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Framing the Path to Fitness: Age Differences in Response to Framed Exercise Messages

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INTRODUCTION

Physical activity is one of the most vital behaviors people of all ages can engage in to improve their physical, cognitive, and mental health (HHS, 2018). Although physical activity benefits people of all ages, regular exercise is especially important for older individuals; it helps improve physical and mental functions and reverse certain effects of chronic disease, keeping older adults mobile and independent (McPhee et al., 2016). Despite the myriad benefits of physical activity, 75% of active adults in the US, meaning those who exercise regularly, fall short of the recommended levels of physical activity, with an even greater percentage of older adults living inactive lives, meaning they exercise minimally and engage in prolonged sedentary behavior (CDC, 2019). The goal of the current study was to explore different types of message framing targeted at encouraging older and younger adults to exercise. We recruited older adults ($n = 184; M_{age} = 69.45$ years, age range: 65-80 years) and younger adults ($n = 233; M_{age} = 24.74$ years, age range: 18-30 years) to read exercise-related messages. Intrapersonal statements emphasized the personal health benefits of exercise (e.g., “Regularly engaging in aerobic exercises will improve your health”). Interpersonal statements emphasized the social benefits of exercise (e.g., “Regularly exercising will increase the quality of your social interactions”). For each statement, participants indicated: (1) their feelings about the statement, (2) their perceived effectiveness of the statement in motivating them to exercise, and (3) their exercise intentions. Results indicated that both age groups felt more positively, expressed greater perceived effectiveness, and reported higher exercise intentions for the intrapersonal relative to interpersonal statements. Interestingly, the difference was larger for older relative to younger adults, suggesting that emphasizing health versus social benefits mattered slightly more for older relative to younger adults. The findings from the current work shed light on how to motivate older and younger adults to exercise and could be used by researchers and practitioners designing exercise interventions.
percentage of older adults living inactive lives, meaning they exercise minimally and engage in prolonged sedentary behavior (CDC, 2019).

Given the broad health benefits of physical activity, community-based intervention programs have been developed to promote regular exercise in older adults (Hughes et al., 2009; Van der Bij et al., 2002). Despite the availability of such programs, many individuals refrain from participating in them, primarily because of a lack of motivation (Sabin, 2005). Given the impact of motivation on behavior change, understanding the relationship between the two can lead to the development of more effectively tailored health messages, that may motivate people to get off the couch and head to the gym. But what types of messages might be most effective in motivating older adults to exercise?

Message Framing and Positive Affect

Message framing has been shown to be an effective means of promoting behavior change (Rothman & Salovey, 1997). Message framing as gain– or loss–framed can evoke different affective reactions, such that gain-framed messages (e.g., exercising regularly can decrease the risk of cardiovascular disease) evoke positive affect, whereas loss-framed messages (e.g., not exercising regularly can increase the risk of cardiovascular disease) evoke negative affect (Liu et al., 2019; Mikels et al., 2016; van’t Riet et al., 2010).

Further, Liu et al. (2019) found that when participants reported greater positive affect toward the gain-framed messages, they also felt that the messages were more effective. This was especially true for older adults (Liu et al., 2019). Interestingly, though, the greater positive affect has been shown to influence older adults’ health behavior (Mikels et al., 2021). This was not the case for perceived effectiveness (Mikels et al., 2021), thus highlighting the critical role that positive affect can play in health messaging. Moreover, evidence suggests that gain-framed messages lead to greater information acceptance and more favorable attitudes toward the messages (van’t Riet et al., 2010).

As mentioned, positive affect can play a critically important role in guiding behavior, particularly within the health domain and especially for older adults. This may not be surprising, given that evidence suggests that older and younger adults differ in their information processing of positive relative to negative material such that younger adults show a preference for positive material whereas older adults show a preference for negative material — the age-related positivity effect (Baumeister et al., 2001; Carstensen & Mikels, 2005; Mikels et al., 2014; Reed et al., 2014) For instance, older adults consider gain-versus loss-framed health-related messages to be more informative and better remember them relative to younger adults (Shamaskin, Mikels, & Reed, 2010). Within another health study, Notthoff and Carstensen (2014) found that older adults’ walking increased in response to gain-framed messages compared to loss-framed messages. Interestingly, though, the frame did not impact younger adults' walking. One way to interpret these findings is that positive gain-framed messages but not negative loss-framed messages are important for older adults’ exercise behaviors (Mikels et al., 2020).

