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Bulking up or bulging over: Motivating physical activity through framing

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### Abstract

Motivating people to perform physical activities can be a challenging task. One possible avenue is through the use of framing of exercise-related imagery and messages. Gain-frame imagery demonstrates the benefits of performing an activity, whereas loss-frame demonstrates the risks of not taking action on something (Tversky & Kahneman, 1981). With social media as a prevalent platform for exercise tips and tricks, it is possible that the way in which such imagery is framed in advertisements, blogs, and apps could be hindering or helping followers get closer to their physical activity goals. I hypothesized that gain-framed imagery motivates participants to have a desire to exercise more than loss-framed imagery. Two moderators, consideration of future consequences and social comparison, were also analyzed. Union College students ( $N = 135$ ) recruited through an online database completed a survey on physical activity, social comparison, and consideration of future consequences, were asked to analyze either gain-frame or loss-frame imagery, and afterwards concluded with a survey of their exercise social cognitions. While gain-framing did not influence motivation to exercise across the variables, loss-framing successfully influenced the strength of moderate-intensity exercise intentions. Thus, negatively-framed messages might be more successful in promoting exercise behavior. Prospect Theory, when applied in this manner, could be used on social media platforms and marketing campaigns to encourage people to exercise. Framing may be able to create a healthier society if these techniques that were successful in changing cognitions can also be applied to behaviors in future studies.

*Key Words: Prospect theory, framing, exercise, social cognitions, intentions*

### Bulking up or bulging over: Motivating physical activity through framing

As the United States increases in population, citizens are also increasing in size. About one-third of the children in America are either obese or overweight (Moore, Harris, & Bradlyn, 2011). This epidemic often begins in childhood and continues to progress into adulthood. In 2013, there were 2.1 billion overweight or obese individuals worldwide (Ng et al., 2014). Being overweight can result in threats to future health, increasing the risk of high cholesterol and blood pressure amongst other potential problems (Moore et al., 2011). Although antidotes for obesity are non-existent, measures such as exercising can be adapted to reduce the chances of becoming obese. Research has demonstrated that obesity is often a result of lack of proper nutrition and exercise, thus suggesting physical activity can reduce chances of becoming obese (Moore et al., 2011). It has been recommended that adults exercise at a moderate-intensity for 150 minutes per week (Centers for Disease Control and Prevention, 2014). A report demonstrated only the District of Columbia and two of 50 states had over 25% of their citizens who met these national physical activity guidelines despite the health benefits that exercising provides. In addition to the potential for reducing the incidence of obesity and the associated health threats, exercising may support and expedite the brain's development. Physical activity can accelerate the rate at which neurotrophins grow, helping other neurons to develop and possibly improving concentration, reaction time, and processing (Tomprowski, Davis, Miller, & Naglieri, 2007). In a longitudinal test of this idea, mentally disabled children were randomly assigned to either exercise or non-exercise groups, and participants who exercised increased their IQ scores and cognitive reaction times (Tomprowski et al., 2007). This research helps support arguments that exercise is crucial not only to maintain one's health, but also to strengthen the brain as well. Thus, researching what encourages people to exercise could be vital in shaping and bettering lifestyles.



Often, marketing campaigns to keep people healthy start in the doctor's office. While inspiration to exercise may come from an array of different sources, at any given moment millions of people are on various social media platforms, such as Instagram, scrolling through pictures that have been posted since the last time they logged on. Many users utilize their accounts to start a revolution of sorts, attracting a specific type of follower. There are cooking accounts, inspirational quotes, and fitness gurus who often demonstrate their own as well as users' progress, recipes, tips, and techniques. The present study was designed to strengthen the marketing techniques of those aiming to increase physical activity among their followers and provide empirical evidence for how to communicate with an audience effectively if they want to help motivate them to work-out.

One of the more common ways to communicate information to patients so it applies to them and they will remember it is through message framing (Myers, 2009). In line with a shift in health-care focus from provider to patient, education regarding simple behavioral modifications that uses tailored or framed messages is typically more cognitively stimulating and influential and often has the ability to affect behavioral decisions. In a literature review on how material can be effectively be presented to patients it was suggested that when gains or losses are certain in presented scenarios, people are more likely to choose those options over ambiguity. However, this work concluded that not enough research has been done on prevention behaviors, specifically physical inactivity and physical activity intentions. Thus, this thesis examined how message framing could be utilized with social media-style images to impact motivation for physical activity. The focus on gains and losses relies on prospect theory (Tversky, & Kahneman, 1981) to offer a theoretically-based application of message framing.

### **Prospect Theory**

When faced with a problem that results in an outcome, a ‘decision frame’ helps decide what action one will take and the possible outcomes that may follow (Tversky, & Kahneman, 1981). These outcomes can be weighed as either gains or losses. For example, a gain might be having more energy as a result of exercise, while a loss might be increasing weight of fatty tissue from not exercising. Ultimately, gains or losses are compared against a ‘reference outcome’ that is considered to be neutral and based off of anticipations and norms (Tversky, & Kahneman, 1981). When framed as gains, motivation is hypothesized to increase, thus leading to people taking action on these cognitions. For example, gain-framed messages had the ability to evoke a desire to take part in a sports team, thus increasing physical activity in the future (Lithopoulos, Rathwell, & Young, 2015). When framed as losses, motivation is hypothesized to decrease, thus decreasing cognitions of completing behaviors related to the framing. Previously, loss-framed messages have been less effective in provoking intentions to participate in physical activity resulting in a decreased amount of exercise (Latimer, Brawley, & Bassett, 2010). Based on prospect theory, messages can thus be framed in terms of gains or in terms of losses, which may subsequently affect the decisions that people make regarding efforts to reduce risks and limit costs in the future.

Given this information, it may be possible to use prospect theory-based message framing to increase motivation for physical activity. When discussing types of health behaviors in conjunction with prospect theory-based framing, there are three main ‘functions’ that can be considered (Berry & Carson, 2010). Of these, a preventative function is most relevant to the present study as physical activity is an action that can help avoid a negative outcome in our health. Previous research suggested gain-framed messages would be the most successful in encouraging prevention behaviors (Berry & Carson, 2010). However, framing research has had

varied results. Whereas most of the studies discussed gain-framing as being more beneficial for increasing physical activity, there have been studies that opposed this or found no conclusive results. Rothman and Salovey (1997) noted much of the research on gain-framing did not have strong effect sizes and further argued that if content of messages is analyzed, there could be a more clear-cut method of determining the effects of framing. Overall, gain-framing has had a stronger influence on both exercise intentions and behavior than loss-framing, and thus it may be more effective in promoting physical activity.

Previous studies have noted that there may be more to framing than simply gain and loss. There might be additional ways that framing can be analyzed: “Obtain a desirable outcome; not obtain an undesirable outcome; obtain an undesirable outcome; or not obtain a desirable outcome” (Jones, 2005, p. 4). Whereas the first two represent gain-framed messages, the latter are loss-framed. The efficiency of all four types of framing was analyzed in a study in which participants were asked to read a health pamphlet and complete a survey afterwards. Every participant was randomly assigned to one of four framing conditions. Similar to the present study, the content of the pamphlet was the same for each level of the dependent variable, however the language varied (Jones, 2005). For all four conditions, intentions to exercise did not increase a significant amount. One finding was that when “benefits gained” or “losses incurred” were analyzed for older participants, they were more likely to fill out a follow-up sheet to receive further exercise information. This was attributed to the easier language of these two conditions, as opposed to double negatives of “benefits lost” or “losses avoided” which have shown to be harder to interpret in past studies. In the current study, the “benefits gained” and “losses incurred” are the primary framing techniques that were used.

While there are multiple subtypes of framing, there might also be differences in the extent to which information is processed. It was predicted that the extent to which people are influenced by framing depends on one's attention to the message presented, how receptive they are to gain or loss-framing, and what type of behavior is being presented (Rothman & Salovey, 1997). Framing should have a stronger effect if information was processed systematically with time to observe all of the details presented. In the present study, this was considered, as participants were exposed to the framing stimuli for an extended period of time. Prospect theory can be mentally processed to different extents and can be used to influence certain specific behaviors.

### **Applying Prospect Theory To Physical Activity**

Message framing can potentially be used to support increases in physical activity. Past research has provided evidence for the effect of both gain-framed and loss-framed messages for increasing exercise cognitions. For example, in a prototype intervention titled "Project Sport," researchers noted there were benefits to using the same images for both gain- and loss-framing but changing the messages that are displayed to participants (Werch, 2007). Whereas gain-framed messages encouraged benefits of being on a sports team for a variety of reasons, loss-framed messages informed children what could happen to their performance if they were to take drugs while participating in a sports team. This study demonstrated that both types of message framing techniques have benefits (Werch, 2007).

In support of loss-framing a study was conducted by Basset-Gunter, Ginis, and Latimer-Cheung (2013) where participants were recruited and read about disease risk information. They were then exposed to gain- or loss-framed messages about physical activity. They completed a questionnaire on their vulnerability, response efficacy, intentions, and cognitive processing.

