more attention to negative PSAs with low motivational activation than those with high activation (i.e., highly arousing).

Arousing content regulates both system activation functions (Bradley et al., 2001). Higher levels of arousing content triggers stronger system activation; and lower arousing content triggers weaker activation. DMT distinguishes the stimuli’s intensity or calmness (i.e., arousing content) from onlookers’ arousal. Each stimulus conceptually has an arousing attribute, or arousing content if you will. For instance, videos with more or faster cuts objectively have a higher arousing content than videos with fewer cuts (Lang, A., Chung, Schwartz & Shin, 2005). Yet, the arousal experienced triggered by the cuts differs by individual. The same process occurs for words and pictures (Kensinger & Corkin, 2004) – stimuli where arousing content may not be manipulated by objective means, because the stimuli itself represent a concept. In these instances, researchers typically use the mean arousal evaluation from an appropriate sample to approximate its arousing content. Bradley and Peter Lang (1999), for example, created a technical report of over 1000 words’ arousal ratings for academic research. Notably, the report distinguishes arousal from valence, which is consistent with DMT. Valence dictates which system(s) are being triggered, and arousing content regulates the strength of activation.

While arousing content regulates both aversive and appetitive activation, each system’s activation function is distinct. The aversive system is more sensitive to arousal than the appetitive (Cacioppo & Bernston, 1999; Ito & Cacioppo, 2005; Rozin &
Royzman, 2001). With each unit increase of arousal (and thus arousing content), the corresponding change in aversive activation strength should be greater than the change in appetitive, ceteris paribus. To put it in other words, the aversive system’s activation function is steeper than the appetitive’s. This is called negativity bias. Its evolutionary purpose is to prioritize environmental threats. The appetitive system, in contrast, is characterized by higher activation than the aversive system, when there is minimal to no arousal. This is called positivity offset, which is suggested to aid productivity in neutral and calm environments (e.g., foraging).

Notably, DMT’s activation functions are quite consistent with RFT’s predictions. Let’s examine a playground bully example, which is a loss scenario. The bully could use an approach-non-loss command by stating, “If you do what I say, I won’t beat you up.” The command asks the target to approach a desirable state, which may predominantly activate the appetitive system. The appetitive system may enjoy an activation advantage at lower arousal levels, but its activation function is less sensitive than the aversive. Thus, it will provide less incremental motivation to adhere to the command. On the other hand, if the bully used an avoid-loss command by stating, “If you don’t do what I say, I’ll beat you up.” Here, the aversive system is likely activated. The aversive system is characterized by the negativity bias, and will be more responsive to the command. DMT supports the notion that people focus more on loss outcomes in loss scenarios, as the loss is typically more arousing. If the loss had minimal arousing content, the non-loss may be attended to more due to positivity offset. It may be that RFT experiments did not detect
that exception, because their studies used arousing loss scenarios to ensure manipulations.

Lee and Aaker’s (2004) study of risk perception and gain-loss frames in RFT shows consistent predictions to DMT’s appetitive and aversive system activation. Their study contained five experiments, one of which used mononucleosis as the message topic. Risk perceptions were manipulated through personal susceptibility – the stimuli conveyed frequent or infrequent behaviors (for the sample) to contract the disease. When risk perception was low (i.e., low arousal), gain frames raised brand attitude more than loss frames. The result is consistent with the appetitive system’s positive offset. In contrast, when risk perception was high, loss frames raised brand attitude more than gain frames, which is consistent with the aversive system’s negativity bias. These parallels support the conjecture that approach and avoidance system activation may provide the cognitive mechanism to how we allocate attention towards promotion and prevention messages.

DMT’s predictions are also consistent with research conducted on controlling language and reactance in health messaging. Reactance is the arousal generated from the perception of threats or reduction to freedoms (Brehm & Brehm, 1981). Individuals become aroused to such threats and attempts to restore that freedom, which may result in message rejection or source derogation in persuasive contexts (Miller et al., 2007). Miller and colleagues noted that well intentioned but tough-minded health campaigns may unintentionally be causing reactance. Some campaigns use controlling and strong language that may be perceived to threaten individuals’ behavioral freedoms. Controlling language uses imperatives, like “must” and “should,” and is contrasted by messages that
use indirect suggestions, like “perhaps” and “maybe.” Miller and colleagues (2007) found that controlling language caused greater anger and negative evaluations towards the message, supporting their reactance hypothesis. This is consistent with DMT, as controlling language may be viewed as highly arousing; and highly arousing content shift individuals from information intake to information rejection. It might appear that health campaigns should use more indirect suggestions in their messaging. However, Miller and colleagues note that such language makes interpretation more difficult, and cedes control over message interpretation. An unexplored alternative may be to use language with more moderately arousing content, which DFT predicts will maintain information intake.

Hypothesis 4 argues arousing content moderates attention to approach-gain and avoid-loss information. When the information has low arousing content, participants will attend to approach-gain messages more than avoid-loss; when there is moderate arousing content, participants will attend equally to approach-gain and avoid-loss messages; and when the frames have high arousing content, participants will attend to avoid-loss messages more than approach-gain. This hypothesis extends current communication gain-loss literature, as motivational intensity has yet to be discussed. Moreover, it is consistent with cumulative prospect theory, which is the principle theoretical framework of communication gain-loss research. A fundamental tenet of prospect theory is that the magnitude, or intensity, of the gain or loss influences how it is processed (Kahneman & Tversky, 1976; Tversky & Kahneman, 1992). Arousing content captures this notion with greater generalizability.
Additionally, individuals’ trait regulatory focus is argued to moderate attention allocation to approach-gain and avoid-loss messages, where promotion focused individuals attend more to approach-gain messages and prevention focused individuals attend more to avoid-loss (Hypothesis 5). RFT stipulates regulatory focus motivates individuals towards consistent goal strategies to their regulatory focus (Higgins, 1997, 1998, 2000). While visual attention has yet to be examined within RFT’s framework, approach-gain and avoid-loss messages have been shown to increase message processing fluency (Lee & Aaker, 2004). More importantly, a fundamental tenet of RFT is that regulatory focus influences what individuals pay attention to. Since higher elaboration appears to hamper regulatory focus’ effects (Kees et al., 2010), it is reasonable to posit regulatory focus influences external attention, as well as internal.

Coactive Activation: Greater Effectiveness by Using Both Approach-Gain and Avoid-Loss Frames

Researchers have not yet explored responses to single messages that include both approach-gain and avoid-loss frames (“frame combination”). For instance, a message with frame combination may state, “Eat healthy foods, like fruits and vegetables, while avoiding unhealthy foods, like chips and candy.” Notice how the two types of frames can be combined into a single message or advertisement. This perspective is particularly apt for communication scholars, because most stimuli have multiple conflicting attributes. A cake, for example, may have a gain taste attribute, but loss health attribute. Dealing with mixed scenarios becomes even more apparent when addressing social or health issues. As
discussed previously, the decision to smoke may include perceived social gains and health losses. Communication scholars address situations that include gains and losses regularly, and exploring frame combination may be pertinent to those efforts.

Some may say frame combination has previously been inadvertently studied through regulatory fit experiments. Scholars have explored the implications of not matching messages to individuals’ regulatory focus (e.g., avoidance with promotion focus and approach with prevention; Forster, Higgins & Idson, 1998) and strategic means to attain the goal (e.g., approach-non-loss and avoid-non-gain; Kim, 2006). These studies support the notion that mismatching hinders, or matching improves, message effectiveness. However, the support for regulatory fit is relative to the misfit stimuli. It does not examine the absolute effects of each frame. There may be an additive effect that would make combining fit and misfit frames (e.g., approach-gain and avoid-non-gain) more effective than either alone. Moreover, some attributes are truly both gain and loss scenarios. The decision to not let a drunk friend drive has a bidirectional ethical and moral component. Impeding the action could make you feel responsible and morally right, while allowing them to drive may make you feel irresponsible or worried. RFT conceptualizes promotion and prevention focuses as distinct processes (Higgins, 1997, 1998, 2002; Higgins et al., 2001). If these processes are distinct, there is a possibility the systems may act in an additive manner, rather than competitive.

Communication and cognitive researchers have found that activating approach and avoidance motivations has an additive effect on attention. The two systems can be active concurrently (i.e., coactive). Positive cues activate approach tendencies and
negative cues activate avoidance tendencies, which may be simultaneously present in the environment or within a single stimulus (Bradley et al., 2001; Cacioppo & Berntson, 1994, 1999; Carver, 2004). Consistent with RFT’s conceptualization, DMT argues and demonstrates the independence of approach and avoidance systems, although they may correlate in some circumstances (Cacioppo & Berntson, 1999; Berntson & Cacioppo, 2008; Lang, A. et al., 2012; Wang et al., 2012). Since each system is dynamic, not static, a system input does not need to be currently present for it to be active. In this case, the system may be returning to its resting state. Thus, it is possible to experience coactivation without negative and positive cues being present at the same time. Take the iconic scenes in the movie *Jaws*, where the film cuts back-and-forth between happy people on the beach and predator shark-like imagery. Negative and positive cues are not always present, yet both systems are concurrently active.

Stimuli with positive and negative attributes should attract the most attention when arousal is moderate (Berntson & Cacioppo, 2008; Bradley, 2009; Wang et al., 2012). Lower arousal simply does not activate the two systems as strongly as higher levels. Low to moderate arousing content is key because high arousal shifts both systems from information intake to information rejection. This occurs to facilitate action readiness and quick decision making. In the prior section we addressed why this is an adaptive trait for the avoidance system (attacker example), but it also occurs in the approach system. The approach motivation system can also shift from information intake to rejection, with high enough arousal. Tell a young child they are going to Disney Land, for example, and you may see an ecstatic response filled with jubilant screaming, jumping and
rambunctious happiness. This example illustrates the approach system can also turn from information intake to rejection, when arousing content is high enough. Due to the negativity bias, however, the approach system shifts to information rejection at comparatively higher arousal levels (Lang, A., et al., 2012). Low to moderate arousal, in contrast, activates both motivation systems stronger than low arousal, without shifting either system from information intake to rejection (Lang, A., et al., 2012; Wang et al., 2012).

The functional independence of the two systems suggest that each system’s effects are additive. Both motivation systems help mobilize cognitive and attention resources to enhance perceptual processing and action readiness (Berntson & Cacioppo, 2008; Bradley, 2009; Wang et al., 2012). Wang and colleagues (2012) contrasted attentional reactions to positive, negative and coactive (i.e., presence of both positive and negative content) content in anti-drug PSAs. The study used time series models to examine real-time heart rate and corrugator responses to the dynamic streams of the motivational PSA content, which is operationalized as external sensory information intake, i.e., external attention (see Stern, Ray, & Quiglye, 2001). Participants attended most to calm anti-marijuana PSA content that activated both motivation systems. In contrast, highly arousing coactive PSA content did not attract as much attention. The results were consistent with Wang and colleagues’ (2012) prediction that greater arousing content shifts attention allocation from external information intake to behavioral preparation. In a similar study, subjects again allocated the greatest amount of cognitive resources to a coactive PSA (Lang, A., et al., 2012). These studies suggest the sum of the
two motivation systems’ activation has greater effect than either system alone, at low to moderate arousal levels. In other words, frame combination will receive the most amount of attention compared to all messages with only one frame type, when arousing content is low to moderate (Hypothesis 6).