Aging, Emotion, and Decision-Making in Exercise Contexts

Research has found that older adults are motivated to a greater extent by social goals to exercise, whereas younger adults are motivated to a greater extent by instrumental goals (Steltenpohl et al., 2019). Furthermore, older adults expressed their underlying reasons to exercise as a means to socialize with others and to foster their existing relationships (Steltenpohl et al., 2019). In stark contrast, younger adults explained that they are motivated to exercise for self-improvement and self-regulation (Steltenpohl et al., 2019). Put simply, older adults tend to view exercise as “we time,” whereas younger adults view exercise as “me time” (Steltenpohl et al., 2019). This study, however, looked at emergent themes from differently aged focus groups without assessing the direct impact and perceived effectiveness of exercise related messaging. Though an
abundance of research exists exploring affect in messaging, little is known about the impact of message framing when emphasizing the personal versus social benefits of exercise. Thus, socioemotional aspects of decision making may be more impactful for older relative to younger adults.

Theories in lifespan research may help us to understand the potential age differences in the intrinsic and extrinsic benefits of exercise. One prominent life span theory of motivation, socioemotional selectivity theory (SST; Carstensen, 1993, 2006; Carstensen, Isaacowitz, & Charles, 1999), emphasizes age-associated changes in future time horizons and their impact on motivational priorities and emotional experience. When individuals perceive their future time horizons as vast and expensive, they tend to prioritize future-oriented goals, such as acquiring knowledge and gaining many social contacts in preparation for an uncertain future. Conversely, when individuals perceive their future time horizons as more limited and narrow, which is common in older adulthood, individuals tend to prioritize present-focused goals, such as experiencing more positivity and avoiding negativity, as well as maintaining and deepening close interpersonal relationships. This motivational shift is thought to lead to a prioritization of positively valenced and emotionally meaningful experiences in social interactions and beyond. As a result of the stronger focus on meaningful, high-quality social interactions in later adulthood indicated by SST, there is a strong possibility that age differences concerning the social benefits of exercise will manifest. Older adults may be more motivated by messages focused on the interpersonal benefits of exercise than younger adults, who are at a stage of life less focused on meaningful social interactions.

The Current Study

This study employed a 2 (age group: older adults, younger adults) by 2 (outcome focus: interpersonal statements, intrapersonal statements) mixed factorial design. Age group was a between-subjects factor, and outcome focus was a within-subjects factor. Younger and older adults were presented with a framed statements task for the purpose of determining how message framing for interpersonal and intrapersonal outcomes impacts older versus younger adults. After each statement, participants indicated how they felt about the statement, how effective the statement was for motivating them to exercise, and their likelihood to exercise in the next week. We hypothesized that (1) older adults would report higher ratings for interpersonal relative to intrapersonal statements, and we predicted that (2) younger adults would have lower ratings for interpersonal relative to intrapersonal statements.

METHODS

Participants

407 participants were recruited to participate in and were retained throughout the duration of the study. Of those participants, 233 were younger adults ($M_{age} = 24.74$ years, $SD = 3.32$, age range: 18-30 years; 52% female, 48% male), and 184 were older adults ($M_{age} = 69.45$ years, $SD = 3.81$, age range: 65-80 years; 55% female, 45% male). Data were collected from October 2022 to November 2022. Participants were recruited through the Prolific online system and were compensated $4.25 for completing this half-hour survey. The responses of participants who did not pass all three attention checks$^1$ ($n_{total} = 71$, $n_{YA} = 27$, $n_{OA} = 43$) were dropped from analyses. This study was reviewed by DePaul University’s Institutional Review Board (IRB). All participants were required to provide informed consent prior to the study. Please see Table 1 for sample demographics and characteristics.

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$^1$ 407 participants passed all three attention checks.
### Table 1.