Overall, perceptions of vulnerability increased after exposure to risk information and physical activity motivation increased for the loss-framed condition more than the gain-framed condition. It is plausible that while we assume people believe physical activity is low-risk and will result in positive outcomes, some might view it as a high-risk, negative outcome action fearing injury, pain, or soreness. Participants may have had higher motivation to process the negatively-framed messages after being exposed to the initial risk information because risk information is more similar and compatible with loss-framed messaging than gain-framed (Basset-Gunter et al., 2013). This research suggested that messages presented regarding exercise might be more thoroughly processed with loss-framing because such messages evoke feelings of susceptibility to consequences. Whereas this study showed support for loss-framed messages, a large majority of the research on prospect theory demonstrates gain-framing might be better.

While fear may allow loss-framed messages to be more exhaustively examined, it is possible that gain-framed messages can be successful in promoting physical activity engagement. Young adults, similar in age to the participants in the present study, are more likely to be focused on health promotion, such as gain-framed goals than potential health losses (Lockwood et al., 2005). It has also been found that younger participants were more likely to improve their diet and exercise habits after reading about a positive/healthy role model but were unaffected by negative/unhealthy models, which might be comparable to framing in the present study. This result could have been attributed to the belief that there was more of a chance they would be like the healthy model if proper changes were made. As a result, they became more motivated to change health-related behaviors (Lockwood et al., 2005). Adults reportedly have a more balanced outlook and see both positive and negative possibilities. Lockwood et al. (2005) had young adults ( $N= 70$ ) and older adults ( $N= 65$ ) complete questionnaires on what/who they have

viewed as motivators to changing their health habits. They found when participants were trying to begin an advantageous behavior such as exercise, positive role models were more often mentioned. Healthy models also primarily influenced young adults, and older adults were helped by both (Lockwood et al., 2005). Thus, gain-framed messages, which focus more on positive information similar to the positive role models in this research, may produce stronger effects on motivation compared to loss-framed messages, which focus more on negative information that may be perceived as less relevant by young adults.

Adult interventions, in addition to youth interventions, have successfully utilized prospect theory to encourage people to increase their physical activity. In an interest to have adults become engaged in a sport, framing-based communication approaches were developed to increase involvement in physical activity (Lithopoulos et al., 2015). As previously mentioned, physical activity can serve as a preventative health behavior. Research has been conducted using the theory of possible selves and gain-framed messaging to see if certain messages had a stronger effect on participants, and if participants shown gain-framed messages had a stronger motivation to partake in sports than the control group (Lithopoulos et al., 2015). Unlike the present study, loss-framed messages were not researched. Participants between 40 and 59 years of age in the experimental group were shown a PowerPoint video with nine sport-gain framed messages that they could only watch once (Lithopoulos et al., 2015). They were asked to write about the theme of the video. The control group completed a quiz about sports and physical activities with no exposure to the video. All participants answered Likert-scale questions to see if their physical possible selves were stimulated. Adults who were presented the gain-framed PowerPoint were more likely to demonstrate high activation of their possible selves. Those in the gain-frame group indicated they could see themselves partaking in activities to interact with friends and

remain healthy and in a sense ‘prevent aging’ (Lithopoulos et al., 2015). Although the age group being tested is different in the present study, this research demonstrated that gain-framed messages can have an effect on people’s willingness to participate in sports and their likelihood of envisioning themselves incorporating some type of physical activity into their routine. Thus, gain-framed messages have the potential ability to increase cognitions about exercise.

In addition to evaluating cognitions, behaviors as a result of gain-framed messages can be measured. Jones et al. (2003) predicted positive framing would be more effective in conveying health messages to participants. Participants completed an initial exercise survey and were randomly assigned to either gain- or loss-framed messages encouraging physical activity (Jones et al., 2003). Finally, attitudes towards physical activity, exercise intentions, and cognitive responses were evaluated. As expected, gain-framed messages led to the greatest amount of both raised exercise intentions and participation. As supported by Tversky and Kahneman’s (1981) research, prevention behaviors were more influenced by gain-framed messages.

Research has been conducted regarding the best practice of creating exercise guidelines that successfully promote positive exercise cognitions and behaviors and how to distribute these to people. However, it has been argued that there is not enough research on the most effective types of messages or content that is circulated (Latimer et al., 2010). Six studies were reviewed that previously researched gain- and loss-framed messages and physical activity objectives. Latimer et al. (2010) found most of the studies that exposed participants to framed messages and completed intention scales had significant results. Overall, gain-framed messages led to stronger intentions to partake in physical activity when compared to loss-framed messages. Thus gain-framed messaging in the present study was hypothesized to increase participant’s intentions to exercise.

In former studies, framing has increased intentions to exercise, but previous habits may also influence the effectiveness of framing. Specifically, there have been several studies where gain-framing generated a high intention to exercise from participants who were previously sedentary (Latimer et al., 2008). However, participants who actively participated in physical activity previous to the study did not see exercise intentions that were as high. It has been predicted that gain-framed messages lead to higher self-efficacy, outcome expectancies, and intentions, thus resulting in increased physical activity (Latimer et al., 2008). To test this, over 500 adult participants, who did not participate in more than 20 minutes a day of exercise were exposed to either gain-, loss-, or mixed-framing of physical activity messages including recommendations, slogans, and guides (Latimer et al., 2008). After an initial phone call to gauge physical activity over the last 10 days, a physical activity guide that was framed in one of three ways was sent to participants. After two weeks, participants were sent a pedometer with instructions and a book to log their steps. All of the material was framed in only one way and participants received a final follow-up phone call and survey to measure physical activity. Similar to a majority of framing studies, this study found that gain-framed messages were successful in increasing the amount of exercise participants partook in after week nine. Because there were many instances of framing over a long period of time, it was predicted that this extended exposure to messages allowed participants to think more critically about what they were viewing (Latimer et al., 2008). As previously mentioned, cognitive processing of messages is crucial, which is why participants in the present study will have a longer period of immediate exposure to the framed images. Generally, the majority of evidence suggests that gain-framed messages may be more successful in increasing physical activity cognitions and behaviors than loss-framed messages may be.



**Moderators**

The overarching aim of the current study is to explore how prospect theory can be applied to influence motivation to exercise. People who might be looking to make behavioral changes can rely on the principles of framing to change how they think about exercise. However, it is possible that the effect of framing on intentions and motivation for exercise might be moderated by two important factors: consideration of future consequences and social comparison.

**Consideration of future consequences (CFC).** Often when considering how to act, people reflect on the future consequences that might occur. For some this is habitual; whether or not there is an initial result that is beneficial or even harmful, there is comprehension that there might be benefits to follow (Strathman, Gleicher, Boninger, & Edwards, 1994). It has been argued that other people do not worry about consequences and instead are interested in instant results. A scale was developed to measure if a participant is more apt to focus on the present or relative future or if they fall in the middle (Strathman et al., 1994). The scale was tested for validity and also validated using counterfactual examples. Strathman et al. (1994) noted that, if upward counterfactual thinking occurs (e.g., an event that could have happened), the individual will feel worse than if they do not act in this manner. If people in the current study, for example, ponder “If I exercised, I could have lost more weight,” they might be more influenced by the techniques. Studies support the idea that CFC can cognitively affect people and influence their emotional state, and thus when measuring physical activity engagement as a result of prospect theory, this moderator should increase the effect size. Those who score higher on the CFC scale should also have higher intentions to exercise, because they are more focused on the future and intentions to exercise in lieu of immediate benefits.

Research has been conducted to further understand the extent to which CFC might influence the relationship of prospect theory and physical activity intentions. In a study measuring both CFC and physical activity, participants were randomly assigned to one of four conditions and told to imagine a prototypical image of himself or herself as either a regular exerciser or a non-exerciser (Ouellette, Hessling, Gibbons, Reis-Bergan, & Gerrard, 2005). They then answered eight questions about these images they mentally created, and four weeks later received a follow-up call asking about their exercise habits on campus. The results suggested that those with low CFC had high reactions to prototypical images (Ouellette et al. 2005). Because prototypes require less imagination of the future, they are easier to see “here and now.” If an individual is low in CFC, then they may be more likely to look at immediate results, which in exercise might not be as impactful because it is often more beneficial to look at long term results. Thus in the present study, I expected that the higher CFC a participant demonstrates, the stronger the relationship will be between framed messages and physical activity intentions. This moderator will be applied in the current study to see how participants react to actual photographs and how people who are more likely to think about the future will be affected by framing techniques.

**Social comparison.** How we see ourselves is often affected by our surroundings. It has been suggested that social comparison can have a large influence on one’s motivation (Strickhouser & Zell, 2015). This introduces the idea that social comparison may be influential in exercise motivation as well. Social comparison is the comparison of one’s own efforts to one’s peers (Strickhouser, & Zell, 2015). In the domain of exercise, a way a person can socially compare to their peers would be seeing an advertisement of a person at a gym and paralleling different features of the models’ body to their own. When considering framing information about

exercise, past research has shown a connection between information presented and social comparison.