It is also argued that frame combination enhances its perceived effectiveness. As noted previously, both systems have unique attributes in their mobilization of attention resources. The approach system motivates greater attention towards internal stimuli, like stimuli scrutiny or relevant elaboration (Berntson & Cacioppo, 2008; Lang, A., 2006). The avoidance system, however, motivates greater attention towards external stimuli, like surveillance focuses. Coactivation generates both types of attention efforts, which is typically an improvement over only one form of processing. This may be particularly true in mediated communication environments, where there is no immediate threat in an evolutionary sense (i.e., advocacy messages generally do not concern immediate life threats). Thus, attracting attention to the message and facilitating integrative processing may be equally important with regards to message effectiveness. For instance, the combined activation of both approach and avoidance motivation tendencies appears to facilitate information encoding (i.e., recognition scores) and storage (i.e., cued recall scores; Lang, A., et al., 2012). Since the two systems have different motivational functions that are complementary, frame combinations are expected to be most effective relative to its alternatives, independent from visual attention’s mediation (Hypothesis 7).
Sensation Seeking Moderates the Effects of Arousing Content

Sensation seeking is a personality trait that is highly associated with risky behavior like drug use, gambling and unsafe sex, just to name a few (Roberti, 2004; Zuckerman & Kuhlman, 2000). It has become a prevalent targeting characteristic for those pursuing public health campaigns. Sensation seeking is the need for “varied, novel, and complex sensations and experience and the willingness to take physical and social risks for the sake of such experience” (Zuckerman, 1979, p. 10). High sensation seekers (HSS), relative to their low counterparts (LSS), are far more likely to engage in risky behaviors, like those listed above. One of the primary reasons for this behavioral divide is that HSS generally appraise risky or stressful environments as less threatening or intimidating than LSS (Roberti, 2004).

Originally, it was posited that HSS would have different resting arousal levels, but research did not support that relationship (Ridgeway & Hare, 1981; Zuckerman, 1990; Zuckerman, Simons & Como, 1988). Rather, the studies suggested that sensation seeking moderates responses to arousing content (e.g., Zuckerman, 1990) – HSS attend to highly arousing content more than LSS. Annie Lang and colleagues (2005) noted that this relationship is consistent with an overactive appetitive system (i.e., approach motivations). HSS allocate more attention resources towards highly arousing content, while experiencing lower levels of arousal relative to LSS, suggesting raised positivity offsets and possibly weakened negativity biases (Lang, A., et al., 2005; Lang, A., Shin & Lee, 2005). Their conclusion, nevertheless, assumes a one-way relationship, rather than a
reciprocal one. Personal characteristics may guide behavior; however, behaviors may also influence personal traits (Slater, Henry, Swaim & Anderson, 2003).

Annie Lang and colleagues (2005) noted that their theorized relationship between sensation seeking and arousing content is consistent with dual-motivational cognitive processing. Zuckerman (1996) suggested that sensation seeking might result from fundamental differences in people’s approach and avoidance tendencies. The biological bases for approach and avoidance responses are the mesolimbic dopamine system, which is associated with reward, and serotonergic system, which is associated with punishment (Zuckerman & Kuhlman, 2000). HSS have more sensitive dopamine and less sensitive serotonergic systems than LSS. Thus, HSS approach systems respond either stronger and avoidance system responds weaker to the same shift in arousing content compared to LSS. Specifically, sensation seeking is expected to moderate arousing content’s moderation, whereas HSS will attend to high arousing content more than LSS (Hypothesis 8).

**Trait Aggressiveness Moderates the Effects of Arousing Content**

Although aggression is a behavior, individuals can have a predisposition to aggressive acts (Buss & Perry, 1992). Social psychologists define aggression as behavior that intends to cause unwanted harm to another person (Bushman & Huesmann, 2010; Huesmann, 2007; Huesmann & Taylor, 2006; Krahé, 2001). Aggressiveness is a personality trait that demonstrates accessible knowledge of aggressive behavior, more
frequent aggressive thoughts, and greater hostility towards others (Anderson, 1997; Slater, 2003).

Aggressiveness may be a relevant targetable demographic for public intervention campaigns. Traditional demographic data (i.e., sex, ethnicity and geography) demonstrates only weak relationships on perceived effectiveness on anti-violence PSAs (Borzekowski & Poussaint, 1999). This suggests anti-violence PSAs need to be more targeted, or targeting to such broad demographics may be inefficient. Targeting anti-violence PSAs to aggressive individuals may produce more desirable results. Additionally, aggressiveness may lead to other antisocial behaviors, like drug use and delinquent behaviors (Farrell, Kung, White & Valois, 2000; Farrell et al., 2005). Farrell argues that aggression, drug use and delinquent behaviors share a common cause. Moreover, social interactions and peer groups may reinforce antisocial tendencies. The antisocial behaviors of aggressive individuals may increase the likelihood of being rejected by peers who exhibit prosocial traits, leading to peer groups that bolster the antisocial behaviors rather than hinder them. Some antisocial behaviors are intertwined with aggressiveness. For instance, aggressiveness is associated with increased likelihood to drink and drive, through a mediated process (Stacy, Newcomb & Bentler, 1991). Additionally, drug and alcohol use impede inhibitions to act aggressively (Anderson & Bushman, 2002; Bushman & Huesmann, 2010), which is one reason society finds substance use antisocial.

Aggressiveness may be of key interest when constructing PSAs or other prosocial campaigns, due to its relation with arousing content. Highly arousing content appears to
stimulate aggression when aggressive cues are present, like in domestic abuse PSAs (Anderson & Bushman, 2002; Bushman & Huesmann, 2010). Arousal generated can strengthen a dominant action tendency, which may be aggressive thoughts or dispositions, in the context of PSAs. Triggering aggressive thoughts may reinforce behavior tendencies, rather than persuade those to take steps to impede them. A message may also question individuals’ actions or attitudes, which may be perceived as a threat to self-esteem. Such threats “are often the source of aggressive behavior” (Anderson & Bushman, 2002, p. 44). Furthermore, arousal can be misattributed (Zillmann, 1988). Arousal generated from a message may place an individual in a self-generated angry state, which could persist after the message is no longer present. This may not only reinforce the antisocial behaviors, but actually trigger states inconsistent with the message’s intent. Arousing content may be a key consideration for those producing prosocial campaigns.

The literature has not resolved how arousing content influences motivational systems differently for individuals with aggressive traits. Harmon-Jones and Sigelman (2001) conducted an EEG experiment, illustrating aggression’s association with anger and left-prefrontal cortex activity. The left-prefrontal cortex is associated with approach tendencies. Amodio and colleagues (2003) EEG study found consistent results, but also demonstrated that the left-prefrontal cortex activation is stronger for those with a promotion regulatory focus. This suggests aggressive people may have stronger approach activation functions and are more promotion orientated. In terms of DMT, we would expect them to have greater positivity offsets. On the other hand, aversive cues – like
weapons and aggressive cues – have been found to increase aggression (Anderson & Bushman, 2002; Bushman & Huesmann, 2010). This suggests aggressive people are more attune to aversive stimuli. DMT would predict a greater negativity bias, as their motivation system has strong activation to those inputs compared to less aggressive individuals. Hence, the first research question asks how trait aggressiveness moderates arousing content’s moderation, regulatory focus’ moderation, or both?
Study 1: Combining Approach-Gain and Avoid-Loss Messages

The first experiment attempts to extend RFT and gain-loss framing, by examining how the combination of both frame types influence attention and perceived effectiveness. Gain and loss frames have traditionally been studied in relation to one another (O’Keefe & Jensen, 2006, 2007, 2009), and have yet to be examined as a combined message. DMT argues the approach and avoidance systems are independent (Berntson & Cacioppo, 2008). Messages with both approach-gain and avoid-loss frames may activate both motivation systems concurrently, resulting in greater mobilization of cognitive resources (Lang, A., et al., 2012; Wang et al., 2012). The argument is consistent with RFT’s assertion that promotion and prevention focuses are independent (Higgins, 2002; Higgins et al., 2001).

The study also includes visual attention as a mediator between message frames and perceived effectiveness. Isolating visual attention’s mediating role may provide an explanatory mechanism for superior perceived effectiveness and attention allocation to messages with frame combinations. Wang and colleagues (2012) demonstrate that approach and avoidance motivation systems regulate attention allocation to each message, allocating the most amount of attention to stimuli that triggers both systems. Furthermore, greater attention towards a message increases its weight in the decision process (Roe et al., 2001). It is posited that greater weight equates to more positive
attitudes towards the message, because the study’s messages advocate participants attain a desirable outcome. Thus, including visual attention in the analysis better delineates message frame’s direct and indirect effects, and begins to establish visual attention’s role in perceived effectiveness.

Study 1 uses Kees and colleagues’ (2010) stimuli. Their previous study examined approach-gain and avoid-loss messages to encourage nutrition and exercise. Here, participants viewed either two approach-gain messages or two avoid-loss. The two types were never mixed. This experiment will create two new combined stimuli from the previous study. One message contained approach-gain frames regarding nutrition and avoid-loss frames regarding exercise. The other message included the other combination of frames. It is expected that the two combined messages will receive the most attention and highest message effectiveness scores, controlling for individuals’ trait regulatory focus.

Hypotheses

Hypotheses 1 and 2 replicate Kees and colleagues’ (2010) findings. H1 is specifically consistent of the established principle of regulatory fit (Higgins, 2002, 2005; Higgins et al., 2001). H1 posits approach-gain and avoid-loss messages will both increase perceived message effectiveness, and that relationship will be moderated by trait regulatory focus. Consideration of future consequences (CFC) is also predicted to moderate the moderation of trait regulatory focus, because CFC increases message elaboration that impedes frame effects (H2).
The study extends RFT and communication gain-loss theory by suggesting visual attention may mediate the relationship with perceived effectiveness, and frame combination attracts more attention and is more effective than single frame messages. Hypotheses 3 combines previous DMT work (e.g., Wang et al., 2012) with DFT (e.g., Busemeyer et al., 2001) to argue approach-gain and avoid-loss information attracts visual attention, which influences how that information is weighed in decision making. More visual attention equates to greater weight in the decision process. Additionally, the study examines whether trait regulatory focus influences attention to approach-gain and avoid-loss information. RFT has not examined how regulatory focus moderates visual attention, although its postulates suggest motivated attention is a component to the process. The study posits participants with greater promotion focus will fixate more on approach-gain information; and those with prevention focuses will attend more to avoid-loss (H5). Finally, the study introduces the notion of gain-loss frame combination to the literature, where approach-gain and avoid-loss information is combined into one message. It is argued frame combinations attract more attention (H6) and are more effective (H7) than single frame messages, due to the independence of the approach and avoidance motivation systems. Activating both systems concurrently is predicted to mobilize more cognitive resources than either one alone. Moreover, the unique attributes of each system are believed to enhance message processing and effectiveness.
Procedure

The experiment is a 2 (Nutrition Message Frames: approach-gain vs. avoid-loss) x 2 (Exercise Message Frames: approach-gain vs. avoid-loss) x 2 (Order: nutrition-exercise, exercise-nutrition) mixed factorial design. Order of each frame is the only between-subjects factor. 100 participants received extra credit for their involvement. Participants had a mean age of 22.2 (SD = 5.3) and 54% were male. The sample was 74% White, 12% Black, 12% Asian and 5% other.

Similar to Kees and colleagues (2010), participants were told the purpose of the study is to test effectiveness of PSAs. After consent and instructions, participants viewed each of the four messages, while their eye gaze was recorded. Messages were shown in random order. After each message was viewed, participants were asked to rate each message’s perceived effectiveness. The study concluded with individual trait measures and demographics.

Stimuli.

The stimuli were used in a previous gain-loss RFT study (Kees et al., 2010). The messages only use the text manipulation in this study, while Kees created mock coloring and images to make the ads more ecological. Colors and images may trigger confounding motivation and influence message interpretation through association. Additionally, images influence eye gaze (Solloway & Tyrawski, & Wang, 2012), which is a key measure in the current study. See appendix A for the stimuli.
Whether the nutrition or exercise attribute is top or bottom in the message was randomly assigned for each participant.

