Comparing Gain- and Loss-Framed Messages on Intent to Exercise in Adults Over 40 years: A Randomized Controlled Trial

Pallavi Menon
University of Pennsylvania

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Comparing Gain- and Loss-Framed Messages on Intent to Exercise in Adults Over 40 years: A Randomized Controlled Trial

Abstract
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Keywords
Framing, gain, loss, exercise, intent

Disciplines
Medicine and Health Sciences | Social and Behavioral Sciences
Comparing Gain- and Loss-Framed Messages on Intent to Exercise in Adults Over 40 years:

A Randomized Controlled Trial

By

Pallavi V Menon

pallavim@wharton.upenn.edu

An Undergraduate Thesis submitted in partial fulfillment of the requirements for the

WHARTON RESEARCH SCHOLARS

Faculty Advisor:

Iwan Barankay

Associate Professor of Management,

Associate Professor of Business Economics and Public Policy

THE WHARTON SCHOOL, UNIVERSITY OF PENNSYLVANIA

MAY 2021
I would first like to express my immense gratitude to Dr. Iwan Barankay who has advised me over the past year from study design, and implementation to the analysis and completion of my research. Despite the challenges with patient recruitment during COVID-19, Professor Barankay motivated me to be flexible with my research structure. His guidance through each step including the IRB approval process, funding requests, study launch and data analysis has been immensely helpful to me as an undergraduate pursuing an independent research study for the first time.

I would also like to thank Dr. Burns and Dr. Catherine Schrand. As an advisor of the LSM program, Dr. Burns has been a huge advocate for me since I joined the program. I am grateful for his unwavering support since my proposal of this project, his advice, and his willingness to connect me to a number of experts in his vast network. I am also extremely grateful to Dr. Schrand who has advised me on the intricacies of the research process. She has always been available to answer my questions through the semester and her immense knowledge and experience always set me on the right path. I am also thankful for Dr. Utsav Schurmans’ assistance in obtaining funding from The Wharton School, which enabled me to recruit and survey participants for the study.

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ABSTRACT

Cumulative prospect theory predicts that losses motivate behavior more than equal gains. However, due to the complexity of health preventive behaviors, research still remain inconclusive about the most effective frame type. In this study, researchers aimed to examine the impact of gain- and loss-framed video to incentivize intent to exercise in adults over the age of 40. The authors randomly assigned participants (N=259) to either a gain-framed (N=129) or loss-framed condition (N=130), in which they received factually equivalent video emphasizing the benefits of exercise or the costs of not exercising. A manipulation check and attention check were also administered. T-tests and difference-in-difference were used for statistical analysis. The researchers revealed that there was no statistically significant difference in intent to exercise between the gain-framed and loss-framed conditions. Furthermore, no statistically significant interaction was found between gender and message framing. These results may be due to the low intensity of the intervention, the short time frame or individual differences in self-efficacy. Nevertheless, a larger scale and long-term study addressing population characterization based on gender, self-efficacy and baseline intention is required to translate results to policy recommendations.

Keywords
Framing, gain, loss, exercise, intent

Disciplines
Medicine and Health Sciences, Social and Behavioural Sciences
INTRODUCTION

The purpose of this research study is to examine the effectiveness of gain vs loss framed health messages on intent to exercise in adults above the age of 40. Previous research grounded in prospect theory and self-efficacy theory shows the effectiveness of gain framed messages for fruit and vegetable intake (Ots and Elbert, 2018), smoking cessation (Salovey et al., 2007), and user’s intentions to use fitness applications (Lim and Noh, 2017). However, other research has shown a higher effectiveness of loss framed messages and financial incentives for long term physical activity among overweight and obese adults (Volpp et al., 2016 and O’Keefe and Jensen, 2011). Therefore, while message framing is an important behavior change tool, research still remains inconclusive about the most effective frame for encouraging health preventative behaviors. In this study, authors randomly assigned participants (N=259) to either a gain- or loss-framed condition, in which participants were required to watch factually equivalent video encouraging physical exercise that emphasizes either the benefits of exercising (gains) or the costs of not exercising (losses), respectively. A gain-framed appeal emphasizes the advantages of compliance with the advocated action (e.g., “if you exercise regularly, it will be easier to maintain a healthy body weight”); a loss-framed appeal emphasizes the disadvantages of noncompliance (“if you don’t exercise regularly, it will be harder to maintain a healthy body weight”) (O’Keefe and Jensen, 2011).