Marketing and advertising have been selective in the images and messages they put on display as they can be influential, partially due to social comparison in which people compare themselves to the models they see in the image (Werch, 2007). Specifically, females are more susceptible to being influenced by the media and social comparison, which can eventually result in displeasure with one's body. Previous research demonstrated that people have a greater chance of making social comparisons if the area or topic of discussion is significant to them. In the present study, this will be relevant if people have a previous history of exercising.

It has also been hypothesized that social comparison and thin-ideal media simultaneously impact each other (Rodgers et al., 2015). Ultimately, researchers believed not being satisfied with one's own self may lead women to want to transform their bodies (self-improve) to fit the social ideal. To measure this idea, data was collected from the Sociocultural Attitudes Toward Appearance Questionnaire, Physical Appearance Comparison Scale, The Body Dissatisfaction subscale of the Eating Disorders Inventory, and BMI calculations three times over a 14 month period from participants ( $N= 277$ ). Media-internalization could be a precursor to social appearance comparison, ultimately predicting unhappiness with one's image. As predicted, there is a relationship between media-internalization and body dissatisfaction (Rodgers et al., 2015). Internally, it is possible that social appearance comparison could be a result of a long-term goal of making changes to satisfy one's ideal self thus looking more like the images seen on media. Thus, in the present study, if people score higher on social comparison scales, they might be more likely to have higher intentions to exercise as this could increase their objectives to improve their own fitness.

## **Covariates**

**Previous Exercise.** In my analyses I plan to control for previous exercise based on research of Berry and Carson (2010), which shows it is important variable to consider. Using the variable of imagination, researchers were interested in understanding how participants would respond to framed-health messages (Berry & Carson, 2010). They measured how message framing and ease of imagination interacted to influence viewpoints on physical activity, diabetes, and heart disease. Berry and Carson (2010) hypothesized gain-framed text would yield positive attitudes towards exercise when symptoms presented were easier to imagine. Furthermore, they measured those who were previously active and hypothesized this group will be even more positively influenced by the messages because of their familiarity with the benefits of exercise. There were two groups of participants: undergraduate students ( $N = 175$ ) and adults over 55 years of age ( $N = 57$ ). Four groups were created: easy to imagine symptoms or hard to imagine symptoms with either gain or loss-framed physical activity messages. They were then asked about their exercise frequency in the last month, answered questions to determine their attitudes towards exercising, as well as how convinced they were by the messages they were shown (Berry, & Carson, 2010). No main effect was found of framed messages towards physical activity or imagination. When presented symptoms that were harder to imagine, participants who previously exercised less had worse attitudes towards the exercise messages (Berry, & Carson, 2010). An area that is important to examine for the present research is if prospect theory has different effects on people depending on their previous exercise.

## **Current Study**

This study examined how college students' motivation for physical activity was impacted by message framing. College students were selected due to the growing number of college

students who are obese or overweight, which in 2009 was 30-35% nationwide (Ferrara, 2009). Moreover, the declines in physical activity that occur during this age tend to remain stable into adulthood (Caspersen, Pereira, & Curran, 2000). This is an age where people begin to develop lifestyle habits and routines that can be either harmful or helpful, because it is a new period of independence and exploration (Arnett, 2000). In a college or university setting, there are typically opportunities to exercise through classes provided by the school or with other peers. It is a setting that often promotes living a healthier lifestyle and teaches students how to continue the habits they develop into adulthood (Ferrara, 2009). There is an array of elements that may encourage students to exercise, such as peer-motivation, accessibility of facilities, and the guarantee of campus safety so students feel secure while travelling to their destinations. All in all, the college setting has been a notably encouraging exercise environment (Ferrara, 2009). Thus college students are the ideal participants for this study, as they face issues of rising obesity, may be in a life-stage where exercise habits become engrained, and are part of an environment where exercise engagement is accessible and encouraged.

The present study researched how different types of images, or more specifically the text within images, influenced college students' intentions or motivation to exercise. The messages in the manipulation utilized gain- and loss-frame techniques based on the tenets of prospect theory. Compared to participants presented loss-framed imagery, participants presented gain-framed imagery were expected to show higher motivation for physical activity, as measured by intentions, self-efficacy, outcome expectations, and self-regulation. Additionally, CFC was expected to moderate the differences based on the image framing, such that those higher in this trait would show larger effects on motivation when presented with gain-framed imagery. Social comparison was also expected to moderate the differences based on the image framing, such that

those higher on this characteristic would display higher motivation when exposed to gain over loss-framed messages. I also explored if gender was a moderator of the relationship between framing and exercise motivation in the present study.

This study tested if prospect theory when applied to images was effective in increasing motivation for exercise. With social media involvement constantly gaining popularity as new applications are created, images and messages that are properly framed could be useful to encourage a behavior that has a plethora of positive effects and is not being utilized enough. Hence, it is crucial to decipher what message might be the most effective in encouraging both exercise cognitions and behavior.

## **Method**

### **Participants**

The sample for this study consisted of Union College students ( $N = 135$ ). There were 51 males and 84 females that took the study. Two participants were excluded from analysis of results. One failed 2 out of 3 random response checks and the experimenter log demonstrated more than one issue (e.g. on cell phone during experiment and debriefing). The second was also removed from data analysis because they explained that they had a medical condition that made them unable to exercise. Therefore, for this individual, motivation to exercise would not have been impacted by the experimental manipulation.

Thus, the total number of students was 50 men and 83 women ( $N = 133$ ) aged 17-24 ( $M = 19.23$ ,  $SD = 1.35$ ). Fifty men and 82 women reported consistent biological sex and gender identity; one woman reported “female” as her biological sex but did not report her gender identity. The majority of participants reported they were not Latino or Hispanic ( $n = 121$ ), whereas several participants stated they were Latino ( $n = 6$ ), and the remainder did not record an

ethnicity ( $n = 6$ ). Participants also indicated their race, and the findings were as follows:

Caucasian ( $n = 104$ ), African American/Black ( $n = 12$ ), Asian ( $n = 10$ ), Native Hawaiian or other Pacific Islander ( $n = 1$ ), American Indian or Alaskan Native ( $n = 1$ ), and Other or Preferred not to answer ( $n = 10$ ). The majority of participants indicated English was their first language ( $n = 120$ ), with the remainder specifying they had another native language aside from English ( $n = 13$ ). Almost half of the participants were on a sports team on campus ( $n = 64$ ). On average, women in this sample had a healthy body mass index (BMI),  $M = 23.58$ ,  $SD = 3.66$ . Most women in the sample ( $n = 60$ ) had a normal or healthy BMI between 18.5-24.9; one woman was underweight with a BMI below 18.5, and a small subset ( $n = 22$ ) were overweight with BMI values above 25. On average, men in this sample had a BMI classified as slightly overweight,  $M = 25.28$ ,  $SD = 4.24$ . Twenty-seven men in the sample had a normal or healthy BMI between 18.5-24.9, 21 were overweight with BMI values above 25, and two were underweight with a BMI below 18.5. On average, over the past 7 days, participants had performed over three hours of moderate-intensity physical activity,  $M = 3.19$ ,  $SD = 3.05$ , and over four hours of vigorous-intensity physical activity,  $M = 4.56$ ,  $SD = 4.32$ .

All participants were recruited through FREUD, the psychology department's online database, which is open to all Union College undergraduates. Participants could choose to receive  $\frac{3}{4}$ -1 psychology credit or a payment of \$6.00-8.00 with the amount of compensation depending on the total time it took them to finish the study.

## **Procedures**

Before administering the study, procedures, materials, and measures, including images to be analyzed, were reviewed by the Union College Human Subjects Review Committee. The

informed consent sheet, statements of confidentiality, and debriefing form were additionally evaluated to ensure that the study met ethical standards.

All participants completed the study in the same laboratory room. The room consisted of four smaller rooms with the same set-up including a chair, computer, keyboard, and mouse. Upon their arrival, participants were welcomed and the experimenter read a script, explaining what the study entailed. Participants were required to agree with the terms of the provided informed consent before continuing. All students were told if they completed the survey in less than 45 minutes they would be compensated with .75 credits or \$6.00, and anything over 45 minutes would yield one full credit or \$8.00. Before beginning, participants were encouraged to leave their cell-phones and other electronic devices outside of the individual room in which the study was taking place.

All participants completed several surveys on the computer to learn about their exercise habits. Then participants were randomly assigned to one of two imagery manipulation conditions, followed by questionnaires assessing the manipulation and its effect on mood, exercise intentions for the next week, and exercise-related social cognitions. Lastly, participants completed a demographic questionnaire. Once they were done, the computer program prompted them to return to the main room, where each participant was debriefed, provided compensation, and had any remaining questions answered.