**Measures.**

*Trait regulatory focus* were operationalized through the regulatory focus questionnaire (RFQ; Higgins et al., 2001). RFQ is an 11-item measure designed to assess individuals’ subjective history of success using promotion and prevention focuses, through the pride participants have in attaining goals from each focus. The questionnaire measures individuals’ promotion focus ($M = 2.66$, $SD = .68$, alpha = .76) and prevention focus ($M = 2.09$, $SD = .80$, alpha = .80), where 0 denotes less chronic focus and 4 indicates higher. These measures are particularly suited for new tasks, as historical focus is predictive of goal attainment strategy to new tasks. Exercise and nutrition, however, are not likely to be new goals, and individuals past experiences with these tasks may inform their general trait dispositions. Nevertheless, there is no measure of regulatory focus to specific goal situations, leaving the RFQ as the most appropriate measure. Additionally, its inclusion adds greater control of possible confounds, compared to Kees and colleagues (2010) who only manipulated environmental triggers and did not control trait regulatory focus differences.

*Consideration of future consequences* (CFC) is a 12-item scale, where participants state their concern with future outcomes ($M = 2.41$, $SD = .56$, alpha = .77; Strathman, Gleicher, Boninger & Edwards, 1994). Participants responded to each item on
a 5-point scale, where 0 indicates the item is “extremely uncharacteristic,” and 4 indicates it is “extremely characteristic.”

Message effectiveness was operationalized through a 9-item measure of perceived message effectiveness (Dillard, 2007; Wang & Lang, A., 2012). Dillard asked participants to respond to Likert-like items regarding whether the message was convincing/not convincing, believable/not believable, sensible/not sensible, wise/foolish, right/wrong, and important/unimportant. Wang and colleague used an alternative measure of ad attitude (Wang & Lang, A., 2012). This measure uses 4 items: persuasive/unpersuasive, believable/unbelievable, informative/uninformative and likable/not likable. There are notable similarities between the measures, and both underwent rigorous measurement creation method. An exploratory factor analysis showed all 9 items loaded onto a single factor with loadings greater than .70. Additionally, the 9-item measure’s alpha was .88, which was higher than Dillard or Wang’s separately. This evidence supports the use of a 9-item measure for perceived effectiveness. Participants could respond to each item on a 7-point scale.

An eye tracker will operationalize visual attention through fixations. Eye fixations on approach-gain or avoid-loss information will be recorded. When individuals look at objects or scenes, their eyes move rapidly. Between these rapid movements, the eye remains relatively still for about 200 – 300 ms, which is called a fixation (Rayner, 1998). Fixations were calculated using the ASL Results software.

Eye tracking data collection was good for Study 1. The study had a possible 400 observations (100 participants x 4 conditions). Seven observations were completely
missing, including one participant where the eye tracker malfunctioned. This left 393 observations with an overall capture rate of 72.75%. Capture rate is the total data loss time divided by total observation time, adjusting for blinks. Forty-one additional observations had a capture rate under 30%, and were excluded. A total of 12% of observations were excluded from analysis, and only one participant’s eye tracking data was fully excluded. The overall capture rate of observations included in analysis was 75.05%.

*Exercise behavior* was measured to operationalize participants’ attitudes towards exercise and sedentary lifestyles. Individuals’ exercise behaviors likely influence how they perceive related content and advocacy messages. It is being measured to control for its possible confounding influence. Participants responded to the Godin Leisure Time Exercise Questionnaire (GLTEQ; Godin & Shepard, 1985). The questionnaire is a widely used and simple self-administered measure for assessing physical activity over the last week (Wójcicki, White & McAuley, 2009). It consists of four items that are weighted and summed.

**Analysis**

**Manipulation check.**

After all study questions and individual characteristic items were answered, participants viewed the exact four messages they read in the study. Participants were asked to evaluate statements about each message. The statements were used to substantiate approach-gain and avoid-loss manipulations. Both dimensions were
measured through two items. Approach-gain items asked “whether the message advocates that people should:” (1) “approach outcomes where something is gained,” and (2) “obtain rewards or benefits” (alpha = .85). Avoid-loss items asked respondents “whether the message suggests people should:” (1) “avoid outcomes where something is lost,” and (2) “avoid negative experiences” (alpha = .76).

A repeated multivariate analysis of variance (MANOVA) was conducted assessing if there were differences between the four message conditions on approach-gain and avoid-loss dimension measures. A significant difference was found, Wilk’s $\Lambda = .47$, $F(6,91) = 17.05$, $p \leq .001$, multivariate $\eta^2 = .53$. The follow up univariate analysis, with Greenhouse-Geisser correction, was also significant for the approach-gain check, $F(2.03, 194.62) = 53.33$, $p \leq .001$, and avoid-loss, $F(2.34, 224.88) = 20.58$, $p \leq .001$. Approach-gain messages scored higher than avoid-loss messages on the approach scale, $D = 1.86$, $t(95) = 9.72$, $p \leq .001$, and lower on the avoid scale, $D = -1.27$, $t(95) = -6.01$, $p \leq .001$. On the approach scale, frame combinations scored higher than avoid-loss frames, $D = 1.38$, $t(95) = 7.76$ $p \leq .001$, and lower than approach-gain, $D = -0.48$, $t(95) = 5.41$, $p \leq .001$. On the avoid scale, frame combinations was insignificantly lower than avoid-loss frames, $D = -0.17$, $t(95) = -1.35$, $p = .19$, and higher than approach-gain, $D = 1.10$, $t(95) = 5.47$, $p \leq .001$. The two arbitrary categories of frame combinations did not significantly differ on either scale. The manipulation check indicates a successful manipulation.
Latent variables confirmatory factor analysis.

Message effectiveness was measured as a latent construct. Regulatory focuses and CFC were not estimated as latent constructs, because many of the hypothesized relationships address interaction effects. Additionally, including all the measures as latent constructs would create more parameters than number of clusters. The confirmatory factor analysis (CFA) model verifies our measurement model, before investigating relationships between variables. The CFA was generated using complex survey analysis in Mplus Version 6 (Muthén & Muthén, 2010). This is a form of mixed linear modeling, where standard errors and chi-square tests of model fit are calculated taking into account stratification, non-independence of observations due to cluster sampling (Muthén & Satorra, 1995; Muthén & Muthén, 2010).

The CFA used maximum likelihood with robust standard errors estimation (MLR). The factor loading closest to 1 was fixed to 1. All factor loadings significantly contributed to their respective latent construct, $p < .001$. Unique items from Dillards’ measure (convincing/not convincing, sensible/not sensible, wise/foolish, right/wrong, and important/unimportant) were allowed to correlate with unique items from Wang’s (persuasive/unpersuasive, informative/uninformative and likable/not likable). The CFA exhibited good model fit (Hooper, Coughlan, & Mullen, 2008). The $\chi^2$ statistic was insignificant, $\chi^2 (12) = 18.07$, $p = .11$. The root mean square error of approximation (RMSEA) was 0.04, 90% CI [.001, .07], with $p = .74$ that the RMSEA was less than 0.05; the comparative fit index (CFI) was .99 and non-normed fit index (NNFI) was .97; and the standardized root mean square residual (SRMR) was .03.
Analysis approach.

A structural equation modeling (SEM) approach examined hypotheses. SEM is preferable for understanding causal mechanisms due to its holistic approach, enabling us to examine how the different messages systematically influence attention and perceived message effectiveness. Dichotomous variables were created, representing each message condition. Messages with only avoid-loss frames were used as the reference. Participants’ age, gender and exercise behavior were initially controlled for, but then removed from the model because they did not influence hypothesized relationships. The SEM was generated with MLR estimation, clustering observations by participants (Muthén & Satorra, 1995; Muthén & Muthén, 2010). The initial SEM contained all hypothesized relationships, and had good fit. This is encouraging, as not all hypothesizes were supported and insignificant paths degrade fit. A two-stage estimation process was used for parsimony. First, all highly insignificant relationships (p > 0.1) were removed. Next, insignificant paths in each group were removed, except those that were necessary for covariate controls or mediation analysis (Preacher, Rucker, & Hayes, 2007).

The final reported model did not significantly change fit compared to the initial model, TRd (20) = 9.52, p = .98. A log likelihood difference test evaluated the relative change in fit between the initial and final models, because a chi-squared difference cannot be used with MLR estimation. The $\chi^2$ statistic was insignificant, $\chi^2(53) = 52.25$, p > .50; the RMSEA was 0.001, 90 CI [.001, .03], with p > .99 that the RMSEA was less than 0.05; the CFI and NNFI were both .99; and the SRMR was .03. Figure 3 illustrates the final SEM.
The final assertions addressed whether combination messages attracted the most attention (H6) and were perceived as most effective (H7). Two procedures could be used to analyze these hypotheses – SPSS’s repeated ANOVA and a mixed linear model that clusters participants’ observations. Both procedures will produce identical results. The repeated ANOVA’s univariate test is the benefit of that test, but it cannot analyze the two combination messages as a single category. The alternative regression approach can analyze the two combination categories as a single manipulation, which is preferable because there is no theoretical or methodological justification to distinguish them. However, the regression approach does not provide univariate statistics. A combination of the two was used.

Figure 3: Final SEM for Study 1.

* $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$
**Hypotheses analysis.**

Our hypotheses focused on the direct and mediated effects of gain-loss messages on attention and effectiveness. Hypothesis 1 suggests the frames’ influence on effectiveness is moderated by trait regulatory focus, and H2 asserts that CFC will moderate trait regulatory focus’ moderation. Two-way interactions between message manipulation and promotion or prevention focus were evaluated, along with three-way interactions that included CFC. All interactions were insignificant. Hypotheses 1 and 2 are rejected. The measure’s direct effects were also included in the model as controls, revealing prevention focus’ significant direct effect on effectiveness.

Hypotheses 3 suggests gain-loss frames’ influence on perceived effectiveness is mediated by attention. Total fixation duration to approach-gain ($R^2 = .50$) and avoid-loss information ($R^2 = .48$) were examined, and over 48% of each measure’s variance was explained by the message manipulations. Attention to either approach-gain or avoid-loss information, however, did not influence perceived effectiveness. Indirect effects of each message condition on effectiveness via attention were also insignificant. There is no support for H3’s mediation assertions. Furthermore, H5 posits that regulatory focus moderates framing effects on attention, which was not supported.

Lastly, combination frames were argued to attract more attention (H6) and be perceived as more effective (H7). A repeated ANOVA, with Greenhouse-Geisser correction, explored differences in total fixation durations towards the entire message. Results indicate there is no difference between frames, $F(2.76, 259.63) = 1.33, p > .99$. These results were further analyzed in a MLR estimated linear model. When total
fixations are divided into fixations towards approach-gain or avoid-loss information (i.e., approach-gain vs. combination and avoid-loss vs. combination), there were differences in attention. Attention to combination messages were multiplied by two to equally compare influence, because each message contained two frames and total attention was not being analyzed anymore. Approach-gain only messages attracted a 2.11 second greater fixation duration on approach-gain information than combination messages, \( t(99) = 2.31, p \leq .02 \). There was no significant difference between fixations on avoid-loss information. H6 is not supported.

Hypothesis 7 argued combination frames would be the most effective. A repeated ANOVA assessed whether there were differences between perceived effectiveness ratings. Mauchly’s test of sphericity was insignificant. Results indicated that participants did rate the four products differently, \( F(3, 297) = 6.08, p \leq .001, \text{ univariate } \eta^2 = .06 \). Messages with only avoid-loss frames had lower effectiveness than only approach-gain message (\( D = .24, t(99) = 3.45, p \leq .001 \)). The two frame combination messages, however, exhibited inconsistent results. One frame combination was significantly more effective than avoid-loss only frames, while the other did not differ. Additionally, the approach-gain only message is more effect than one combination frame, while it did not differ from the other. To analyze frame combinations as a single category, the means were again estimated using a mixed linear model. The avoid-loss and approach-gain means were identical to the previously reported repeated ANOVA. Frame combinations received greater effectiveness ratings than avoidance-only (\( D = .14, \)
$t(99) = 2.58, \ p \leq .01$, but were less effective than approach-only ($D = -.10, \ t(99) = -1.95, \ p = .05$). Hypothesis 7 was rejected.