**Sample Demographics**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Younger Adults (n = 223)</th>
<th>Older Adults (n = 184)</th>
<th>Test Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>%</td>
</tr>
<tr>
<td>Age (in years)</td>
<td>24.74</td>
<td>3.32</td>
<td>69.45</td>
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<td>Sex (% female)</td>
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<td>13%</td>
<td>1%</td>
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<tr>
<td>Other</td>
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<td>3%</td>
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<td>Current Negative Affect</td>
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<td>Trait-Level Positivity Resonance</td>
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<td>Vocabulary</td>
<td>32.32</td>
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<td>8</td>
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<td>Sports Activity</td>
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<tr>
<td>Leisure Time (excluding sport)</td>
<td>2.29</td>
<td>0.63</td>
<td>2.6</td>
</tr>
</tbody>
</table>

**Note.** Current positive and negative affect were rated on a 5-point scale (0 = *Not at all*, 4 = *Extremely*). Younger adults’ trait-level positivity resonance ranged from 2.50% – 95%. Older adults’ trait-level positivity resonance ranged from 2.38% – 98.75%. Younger adults’ vocabulary scores ranged from 15-40. Older adults’ vocabulary scores ranged from 24-40. Younger adults’ letter comparison scores ranged from 0-21. Older adults’ letter comparison scores ranged from 3-16.
Materials

Modified Differential Emotion Scale
Because we were measuring emotional reactions to the statements, we included a measure of current state affect using the Modified Differential Emotion Scale (mDES; Fredrickson et al., 2003; see Appendix A). This 20-item scale measured the extent to which participants felt 12 positive (amusement, awe, compassion, contentment, gratitude, hope, interest, joy, love, pride, surprise, flirtatious) and 8 negative emotions (anger, contempt, disgust, embarrassment, fear, guilt, sadness, shame) presented in sets of three (e.g., “to what extent are you currently feeling amused (1), fun-loving (2), silly (3)?”). To what extent are you currently feeling angry (1), irritated (2), annoyed (3)?”). Participants responded to each item on a 5-point scale (0 = Not at all, 4 = Extremely). Responses were averaged to create separate positive (α = .91) and negative (α = .88) current state affect averages. Older adults reported significantly higher positive state affect and lower negative state affect compared to younger adults (see Table 1). These findings track with past research demonstrating age-related differences in positive and negative affect across varying methodologies (Carstensen et al., 2000; 2011; Charles et al., 2001; Mroczek & Kolarz, 1998). Participants answered all items of the scale, both positive and negative; this scale was selected as the three-pronged emotion clusters better target the individual emotion each item is attempting to measure when compared to using a single word that may carry unintended or unclear connotations.

Message Framing Task
The framed statements task involved reading and rating framed statements that focused on the intrapersonal and interpersonal outcomes of engaging in exercise behavior. Intrapersonal-focused statements (12 statements) were framed based on the self-relevant mental and physical health-related benefits of engaging in exercise behavior (e.g., “regularly engaging in aerobic exercises will improve your health”). Interpersonal-focused statements (12 statements) were framed based on the social benefits of engaging in exercise behavior (e.g., “regularly exercising will increase the quality of your social interactions”). All statements were framed as a gain rather than a loss, with a desirable rather than undesirable outcome. Appendix C contains all the statements.

For each statement, we measured: (1) feelings about the statement, (2) perceived effectiveness of the statement in motivating them to exercise, and (3) exercise intentions. To measure feelings, participants indicated how they felt about the message on a 6-point bipolar scale, ranging from very negatively (-3) to very positively (3). These questions were separately averaged across interpersonal (α = .93) and intrapersonal (α = .94) statements. Affect ratings for intrapersonal statements were comparably reliable for older (α = .94) and younger (α = .92) adults. Affect ratings for interpersonal statements were comparably reliable for older (α = .94) and younger (α = .91) adults.

To measure perceived effectiveness, participants indicated how effective they found each statement to be in motivating one to exercise on a 7-point scale (1 = Not at all effective, 7 = Extremely effective). These ratings were separately averaged across interpersonal (α = .95) and intrapersonal (α = .96) statements. Effectiveness ratings for intrapersonal statements were comparably reliable for older (α = .97) and younger (α = .95) adults. Effectiveness ratings for interpersonal statements were comparably reliable for older (α = .96) and younger (α = .94) adults.