### **Measures and Manipulation**

**Exercise.** The physical activity participation of participants during the week prior to taking the study was analyzed using two different measures, and perceived physical fitness was also assessed. The first way in which physical activity participation was measured was with an exercise scale adapted from Ouellette et al. (2005); this adapted measure is presented in



Appendix A. Participants were asked about the frequency of aerobic exercise for an athletic team, aerobic exercise not for an athletic team, stretching exercises, and muscle-strengthening exercises. Additional questions were added to determine the vigor and the frequency of participants' physical activity. An eight point scale was implemented to measure how often participants exercised from 0 (*never*) to 7 (*7 days a week*). An average was calculated to measure the extent of exercise behavior for the week.

The Stanford 7-Day Recall is another method of measuring participant's exercise activities over the last seven days (Sallis, Haskell, & Wood, 1985). Participants were asked to recall how much time they spent on both vigorous- and moderate-intensity physical activity in the last week. Vigorous-intensity activity included the following: jogging or running, swimming, strenuous sports such as singles tennis or racquetball, digging in the garden, chopping wood, etc. Moderate-intensity activity included the following: bicycling on level ground, brisk walking, sports such as golf or doubles tennis, yard work, heavy housecleaning, etc. The Perceived Functional Ability scale (PFA) approximated the stamina of participants while exercising and asked them, "Which exercise pace is just right for you?" (George, Stone, & Burkett, 1997). Additionally, participants were asked, "How fast could you cover a distance of 3-miles and NOT become breathless or overly fatigued?" Answers varied on a scale from walking at a slow pace to running at a fast pace. A mean score was calculated and helped gain a better understanding of how often and how rigorously participants' exercised.

**Social comparison.** The Physical Appearance Comparison scale (PACs) was used to measure one's likelihood of observing others actions or appearances in reference to one's self (Thompson, Heinberg, & Tantleff, 1991). A seven-point scale was used from 1 (*not likely at all*) to 7 (*very likely*) to gauge this probability with questions such as, "In social situations, I

sometimes compare my figure to the figures of other people.” The total score was used to evaluate social comparison rates, where a participant with a higher score is more likely to socially compare his or her physical appearance to others.

**Future consequences.** To measure how participants allowed concepts of the future to influence their present decisions, the Consideration of Future Consequences scale (CFCs) was implemented (Stratham, 1994). A five-point scale was utilized from 1 (*uncharacteristic of me*) to 5 (*characteristic of me*) to understand how influential potential future consequences were when making decisions on items such as, “I only act to satisfy immediate concerns, figuring the future will take care of itself.” The items were summed, and a higher number represents a higher CFC.

**Imagery manipulation.** Based on prospect theory (Tversky, & Kahneman, 1981) and the specifications of Jones (2005), 16 edited images were produced to create the manipulation for this study. See Appendix B for all images. Each image included a transposed message that corresponded with the frame: gain or loss. An example gain-framed statement reads, “Work out. Eat Well. Be Patient. Your body will reward you.” An example loss-framed statement reads, “If you don’t suck it up, one day you’ll have to suck it in.” For each message, there was a photograph of a man or a woman; all participants received gender-matched images. The four experimental groups included a presentation of one of the following: four gain-framed images with a man pictured ( $n = 24$  men), four gain-framed images with a women pictured ( $n = 42$  women), four loss-framed images with a man pictured ( $n = 27$  men), and four loss-framed images with a woman pictured ( $n = 42$  women). The selected photos were coordinated to minimize differences between photographs presented to both genders of participants. The themes of the photographs were as follows: long distance running, planking, completing abdominal

exercises, and running up steps. Thus, each participant was randomly assigned to receive four gender-matched images with one type of frame: gain or loss.

Similar to previous sport imagery research (e.g., Lithopoulos et al., 2015), participants were told to write about the themes of the images immediately after they viewed them. Participants were given three minutes to write about each image and were encouraged to focus on the details and themes of the photographs during their writing. Additional questions to analyze the images were developed comparable to the imagery studies of Ouellette et al. (2005). They focused on details of the images such as the subject's appearance, health, and energy levels. These themes were developed into six questions, which can be found in Appendix C.

A manipulation check was created to assure that the images developed were producing the properly invoked responses. Participants were required to complete 33 questions to assess whether or not the images viewed were effectively evoking responses in line with the assigned framing condition. It measured how pleasant or unpleasant participants judged the photographs to be and how much it exhibited the benefits or consequences of exercising or not. The full measure can be seen in Appendix D. If the independent variable manipulation was successful, answers involving positive outcomes related to physical activity should have been higher for those in the gain-framed group than those in loss-framed group and answers involving negative outcomes related to not exercising should have been higher for those in the loss-framed group than those in the gain-framed group.

To measure participants' affect after the manipulation, participants completed the Brief Mood Introspection scale (BMIS) using rankings of mood-adjectives (Mayer & Gaschke, 1988). The scale ranged from 1 (*definitely do not feel*) to 7 (*definitely feel*). This evaluated participants' affective valence and arousal at the time of taking the study. Whereas high arousal would mean a

participant is excited, low arousal would mean they are calm. Negative valence would reflect emotions such as anger, and positive valence would reflect emotions such as happiness.

**Exercise social cognitions.** A measure of exercise intentions over the next week was developed to predict participants' willingness to partake in both moderate- and vigorous-intensity physical activity. This measure can be seen in Appendix E. It inquired about how many minutes the person planned to work out for, followed by how strongly participants intended on sticking to those intentions using a seven point scale from 1 (*extremely unlikely*) to 7 (*extremely likely*).

Research has noted that attitudes towards exercise could impact physical activity completion (Gallagher & Updegraff, 2011). Therefore, the study also included the Exercise Self-Efficacy questionnaire (Marcus, Selby, Niaura, & Rossi, 1992). This five question survey asked participants if they were "Confident they can participate in regular exercise when they are... tired, in a bad mood, don't have the time, on vacation, when it is raining or snowing". These questions represent participant's ability to budget time, any negative emotions, as well as relapse counteractions.

To further evaluate participants' views on exercise, the present study used the Outcome Expectations for Exercise measure (Resnick, Zimmerman, Orwig, Furstenberg, & Magaziner's, 2001). This included a five-point scale of strongly agree/disagree with statements such as "Regular exercise makes me feel better physically." Furthermore, it evaluated how people feel after exercise both mentally and physically. Mean scores were used to measure this, with a higher score representing a stronger outcome expectation from exercise.

The Exercise Self-Regulation Scale was implemented to determine how people both plan and set exercise goals based on a five-point scale of 1 (*does not describe*) to 5 (*describes*

*completely*; Rovniak, Anderson, Winett, & Stephens, 2002). An example from the scale is, “I often set exercise goal.” An average score was used to analyze how apt participants are to both plan and set exercise goals.

**Demographic.** A demographic questionnaire was utilized at the conclusion of the study. The demographic questionnaire asked about basic background information such as race, gender, and religion. Additionally, participants were asked if they were on a sports team and what their height and weight were. The demographic questionnaire can be seen in Appendix F.

## Results

### Descriptive Statistics

The means and standard deviations for all measures can be found in Table 1. As stated before, participants engaged in a moderately high level of previous moderate and vigorous exercise of about eight hours a week. Overall, after being exposed to the manipulation, participants intended to exercise moderately and vigorously for about nine hours a week at three times a week after exposure to the framed material. The strength of these intentions were also fairly high for moderate and vigorous exercise at only one point below the scale maximum. Participants had moderate intentions to set exercise goals and to make plans to exercise. Generally, participants were likely to compare themselves to others and consider potential future events. Overall, participants strongly felt that exercising would help them feel less tired, help strengthen their bones, and make them feel better. They also were fairly confident that they could exercise when pressed for time, there is bad weather, and when they are tired. Thus, participants seemed to have a high level of previous exercise and high motivation for future physical activity.

The reliability for all multi-item measures can be found in Table 1. All measures aside from the exercise scale and the aroused-calm dimension of the BMIS ranged from acceptable ( $\alpha$

= 0.75) to excellent ( $\alpha = 0.94$ ). The majority of measures employed have been well-validated in past work. The only two measures reported in Table 1 that were created for this study were the exercise intentions measure, which evidenced high reliability, and the exercise scale, which evidenced poor reliability. This might be due to the fact that the exercise scale was developed from a three-question scale and had never been previously utilized.

### **Manipulation Checks**

When analyzing the post-imagery manipulation check, we expected there to be no significant difference in any of the items besides the eight items that reflected framing and asked about benefits gained from exercising versus consequences from not exercising (i.e., items 18-25 as seen in Appendix D). A *t*-test for independent means was performed, and there was a significant difference for these eight manipulation checks (see Table 2). These results suggest that those who were in the gain-framed group perceived that they saw the images in a way that was more positive and would present more benefits whereas the loss-framed group perceived the images in a negative manner such as consequences incurred from not exercising. An independent samples *t*-test was conducted to analyze if the two conditions differed on either of the mood spectrums. As seen in Table 2 there was no significant difference in the pleasant/unpleasant dimension or the aroused/calm dimension across gain- and loss-framed groups. Participants' mood did not differ between the gain- and loss-framed groups. Even though the loss group saw more negatively-based images, they felt no difference in mood after viewing the pictures.