Since most of the research on message framing for exercise is performed on younger populations or demographics with obesity, this study focused on older participants. Furthermore, to maximize safety in the COVID-19 environment, this study measured intent to exercise based on an established scale (Courneya, 1994), rather than exercise behavior.
Higher levels of regular physical activity have proven association with lower rates of cardiovascular disease, diabetes, obesity, hypertension, and all-cause mortality (Caspersen and Mosterd, 1994). However, more than half of adults in the United States do not attain the minimum recommended level of physical activity to have these health benefits (CDC, n.d). Regular exercise combined with limiting calorie intake was shown to be most effective in reducing body mass (Andersen, 1999). Exercise provides health benefits even if people do not lose weight (Blair and Jackson, 1995). There are also psychological benefits to exercising: people who exercise regularly are likely to be less depressed, have higher self-esteem, and have an improved body image (Brownell, 1995). Regular exercise may also reduce stress and anxiety (Kayman, Bruvold and Stern, 1990).

Currently, many programs directed at incentivizing physical exercise do so through gain or loss framed financial incentives (Rand Corporation, 2013), typically administered as part of health insurance plans. While effective, these programs can be costly to maintain and are not always feasible. For example, when physicians advise patients to exercise, a message framing technique may be more easily implemented than a financial incentive. Therefore, understanding the results of these study is important to craft a low cost way to drive motivation to exercise. Patients at risk for obesity or cardiovascular disease can easily and inexpensively set up social incentives for exercise by recruiting trusted family or friends. These results can also be used by insurance companies. The use of incentive-based worksite and insurance reimbursement programs targeting preventive health behaviors is growing in popularity. Finally, these results can be used by employers through corporate fitness programs. The worksite has evolved into an optimal arena for health promotion programs. These programs are employed in an attempt to decrease an individual’s chances for developing the risk factors associated with coronary heart
disease (CHD) and although many corporations offer their employees a variety of health promotion programs and behavior modification strategies, only a small percentage of the working population takes advantage of such efforts. Providing relatively large monetary rewards to each individual meeting an exercise program goal, while potentially viable in large companies, may not be feasible for local fitness centers or small businesses. Corporate fitness programs are concerned with recruitment and adherence and consistently and exponentially increasing participation to justify cost (Elwood, 2003). Therefore incentives as simple as message framing could be applied in larger contexts where employers could create teams/units of employees to incentivize each other to exercise, as a less costly option for sustainable incentive programs.

BACKGROUND AND MOTIVATION

Behavioral economics incorporates principles from psychology to help understand why persons make decisions that are not in line with longer-term health goals. Many individuals acknowledge that physical activity is good for their health but do not do enough of it. Instead, they often deviate from these goals in a predictable manner and from a common set of decision errors (Loewenstein et al, 2011). For example, persons tend to be more motivated by immediate rather than delayed gratification (O'Donoghue T and Rabin M, 2000) and by losses rather than gains. Prospect theory describes the nonlinear relationship between objective outcomes (in terms of gains and losses) and one’s subjective reactions to them (Tversky and Kahneman, 1981). The theory suggests the implications of framing, wherein individuals respond differently to factually equivalent messages depending on whether they are framed so as to emphasize benefits (gain-framed) or costs (loss-framed). This idea is also applicable to health promotion messages (Rothman and Salovey, 1997). For example, in a study pertaining to smoking cessation, “You
will live longer if you quit smoking” is a gain-framed message, and “You will die sooner if you do not quit smoking” is a loss-framed message (Salovey et al., 2007). Prospect theory suggests that if gains are made salient, people are averse to risk, and when losses are made prominent, individuals are risk-seeking. Therefore, even with factually equivalent messages the framing can determine with an individual is willing to incur risk either to encourage a desirable outcome or avoid an outcome that is unwanted (Tversky and Kahneman, 1981). These insights reveal that the design and delivery of an incentive has an important influence on its effectiveness.