To measure exercise intentions, participants indicated how likely they were to exercise this week on a 7-point scale (1 = Not at all, 7 = Extremely). Responses to these questions were averaged separately across interpersonal (α = .97) and intrapersonal (α = .97) statements. Exercise intention ratings for intrapersonal statements were comparably reliable for older (α = .98) and younger (α = .97) adults. Exercise intention ratings for interpersonal statements
were comparably reliable for older (\(\alpha = .97\)) and younger (\(\alpha = .96\)) adults.

Demographics

Participants also provided general demographic information. Specifically, participants provided the following information: age (in years), date of birth, sex, health status, marital status, employment status, years of education, highest completed level of education, native English speaker, ethnicity, race, socioeconomic status, and household income (see Appendix D).

Descriptive measures

We included descriptive measures such as the Shipley Vocab test (see Appendix G) and the Letter comparison task (see Appendix F) to ensure that the sample is generalizable and representative of the older adult population (Salthouse & Babcock, 1991; Shipley, 1986).

AARP Physical Activity and Sedentary Behavior Questionnaire

Physical activity was measured using the AARP Physical Activity and Sedentary Behavior Questionnaire (Matthews et al., 2018). Also included was the Habitual Physical Activity Questionnaire, which separated a person’s physical activity into three distinct dimensions: (1) physical activity at work, (2) sports activity during leisure time, and (3) physical activity during leisure time excluding sport (Baecke et al., 1982). Additionally, participants completed the Stages of Change measure (see Appendix E; Marcus et al., 1992).

Cognitive Batteries

The Letter Comparison task (Appendix F) and Shipley Vocab test (Appendix G) were also included to measure processing speed and crystalized intelligence, respectively (Salthouse & Babcock, 1991; Shipley, 1986). For the comparison task, participants were presented with two strings of letters and were instructed to indicate whether the strings of letters were the same or different. Participants completed five practice trials and received feedback on their accuracy. Afterward, participants had 30 seconds to compare 21 sets of letters and indicate whether they were the same or different. The total number of trials participants answered correctly was summed, with higher scores indicating faster speed of processing. For the Shipley vocab test, participants were presented with a word in all caps and were instructed to select one word from a list of four words that most closely matched the word in all caps. There were 40 items in total. The total number of words answered correctly was summed, with higher scores indicating greater crystallized intelligence. Scores on the cognitive battery are presented in Table 1.

Procedure

After providing informed consent\(^2\), participants were informed that they would complete a series of questionnaires. First, participants completed the measure of state affect (via the mDES; Fredrickson et al., 2003). After being presented with the opportunity for a brief break, they completed the framed statement task. All statements were presented to participants in a randomized order. Once the task was completed, participants completed the exercise-related measures. From there, participants moved on to the cognitive assessments. Finally, participants completed the demographics questionnaire.

RESULTS

Data Analysis Strategy

We conducted independent samples t-tests (two-tailed) to determine whether there were age differences in the control variables. For the primary analyses, we conducted multilevel regressions for the three dependent variables of interest for the purpose of determining how framing for interpersonal and intrapersonal outcomes impacts older versus younger adults: (1) affect ratings, (2) effectiveness ratings, and

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\(^2\) Participants were initially prescreened using the Stages of Change measure to be categorized into active or sedentary physical activity level to ensure an even number of active and inactive participants; U.S. residents; age ranges: 18-30 years old (for the younger adult category) and 65-80 years old (for the older adult category). Physical activity level itself is not a central variable to the study.
(3) exercise intention ratings. Data were analyzed using R Version 4.0.2 (R Core Team, 2019). Models were estimated using the “lmer()” function in the lmerTest package (Kuznetsova et al., 2017). Significance tests for main effects and interactions were summarized using the “anova()” function in the car package (Fox & Weisberg, 2019). Effect size estimates were generated via the “anova_stats()” function in the sjstats package (Lüdecke, 2020). Post hoc comparisons for the main effect of condition were computed using the “emmeans()” function in the emmeans package (Lenth, 2020), and p-values were adjusted for multiple comparisons using Holm corrections. We decomposed significant interactions with a simple slopes analysis with the “sim_slopes()” function in the interactions package (Long, 2019).