Unexpectedly, three other post-imagery manipulation check items were significantly different (see items 3-5 in Table 2). Specifically loss-framing participants reported higher attention towards the images and interest and enjoyment in viewing the photographs than gain-framing participants. These items were significantly related to one another,  $r = 0.51-0.79$ ,  $p <$

0.01. Thus, a composite “image-engagement” variable of these three items was created for subsequent analysis,  $M = 4.29$ ,  $SD = 1.38$ ; the significant difference between gain- and loss-framing on this composite variable was replicated as expected,  $t(131) = 3.20$ ,  $p < 0.01$ .

### **Effect of Imagery Framing**

A  $t$ -test for independent means analyzed differences between gain- and loss-framing across all of the dependent variables. As seen in Table 3 and Figure 1, there was only a significant effect of gain- and loss- framing on moderate exercise intention strength. Those participants who were presented with loss-framing reported stronger intentions to engage in moderate-intensity physical activity compared to those presented with gain-framing.

A multivariate general linear model was computed in which framing conditions was used to predict the exercise motivation and cognition variables when controlling for the previous exercise measures (i.e., Stanford 7 Day Recall and Perceived Functional Ability). In line with the findings from the independent samples  $t$ -test, the multivariate test revealed that framing condition did not predict significant variance in all seven outcome variables,  $F(7, 119) = 1.01$ ,  $p = 0.43$ , partial  $\eta^2 = 0.06$ . However, even when controlling for previous exercise and perceived functional ability, the framing condition did continue to predict significant variance in the strength of moderate-intensity exercise intentions,  $F(1, 125) = 6.03$ ,  $p = 0.02$ , partial  $\eta^2 = 0.05$ .

Due to the unexpected differences in interest, enjoyment, and attention that the framing manipulation produced, an exploratory mediation analysis was performed to examine if the differences that gain- and loss-framing participants showed in the strength of their intentions for moderate-intensity exercise might be explained by the differences in the composite image-engagement variable. A regression analysis using Hayes’s Process tool in SPSS was computed (Hayes, 2013); this analysis computed a bias corrected accelerated (BCa) bootstrapped

confidence interval (CI) based on 1000 samples. There was a significant indirect effect of framing condition on moderate intention strength through image-engagement,  $b = -0.16$ , BCa CI  $[-0.35, -0.05]$ , representing a small effect,  $\kappa^2 = 0.07$ , 95% BCa CI  $[0.02, 0.14]$ . Figure 2 displays a model of framing condition as a predictor of moderate intention strength, mediated by image-engagement.

### **Moderation Analyses**

**Consideration of future consequences.** To test whether the relationship between gain- and loss-framing and moderate-intensity exercise intention strength was moderated by CFC, a regression analysis using Hayes's Process tool in SPSS was computed (Hayes, 2013). As seen in Table 4, there was no evidence for an interaction effect. Although framing condition significantly predicted moderate-intensity intention strength in this linear model, CFC and the interaction term did not significantly predict moderate-intensity intention strength,  $F(3, 129) = 2.32$ ,  $R^2 = 0.05$ ,  $p = 0.08$ .

**Social comparison.** To test whether the relationship between gain and loss-framing and moderate-intensity exercise intention strength was moderated by physical appearance comparison, a regression analysis using Hayes's Process tool in SPSS was computed (Hayes, 2013). As seen in Table 5, there was no evidence for an interaction effect. Although framing condition significantly predicted moderate-intensity intention strength in this linear model, physical appearance comparison and the interaction term did not significantly predict moderate-intensity intention strength,  $F(3, 129) = 2.32$ ,  $R^2 = 0.05$ ,  $p = 0.08$ .

**Gender.** To test whether the relationship between gain and loss-framing and moderate-intensity exercise intention strength was moderated by gender, a regression analysis using Hayes's Process tool in SPSS was computed (Hayes, 2013). The effect was moderated by



gender,  $F(3, 129) = 4.08$ ,  $R^2 = 0.08$ ,  $p = 0.01$ . For men, framing condition did not predict moderate-intensity intention strength,  $b = 0.02$ , 95% CI  $[-0.62, 0.67]$ ,  $t = 0.07$ ,  $p = 0.95$ . For women, framing condition significantly predicted moderate-intensity intention strength,  $b = -0.83$ , 95% CI  $[-1.33, -0.34]$ ,  $t = -3.34$ ,  $p < 0.01$ . Figure 3 presents the interaction between gender and framing condition across all of the dependent variables.

### Discussion

The hypothesis that gain-framed messages would have a larger effect on exercise motivation than loss-framed messages was not supported in the present study. Across the dependent variables of moderate-intensity exercise intentions and associated intention strength, vigorous-intensity exercise intentions and associated intention strength, outcome expectations, self-regulation, and self-efficacy, there was only a significant difference in the strength of moderate-intensity exercise intentions. Compared to participants exposed to gain-framed messages, participants exposed to loss-framed messages had stronger intentions to engage in moderate-intensity physical activity. Although not significant, compared to gain-framing, loss-framing led to higher motivation across all of the dependent variables as evidenced by the effect sizes presented in Table 3. Therefore, presenting exercise information in terms of potential losses (e.g., “You can be sore tomorrow, or you can be sorry tomorrow. You choose.”) might be more motivating than presenting information in terms of potential gains (e.g., “You’re only one workout away from a good mood.”). While the majority of previous researchers found gain-framing to be more successful than its counterpart, several researchers, such as Rothman and Salovey (1997), found inconclusive and unreliable results in relation to prospect theory.

Although surprising, there was a significant difference presented in questions asking about participants’ attention during the task and interest/enjoyment while viewing the pictures in

the manipulation check. Specifically, those in the loss-framed groups rated these questions on the higher end of the scale. The variable image-engagement was developed from the manipulation check questions regarding interest, enjoyment, and attention. Because these questions had a significant effect size, exploratory research was conducted to see if these variables mediated framing effects. Women in the loss-framed condition demonstrated higher image-engagement when compared to the gain-framed condition. Women attended to these images differently, paid more attention to them, and reported higher levels of enjoyment and engagement. This effect of loss-framing should be considered when developing images and messages that target women specifically as their audience.

Neither of the predicted personality moderators had an effect on the dependent variable of intentions. In fact CFC and physical appearance social comparison scores were unrelated to any of the measures of current exercise behavior, perceived fitness, exercise intentions, or social cognitions and motivation for physical activity. CFC and social comparison levels did not impact the effect of framing as previous researchers found. Previous research determined that CFC served as a moderator for those who were able to imagine a possible self (Ouellette et al., 2005). In contrast to these findings, CFC did not moderate motivation, which might be more reflective of the images presented to participants in this study. Additionally, Strickhouser and Zell (2015) concluded social comparison influenced how participants evaluated themselves, and Rodgers et al. (2015) argued that social appearance comparison might result in long-term aspirations to change one's self-image. Perhaps social comparison is more common on college campuses amongst college students, and thus did not have as much of an effect on the present study because it is an everyday occurrence. It is also possible that social comparison could be a long-term moderator, affecting not only intentions to exercise, but behaviors, as social comparison

might lead to long term self-image dissatisfaction (Rodgers et al., 2015). More research would have to be conducted to measure these moderators.

After conducting further tests, the main effect of framing on the strength of moderate-intensity physical activity intentions was only significant for women and not men. Perhaps women were more strongly manipulated by the photographs than men. It is possible that this occurred due to the sample consisting of only undergraduate women. On a college campus, there might be higher pressures to conform to the norms of society, to be fit and to be thin. It would be interesting to explore the relationship between women and framing. Specifically research should be done to understand why loss-framed and not gain-framed messages in this study influenced only women. Further research should be done to see if there were aspects of the content of the negative messages that might have had a stronger influence on women who might be more exposed to “conformity media.” This should be done to see if this sample was unique, or if loss-framing is actually more successful to influence exercise intentions and motivation in women.

### **Limitations**

The present study has several limitations. First, it only measured intentions to exercise contrary to assessing the actual behavior of participating in forms of physical activity after exposure to framed photographs. Although one may report they would like to exercise for several hours in the upcoming week, there is no telling of how they will follow through with the intentions. Thus, the present study does not measure the effectiveness of gain- and loss-framed messages outside of participants anticipating to exercise.