A meta-analysis of 198 effect sizes from 94 peer-reviewed published studies compared the persuasive impact of gain- and loss-framed messages (Gallagher & Updegraff, 2012). The research revealed that gain-framed messages were more likely than loss-framed messages to encourage prevention behaviors ($r=0.083$, $p=0.002$), specifically for skin cancer prevention, smoking cessation, and physical activity. Salovey et al. (2007) performed a study in which participants received factually equivalent video and printed messages encouraging smoking cessation that emphasized either the benefits of quitting (gains) or the costs of continuing to smoke (losses). It was seen that the gain-framed messages were more persuasive with a significantly higher proportion of participants being continuously abstinent as opposed to the loss-framed condition. Another relevant study by The Rand Corporation (2013) compared incentives for exercise. The study involved more than 400,000 participants in a wellness incentive program in three countries: South Africa, the United Kingdom, and the United States. The results showed that the loss-framed system resulted in increased physical activity compared with the gains-framed program in which members had about 34% more tracked activity days, or about 4.8 additional activity days per month. Another interesting finding was that the members who were at risk for poor health due to obesity or other factors tended to participate at a lower
rate in these incentive programs, but among those who did, the loss-framed program produced even greater increases in activity levels.

Lim and Noh (2017), examined the effect of message framing on users' intentions to adopt fitness applications. Through a specially designed fitness app, the researchers tested the effectiveness of gain vs loss-framed performance feedback in the adoption of the fitness app as well as in enhancing exercise self-efficacy and outcome expectations of exercise. Results of this study showed the advantage of gain-framed messages over loss-framed messages in increasing user's intentions to use the app.

Finally, research by Volpp et al. (2016) at the University of Pennsylvania examined how framing equivalent financial incentives could influence physical activity among overweight and obese adults. The researchers found that participants who risked losing the reward they had already been given (the loss incentive group) achieved the goal 45 percent of the time, amounting to an almost 50 percent increase over the control group. Therefore the loss framed incentive seemed to be a powerful motivator.

Overall these studies show that message framing has a significant impact on motivating exercise. However, there are mixed results on whether gain or loss framing works better for healthy behaviors, specifically exercise. Furthermore, most of the research is on the exercise behavior rather than intent to exercise, which in itself is a powerful motivator of behavior. This study examined intent to exercise rather than the behavior of exercise, as a practicality choice. This is important as the creation of intent is essential for the performance of the behavior. Finally, there is a lack of research on motivating intent to exercise specifically in older adults, who may actually benefit more from increased exercise due to the risk of age-related disorders.
Taken together, motivating intent to exercise in older adults is a pressing public health concern. The lack of consensus on the impact of message framing for health preventative behaviors and the relatively low cost nature of such an intervention uniquely positions this study as important.

METHODS

Study Design

The study was conducted as a randomized controlled study of two framed message conditions to incentivize intent to exercise. Two hundred seventy adults over the age of 40 were randomly assigned to view either a gain- or loss-framed video featuring an exercise instructor demonstrating simple exercises to a group of adults over the age of 40 to incentivize intent to exercise. Previous literature has demonstrated the reliability of delivering framed messages through preproduced video (Toll et al., 2007). An initial interview was conducted in collaboration with the American Heart Association in order to understand general trends and exercise behaviours of adults over the age of 40, specifically given the COVID-19 circumstances. The responses guided the researchers in the construction of a survey on Qualtrics to assess current exercise behaviours, administer the intervention and assess intent to exercise post-intervention. The survey included an informed consent page (Exhibit A) at the beginning of the study, a set of questions to establish baseline exercise intention (Exhibit B), one of the two framed videos and a debrief page (Exhibit C) upon completion. The interventional video was either a gain framed or loss framed video, each of which was 90 seconds long. Both of these videos showed the same set of exercises performed by the same group of people (excerpts of exercises were compiled with permission from The National Institute on Aging’s 15-minute Sample Workout for Older Adults from Go4Life, Figure 1). However each of the two videos displayed a different set of statements between the exercises. One video contained gain-framed
statements while the other video contained factually equivalent loss-framed statements.