Intraclass correlations ranged from .523-.863, suggesting that participants’ responses to all of the statements were highly dependent, and a multilevel framework is preferred to account for the nesting of statements within participants. We included a random intercept for statement and a random intercept for outcome focus for each participant in the analyses below. In the analyses below, we included a dummy coded age group (ref = older adults), dummy coded outcome focus (ref = interpersonal), and the two-way interaction term. Significant two-way interactions were decomposed using a simple slopes analysis.

Affect Ratings
The analysis for affect ratings revealed a significant main effect of outcome focus ($F(1, 53.66) = 32.19, p < .001, \eta^2_p = .005$) and a significant two-way interaction between age group and outcome focus ($F(1, 806) = 5.81, p = .017$). More specifically, the simple slopes analysis indicated that younger adults reported higher affect ratings for intrapersonal relative to interpersonal statements ($b = 0.63, SE = 0.15, t = 4.28, p < .010$). Older adults also reported higher affect ratings for intrapersonal relative to interpersonal statements, but to a greater degree when compared to younger adults, $b = 1.33, SE = 0.16, t = 8.30, p < .010$. Please refer to Figure 1 for the means separated by age group and outcome focus.

Effectiveness Ratings
The results for effectiveness ratings revealed a significant main effect of outcome focus, $F(1, 37.21) = 68.96, p < .001, \eta^2_p = .008$. There was also a significant two-way interaction between age group and outcome focus, $F(1, 402.97) = 37.78 p < .001, \eta^2_p = .004$. The simple slopes analysis indicated that younger adults reported higher effectiveness ratings for intrapersonal relative to interpersonal statements, $b = 0.66, SE = 0.16, t = 4.21, p < .010$. Older adults also reported higher effectiveness ratings for intrapersonal relative to interpersonal statements, but to a greater degree when compared to younger adults, $b = 1.33, SE = 0.16, t = 8.30, p < .010$. Please refer to Figure 2 for means separated by age group and outcome focus.
Figure 2. Mean effectiveness ratings for each outcome focus for older and younger adults. Responses ranged from 1 (Not at all) to 7 (Extremely). Confidence intervals are displayed. **p < .01.

Exercise Intentions Ratings

The results for exercise intentions ratings revealed a significant main effect of outcome focus, $F(1, 40.37) = 64.28, p < .001, \eta^2_p = .007$, and a significant two-way interaction between age group and outcome focus, $F(1, 402.99) = 28.04, p < .001, \eta^2_p = .003$. More specifically, younger adults reported higher exercise intentions for intrapersonal relative to interpersonal statements, $b = 0.58, SE = 0.14, t = 4.23, p < .010$. Older adults also reported higher exercise intentions for intrapersonal relative to interpersonal statements, but the difference between intrapersonal and interpersonal statements was larger for older adults, $b = 1.12, SE = 0.14, t = 8.02, p < .010$. Please refer to Figure 3 for the means separated by age group and outcome focus.

Figure 3. Mean exercise intentions ratings for each outcome focus for older and younger adults. Responses ranged from 1 (Not at all) to 7 (Extremely). Confidence intervals are displayed. **p < .01.

DISCUSSION

The goal of the current study was to examine how framing exercise messages in terms of their personal health benefits (intrapersonal statements) and their social benefits (interpersonal statements) impacts older and younger adults’ intentions to exercise. Older and younger adults were presented with both interpersonal and intrapersonal statements and indicated how they felt about each statement, how effective they found the statement to be in motivating them to exercise, and how likely they were to start exercising within the next week. The results showed that intrapersonal statements were rated more positively, more effective in motivating exercise, and more effective in encouraging exercise in the next week relative to interpersonal statements by both age groups. However, the difference in ratings for intrapersonal relative to interpersonal statements was greater for older relative to younger adults. These findings suggest that, overall, intrapersonal statements that focus on the self-relevant mental and physical health-related benefits of exercise are more effective than interpersonal statements that focus on the social benefits of exercise in motivating both older and younger adults to exercise, with intrapersonal...
statements being the most effective in motivating exercise among older adults relative to younger adults.