The sample that was utilized for the present study could have been unrepresentative of a broader target population that includes adults not attending an expensive, private liberal arts college. Ideally, a sample of more demographically diverse young adults should have been

utilized, combined with a larger sample size, which might result in different effects on dependent variables. Primarily, this would allow for a better representation of the population, and it would reduce the likelihood of finding effects due to chance. Because the sample was restricted to a specific group of college students, the target population of young adults was not met. College students typically have free access to workout centers or classes on campus, whereas young adults might have to work harder simply to start their journey of working out. This difference in access may have affect how the two populations differ in intentions or cognitions to exercise. Having to take the extra steps to exercise might be a barrier young adults aside from college students are not as willing to face. Furthermore, college students might be exposed to images like those used in the manipulation more than young adults as a whole because they are more attuned to social media accounts, and the influence of others' media conformity and norms on campus. Thus, this sample may respond differently to such images when compared to alternative populations of young adults. Because emerging adults are developing identities which may include exercise habit formation, this is an important population to target. Future research would benefit from exploring how different demographic and educational characteristics impact the effect of framing on exercise motivation.

Additionally, the majority of participants were compensated in psychology credit, which is required to complete two Union College classes. Convenience sampling was utilized, in lieu of random sampling which may have also influenced the results. This often leads to an under-representation of certain groups, or an over-representation of psychology students who solely wanted to get credit for the experiment and potentially had no other interest in the study. Effort put in by all participants despite their method of compensation might have been diminished. Whether they needed credit for class or money, they knew that they would be compensated in

some form or another, thus reducing their motivation to diligently complete the surveys.

Participants might have sped through the questions, or not have looked at the images presented for the full period of time, thus reducing the validity of the manipulation. This study did include random response checks and a careful participant log to control for these problems. However, these are not fail-safe methods.

Another limitation might have stemmed from the survey itself. Many of the questions were personal (e.g., previous exercise or current weight), which may have resulted in answers driven by the social desirability bias. Despite the fact that all participants knew the experiment was anonymous and watched researchers enter coded subject numbers, they might still have been embarrassed about their weight or exercise habits. They could have responded in a manner that society would deem as normal, instead of answering truthfully. This would affect the amount to which the study reflects the true effects of framing on exercise motivation.

The program, Media Lab, was utilized to avoid the need for manual data entry and associated errors; however it is not a modern mode of surveying. Today, people are used to high-tech, interactive programming. This most likely would not have a huge effect on the results but may have made participants less engaged as time went on. Additionally, while most participants completed the experiment in the afternoon, it is difficult to predict what the participants (who were all students) had just experienced in their classes or had on their mind for the remainder of the day. These other tasks or thoughts could have been distracting from the present study. As previously mentioned, all of the images were self-made with a computer program. Some of the photographs were clearer than others, which may have had an effect on how reliable participants thought the study was. Thus, there are several aspects of the study design and implementation that might not reflect how such framing might occur in the real-world, particularly through the

use of social media platforms such as Instagram. Because of this, future research should test whether or not loss-framed messages have an impact on exercise motivation in the field.

### **Future directions**

In order to examine how prospect theory-based framing might have an impact on exercise motivation, there are many avenues for future research. The present study could be applied to a larger range of age groups. College students typically have free and easy access to exercise supplies or a gymnasium; older adults normally have to pay for gear and memberships to exercise. This additional cost might change how much people are motivated to partake in physical activity amongst the array of commitments outside of schoolwork. Presenting the consequences of exercising might encourage people to take the leap and invest in exercising. A longitudinal study would not only be able to depict how accurate intentions to exercise in predicting actual behavior to exercise but would allow researchers to study the long-term effects of framing. Because participants reported their intentions in the same setting as the manipulation, they might not have been as influenced by the framing, as a repeated, long-term exposure might be.

A similar study could be utilized to measure framing effects on exercise intentions using a stronger manipulation. As mentioned, the images were all made by the researcher, and might be seen as more reputable if a professional designer made the images. There has been little research conducted on the interaction of framing effects and credibility of messages when applied to physical activity intentions. Researchers have predicted that sources that are both positive and display higher authority will be the most influential towards exercise intentions (Arora, Stoner, & Arora, 2006). In a study of 136 participants who rated credibility of a newsletter and were asked to answer several exercise intention questionnaires, negatively-framed

messages had an effect only if credibility was high. Credibility did not impact positively-framed messages. In the present study, surprisingly, the loss-framed images had the most influence on moderate intentions to exercise and were made using the same programs as the other twelve images. The images were not a well-known advertisement, but this would not matter for the gain-framed images. While credibility most likely would not affect gain-framed images, it would be interesting to see if professionally created images would further increase the strength of moderate exercise intentions as well as other exercise motivation variables for the loss-framed group.

Additionally, more images shown for a shorter period of time, such as the design in Lithopoulos' et al. (2015) PowerPoint video might have a stronger manipulation than four images for a three-minute period. Seeing more than just four people partake in an array of vigorous- and moderate-intensity activities might be able to evoke participants imagining themselves partaking in the activity more. Introducing different workout environments or equipment with an array of different subjects might allow participants to form stronger personal connections and prototypical self-images from the photographs, consequently creating stronger intentions to exercise.

### **Implications**

In 2015, the number of Instagram users in the United States was estimated to be 77.6 million (Smith, 2016). This is a main source of sharing personal photographs or videos, including exercise progress, fitness tips, and inspirational messages. The present study examined which type of messages might be the most effective for users trying to motivate others to exercise. The use of framing does not stop with Instagram; it has been used in health-related programs to encourage others to start exercising, and even in pamphlets or advertisements. If a

certain type of message is more effective, it should be utilized to help influence people to form healthy habits, such as engagement in regular physical activity. While previous research has supported positive-framing as significantly more effective than loss-framing for preventative behaviors such as, motivating people to exercise, the present study did not support these findings. Researchers have noted unreliable results in framing studies and preventative behaviors (Rothman, & Salovey, 1997). Thus, the results of this thesis additionally suggest that further research is needed to understand the full extent of framing. With obesity on the rise in the United States, it is extremely crucial now more than ever before to uncover how to properly motivate people to exercise and partake in habits that will help keep people healthy. Framing could be one key to reducing not only obesity, but the plethora of other problems that can accompany it.



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Table 1  
Averages Scores, Standard Deviation and Reliability of All Measures

<u>Measure</u>	<u>Mean Score (M)</u>	<u>Standard Deviation (SD)</u>	<u>Cronbach's <math>\alpha</math></u>
Exercise Scale	3.27	1.42	0.55
PACs	22.09	5.95	0.75
CFCs	42.87	6.41	0.79
Perceived Functional Ability	4.64	1.22	0.81
Brief Mood Introspection (Pleasant/Unpleasant)	6.52	13.44	0.84
Brief Mood Introspection (Aroused/Calm)	23.83	7.81	0.58
Stanford 7 Day Recall (Moderate)	3.19	3.05	--
Stanford 7 Day Recall (Vigorous)	4.56	4.32	--
Exercise Intentions (Moderate)	4.08	3.43	--
Exercise Intentions (Vigorous)	4.89	3.95	--
Intention Strength (Moderate)	5.76	1.17	0.86
Intention Strength (Vigorous)	5.90	1.30	0.94
Exercise Self-Regulation(Planning)	2.70	0.78	0.77
Exercise Self-Regulation (Goals)	2.87	0.91	0.89
Outcome Expectations	4.16	0.67	0.89
Exercise Self-Efficacy	5.04	1.57	0.84

Table 2  
Manipulation Check Analysis[illegible]

Table 3

Exercise Motivation across Variables

<u>Measure</u>	<u>Loss</u> <u>Mean</u>	<u>Gain</u> <u>Mean</u>	<u>Std. Error</u> <u>Loss</u>	<u>Std. Error</u> <u>Gain</u>	<u>t</u>	<u>d</u>
Exercise Self Regulation	2.90	2.68	0.08	0.10	1.63	2.43
Exercise Strength (Moderate)	6.02	5.50	0.12	0.16	2.56	3.67
Exercise Strength (Vigorous)	6.08	5.72	0.15	0.17	1.62	2.26
Exercise Intentions (Moderate)	4.55	3.62	0.48	0.35	1.57	2.22
Exercise Intentions (Vigorous)	5.52	4.27	0.53	0.43	1.82	2.59
Outcome Expectations	4.20	4.13	0.09	0.08	0.61	0.82
Exercise Self Efficacy	5.20	4.89	0.18	0.20	1.17	1.62



Table 4  
Linear Model of CFC x Framing Interaction

	<u><i>b</i></u>	<u><i>SE b</i></u>	<u><i>t</i></u>	<u><i>p</i></u>
Constant	5.76 [5.56, 5.97]	0.10	55.55	$p < .01$
CFC	0.01 [-0.03, 0.04]	0.02	0.35	$p = .73$
Framing	-0.51 [-0.92, -0.10]	0.01	-2.44	$p = .02$
Interaction	0.01 [-0.06, 0.07]	0.03	0.15	$p = .88$