**Discussion**

Study 1 did not support the hypotheses and did not replicate Kees and colleagues (2010) findings. The differences may be due to methodological differences that were not believed to influence results when formulating the study.

Although regulatory fit is well established in the literature, Kees illustrates how regulatory focus is more of a heuristic than an elaborative influence in decision making. In Kees’ study, participants with high CFC were not affected by their regulatory focus. High CFC diminished regulatory focus’ influence because those participants elaborated over the message more, causing their dispositional focus to have less effect. This study used a within subject design, causing participants to cognate more over the same message. There was also a thought listing exercise before rating each message’s effectiveness. Thought lists were included for further qualitative analysis in subsequent articles. However, they may have unintentionally increased participants’ elaboration, as well. Under greater elaboration in Kees’ Study 2, prevention focus appears to linearly increase behavioral intention equally in both conditions. Prevention focus had a consistent direct relationship on perceived effectiveness.

On the other hand, all the studies cited that investigate regulatory fit use categorical analysis. The analysis here evaluated regulatory focus as a continuous measure, which could be co-present within a participant – individuals were not
categorized as either promotion or prevention focused. Dichotomization of quasi-continuous measures (i.e., actually ordinal Likert-item measures) results in residual confounding and potentially serious bias due to arbitrary cutpoints (Royston, Altman & Sauerbrei, 2006). Categorizing individuals as either promotion or prevention focused leads to confounding the residual, because it includes variance from both trait measures. Dichotomizing a single continuous measure biases the variance, where it increases the likelihood of false positives (Austin & Brunner, 2004). To the investigator’s knowledge this is the first study where promotion and prevention focus were included in the same model as continuous measures. This may have decreased the chance of an interaction’s false positive, while also increasing power of the traits’ direct effects.

Message conditions did not show a mediated relationship on effectiveness through attention, which was one of the main hypotheses of this study. DFT suggests the longer individuals pay attention to information, the more that information will weigh in decisions. The study assumed participants would have consistent thoughts about each message, as they are all prosocial. This assumption may have been false and be a confounding influence, because inconsistent thoughts would oppose consistent thoughts’ effects, and thus the influence of attention on effectiveness. Another explanation may be due to the study’s topic and message control. Study 1’s stimuli kept the phrasing and topic consistent for all conditions (see Appendix A). Participants’ attention towards each message may have been insignificant, because the information was similar and the manipulation may have been detectable after the first trial. Information may have also accumulated cognitively overtime, hindering the effect of attention to any single
message. Study 2 may still wish to investigate the mediation hypothesis, as its design introduces different topics for each message condition. Attention will have more relation to the amount of time individuals consider the information, which may be an unintended confound to Study 1.

Finally, combination messages did not attract more attention or were perceived as most effective. Rather a general trend emerged, where participants tend to fixate more on avoid-loss information and find approach-gain messages more effective. While this was not a hypothesized result, the attention results are consistent with DMT, as people attend more to potential threats in their environments (Berntson & Cacioppo, 2008). Additionally, approach-gain messages likely trigger approach motivations. These attributes may be more influential on perceived effectiveness, because it is associated with greater positive affect. Furthermore, gain outcomes may be more salient desirable outcomes than non-losses, causing them to influence perceived effectiveness more. Nevertheless, these hypotheses are quite dependent on arousal, because approach and avoidance motivations activate differently with calm and arousing stimuli. Study 1’s stimuli may have been too calm to adequately test H6 and H7. Study 2 is still necessary to properly evaluate these hypotheses.

Prevention regulatory focus’ positive direct relationship on effectiveness is quite intriguing, given avoid-loss frames appear to decrease effectiveness relative to approach-gain frames. Prevention focus is typically used to operationalize individuals’ preference for avoidance as a goal attainment strategy. However, conceptually, it captures their attention towards undesirable outcomes, which has been shown to trigger avoidance
strategies. The direct relationship suggests people are sensitive to the negative outcome and welcome strategies to avoid them, regardless of how the strategy is phrased. This is consistent with DMT, which has established people’s heightened sensitivity to potential harms in their environment. Previous research may have missed this finding, due to their dichotomization of individuals into either promotion or prevention regulatory focus. Additionally, the SEM analysis’ holistic approach may be more apt in revealing how the entire process accurately functions.
Study 2: Arousing Content Moderates the Framing Effects of Approach-Gain vs. Avoid-Loss Messages

Study 2 extends previous research by testing whether arousing content moderates how approach-gain and avoid-loss frames are processed. Approach and avoidance motivations are not activated in a binary fashion. Rather, they are activated at different levels, and those levels have distinct implications for cognitive processing (Berntson & Cacioppo, 2008). Motivation systems’ influence and respective outcomes are determined by activation intensity, which is influenced by communication messages’ arousing content (Lang, A., 2006; Wang et al., 2012). This idea is important to explore, because higher levels of motivational activation, especially aversive activation, mobilize resources to behavioral responses (e.g., fight or flight), rather than information intake (i.e., attention to communication stimuli). While the shift may be desirable in some contexts, many messages need to be effectively processed and stored for future retrieval. Messages’ arousing content should be investigated as it may help explain inconsistent gain-loss framing effects in the literature (O’Keefe & Jensen, 2006, 2007, 2009).

Message arousing content is investigated with two key moderators – sensation seeking and trait aggressiveness. Sensation seeking is an individual trait that is highly associated with substance use and other risky behavior (Zuckerman & Kuhlman, 2000). Targeting high sensation seekers (HSS) has been an effective tactic for anti-substance
PSAs (Stephenson et al., 2003). Sensation seeking is argued to moderate how arousing content is perceived, causing HSS to seek content that is more arousing (Lang, A., et al., 2005). If this is a processing characteristic, it should also occur in contexts that are not substance or risk related; and thus, sensation seeking is included in the study. Trait aggressiveness is also explored as a possible moderator of arousing content. Naturally, trait aggressiveness is most relevant to anti-violence campaigns. But, trait aggressiveness may also be relevant to campaigns that address related antisocial behaviors, like alcohol consumption. Trait aggressiveness may also influence how advocacy messages are processed, in general, because prosocial messages may be perceived as a threat to self, social or group esteem. Additionally, individuals with high trait aggressiveness exhibit different motivation activation patterns compared to those that are low (Amodio et al., 2003). If this is true, their motivation activation functions may exhibit distinct characteristics in general processing as well.

**Hypotheses**

All the hypotheses from Study 1 are included, except H2. Hypothesis 2 concerns CFC moderation of regulatory focus. In Study 1, the stimuli’s future consequences remained consistent between nutrition and exercise frames. In this study, however, the variance in topics makes it difficult to keep future consequences consistent. Since CFC is not a primary concern of this dissertation and Study 1 did not support the relationship, it is not included in the second study.
The main purpose of Study 2 is to test hypotheses concerning arousing content and examine previous findings while controlling for arousing content. The principal addition is the argument that arousing content moderates attention to approach-gain and avoid-loss information (H4). Specifically, frame combinations are argued to attract the most attention, when there is low to moderate arousal (H6). Sensation seeking is argued to moderate these relationships, where HSS attend more to highly arousing content (H8). Finally, a research question is posed that asks how trait aggressiveness moderates attention to arousing content.

**Procedure**

The experiment was a 2 (Information A: approach-gain vs. avoid-loss) x 2 (Information B: approach-gain vs. avoid-loss) x 2 (Arousing Content of the Topic: low vs. high) x 2 (Order: info A – info B vs. info B – info A) mixed factorial design.

Participants viewed eight messages, one at a time at their own pace. After viewing each message, they responded to message effectiveness items. Participants were also asked to rate how aroused the message makes them feel. The study concludes with trait measures and demographics. Participants in the main part of Study 2 were the same as Study 1.

**Stimuli.**

There are eight message conditions for each participant. Eight topics were selected, so participants would not read the same message twice. Topics were selected from Coloribus, an online advertisement archive that contains more than 2 million ads
dating back to 1969, which are mostly from the US and EU. The database was chosen to increase ecological validity. The initial search selected print ads from the “public awareness” section, from 2000 to present. Possible message topics were selected using the following criteria: (a) the ad was a PSA; and (b) the PSA was not about a gender specific issue (e.g., breast or testicular cancer). Of the topics identified, four topics were low arousing content levels and four were high. The low arousing topics concern daily physical activity, recycling, bicycle road safety and flossing. The highly arousing topics concern drunk driving, domestic violence, child sexual abuse and condom use.

Next, approach-gain and avoid-loss messages were created for each topic. Approach-gain messages advocated approaching a gain outcome, while avoid-loss messages advocated avoiding a loss. Additionally, the decision attribute or outcome remained consistent between frame manipulations. Thus, manipulated outcomes were both a gain and loss scenario. For instance, action can affect how individuals may feel. Positive feelings (e.g., happiness) could be considered a gain, while negative feelings (e.g., distress) could be considered a loss. Two outcomes that are both gain and loss scenarios will be identified for each topic message, and two versions were made for each topic. Additionally, when the two frames are presented, their top or bottom screen placement was randomized.

Arousal was further manipulated through the use of arousing words. End-state language varies based on the arousing content of the words used. The technical report on Affective Norms for English Words contains arousal ratings for many words (Bradley & Lang, P. J., 2010). Low arousing messages use target words with a rating between 2 –
4.5 and high has ratings from 5.5 – 8. When choosing a target word, the selection
process for an appropriate word begins at ratings of 2 for low and 8 for high, attempting
to maximize the difference. Appendix B illustrates an example set of stimuli for the
drunk driving topic. Note that while eight messages were created for each topic, only one
will be shown to each participant.

Arousing images were also considered to prime arousal levels before reading the
text. Pictures are known to influence arousal more than text, and may be necessary to
evoke different experiences. On the other hand, images may interact with the text content
and influence cognitive processing in manners not addressed in this dissertation (Rayner,
1998; Solloway et al., 2012). Possible images came from Cooper and Wang
(Unpublished), because it created a databank of calm vs. arousing and positive vs.
negative images.

Finally, each message type was designed to have similar word counts, reading
ease and grade level to control for possible readability confounds. Flesch Reading Ease
and Flesch-Kincaid Grade Level was measured by Microsoft Word (Kincaid, Fishburne,
Rogers & Chissom, 1975).

**Stimuli pretest.**

The pretest’s purpose was to evaluate arousing content of text stimuli for Study 2.
Each participant viewed 64 messages that were presented individually, and responded to
evaluative questions. The 64 messages were randomly chosen from the total pool of 128
(4 frame conditions x 2 text arousal levels x 8 topics x 2 versions). Participants received
$2 compensation. The pretest was an online study through Qualtrics, using American participants on Mechanical Turk. The study was completed in a 4-day period. An unrelated task was completed immediately before this pretest, for a separate research project.

Procedure. A total of 555 individuals participated in the pretest\(^1\), with 88.3% fully completing the pretest. Participants who viewed at least half of the 64 messages were included as candidates for analysis, leaving 529 participants prior to cleaning. Next, participants who completed the pretest and unrelated task in less than 25 minutes were not used in analysis (n = 9), because researchers reading and answering the items as fast as we could in pilot tests took us a minimum of 30 minutes. Finally, participants who provided identical responses to 92%, or more, of all the questions were not included in analysis (n = 146).

There were 374 participants included in final analysis (67.4% of all participants). These participants took an average of 57.6 minutes to complete the pretest and unrelated task. Participants were 50% female, with a mean age of 35.47 (SD = 12.11). Participants self-identified as 81.3% White, 8.3% Black, 4.6% Hispanic, 5.5% Asian and 4.0% selected other. There were no demographic differences among retained and discarded cases.