Following survey construction, Prolific was used as a research platform to reliably administer an online pilot study of twenty participants and a larger scale online study recruiting two hundred fifty adults. This study was approved by the Institutional Review Board of The University of Pennsylvania.

**Figure 1. Screenshots of video adapted with permission from ‘The National Institute on Aging’s 15-minute Sample Workout for Older Adults from Go4Life’**

![Video Screenshots]

**Setting and Participants**

The researchers utilized the preset filters on the Prolific platform to select for participants who were US nationals, above the age of 40, had a >95% approval rate and had completed >300 studies on Prolific. Participants were compensated at a rate above minimum wage. A pilot study of 20 participants was conducted initially and no errors were encountered. The identical survey was then administered online to 250 participants. The sample size was calculated using a power
of 0.89 and effect size 0.2, based on prior literature, which yielded an output of N=200. Given expected dropout, the sample size to be recruited is N = 270 via Prolific.

Subject Confidentiality

All of the participants’ information that is collected was kept confidential in a password protected file in the Wharton School at the University of Pennsylvania and the only risk to the study is the usual risk of data breach, which is common to all survey studies. Only the investigator for the study, the study team and the Institutional Review Board of the University of Pennsylvania was permitted to use the information. Since the participants used their Prolific ID to complete the study, they remained de-identified. The information could be stored and shared for future research in this de-identified fashion.

Randomization and Interventions

After reading the consent form, participants were directed to fill out a pre-survey with questions to establish demographic characteristics of the participants (age, race, gender) and baseline intention to exercise. Exercise intentions was assessed by two items (Courneya, 1994), representing the two main dependent variables: (a) “In the next two weeks, my goal is to exercise” which is rated on a 7-point scale ranging from 0 (not at all) to 7 (every day) (Variable 1 (Goal)); and (b) “I intend to exercise at least every other day for the next two weeks” which is rated on a 7-point scale ranging from 0 (Strongly Disagree) to 7 (Strongly Agree) (Variable 2 (Intent)). Variable 1 requires quantification of frequency of intention to exercise by the participant, while Variable 2 evaluates the agreement of the participant with a statement with
preset exercise frequency. Taken together, these variables provide a strong measure of intent to exercise.

Following the completion of the pre-survey, participants were shown one of the two pre-produced videos. Each of the two videos were approximately 90 seconds long and were factually identical, displaying the same set of instructors performing the same simple exercises, with text statements appearing between the subsequent exercises. In one video these statements were gain framed, while in the other video the statements were loss framed. The statements that were shown in the video are displayed in Table 1.

**Table 1. Factually identical gain and loss framed statements displayed in the gain and loss framed intervention videos respectively**

<table>
<thead>
<tr>
<th>Gain-Framed Statements</th>
<th>Loss-Framed Statements</th>
</tr>
</thead>
<tbody>
<tr>
<td>The first exercise will help tone and strengthen your arm muscles</td>
<td>If you don’t perform this exercise your arm muscles may lose strength</td>
</tr>
<tr>
<td>The next exercise will strengthen your shoulders and reduce risks of back injury</td>
<td>Without the next exercise you will weaken your shoulders and increase risks of back injury</td>
</tr>
<tr>
<td>The next exercise will help you quickly burn belly fat!</td>
<td>You can gain belly fat if you don’t perform this next exercise</td>
</tr>
<tr>
<td>The next exercise will increase your flexibility and leg strength</td>
<td>If you don’t perform this exercise you may lose leg strength</td>
</tr>
<tr>
<td>This last exercise will strengthen your glutes and improve your posture</td>
<td>Without this last exercise you may weaken your glutes and weaken your posture</td>
</tr>
</tbody>
</table>
After exposure to the video, participants were directed to answer posttest questions. This included two questions to ensure the validity of the message framing manipulation and one question, which falsely describes the study, as an attention check. The same two questions from the presurvey on intent to exercise were reproduced in the posttest survey. Following the postsurvey, participants were asked to read a debrief statement to complete their participation. There were no follow up sessions.