The current findings are consistent with the framing effect, in which the framing (content and construction) of a message affects how effective the message is in promoting behavior change (Carfora et al., 2021; Liu et al., 2020). In general, both older and younger adults found that intrapersonal statements framed based on personal benefits were more effective in motivating them to exercise when compared to interpersonal statements. Although the difference for intrapersonal versus interpersonal statements was larger for older relative to younger adults, it does importantly highlight how emphasizing certain benefits can lead to different emotional reactions, perceived effectiveness, and exercise intentions.

When developing the interpersonal statements, we focused on the tenets of socioemotional selectivity theory (SST; Carstensen, 1992), which posits an age-related shift toward positivity and interpersonal connectedness in older adulthood as a function of a limited time horizon. According to SST, older adults deeply value maintaining and deepening close, meaningful interpersonal relationships, even within an exercise context. One study using focus groups found that older adults view exercise as “we” time, whereas younger adults view exercise as “me” time (Steltenpohl et al., 2019). The findings from the current study challenge existing literature on the age-related differences in the effectiveness of interpersonal and intrapersonal statements. Although the qualitative data from the focus group study (Steltenpohl et al., 2019) would lead us to predict that older adults would be particularly responsive to and/or motivated by the interpersonal statements, this was not the case in the current study. Older adults’ responses to the interpersonal statements were not disproportionately higher than intrapersonal statements. In fact, it was the opposite. Like younger adults, older adults reported more positive feelings, greater effectiveness, and increased exercise intentions for intrapersonal relative to interpersonal statements. Consistent with the focus group study (Steltenpohl et al., 2019), younger adults were more motivated by self-focused goals.

One possible explanation for the lack of support for our hypothesis may be that framing both intrapersonal and interpersonal statements as a positive gain may not have carried as much relevance when compared to loss-framed statements. In the current study, the statements emphasized what social and health benefits could be engaged by regularly exercising. The emphasis on the positive gains of exercise for both outcomes might not effectively engage older adults’ socioemotional motivations and goals. Instead, older adults might respond differently to loss-framed statements that emphasize how not engaging in exercise affects their lives socially (interpersonal) and personally (intrapersonal). It could be the case that older adults may respond with greater effectiveness and exercise intentions for loss-framed interpersonal statements that emphasize what social benefits they could lose by not engaging in regular exercise.

Another possible explanation for participants' higher ratings for intrapersonal relative to interpersonal statements may be that the benefits highlighted in the intrapersonal statements are clearer and more tangible than the interpersonal statements. It is not surprising to individuals of any age that regularly engaging in aerobic exercise can lead to improved cardiovascular health, joint mobility, or flexibility. This is often why people start exercising in the first place – to improve their physical health. Seeing or experiencing the positive effects of regular exercise may create a clear framework for motivating one to exercise. Furthermore, the personal health benefits of exercise are often highlighted by media during exercise marketing campaigns, making them more readily accessible in one’s short-term memory when compared to social benefits. Consequently, social benefits highlighted in the interpersonal statements may not be as immediate, clear, or measurable. Regularly engaging in aerobic exercise in order to better keep up with one’s friends and family may still be deemed as a benefit but not one that immediately comes to
mind when thinking about exercise. People may not have connected the longer-term social benefits of exercise with their exercise experiences, whereas the short (and long) term health benefits of exercise are clear and evident to participants.

Finally, another factor that may have impacted participants’ ratings during the framed statements task is their current level of exercise. Participants who already exercise regularly may find certain benefits more motivating than others. Although we attempted to control for this component by prescreening for activity level using the Stages of Change measure (Marcus et al., 1992), a sizeable number of participants (n=100 out of 389 prescreened) indicated belonging to one stage during the prescreen (e.g., Contemplation) and then reported belonging to an entirely different stage at the time of the survey (e.g., Action). Because our attempt to control for and recruit participants from varying physical activity levels was moderately hindered, we were unable to determine with any degree of certainty whether the current activity level played a role in participants’ ratings of the statements.