\(^1\) Eleven participants responded to the unrelated task, but ended participation prior to this pretest; and thirty-four participants consented then immediately exited the study.
Prospective stimulus. Text arousal and topic arousal were manipulated into high and low categories, as described in the above section.

Picture primes were also evaluated as a method to generate arousal variance. Each viewed message had a 50% chance (with counter balancing) of having pictorial primes prior to the message. The other half of viewed messages was presented without any primes. When picture primes occurred, four highly arousing images were displayed sequentially for 0.5 seconds each for high text arousing content messages. Alternatively, two low arousing images were displayed sequentially for 1 second each for low text arousing content messages. While image primes occurred for 2 seconds for both conditions, the higher arousal condition had faster paced cuts because it increases perceived arousal compared to slower (A. Lang, Bolls, Potter, & Kawahara, 1999; A. Lang, Zhou, Schwartz, Bolls, & Potter, 2000; A. Lang, et al., 2005). Additionally, approach-gain messages were paired with highly positive images; and avoid-losses messages were paired with highly negative images. Messages that include both frame types were paired with an equal number of positive and negative messages.

Images were selected from a prior study that evaluated their arousing content, positive valence and negative valence (Cooper & Wang, unpublished). Positive and negative images were identified by selecting those with highest 25% of valence ratings, for each respective category. Of those selected, the eight images with the highest arousal ratings were included in the pretest, along with the eight lowest arousal ratings. This created four image categories, consisting each of eight images. Each image prime was randomly selected from its appropriate category.
Criterion. Arousal was measured through a 7-point self-assessment manikin, where zero represents “calm/unaroused” and six is “excited/aroused” (Bradley & Lang, P. J., 2010; Lang, P. J., Bradley & Cuthbert, 1999). Self-assessment manikins help participants understand the concept being operationalized, and aid communication of feelings.

Results. The main effects of text and topic arousal manipulations were significant on all messages. A mixed linear model clustered by participant with MLR estimation evaluated manipulations. The model included text arousal, topic arousal and the use of pictures as predictors. Arousing text increased message arousal rating compared to calmer text, $b = .31$, $t(373) = 9.45$, $p \leq .001$, as did arousing message topics, $b = .59$, $t(373) = 13.67$, $p \leq .001$. The presence of pictures, whether they were arousing or calm, did not influence respondents’ arousal ratings of the message, $p = .68$. Pictures will not be used to manipulate arousal in the main study.

The model suggests low arousal manipulation triggers low to moderate arousal in participants. The model’s intercept is 2.47, which is the average arousal rating when text and topic were both calm, $t(373) = 373$, $p \leq .001$. It appears both text and topic manipulation techniques are required to create the desired difference. For the main study, only arousing topics will be presented for the arousing condition, and low arousing topics for the calm condition.

Finally, specific messages were chosen for the main study. Table 1 shows the mean arousal ratings for topics with low arousal, and Table 2 shows the means for high arousal. Arousal score differences between each version were evaluated using an
independent and paired sample t-test. Both tests were used, because some participants viewed both message versions and some did not. The difference was due to pure random assignment of the messages. Admittedly, this does appear to be a flaw in the pretest’s methods, although it did not appear to degrade results. Both paired and independent t-tests provided consistent results. The both test scores were reported in the tables to not discard respondent results.

When selecting messages for the main study, those that significantly differed from their counterpart were identified first. Lower arousal ratings were selected for the calm condition, and higher for the arousing. Many message pairs, however, did not differ with a p-value ≤ .05. Next, messages with slight differences, \( p ≤ .30 \), were identified and the most desirable message was selected (i.e., lower or higher rating depending on condition). Finally, the message versions that did not differ were chosen based on the prior selections within each topic, with an objective to create greater version consistency. For instance, the child sexual abuse topic previously selected two messages from version 2 (\( p ≤ .15 \)) and there was little difference between the other two pairs (\( p > .40 \)). All four child sexual abuse messages were selected from version 2 based on this criterion. The selected messages for the main study are bolded in Tables 1 and 2, and the green highlights denote messages selected based on the test’s significance.

The selected messages did not differ on the Flesch reading ease metric (\( M = 66.46, SD = 2.14 \)), Flesch-Kincaid reading grade level measure (\( M = 8.79, SD = 0.31 \)), or word count (\( M = 39.15, SD = 1.41 \)). Arousal differences were confirmed evaluating only the selected messages. A mixed linear model illustrates the successful
Table 1: Mean arousal scores for less arousing topics in pretest.

| Calm topics | Paired Samples | | | Independent Samples | | |
| | Version 1 | Version 2 | D | t (df) | p | Version 1 | Version 2 | D | t (df) | p |
| | M1 (SD) | M2 (SD) | | | | M1 (SD) | M2 (SD) | | | |
| Bike Safety | | | | | | | | | | |
| Avoid-loss | 3.26 (1.93) | 3.46 (1.97) | 0.20 | 1.15 (95) | 0.13 | 3.25 (1.99) | 3.47 (2.13) | 0.23 | 1.05 (364) | 0.15 |
| Approach-gain | 3.34 (2.02) | 3.63 (2.18) | 0.29 | 1.62 (93) | 0.05 | 3.36 (2.02) | 3.63 (2.23) | 0.28 | 1.28 (370) | 0.10 |
| Combination A | 3.41 (2.01) | 3.40 (1.93) | 0.01 | 0.05 (104) | 0.48 | 3.26 (1.95) | 3.45 (2.02) | 0.19 | 0.92 (372) | 0.18 |
| Combination B | 3.68 (2.09) | 3.72 (2.01) | 0.04 | 0.23 (109) | 0.41 | 3.49 (2.09) | 3.64 (2.08) | 0.15 | 0.68 (369) | 0.25 |
| Flossing | | | | | | | | | | |
| Avoid-loss | 3.77 (2.18) | 3.65 (2.01) | 0.12 | 0.81 (91) | 0.21 | 3.90 (2.27) | 3.75 (2.13) | 0.15 | 0.65 (365) | 0.26 |
| Approach-gain | 3.49 (2.06) | 3.40 (2.14) | 0.10 | 0.54 (92) | 0.29 | 3.46 (2.06) | 3.47 (2.14) | 0.00 | 0.01 (356) | 0.50 |
| Combination A | 3.37 (2.18) | 3.44 (1.94) | 0.06 | 0.34 (77) | 0.37 | 3.50 (2.17) | 3.48 (2.05) | 0.01 | 0.06 (361) | 0.48 |
| Combination B | 3.67 (2.25) | 3.67 (2.20) | 0.00 | 0.00 (98) | 0.50 | 3.60 (2.22) | 3.83 (2.11) | 0.23 | 1.01 (369) | 0.16 |
| Physical activity | | | | | | | | | | |
| Avoid-loss | 3.62 (1.91) | 3.38 (1.96) | 0.24 | 1.31 (83) | 0.10 | 3.65 (2.01) | 3.24 (1.93) | 0.42 | 1.97 (348) | 0.02 |
| Approach-gain | 3.78 (2.18) | 3.57 (2.09) | 0.20 | 1.29 (97) | 0.10 | 3.61 (2.13) | 3.52 (2.13) | 0.09 | 0.41 (369) | 0.34 |
| Combination A | 3.85 (2.04) | 3.77 (2.05) | 0.08 | 0.45 (87) | 0.33 | 3.94 (2.13) | 3.66 (1.99) | 0.28 | 1.31 (358) | 0.10 |
| Combination B | 3.25 (1.92) | 3.54 (2.32) | 0.29 | 1.42 (82) | 0.08 | 3.32 (2.01) | 3.50 (2.19) | 0.18 | 0.83 (373) | 0.21 |
| Recycling | | | | | | | | | | |
| Avoid-loss | 3.33 (2.02) | 3.36 (2.05) | 0.02 | 0.13 (86) | 0.45 | 3.29 (2.04) | 3.43 (2.15) | 0.14 | 0.63 (355) | 0.27 |
| Approach-gain | 3.09 (2.22) | 3.50 (2.30) | 0.41 | 2.31 (85) | 0.01 | 3.01 (2.02) | 3.59 (2.23) | 0.57 | 2.61 (371) | 0.01 |
| Combination A | 3.54 (1.95) | 3.62 (2.05) | 0.08 | 0.44 (96) | 0.33 | 3.49 (2.11) | 3.41 (2.05) | 0.08 | 0.38 (371) | 0.35 |
| Combination B | 3.83 (2.07) | 3.62 (2.02) | 0.20 | 1.10 (92) | 0.14 | 3.52 (2.11) | 3.42 (2.02) | 0.10 | 0.47 (367) | 0.32 |

= Selected based on test’s significance  Bold = Selected message for the main study
Table 2: Mean arousal scores for more arousing topics in pretest.

<table>
<thead>
<tr>
<th>Arousing topics</th>
<th>Paired Samples</th>
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<th>Independent Samples</th>
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<td>M2 (SD)</td>
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<td>M2 (SD)</td>
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<td>D</td>
<td>t (df)</td>
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<td>p</td>
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<td>Child sexual abuse</td>
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<td>Avoid-loss</td>
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<td>1.15 (92)</td>
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<td></td>
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<td>Approach-gain</td>
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<td><strong>3.92 (2.01)</strong></td>
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<td>0.40</td>
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<td>0.11 (82)</td>
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<td>1.79 (92)</td>
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<td>0.96 (82)</td>
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<tr>
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<td>4.24 (2.24)</td>
<td>0.31</td>
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= Selected based on test’s significance  
**Bold** = Selected message for the main study
manipulation, as calmer messages received a 2.49 arousal rated and more arousing messages scored 3.51, \( D = 1.02, t(373) = 15.81, p \leq .001 \). The mixed model was again estimated to examine whether frame manipulations influenced arousal ratings, controlling for the arousal manipulation. Frame manipulations did not significantly influence arousal (\( p > .05 \)).

**Measures.**

*Trait regulatory focus* was operationalized through the regulatory focus questionnaire, as in study 1 (Higgins et al., 2001). Participants can respond on 5-point items, where 0 denotes less chronic focus and 4 indicates higher. Promotion focus had a cronbach alpha of .76, and prevention focus had an alpha of .80.

*Sensation seeking* was measured though the 4-item Brief Sensation Seeking Scale (BSSS-4 Stephenson, Hoyle, Palmgreen & Slater, 2003). The BSSS-4 was formed by selecting one item from each dimension from the Sensation Seeking Scale-Form V. Each item in the brief scale also had the highest inter-item correlations for each dimension. The measure has demonstrated strong reliability and convergent validity through a representative sample of over 5000 youth. Participants responded on 7-point items, where 0 suggests low sensation seeking (LSS) and 6 indicates high sensation seeking (HSS; \( M = 4.04, SD = 1.06, \alpha = .73 \)).

Trait aggressiveness was operationalized through Brief Aggression Questionnaire (BAQ; Webster, et al., 2013). The BAQ is a 12-item measure that uses three items from each of the Aggression Questionnaire’s subscales (Buss & Perry, 1992). Items with the
largest loading factors for each subscale were used in the brief scale. Webster and colleagues demonstrated the measure’s reliability and convergent validity through five experiments with over 4000 participants. Items can be responded to on a 5-point scale. Items were coded so 0 indicates low aggression and 4 suggests high aggression. Participants scored lower on the scale with an average of 1.59 (SD = .61, alpha = .76).

Message effectiveness was operationalized through the same measure as Study 1. Study 1 uses Dillard’s (2007) measure of perceived message effectiveness, and Wang and Annie Lang’s (2012) measure of ad attitude. The items selected for use in Study 1 were used for Study 2 for consistency and comparison (alpha = .96).

Visual attention was operationalized through eye fixations, which will be captured by an eye tracker identically to Study 1. Similar to Study 1, eye tracking was successful at capturing participants’ eye gaze. There were a total of 800 possible observations (100 participants x 8 message conditions). Thirty-two observations were completely missing, with the same one participant from Study 1 missing in all conditions. There were an additional 44 observations excluded from analysis, because eye gaze capture rate was below 30%. This means 90.5% of the possible observations were included in analysis. The analyzed eye tracking data had an average capture rate of 72.83%.