RESULTS

Participant Characteristics

In total, 270 participants completed the study, but the researchers excluded participants that did not complete the study or participants who did not qualify under the >40 years age requirement (n=11). Therefore a total of 259 participants were included for further analysis. The sample is further described in terms of demographic variables in Table 2.

Table 2. Demographic characteristics of the sample (N=259)

<table>
<thead>
<tr>
<th>Demographic Variables</th>
<th>Number of participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
</tr>
<tr>
<td>35-44</td>
<td>78</td>
</tr>
<tr>
<td>45-54</td>
<td>93</td>
</tr>
<tr>
<td>55-64</td>
<td>61</td>
</tr>
<tr>
<td>65-74</td>
<td>22</td>
</tr>
<tr>
<td>75-84</td>
<td>5</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>117</td>
</tr>
</tbody>
</table>
Participants were randomly distributed to gain-framed (N=129) or loss-framed (N=130) group. Sex distribution was fairly uniform between the loss-framed group (55% females), and gain-framed group (54% females). The distribution across the categories of ages were also even between the two framing conditions. In terms of ethnicity, the majority of adults identified as white in both the loss-framed (89%) and the gain-framed (88%). As displayed in Table 3, the two intervention groups also did not show any significant differences in baseline characteristics.

Table 3. Baseline Characteristics of Participants by Study Condition

<table>
<thead>
<tr>
<th>Variable</th>
<th>Gain Framed Groupa</th>
<th>Loss Framed Groupa</th>
<th>Difference (p-statistic)b</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable 1 (Goal)</td>
<td>4.19 (1.95)</td>
<td>4.56 (1.93)</td>
<td>0.37 (0.13)</td>
</tr>
<tr>
<td>Variable 2 (Intent)</td>
<td>4.42 (2.37)</td>
<td>4.76 (2.51)</td>
<td>0.34 (0.26)</td>
</tr>
<tr>
<td>Gender (0 for male, 1 for female)</td>
<td>0.55 (0.50)</td>
<td>0.55 (0.50)</td>
<td>-0.0042 (0.95)</td>
</tr>
</tbody>
</table>
Manipulation Check

A manipulation check was included to ensure the validity of the message framing. As expected, participants in the gain-framed message condition perceived the arguments as benefits focused rather than cost focused as compared to participants in the loss-framed message condition (p<0.0001). Therefore, the manipulation of message framing seemed to be successful and served as a surrogate outcome to confirm the difference between the two framed videos.

Attention Check

Only 2 participants answered the attention check question incorrectly. Therefore, 257 participants (99.23%) correctly answered the question.

Effects on Intention

As shown in Table 4, the main effect of framing on intention was not significant in either of the tested variables (p=0.78 for variable 1 and p=0.93 for variable 2) with means for change in variable 1: gain-framed message: M=0.39, SD = 0.75 vs. loss-framed message: M=0.36, SD=0.78 and means for change in variable 2: gain-framed message: M=0.38, SD (0.85) vs. loss-framed message: M=0.37, SD=1.01.
Table 4. Change in intention (Variable 1 and Variable 2) by Study Condition