Table 5  
Linear Model of PACS x Framing Interaction

	<u><i>b</i></u>	<u><i>SE b</i></u>	<u><i>t</i></u>	<u><i>p</i></u>
	5.76			
Constant	[5.56, 5.96]	0.10	56.43	$p < .01$
	-0.01			
PACS	[-0.04, 0.03]	0.02	-0.35	$p = .73$
	-0.52			
Framing	[-0.92, -0.11]	0.20	-2.53	$p = .01$
	-0.02			
Interaction	[-0.08, 0.05]	0.03	-0.51	$p = .61$

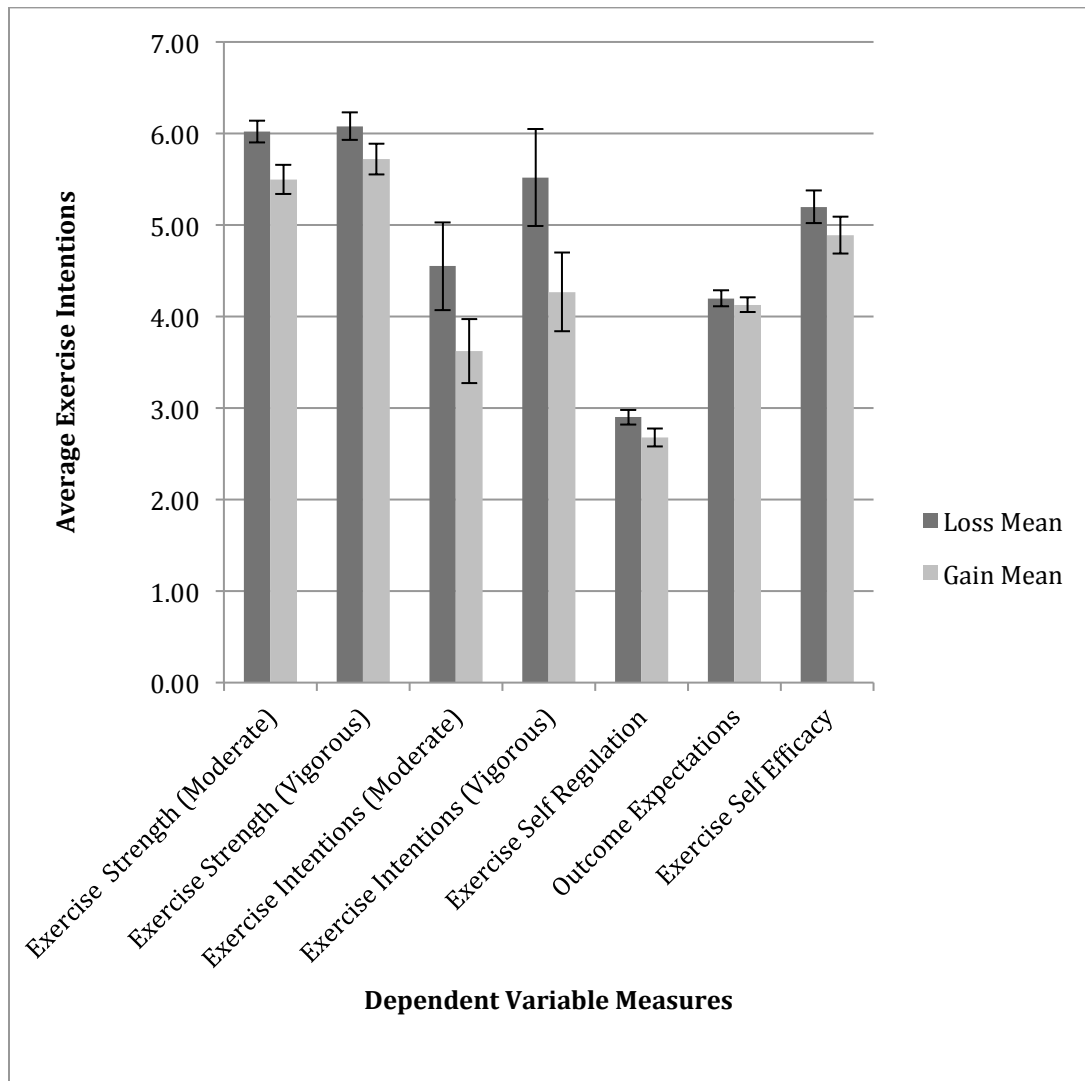
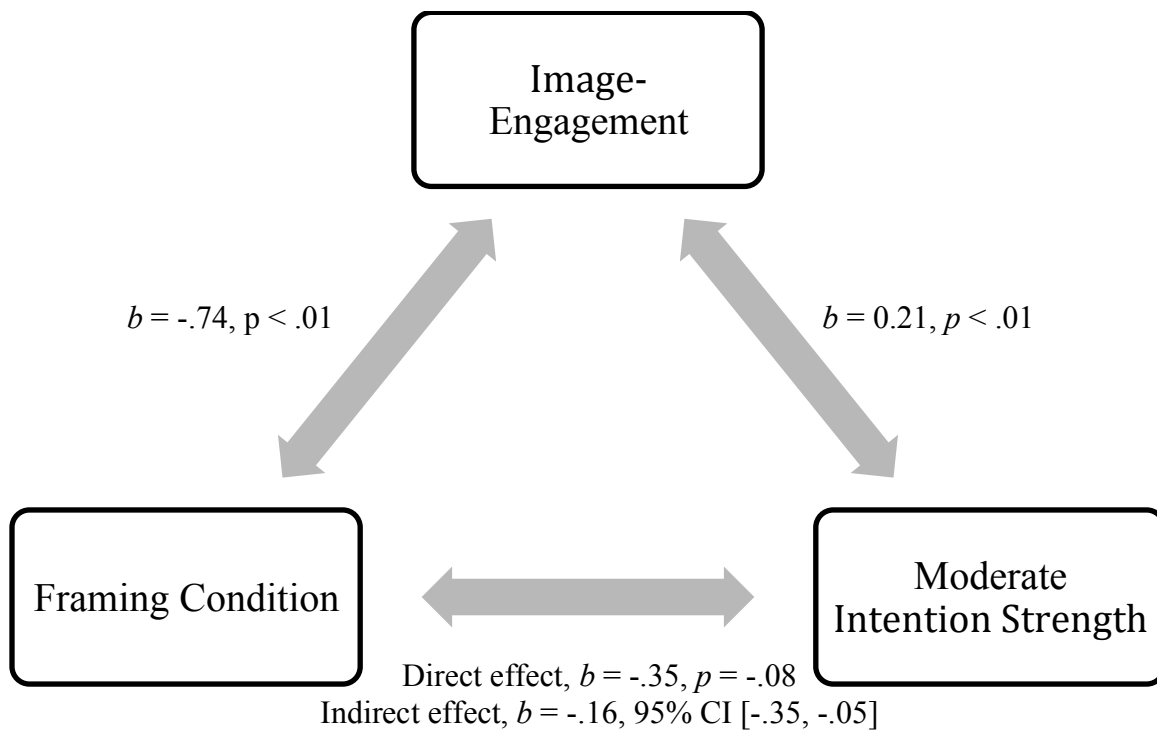


Figure 1. Average exercise intentions for the gain- and loss-framed experimental groups across all seven variables.



*Figure 2.* A model of framing condition as a predictor of moderate intention strength, mediated by image-engagement.