Perceived arousal was measured through a 9-point self-assessment manikin, where one equals “calm/unaroused” and nine is “excited/aroused” (Bradely & Lang, P. J., 2010; Lang, P. J., Bradley & Cuthbert, 1999). The measure’s response scale was increased from the pretest’s 7-point item (M = 3.49, SD = 1.96) to hopefully increase
sensitivity compared to the pretest. The arousal measure was analyzed in the model, rather than the dichotomous arousal manipulation, to increase variance.

**Results**

**Manipulation check.**

Identical to Study 1, participants completed a manipulation check at the end of the study. Approach-gain and avoid-loss manipulations were substantiated using the same methods as study 1. The two item approach (alpha = .84) and avoid (alpha = .78) measures had desired internal consistency.

A repeated MANOVA was conducted assessing if there were differences between the eight message conditions on approach-gain and avoid-loss dimension measures. The predictors were message and arousal conditions. A significant difference was found for message, $Wilk's \Lambda = .56$, $F(6,94) = 12.40$, $p \leq .001$, partial $\eta^2 = .44$, and arousal manipulations $Wilk's \Lambda = .62$, $F(2,98) = 30.10$, $p \leq .001$, partial $\eta^2 = .38$.

The follow up frame manipulation univariate analyses, with Greenhouse-Geisser correction, was also significant for approach-gain, $F(2.03, 200.50) = 33.92$, $p \leq .001$, and avoid-loss, $F(2.01, 199.26) = 22.16$, $p \leq .001$. Approach-gain messages scored higher than avoid-loss messages on the approach scale, $D = 1.39$, $t(99) = 7.38$, $p \leq .001$, and lower on the avoid scale, $D = -1.15$, $t(99) = -5.69$, $p \leq .001$. Frame combinations scored higher than avoid-loss frames on the approach scale, $D = 1.02$, $t(99) = 6.20$, $p \leq .001$, and lower than approach-gain, $D = -.38$, $t(99) = -3.93$, $p \leq .001$. Regarding the avoid scale, frame combinations scored lower than avoid-loss
frames, \( D = -0.21, \ t(99) = -2.21, \ p < .05 \), and higher than approach-gain, \( D = .95, \ t(99) = 5.92, \ p \leq .001 \). The two arbitrary categories of frame combinations did not significantly differ on either scale. The manipulation check indicates successful frame manipulations.

The arousal manipulation was also investigated to ensure it did not bias frame manipulations, which it did not. Univariate analysis shows that arousal had significant effects on the approach measure, \( F(1, 99) = 7.69, \ p < .01 \), and avoid measure, \( F(1, 99) = 40.51, \ p \leq .001 \). It appears the arousing condition linearly decreases approach evaluations of all message conditions compared to calm, \( D = -0.28 \), and increases avoid message evaluations, \( D = .53 \). The frame and approach manipulations did not significantly interact.

Arousal was also successfully manipulated, although participants’ arousal rating for each message was actually used in analysis. Arousal ratings were regressed on the arousal and message manipulations, nesting responses by participant. Arousing messages had higher arousal scores than calm messages, \( D = .69, \ t(99) = 6.94, \ p \leq .001 \). Message frame manipulations did not influence arousal ratings.

**Latent variables confirmatory factor analysis.**

Message perceived effectiveness was measured as a latent construct consistent with Study 1. The CFA used the same estimation techniques as Study 1 to account for stratification and non-independence of observations, due to cluster sampling (Muthén & Satorra, 1995; Muthén & Muthén, 2010). All factor loadings significantly contributed to
their respective latent construct, p < .001. Unique items from Dillards’ measure were allowed to correlate with unique items from Wang’s. The CFA exhibited good model fit (Hooper, Coughlan, & Mullen, 2008). The $\chi^2$ statistic was insignificant, $\chi^2 (9) = 11.56$, $p = .17$. The RMSEA was 0.02, 90% CI [.001, .05], with $p = .94$ that the RMSEA was less than 0.05; the CFI was .99, NNFI was .99, and SRMR was .01.

**Analysis approach.**

A SEM approach was used to evaluate hypotheses. The estimation techniques and measurement model stayed consistent to Study 1, allowing for accurate comparison. The initial SEM contained all of Study 2’s hypothesized relationships, and had good fit. A two-stage estimation process was used for parsimony. When analyzing perceived effectiveness, arousal scores were controlled for. First, all highly insignificant relationships ($p > 0.1$) on attention were removed than message effectiveness. Those paths necessary for covariate controls or mediation analysis were included in the model (Preacher, Rucker, & Hayes, 2007).

The final reported model did not significantly change fit compared to the initial model. The log likelihood difference test evaluated the relative change in fit, $\text{TRd (20)} = 14.51$, $p > .81$. The chi-square statistic was significant, $\chi^2 = 180.26$, $df = 97$, $p \leq .001$, which is acceptable due to the large sample size (see Steiger, 2007). The ratio between df and the chi-square statistic was less than two, consistent with good fit (Hooper, Coughlan & Mullen, 2008). The RMSEA was 0.03, 90% CI [.03, .04], with $p > .99$ that the RMSEA was less than 0.05. The SRMR was .03; and the CFI and NNFI were
both .98. Figure 4 illustrates the final SEM.

The combination message supremacy assertions addressed whether it attracted the most attention during low to moderate arousal (H6), and was perceived as most effective (H7). Unlike Study 1, ANOVAs could not be used to evaluate these hypotheses because arousal was operationalized as a continuous repeated measure. A mixed linear model that clusters participants’ observations evaluated the hypotheses individually, like Study 1. Coefficient comparisons in the final SEM were also used to evaluate these hypotheses.

Figure 4: Final SEM for Study 2.
Hypotheses analysis.

Arousal is the primary contribution Study 2 adds, compared to Study 1. But the foundational relationships are evaluated before analyzing how arousal influences those effects. Hypothesis 1 suggests the influence of gain-loss messages on effectiveness is moderated by trait regulatory focus. Two-way interactions with promotion or prevention focus were evaluated, along with three-way interactions that included both regulatory focuses. All interactions were insignificant. Hypothesis 1 was rejected, which is consistent with Study 1’s findings. Like Study 1, controlling for the direct effects revealed prevention focus’ relationship on effectiveness (see Figure 4).

Hypothesis 3 suggests the frames’ influence on effectiveness is mediated by attention. Unlike Study 1, total fixation duration on avoid-loss information was a significant predictor of effectiveness, although it decreased effectiveness. Fixation duration on approach-gain information did not influence effectiveness, similar to Study 1. Avoid-loss and combination messages appear to have significant mediated relationships with effectiveness via attention to avoid-loss information. The frames influence fixations on both types of information ($p \leq .001$; see Figure 4), accounting for 46% of variance when arousal scores are included. The significant paths suggest mediation, but the indirect effects should be evaluated.

The Sobel test was used to evaluate their indirect effects. Hayes (2009) suggests bootstrapped confidence intervals are a preferable mediation test, but bootstrapping does not take into account the dependence between observations in this design, which was why they were not used. Combinations frames influenced perceived effectiveness via attention
to avoid-loss information, *indirect* = .15, *t* (99) = 1.95, *p* = .05, with a total effect of .40, *t* (99) = 4.41, *p* ≤ .001. Avoid-loss messages’ indirect effect on perceived effectiveness via attention to avoid-loss information was marginally significant, *indirect* = − .20, *t* (99) = −1.82, *p* = .07. Its total effect was significant, *total* = −.34, *t* (99) = −2.28, *p* ≤ .05, with an insignificant direct relationship on effectiveness, *t* (99) = −.67, *p* = .50. The evidence suggests combination and avoid-loss messages influence effectiveness through attention to avoid-loss information. Approach-gain messages did have a significant mediated influence on effectiveness, and combination messages did not have a mediated relationship through approach-gain attention.

Hypothesis 3 is partially supported. It is partially supported because attention to approach-gain information did not mediate frames’ relationship with effectiveness; the avoid-loss frame’s indirect effect contradicted the positive hypothesized mediated path.

Three different hypotheses addressed moderation on attention outcomes. Hypothesis 4 argues individuals generally pay more attention to arousing information; but people will attend more approach-gain information when the content is calmer, and more to avoid-loss when the content is arousing. Promotion and prevention focus (H5) and sensation seeking (H8) are also predicted to moderate frame’s effects on attention. Three-way interactions were examined first. If they were insignificant, two-ways were examined.

When attending to approach-gain information, there is moderated moderation with arousal and sensation seeking. A three-way interaction suggests arousal moderates approach-gain message’s effects on its information, and sensation seeking moderates that
moderation. The interaction between approach frames, arousal scores and BSS was significant, \( b = .17, \ t(99) = 2.16, \ p < .05 \). The interaction was probed using the “pick-a-point” approach, where the measures’ means and scores plus or minus one standard deviation were used (Hayes & Matthes, 2009). The Johnson-Neyman Technique could not be used, due to clustering during estimation. The arousal score’s and BSS’s conditional effects were estimated at each point (see Figure 5). Arousal’s conditional effect on attention to approach-gain information was significant for approach-gain messages at all point, as was BSS’s conditional effect, \( p \leq .001 \). Hypotheses 4 and 8 are supported for approach-gain messages. Combinations messages had insignificant three-way or two-way interactions with arousal scores and/or the BSS.

The same three-way interaction was insignificant when analyzing attention to avoid-loss information. Combinations of two-way interactions were examined to evaluate each hypothesis individually. Sensation seeking moderated avoid-loss messages influence on avoid-loss information. The two non-combination messages conditions significantly interacted with the BSS, \( p < .05 \). The pick-a-point approach examined the interaction. Both the messages’ and BSS’s conditional effects were significant at all points, \( p \leq .01 \). Figure 6 illustrates BSS’s conditional effect on avoid-loss information attention. Hypothesis 8 is partially supported, as arousal did not influence its moderation for avoid-loss information attention.

Hypothesis 5 was not supported, which is consistent with Study 1. Promotion and prevention regulatory focus did moderate any frames’ effects on attention. However, when investigating the moderation hypotheses, it revealed arousal and prevention focus
had a significant interaction on avoid-loss information attention, $b = -0.21$, $t(99) = -2.42$, $p < .05$. Lower arousing content increased attention towards avoid-loss information, as prevent focus increased ($p < .05$, see Figure 7); and higher arousing content decreased attention to avoid-loss information, $p < .05$. Calmer content increases attention towards avoid-loss information when that form of information is participants’ preferred goal attainment strategy (i.e., high prevention focus). In contrast, when participants have a low prevent focus, high arousing content attracts the most attention. The interaction supports the argument that low levels of arousal increase attention motivation, while higher levels shift individuals from information intake to behavioral response.

Combination frames were argued to attract the most attention when arousal is low to moderate (H6). The SEM model does not support this hypothesis, because arousal scores do not moderate combination frames’ effects on attention. Frame influence was further examined by comparing message coefficients in the model. The coefficient for combination messages were multiplied by two to compare influence equally, because each message contained two frames and total attention was not being analyzed at once. Combination frames did not significantly change the amount of fixations compared to the other two frame conditions, $p > .05$. Next, a mixed linear MLR regression estimated message manipulation’s and arousal scores’ influence on total fixation duration towards the entire message (see Figure 8). The interaction between arousal scores and combination messages was not significant, but it approached significance for approach-gain and avoid-loss messages ($p < .07$). When you remove arousal from the model,
Figure 5: Three-way interaction between arousal, sensation seeking and approach-gain messages on approach-gain total fixation duration.

Figure 6: BSS’s interaction total effect on avoid-loss total fixation duration.
however, there are no mean differences between message conditions. While H6 is not supported, Figures 5 and 8 suggest arousal did have a role in attracting attention. Arousing content appears to increase attention towards approach-gain information, compared to calm.