Limitations and Future Directions

Although efforts were made to recruit a diverse sample of participants, it is essential to acknowledge that the study’s sample may not fully represent the broader population. The participants were recruited online, which might introduce selection bias. Also, the sample was relatively homogenous, particularly in terms of race. The majority of participants were White/Caucasian. Therefore, the generalizability of the findings to more diverse populations may be limited. Future research should aim to include a more diverse and representative sample.

Because the study utilized Prolific’s online survey system, the measures in this study relied on self-report. Self-report measures are subject to response bias and may not always accurately reflect participants’ actual behaviors or motivations. Future research could benefit from incorporating objective measures of observational data to validate self-reported outcomes. Further, the current study utilized a cross-sectional design, which provides a snapshot of participants’ responses at one point in time. Longitudinal research may offer a more comprehensive understanding of how message framing affects exercise motivation over time.

In addition, a further limitation of this study would be the method of measuring both actual exercise as a pre-screen and intention to exercise after reading the framed statements. Future research would benefit from giving participants the option to complete a task to demonstrate the intent to exercise (e.g., having them sign up for a class, to be contacted about further information, etc.).

Building on the insights gained from this study, future research could develop and test behavioral interventions that leverage effective message-framing strategies with gain and loss-framed statements to promote physical activity among older adults. To assess their practical utility, interventions such as exercise programs could be implemented in real-world settings. This should be done with more diverse participant samples, including individuals from various racial/cultural backgrounds, socioeconomic statuses, and language groups, to enhance the generalizability of the findings. This would provide a more comprehensive understanding of how message framing impacts exercise motivation across different populations. In conclusion, although this study has provided valuable insights into the impact of message framing on exercise motivation among older and younger adults, there are limitations that warrant consideration. Addressing these limitations and pursuing the suggested future directions will contribute to a more comprehensive understanding of how to effectively promote physical activity in older adults across diverse populations.

Conclusion

In the current work, we explored how younger and older adults respond to exercise-related messages that emphasize the health benefits (intrapersonal statements) and the social benefits (interpersonal statements). Guided by theory, we
predicted that older adults would respond more favorably to interpersonal statements, given their tendency to prioritize interpersonal connectedness and meaning compared to younger adults. However, the results showed that both older and younger adults rated the intrapersonal statements more positively, as more effective, and with greater exercise intentions compared to the interpersonal statements. Interestingly, the difference was larger for older relative to younger adults, suggesting that emphasizing health benefits versus social benefits mattered slightly more for older relative to younger adults. The findings from the current work shed light on how to motivate older and younger adults to exercise and could be used by researchers and practitioners designing exercise interventions. More research on motivating aging populations to exercise is needed to curtail the epidemic of inactivity in the later years. As the average lifespan increases, maintaining a high quality of life is contingent on developing healthy habits—of which regular exercise is one of the most crucial.

ACKNOWLEDGEMENTS

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REFERENCES


Fredrickson, B. L., Tugade, M. M., Waugh, C. E., & Larkin, G. R. (2003). What good are positive emotions in crisis? A prospective study of resilience and emotions following the terrorist attacks...


APPENDIX

Appendix A. Modified Differential Emotion Scale (mDES)

Instructions: In any given circumstance, people often have a number of different feelings. Please indicate how much of each emotion you are feeling right now, at this moment. Use the following 0 to 4 scale to make your ratings:

0 = Not at all
1 = A little bit
2 = Moderately
3 = Quite a bit
4 = Extremely

1. To what extent are you currently feeling amused, fun-loving, silly? P
2. To what extent are you currently feeling angry, irritated, annoyed? N
3. To what extent are you currently feeling ashamed, humiliated, disgraced? N
4. To what extent are you currently feeling awe, wonder, amazement? P
5. To what extent are you currently feeling contemptuous, scornful, disdainful? N
6. To what extent are you currently feeling content, serene, peaceful? P
7. To what extent are you currently feeling disgust, distaste, revulsion? N
8. To what extent are you currently feeling embarrassed, self-conscious, blushing? N
9. To what extent are you currently feeling glad, happy, joyful? P
10. To what extent are you currently feeling grateful, appreciative, thankful? P
11. To what extent are you currently feeling hopeful, optimistic, encouraged? P
12. To what extent are you currently feeling interested, alert, curious? P
13. To what extent are you currently feeling love, closeness, trust? P
14. To what extent are you currently feeling proud, confident, self-assured? P
15. To what extent are you currently feeling repentant, guilty, blameworthy? N
16. To what extent are you currently feeling sad, downhearted, unhappy? N
17. To what extent are you currently feeling scared, fearful, afraid? N
18. To what extent are you currently feeling sexual, desiring, flirtatious? P
19. To what extent are you currently feeling surprised, amazed, astonished? P
20. To what extent are you currently feeling sympathy, concern, compassion? P