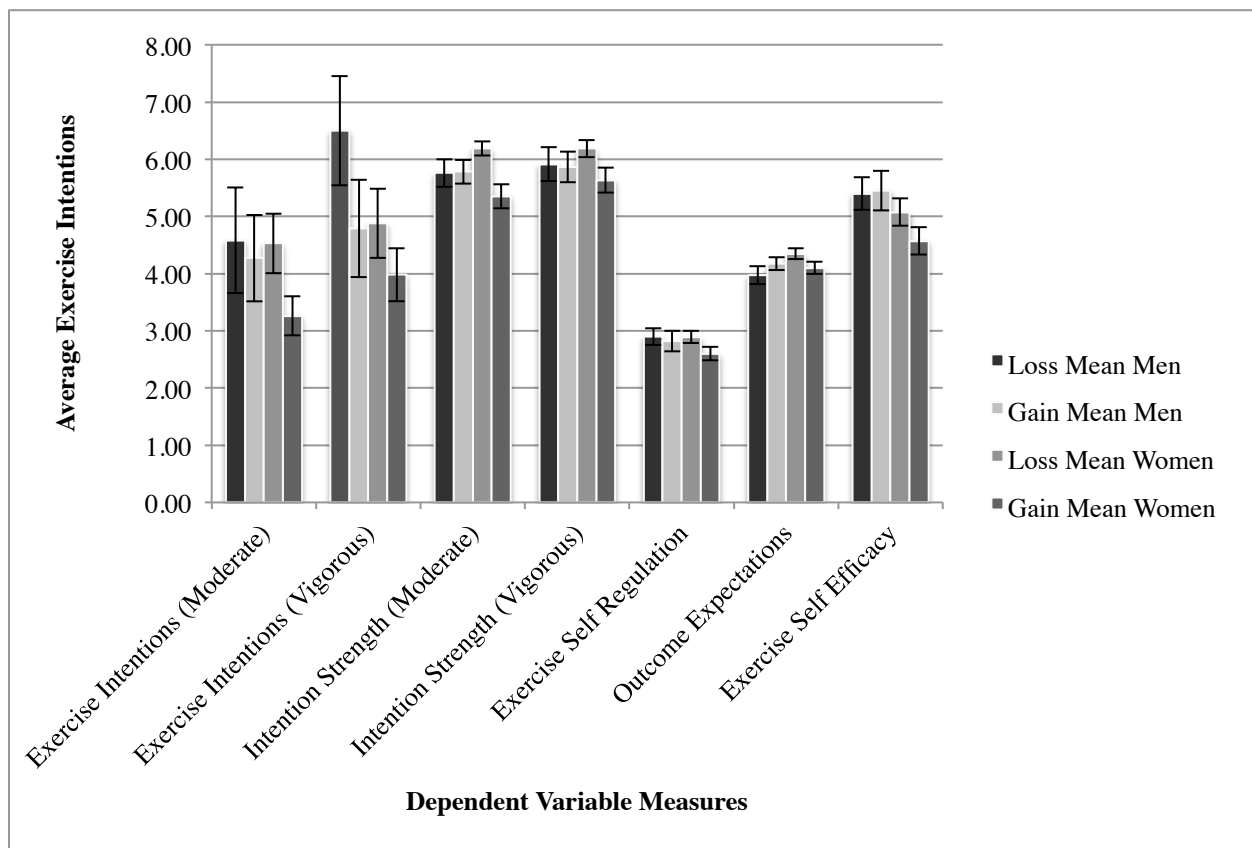


Figure 3. Interaction between gender and framing conditions across all of the dependent variables.

For each of the statements below, please indicate how many days in the last week you participated in the activities listed.

- |       |   |   |   |   |   |   |               |
|-------|---|---|---|---|---|---|---------------|
| 0     | 1 | 2 | 3 | 4 | 5 | 6 | 7             |
| Never |   |   |   |   |   |   | 7 Days a Week |

- |       |   |   |   |   |   |   |               |
|-------|---|---|---|---|---|---|---------------|
| 0     | 1 | 2 | 3 | 4 | 5 | 6 | 7             |
| Never |   |   |   |   |   |   | 7 Days a Week |

- 0 1 2 3 4 5 6 7  
Never 7 Days a Week

- |       |   |   |   |   |   |   |               |
|-------|---|---|---|---|---|---|---------------|
| 0     | 1 | 2 | 3 | 4 | 5 | 6 | 7             |
| Never |   |   |   |   |   |   | 7 Days a Week |

- \_\_\_\_\_ This week I engaged in about the same physical activity than I typically do.

Appendix B  
Framed Exercise Imagery









Appendix C  
Imagery Manipulation Writing Task

For the next 3 minutes, please analyze the image that is being presented to you. Once you are done examining it, please write about the theme(s) that appeared in the photograph.

What was the first thing that came to your mind when you thought of this image?

What did you think about the person's appearance in the image?

What would you conclude about this person's general health?

How would you describe this person's energy level?

What do you think this person's attitude towards life is?

How would you imagine the relationships of the person you viewed?

### Appendix D Manipulation Check Questions

1. How hard did you try on the task?

X X

Very  
Little

Very  
Much

2. How much did you feel the task was important?

X X

Not  
At all

Very  
Much

3. To what extent, were you able to keep your attention centered on the task?

X X

Not  
At all

Very  
Much

4. How interested were you in viewing the images?

X X

Very  
Little

Very  
Much

5. How much did you enjoy viewing these images?

X X

Very  
Little

Very  
Much

6. How unpleasant was the task?

X X

Not  
At all

Very  
Much

7. How stressful did you find this task?

X X

Not  
At all

Very  
Much

8. How much did this task make you feel self-conscious?

X X

Very  
Little

Very  
Much



18. To what extent did you think the images presented in the task were positive?

X X

Not

At all

Very

Much

19. To what extent did you think the images presented in the task were negative?

X X

Not

At all

Very

Much

20. I felt that the images displayed

X X

Positive Information

Negative Information

21. How much did the images focus on obtaining a desirable outcome (e.g., exercising to feel good)?

X X

Not

At all

Very

Much

22. How much did the images focus on avoiding an undesirable outcome (e.g., exercising to NOT feel bad)?

X X

Not

At all

Very

Much

23. How much did images focus on obtaining an undesirable outcome (e.g., exercising to feel bad)?

X X

Not

At all

Very

Much

24. To what extent did the image tell you about benefits of exercising?

X X

Not

At all

Very

Much

25. On the whole, I found the images to be

X X

Pleasant

Unpleasant

26. To what extent did the image tell you about the consequences of not exercising?

X X

Not

Very

At all

Much

27. How much did images focus on avoiding a desirable outcome (e.g., exercising to NOT feel good)?

X X

Not

Very

At all

Much

### Appendix E Exercise Intentions

For this study, regular exercise is defined as one of the following:

- Moderate-intensity physical activity (e.g., walking briskly, water aerobics, bicycling slower than 10 miles per hour, doubles tennis, ballroom dancing) for at least 150 minutes (2 hours and 30 minutes) per week.
- Vigorous-intensity physical activity (e.g., jogging, running, singles tennis, aerobic dancing, bicycling 10 miles per hour or faster, jumping rope, hiking uphill) for at least 75 minutes (1 hour and 15 minutes) per week.
- An equivalent combination of moderate- and vigorous-intensity aerobic activity as listed above per week.

In the next week, report how many hours of moderate exercise you intend to perform \_\_\_\_\_ hours  
In the next week, report how many hours of vigorous exercise you intend to perform \_\_\_\_\_ hours

---

We are also interested in examining how strongly you hold these intentions. Please answer the following questions.

How strongly do you intend to exercise at a moderate intensity for X minutes next week?

1	2	3	4	5	6	7
Not very strongly						Very
strongly						

How strongly do you intend to exercise at a vigorous intensity for [insert participant response] minutes next week?

1	2	3	4	5	6	7
Not very strongly						Very strongly

I am determined to exercise at a moderate intensity for [insert participant response] minutes next week.

1	2	3	4	5	6	7
Not at all						Very much

I am determined to exercise at a vigorous intensity for [insert participant response] minutes next week.

1	2	3	4	5	6	7
Not at all						Very much

I will try my best to do moderate-intensity exercise for [insert participant response] minutes next week.

1	2	3	4	5	6	7
Extremely unlikely						Extremely likely

I will try my best to do vigorous-intensity exercise for [insert participant response] minutes next week.

1	2	3	4	5	6	7
Extremely unlikely						Extremely likely

How likely is it that you will perform moderate-intensity exercise for [insert participant response] minutes next week?

1	2	3	4	5	6	7
Extremely unlikely						Extremely likely

How likely is it that you will perform vigorous-intensity exercise for [insert participant response] minutes next week?

1	2	3	4	5	6	7
Extremely unlikely						Extremely likely

Appendix F  
General Information Questionnaire

- 1) What is your age? \_\_\_\_\_
- 2) What is your biological sex?  
Male  
Female  
Intersex  
Prefer not to answer]
- 3) What is your gender identity?  
Male  
Female  
Non-Binary  
Prefer not to answer
- 4) What ethnicity do you consider yourself to be?  
Hispanic or Latino  
NOT Hispanic or Latino  
Prefer not to answer
- 5) In which racial or national-origin group do you consider yourself to be included? Select one or more of the following.  
American Indian or Alaskan Native  
Asian  
Black or African-American  
Native Hawaiian or other Pacific Islander  
White  
Other (Please specify) \_\_\_\_\_  
I prefer not to answer this question
- 6) Is English your native language?  
Yes  
No



7) How would you describe your religious background?

Catholic (Christian)

Orthodox Eastern (Christian)

Protestant (Christian - e.g., Baptist, Methodist, Lutheran)

Mormon (Christian)

Jewish

Muslim/Islamic

Buddhist

Hindu

Other

No religion

Prefer not to answer

8) Please indicate how committed you are to your religious beliefs:

Devout (Strong)

Moderate

Inactive

Not applicable

9) Are you on a sports team?

Yes

No

10) If yes, please circle which type of team you are a part of:

Intercollegiate

Intramural

Club

Recreational

11) What is your height? \_\_\_\_ feet \_\_\_\_ inches

12) What is your current weight? \_\_\_\_\_ pounds

13) What is your ideal weight? \_\_\_\_\_ pounds

14) What is the most that you have ever weighed? \_\_\_\_\_ pounds

15) People take surveys for a lot of reasons. Were you completely honest and serious in responding to this survey? Or were you joking around or giving less-than-honest responses?

I answered the survey seriously and honestly.

I provided joking or less-than-honest responses to the survey.