Hypothesis 7 argued messages that included both approach-gain and avoid-loss frames would be most effective. The SEM supports this hypothesis (see Figure 4). Combination messages increased perceived effectiveness over avoid-loss messages, $D = .25, \ t(99) = 2.25, \ p < .05$, while the approach-gain messages did not, $p > .05$.

Each message’s total effects on perceived effectiveness through all possible paths in the SEM, including insignificant paths, were estimated in Mplus. The results were consistent with the direct effects analysis. Hypothesis 7 is supported.

Figure 7: Arousal and prevention focus’ interaction on avoid-loss fixation duration.
Aggressiveness research question analysis. The research question asked how aggressiveness moderates attention. All combinations of three-way and two-way interactions with participants’ BAQ score on attention measures were added to the final SEM. The insignificant interactions were removed, and fit scores remained good.

An interaction between BAQ scores and arousal ratings of messages on total fixations towards approach-gain information was significant, \( b = .16, \ t(99) = 2.05, \ p < .05 \). The interaction was not significant for combination messages. Figure 9 shows a trend where BAQ increases total fixation duration on approach-gain information, when arousal is high; and it decreases total fixation when arousal is low. The interaction was analyzed using the pick-a-point approach, identically to previously examined
interactions. BAQ’s conditional effect was only significant when participants scored highly on the measure, $\theta_{BAQ|M+SD} = .90$, $t(99) = 2.05$, $p < .05$. BAQ did not significantly influence attention measures in any other manner.

Figure 9: BAQ and arousal scores on total fixation to approach-gain information.

Discussion

Study 2 provided insight into the many questions posed by this dissertation. It added arousal to the analysis, which clarified attention’s mediating role on perceived message effectiveness. The within subject design that varied message topics also helped reveal how combination messages are more effective than messages with only one type of frame. Additionally, the study’s holistic approach helped clarify how regulatory focus
and sensation seeking influence attention and perceived effectiveness. Finally, Study 2 provided insight on how aggressiveness influences the cognitive process, outside of contexts that specifically investigate aggressive acts.

Attention’s mediating role on message effectiveness. The mediation hypothesis argued messages influence effectiveness via attention was partially supported. Attention to avoid-loss information did have a mediating role, where attention to approach-gain information did not. Attention to avoid-loss information’s influence on effectiveness may have approximated issue concern, which does influence perceived message effectiveness. Kees and colleagues (2010) found risk concerns towards the topic mediated gain-loss message influence on perceived attitudes towards the message. Framing issues as loss scenarios may be more likely to trigger risk concerns, because they emphasize possible harms. This contrasts gain scenarios, which emphasize possible benefits. Approximating risk concerns, however, does not explain why the relationship with effectiveness is negative – raised issue concern should have a positive relationship with persuasive outcomes (Solloway, Slater, Chung & Goodall, 2013). DMT does provide an explanation consistent with these results. The avoid-loss messages and/or risk concerns are negative information. DMT has shown that negative content triggers negative affect, which can be misattributed onto the content being processed.

On the other hand, the affective explanation does not address why attention to approach-gain information does not influence effectiveness. If emotional triggers explained avoid-loss’ negative relationship, one might expect a positive relationship between attention to approach-gain and effectiveness. Although total fixation duration on
approach-gain information did not significantly influence effectiveness, the relationship leaned negative, $b = -0.02$, $t(99) = -1.19$, $p = .24$. This may seem troublesome, as Figure 8 suggest increased arousal increased approach-gain information more than avoid-loss. Readers must remember, however, Figure 8 was an analysis on total fixation duration, regardless of frame. The SEM shows arousal increased attention towards avoid-loss over more than twice the amount than it did in its interaction on approach-gain information (see Figures 4 and 5). This suggest arousal may have triggered sufficient motivation to attract marginally more attention to approach-gain information, but not enough to produce an affective response like avoid-loss information. The manipulation check supports this perspective, as raised arousal decreases the perception that a message advocates approach tendencies and increases perceptions that it advocates avoidance. Arousing content may interact with individuals’ perception of positive and negative attributes of persuasive messages. This may be an interesting research question for communication scholars to explore, due to the fact that our stimuli often uses linguistic manipulation that may can be more subjective than Psychology’s.

The arousal explanation is further supported by the fact that mediation completely disappears, when arousal scores are not included in the model. A follow-up analysis removed arousal scores from the final model, which produced results consistent with Study 1. The follow-up analysis not only supports the post-hoc explanation of mediation results, but also substantiates the pivotal role arousal plays when investigating gain-loss framing effects.
**Combinations messages’ effectiveness.** Combination messages received higher effectiveness scores than messages with only approach-gain or avoid-loss messages. This finding is significant for professionals that create PSAs and other prosocial messaging. The Study’s results are rather robust, as the message manipulations varied within subject while participants viewed eight different topics. Previous researchers argued approach and avoid motivations functioned independently from each other (Higgins, 1997, 1998; Carver, 2004; Cacioppo & Berntson, 1994, 1999). Studies 1 and 2 extended this idea, arguing the dual activation of both systems may mobilize more motivation than either system alone (Wang, et al., 2012). Study 1 did not support this hypothesis, but its lack of support may have been due to within subject design and consistent phrasing across message conditions – participants may have detected the manipulation or became desensitized due to multiple exposures. This did not occur in Study 2, as message topic and information content varied between frame manipulations. Approach-gain and avoid-loss only messages did not significantly differ in Study 2’s effectiveness measure and were lower than combination messages, suggesting that the activation of both motivation systems is advantageous in the persuasion process.

An alternative explanation to the dissertation’s dual motivation explanation is that combination messages provide both goal attainment strategies, which may be more inclusive for a broad audience with different strategy preferences. While this argument appears appealing to accept, one would expect promotion and prevention regulatory focus to moderate its respective message condition. Individuals with a stronger promotion focuses would be expected to find approach-gain messages more effective, and same
relationship would be expected for prevention focus and avoid-loss messages. The results, however, show promotion and prevention regulatory focus do not moderate any frame manipulations, with promotion having no influence in the model.

Increasing perceived effectiveness through approach-gain and avoid-loss frame combination is a significant finding for both scholars and communication professionals. Previously, each frame type was examined in opposition to the other, obscuring the independent nature of motivated processing. Academic work in Communication has often explores distinct differences in message or transmission attributes. Here, motivation processes were first explored then it was hypothesized which message attributes would be the most effective. This approach may help reveal comparative advantages in other contexts. It also further supports the concept of dual motivation activation introduced to Communication by Wang and colleagues (e.g., 2012). The study highlights to scholars and professionals that individuals are often driven by both approach and avoid motivations simultaneously. Neglecting either motivation may be relatively detrimental to the target persuasive goal.

Professional communicators who choose to use this research in their intervention or campaign should be mindful to how the combination messages were constructed. Approach-gain and avoid-loss frames did not simply change the emphasis from desirable outcomes to undesirable, or vise versa. Approach-gain frames suggested strategies to attain a positive gain, while avoid-loss suggested strategies to prevent a possible harm. Both frames emphasized what individuals naturally fixate most on in gain or loss scenarios. This is an important distinction for practitioners, as the scenarios they are
addressing might dictate frame choice. It also may help them better navigate the literature that has confounding operations at times. Furthermore, combination messages did not combine gain-loss frames into a single message. Rather, the message contained one approach-gain frame and one avoid-loss frame. This study did not address how to combine gain-loss frames into a statement, or the effects of such a statement.

Regulatory focus’ effect regardless of frame. One of the study’s more unexpected results was how regulatory focus did not influence approach-gain or avoid loss frames. Promotion regulatory focus simply did influence the process. One may conclude sensation seeking explained the variance of promotion focus, because sensation seeking appears to function as promotion focus was hypothesized to function. A post-hoc analysis investigated this explanation by removing sensation seeking from the initial SEM. Its removal did not make any of promotion focus’ effects or interactions significant. Additionally, Study 1 did not include sensation seeking and promotion focus also did not have a significant relationship. The author only has a methodological explanation for why this study differs from previous studies. As noted in Study 1’s discussion, previous studies dichotomize individuals’ regulatory focus as either promotion or prevention. Prevention focus’ significant direct effect found in Study 1 and 2 may be misattributed onto promotion focus through dichotomization, because individuals that show a promotion preference still have prevention tendencies. Prevention focus may be the driving influence when evaluated persuasive messages, which was only revealed by maintaining each dimension as continuous and modeling the effects using a holistic method. Additionally, participants scored higher on the promotion measure than
prevention, \( D = .57, \ t(99) = 5.62, \ p \leq .001. \) The within subject design may have revealed individuals favor and anchor goal attainment strategies to their promotion focus, making its effects minimal when you control for individual dispositions.

Prevention regulatory focus influenced attention and message effectiveness irrespective of the message’s frames. Prevention focus and arousal moderate attention to avoid-loss information consistent with DMT, albeit not in the manner articulated in the hypotheses. When prevention focus was low, more arousing content received more total fixation durations. But when prevention focus was high, calmer content received more total fixations. This pattern suggests a shift from information intake to rejection (i.e., action readiness) predicted by DMT (Cacioppo & Berntson, 1999). Individuals with greater prevention focus scores likely experienced greater avoidance motivation activation from the same amount of arousal than those with lower scores. While reading low arousing content, they would experience greater motivation activation and thus pay more attention to the information. However when the arousing content was high, individuals with a high prevention focus were more likely to shift into information rejection. Those with lower prevention focus scores likely remained in intake mode while reading high arousal content, because the stimuli caused less motivation activation.

Prevention focus’ direct relationship with message effectiveness is consistent across message conditions and present in both studies. People with higher prevention focused are also associated with higher security needs (Higgins, 1997). The prosocial messages may have prompted security-orientated thoughts, which made the message more persuasive as it serviced those needs. Prevention focus is also associated with goal
attainment strategies that ensure correct rejections. The prosocial messages were advocating advantageous actions for society, by definition. Individuals with strong prevention focuses may simply be prone to accepting prosocial messaging to minimize errors of commission. This idea warrants further investigation, as professionals running prosocial communication campaigns may find these individuals easier to persuade, and thus wish to target them.

*Sensation seeking increases attention.* Sensation was argued to moderate arousal’s effect on attention, where HSS would fixate more on arousing content. This hypothesis was supported for approach-gain information. Study 2 not only replicates previous findings in a unique context, but also may help explain sensation seeking’s causal mechanism due to the relative difference for attention to avoid-gain information. Sensation seeking had a direct effect on avoid-loss attention and a positive conditional effect on avoid-loss messages influence on attention. But it did not interact with arousal on avoid-loss attention. Post-hoc analysis evaluated BSS total effect on approach-gain and avoid-loss information, controlling for arousal. BSS had a greater total effect on avoid-loss information fixation duration than approach-gain, $D = 1.25, t(99) = 2.32, p < .05$. This evidence is inconsistent with Annie Lang’s and colleagues (2005) explanation that HSS have overactive appetitive systems.

Slater and colleagues (2003) suggest that personal characteristics and behaviors may mutually reinforce each other over time. Generally speaking, it is well established that HSS engage in more risky behaviors. BSS may have not interacted with arousing content from avoid-loss information, because HSS have become more attracted or attune
to loss scenarios due to their behavioral choices. HSS may find themselves in risky situations more often, and thus are more prone to focus on those consequences. Or, they simply may be more attracted to risky or loss scenarios, and find it more appealing. This notion is supported by the fact that BSS is negatively correlated with prevention regulatory focus, \( r(98) = -0.41, \ p \leq 0.01 \).