<table>
<thead>
<tr>
<th>Variable</th>
<th>Gain Framed Group&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Loss Framed Group&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Difference (p-statistic)&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable 1 (Goal)</td>
<td>0.39 (0.75)</td>
<td>0.36 (0.78)</td>
<td>-0.03 (0.78)</td>
</tr>
<tr>
<td>Variable 2 (Intent)</td>
<td>0.38 (0.85)</td>
<td>0.37 (1.01)</td>
<td>-0.011 (0.93)</td>
</tr>
</tbody>
</table>

<sup>a</sup>Values are reported as means with standard deviation in parentheses

<sup>b</sup>Values are reported as means of difference between gain and loss condition with p-value in parentheses

Furthermore, no significant Gender x Message Frame interaction was found for Variable 1 (Goal) (p=0.92) or Variable 2 (Intent) (p=0.00085) when a difference-in-difference formula was applied (Figure 2). For Variable 1 (Goal), the difference in exercise intention with for females with loss framing (M=0.45, SD=0.95) and gain framing (M=0.47, SD=0.83) was higher, but not significantly so, than males with loss framing (M=0.25, SD=0.47) and gain framing (M=0.29, SD=0.65) respectively. A similar result was observed for Variable 2 (Intent) with a higher, but not statistically significant, difference in intention between females with loss framing (M=0.56, SD=1.22) and gain framing (M=0.50, SD=0.90) than males with loss framing (M=0.14, SD=0.63) and gain framing (M=0.24, SD=0.80) respectively. Therefore, it may be interesting to conduct a larger scale study to carefully investigate Gender x Message frame interaction on both exercise intent and behavior.
DISCUSSION

In this present study, we assessed the effects of message framing on the intention to exercise. This is the first study to assess the effects of message framing on the intent to exercise specifically for adults over the age of 40 through a video intervention. The experimental intervention consisted of two structurally similar videos differing only in the nature of text emphasizing either gains (benefits of exercise) or losses (costs of not exercising). We also examined the interaction effect between gender and message framing. There were no significant main effects for gain or loss framing on the intention to exercise, suggesting that a framed intervention solely delivery through videos may not be effective. As previously described, it is difficult to predict the effects of gain and loss framing for exercise intent in older adults. Factors for why a significant change was not seen could include the low intensity of the message framing intervention, the short time frame of the intervention, lack of other accompanying incentives (such as financial incentives) and the measurement of intent as opposed to exercise behavior. Furthermore, in this study all the participants were blind to the message framing condition with no additional framed print information. Other studies have suggested that stronger effects may have been observed if framed print were combined with video information (Toll et al., 2007).
While the researchers did not find a significant interaction between gender and message frame one exercise intent in this present study, it may be interesting to conduct a larger scale study to investigate this further. Previous studies show that gender can moderate message effectiveness and the identification of the individual with the gender of the exercise instructor could influence the persuasiveness of the message (Kiene, Barta, Zelenski, & Cothran, 2005).

Due to the COVID-19 circumstances, it was necessary to adopt a virtual, non-contact intervention such as a video. The nature of this intervention introduces possible individual variability in attention to text, relatability of instructor displayed (such as by gender, age, and body type), and clarity of information. Studies have demonstrated the importance of the content delivery method when providing high quality information about physical activity (Bopp, Vadeboncoeur, Stellefson, & Weinz, 2019). Another point to note is that this intervention was administered as a one-time session with no follow-ups and prior research has demonstrated temporal effects of message framing. Bruijn and Budding (2016) demonstrated that intention to consume fruit in adults was influenced by frame and temporal context such that gain-framed messages were more persuasive when combined with long-term consequences and loss-framed messages were more persuasive when combined with short-term consequences. It is therefore reasonable that a significant increase in intent to exercise requires persistent reinforcement through repeated interventions.