*Aggressiveness moderated moderation of arousal on approach-gain information.*

The question of how aggression influenced attention was posed. The question was asked due to the trait’s association with arousal, approach motivations and antisocial behavior. A research question was posed rather than a hypothesis, because aggressiveness is not typically studied outside of aggressive contexts – this study did not include any measure of direct, indirect or misplaced aggression. Its inclusion appears justified, as aggressiveness systematically influenced attention to approach-gain messages.

Participants’ BAQ and arousal scores had a significant interaction on approach-gain attention, when the message only contained approach-gain frames. The interaction is consistent with an overactive approach system – the explanatory mechanism suggested by Harmon-Jones and Sigelman (2001). Furthermore, individuals with higher aggressiveness scores tend to fixate longer on more arousing messages. This is also consistent with the well-established notion that highly arousing content is more motivating for aggressive individuals (Anderson & Bushman, 2002; Bushman & Huesmann, 2010).

This finding does not merely confirm previously known relationships in a different context, but it also extends the research into cognitive process outside of
aggressive contexts. The study provides evidence that trait aggressiveness influences individuals cognitive processing in general, and may be a trait professional communicators want to address when formulating interventions or prosocial campaigns. Aggressive individuals are associated with antisocial behaviors, some of which were topics of this study (i.e., drunk driving and domestic abuse). When formulating anti-domestic abuse campaigns, for instance, practitioners may want to formulate highly arousing messages with mainly approach-gain frames to attract more attention. Additionally, targeting individuals’ with distinct traits is becoming more readily available in our media environment (Hirsh, Kang, & Bodenhausen, 2012). Campaigns may wish to tailor messages to this audience because they process information differently, regardless of whether the topic concerns aggressive behaviors or antisocial behaviors.
Conclusion

The two main arguments proposed were whether the combination of two frames would attract more attention and be more effective, and whether attention would mediate message effectiveness. To do this, the paper started with a clarification of communication’s conceptual and typical definition of gain-loss frames, adhering to the original sources from psychology, and the pragmatics of persuasive advocacy. The addition of arousing content can help reveal more consistent gain-loss frame effects in future studies. While the inclusion of aggressiveness, suggests greater emphasis on trait aggressiveness as an important cognitive processing attribute.

Combination messages were perceived the most effective message in Study 2, compared to messages with only approach-gain or avoid-loss frames. Combination messages used a mixture of one approach-gain and avoid-loss frame. Previous research established that messages advocating strategies to achieve gains trigger approach motivations, and messages advocating strategies to minimize harms trigger avoid motivations. It was argued that messages with both goal attainment strategies would trigger both the approach and avoid motivation systems, mobilizing more cognitive resources towards the message than messages with only one goal attainment strategy. Study 2 supported the argument that combination messages are perceived as more effective. The support is rather robust, as Study 2 used a mixed-factorial design with each
participant evaluating a distinct randomly assigned topic for each of the 8 message conditions. In contrast, Study 1 did not provide support to the hypothesis on combination messages. Study 1 likely did not exhibit message effectiveness differences between conditions because the consistent phrasing and topic between conditions. It is possible that the design of Study 1 made participants sensitive to the manipulation. However, Study 1 was a useful first step to explore the framing effects and it demonstrated the importance of manipulation or control of arousing content in message frame research.

Although Study 2 supported that combination messages are more effective, the proposed explanatory mechanism is not clear yet. Combination messages were believe to activate both motivation systems, causing individuals to exert more cognitive resources towards the message, as noted above. Combination messages did not attract more attention in either study, which does not support the proposed explanation. An alternative explanation may be that providing two different goal attainment strategies is more likely to be agreeable for larger audiences with diverse tastes. This explanation also lacks support from both studies, because regulatory focus did not influence framing effects. Consistent with our evidence, participants might have found combination messages more effective and made an evaluative decision on the message faster, which would decrease total attention relative to the other messages. Future studies should investigate other measures of attention and cognitive elaboration, which may help clarify the relationship between cognitive elaboration and attention.

Attention did not influence perceived message effectiveness as predicted. DFT proposes that increased attention towards attributes of options, which increases the
attributions’ weight in decision making (e.g., Busemeyer & Townsend, 1993). This could work for or against the option, depending on whether the attribution increases or decreases the utility of the option. Using similar models, Krajbich and Rangel (2011) argued that attention to options/objects would increase probability to choose them. However, in our context, participants were assumed to evaluate Study 1 and 2’s messages as positive, due to their prosocial advocacy. Thus, it was hypothesized that more attention would increase effectiveness. Positive evaluations may have been a false assumption. Participants may have disagreed with the message, critiqued the phrasing, or counter argued against the statement. Study 2 had the only support for a relationship between attention and effectiveness; and fixations on avoid-loss information decreased perceived effectiveness, not increase. Attention may still be the explanatory mechanism, but participants’ opposing evaluations may confound its effects. As the DFT suggests, attention (indicated by eye gaze) may provide a decision weight to option attributes, which have to be considered along with participants’ valence evaluations. If the participants’ evaluation on the frames/attributes was negative, it is quite interesting to see that fixations on avoid-loss information decreased effectiveness, which could be considered consistent with our theoretical framework. DMT characterizes the avoidance system with experience of negative affect, which all cited frameworks believe can be misattributed onto the message. Attention to avoid-loss information may have produced negative affect, which was weighed more in the decision process causing lower perceived effectiveness. More research is needed to clarify how attention influences persuasive outcomes, especially formal dynamic models based on the DFT.
A framework that operationalizes gain-loss framing for communication research was advanced, which may add organizational power to the discourse. In the past, communication research confounded emphasizing desirable or undesirable outcomes with gain-loss framing. Kahneman, Higgins and Carver all identify gain scenarios with both desirable and undesirable outcomes, as they do with loss scenarios. RFT established that it is most persuasive to match the advocated goal attainment strategy with the scenarios’ salient end-state (i.e., non-neutral). Thus, approach strategies are more effective in gain scenarios and avoid in loss scenarios. By grouping all desirable and undesirable outcomes together, scholars may have unintentionally compared dissimilar, or even opposing, constructs. Past research may have also produced conflicting results because gain-loss outcome emphasis was examined, while disregarding the advocated goal attainment strategy. Here, we advocated that approach-gain and avoid-loss frames should be examined, because RFT has established that approach-nonloss and avoid-nongain are less persuasive than their counterparts.

The framework also has predictive power, although it was not thoroughly tested in these studies. By organizing gain-loss frames into four categories and identifying the two most persuasive frames, research concerning approach and avoid motivation systems could be applied. Not only does each system generate distinct affect experiences, but their motivation activation functions are also unique. These functions are regulated by arousal, which is not typically considered in gain-loss studies. Study 2 illustrates how excluding arousal could result in analysis with confounds, because removing arousal from the model makes all framing and attention influence on message effectiveness
insignificant. Some readers may interpret Figure 8 to suggest arousal did not motivate attention towards avoid-loss information. However, individuals’ prevention focus interacts with arousal’s influence (see Figure 7), producing effects that appear to intensify arousal’s influence. When arousal is low, for instance, prevention focus increases its positive influence on attention. However if arousal is high, prevention focus decreases its influence on attention, suggesting a shift to information rejection when prevention and arousal are both high.

Study 2 began to examine gain-loss frames influence on attention and perceived effectiveness. Future studies are strongly encouraged to adopt our organizational framework, and test the resulting cognitive processing and motivation implications. Current research was limited to visual attention and arousal manipulation through text. It appears visual attention may have a more intricate influence in elaborative processing than a simple direct relationship with persuasive outcomes. Examining other measures of cognitive processing may reveal its effects. Additionally, arousing content is difficult to manipulate through text alone. Manipulating arousal with greater variance and more precision will better test arousal’s role in motivation activation and elaboration, because relative arousal levels are the key predictor for motivation functions that are not linear. Future research should also use within-subject experimental designs, as it is the likely reason this research identified novel roles for the different cognitive processing individual traits.
References


Appendix A: Stimuli for Study 1

The messages are from Kees and colleagues (2010). The top is the approach-gain message and bottom is avoid-loss.

Seek Healthy Foods and Exercise to Manage Body Weight
Seek Healthy Foods. In terms of your eating behavior, you should focus on consuming healthy foods that increase metabolism. Eat Plenty of Fruits and Veggies: A diet loaded with fruits and vegetables can be an effective strategy for managing weight. Choose Whole Grains: Choose whole grain varieties of cereal and muffins over “refined” grains such as white bread.

Seek Exercise. Focus on increasing physical activity and exercise to burn calories. Exercise Daily: Through 30 to 60 minutes of vigorous exercise on most days of the week, you can burn calories and boost metabolism. Walk to Class/Take the Stairs: An important aspect of getting in shape is to build physical activity into your daily routine.

Avoid Unhealthy Foods and Inactivity to Manage Body Weight
Avoid Unhealthy Foods. In terms of your eating behavior, you should focus on reducing caloric and fat intake. Avoid Foods High in Calories and Fat: Avoid foods containing saturated fats such as fatty red meats, butter, whole milk, cheese, and ice cream. Avoid Added Sugars and Caloric Sweeteners: One 20 oz. soda contains more added sugar than is suggested for an entire day.

Avoid Inactivity. Focus on reducing the amount of time you are inactive during the day. Limit Sedentary Behaviors: If your school and/or work schedule force you to be desk-bound, try to use your free time to get moving. Avoid Being a “Couch Potato”: Avoid the amount of time that you spend sitting down each day—reduce activities such as watching television.

The two messages are combined, creating an approach-gain nutrition and avoid-loss exercise message, and an avoid-los nutrition and approach-gain exercise message.
Appendix B: Pretest Stimulus Example


*Topic*: drunk driving

*Approach-gain (low arousal)*: (Words = 39, Easy = 67.7, Grade = 8.6)

*Try to arrange* a responsible way home before going out to drink alcohol, because it *might make you feel relaxed* throughout the night. *Try to call* drunken friends a taxi, which *may make* the streets *somewhat safe* for everyone.

*Approach-gain (high arousal)*: (Words = 39, Easy = 63.3, Grade = 9.2)

*Always arrange* a responsible way home before going out to drink alcohol, because it *will make you feel more joy* throughout the night. *Always call* drunken friends a taxi, which *will make* the streets *much more desirable* for everyone.

*Avoid-loss (low arousal)*: (Words = 41, Easy = 60.1, Grade = 9.9)

*Try to avoid* going out to drink alcohol without a responsible way to get home, because it *might make you feel uncomfortable* throughout the night. *Try to stop* drunken friends from driving, which *may make* the streets *somewhat unsafe* for everyone.

*Avoid-loss (high arousal)*: (Words = 40, Easy = 61.7, Grade = 9.7)

*Always avoid* going out to drink alcohol without a responsible way to get home, because it *will make you feel horrible* throughout the night. *Always stop* drunken friends from driving, which *will make* the streets *much more dangerous* for everyone.
Approach-gain & avoid-loss (low arousal): (Words = 39, Easy = 65.5, Grade = 8.9)
Try to arrange a responsible way home before going out to drink alcohol, because it
might make you feel relaxed throughout the night. Try to stop drunken friends from
driving, which may make the streets somewhat unsafe for everyone.

Approach-gain & avoid-loss (high arousal): (Words = 39, Easy = 65.5, Grade = 8.9)
Always arrange a responsible way home before going out to drink alcohol, because it
might make you feel more joy throughout the night. Always stop drunken friends from
driving, which will make the streets much more dangerous for everyone.

Avoid-loss & approach-gain (low arousal): (Words = 41, Easy = 62.2, Grade = 9.6)
Try to avoid going out to drink alcohol without a responsible way to get home, because it
might make you feel uncomfortable throughout the night. Try to call drunken friends a
taxi, which may make the streets somewhat safe for everyone.

Avoid-loss & approach-gain (high arousal): (Words = 40, Easy = 59.6, Grade = 9.9)
Always avoid going out to drink alcohol without a responsible way to get home, because
it will make you feel horrible throughout the night. Always call drunken friends a taxi,
which will make the streets much more desirable for everyone.