Research is also increasingly demonstrating the subjectivity of the influence of framing due to individual characteristics, such as motivation to perform a specific behavior (Thomas, Olds, Pettigrew, Randle & Lewis, 2014). Specifically, Churchill and Pavey (2013) demonstrated
that a gain-framed message increased subsequent fruit and vegetable intake in participants with the highest level of autonomy as compared with a loss-framed message. Self-efficacy, grit and consideration of future consequences have also been demonstrated to influence perception of messages. Pairing the videos with messages to improve self-efficacy may modify self-regulatory skills, which are needed to maintain behavior change (Anderson-Bill, Smith, Winett, & Wojcik, 2011). Furthermore, baseline involvement may also influence intention; specifically loss-framed messages have been found to be more effective among those with a higher baseline intention (Godinho, Alvarez, & Lima, 2016), and there is evidence that gain-framed messages are effective for those with a low baseline consumption (Gerend & Shepherd, 2016).

Since message framing can result in variable outcomes due to individual differences, it is imperative to further investigate responsiveness to gain-framed and loss-framed messages on an individual basis using a larger sample. Characterizing a target audience in depth before administration of the survey may enhance ability to predict which framing method is more effective (Wansink & Pope, 2015).

There is also evidence that the mode of communication of the intention can have an impact on its intensity and therefore, effectiveness. Specifically, audio-tailored interventions have been demonstrated to be more effective than text incentives (Elbert et al., 2016). Auditory messages can create additional trust and cooperation as well as stimulate social proximity (Chaiken & Eagly, 1983). This enhances the clarity of the message and supports the attentiveness of the listener while perceiving audiovisual messages (Petty & Cacioppo, 1986).
It is also important to note the distinction between intention and actual behavior. While this study aimed at increasing intent to exercise, data suggests that intention predicts a mere 30% to 40% of the variation in health behavior (Armitage & Conner, 2001), leading to an intention-behavior gap. There has been discussion on potential variables to moderate this gap such as personality (MacCann, Todd, Mullan, & Roberts, 2015), self-efficacy and action control and planning or implementation intentions (Faries, 2016). This necessitates additional research investigating these variables in concordance with message framing to understand impact on both intent and behavior.

**CONCLUSION**

Overall, the current study broadens our view on the effectiveness of message framing and the interaction effect between gender and frame type. As suggested, previous literature is inconclusive about gain vs loss framing for health preventative behaviors specifically in an older demographic. This study revealed no statistically significant difference between the gain- and loss-framed conditions on intent to exercise. However, analysis of one of the two dependent variables revealed a statistically significant interaction between gender and message framing. These findings necessitate further investigation into duration of intervention, mode of communication and population characterization based on gender, self-efficacy and baseline intention to translate results to policy or intervention recommendations.
REFERENCES


Kiene SM, Barta WD, Zelenski JM, Cothran DL. Why are you bringing up condoms now? The effects of message content on framing effects of condom use messages. *Health Psychology*. 2005;24:321–326


APPENDIX

Exhibit A: Pre-Study Consent Form

UNIVERSITY OF PENNSYLVANIA
RESEARCH SUBJECT
INFORMED CONSENT FORM

Protocol Title: Effect of message framing on incentive to exercise

Principal Investigator: Dr. Iwan Barankay
barankay@wharton.upenn.edu

Emergency Contact: Pallavi Menon
+12679943442
pallavim@wharton.upenn.edu

You are being invited to participate in a research study. Your participation is voluntary, and you should only participate if you completely understand what the study requires and what the risks of participation are. You should ask the study team any questions you have related to participating before agreeing to join the study. If you have any questions about your rights as a human research participant at any time before, during or after participation, please contact the Institutional Review Board (IRB) at (215) 898-2614 for assistance.

What is the purpose of the study?
The research study is being conducted to investigate the effect of message framing on incentive to exercise for adults above the age of 40.

What will I be asked to do?
If you agree to join the study, you will complete a short pre-survey, watch a 90 second video, and complete a short post-survey.

How long will I be in the study?
Your participation will conclude in a single session which will last for about 10 minutes. There will be no follow up sessions.

What are the benefits and risks?
You will not personally benefit from your participation. The risks to the study include potential loss of confidentiality, and all of your information that is collected will be kept confidential in a password protected file in the Wharton School at the University of Pennsylvania. Only the investigator for the study, the study team and the Institutional Review Board of the University of Pennsylvania may use or share your information.
What happens if I do not choose to join the research study?
You may choose to join the study or you may choose not to join the study. Your participation is voluntary. There is no penalty if you choose not to join the research study.

Future use of data
Your information will be de-identified. De-identified means that all identifiers have been removed. The information could be stored and shared for future research in this de-identified fashion. It would not be possible for future researchers to identify you as we would not share any identifiable information about you with future researchers. This can be done without again seeking your consent in the future, as permitted by law. The future use of your information only applies to the information collected on this study.

Will I be paid for being in this study?
You will be compensated via Prolific for your participation

Who can I call with questions, complaints or if I’m concerned about my rights as a research subject?
If you have questions regarding your rights or welfare as a research subject you may contact the University of Pennsylvania’s Institutional Review Board at 215-898-2614.
Any information appended to the survey data will be collected using the same care to protect your identity and that your authorization for use of my data for this specific research program does not expire. The researchers will know whether you have completed the survey, and may contact you about your experience.
Exhibit B: Qualtrics Exercise Incentives Research Survey

Start of Block: Block 1

Q1 Please enter your unique Prolific ID
__________________________________________________________

Q2 What is your age?

- Under 18 (1)
- 18 - 24 (2)
- 25 - 34 (3)
- 35 - 44 (4)
- 45 - 54 (5)
- 55 - 64 (6)
- 65 - 74 (7)
- 75 - 84 (8)
- 85 or older (9)
Q3 What is your gender?

- Male (1)
- Female (2)
- Non-binary / third gender (3)
- Prefer not to say (4)

Q4 What is your ethnicity?

- White (1)
- Black or African American (2)
- American Indian or Alaska Native (3)
- Asian (4)
- Native Hawaiian or Pacific Islander (5)
- Other (6)

Q5 Please answer the following questions about your current exercise intentions

<table>
<thead>
<tr>
<th>Question</th>
<th>Scale</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;In the next two weeks, my goal is to exercise,&quot; (0=Not at all, 7=everyday)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&quot;I intend to exercise at least every other day for the next two weeks&quot; (0=Strongly Disagree, 7=Strongly Agree)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Q6 Please watch the following video carefully before answering the remaining questions on this survey.

Q7 Timing
First Click (1)
Last Click (2)
Page Submit (3)
Click Count (4)

Q29 Please watch the following video carefully before answering the remaining questions on this survey.

Q31 Timing
First Click (1)
Last Click (2)
Page Submit (3)
Click Count (4)
Q8 The video focused more on

- Benefits of Exercising (1)
- Costs of Not Exercising (2)
- Does Not Apply (3)

Q9 The video mainly discussed

- The long term effects of smoking (1)
- The long term effects of alcohol consumption (2)
- Does Not Apply (3)

Q10 The overall tone of the video was

- Positive (1)
- Negative (2)
- Does Not Apply (3)

Q11 Please answer the following questions about your exercise intentions after watching the video

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;In the next two weeks, my goal is to exercise,&quot; (0=Not at all, 7=everyday) ()</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>“I intend to exercise at least every other day for the next two weeks” (0=Strongly Disagree, 7=Strongly Agree) ()</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Thank you for your participation in this study!

End of Block: Block 3

Exhibit C: Post-study Debrief Statement

Thank you for your participation in this study. The goal of this study was to determine the effect of gain vs loss framed statements on incentive to exercise for adults above the age of 40. In this experiment, you viewed the *insert framing type* video intervention.

Your participation is not only greatly appreciated by the researchers involved, but the data collected could possibly be used by doctors, insurance companies and employers to advise patients and motivate exercise incentive programs.

Finally, we urge you not to discuss this study with anyone else who is currently participating or might participate at a future point in time. If you have any questions about this study, please contact us

Principal Investigator:
Dr. Iwan Barankay
barankay@wharton.upenn.edu

Emergency Contact:
Pallavi Menon
pallavim@wharton.upenn.edu

Thank you!