Note. P = Positive; N = Negative. Responses to the items are averaged across to create separate subscales for positive and negative emotions, with higher scores indicating higher levels of emotions experienced.


-Positive emotions (α = .79)
-Negative emotions (α = .69)
Appendix B. Trait-Level Positivity Resonance

**Instructions:**

Think off all your experiences and encounters with other people—the people you interact with regularly on a daily basis, including family, friends, neighbors, work colleagues, customers, etc. (do not just focus on one person individually but how you feel collectively with other people, in general). Please read each item below and estimate how much of the time (0%-100%) you…

**Response Scale:** Best is a sliding response scale that run from 0-100%, anchored at 0%.

**Items:**

1.) ...you are able to attune to other peoples’ words and experiences?

   %

2.) ...you experience a “flow of conversation” with other people?

   %

3.) ...you feel energized?

   %

4.) ...you and other people share a mutual understanding of one another?

   %

5.) ...you and other people are mutually responsive to one another’s needs?

   %

6.) ...you feel a sense of mutual trust with other people?

   %

7.) ...you and other people mutually focus on the “best side” of one another?

   %

8.) ...you feel “in sync” with other people?

   %
Appendix C. Framed Statements

**Intrapersonal focus**
1. Regularly engaging in aerobic exercises will improve your health.
2. Adequate routine exercise will help you regulate your stress.
3. Frequent exercise will improve your body's ability to clear cholesterol.
4. Routinely exercising will help you become/stay more agile.
5. Regularly engaging in aerobic exercises will help develop your muscles.
6. Routinely exercising will help you maintain good health.
7. Regularly engaging in strength training will increase your muscle strength.
8. Adequate routine exercise will increase your joint mobility over time.
9. Stretching regularly will increase your muscle health.
10. Participating in frequent aerobic exercise will boost your metabolism.
11. A physically active lifestyle will bolster your immune system’s ability to deal with illness.
12. Stretching regularly will help you achieve a great range of motion.

**Interpersonal focus**
1. Regularly exercising will improve the way others perceive you in social settings. SB
2. Exercising regularly will make you look good and increase the likelihood of getting compliments. SB
3. Going on a walk with a loved one will increase your gratitude for one another. SM
4. Participating in a weekly class (e.g., water aerobics, Zumba, spin) will provide you with more opportunities for social interaction. SM
5. Having a physically active lifestyle will allow your friends and family to focus on enjoying your company. SB
6. Regularly engaging in aerobic exercise will make it easier to keep up when interacting with family and friends. SB
7. Regularly taking walks with a close other (e.g., friend, spouse, partner) can help deepen your relationship. SM
8. Regularly exercising with someone will create positive and meaningful opportunities to spend time together. SM
9. Regularly exercising will increase the quality of your social interactions. SB
10. Adequate routine exercise will increase meaningful engagements with others. SB
11. Doing exercise classes with a close other can be a fun way to get in sync with them. SM
12. Exercising with others frequently will provide more opportunities to strengthen social bonds. SM
Appendix D. Demographics

Age: ______________________

Birthdate: ______________________ (MM/DD/YYYY)

Sex: M / F / Prefer Not to Answer (circle one)

How many years of education have you completed (e.g., high school = 12 years; bachelor’s degree = 16 years; master’s degree = 18 years)? ________________

What is the highest level of education you have obtained? (please circle one)
   1. Less than high school
   2. High school degree or equivalent
   3. Some college but no degree
   4. Associate’s Degree
   5. Bachelor’s Degree (e.g., BA, BS, AB)
   6. Master’s Degree (e.g., MA, MS, MBA, MSW, MEng, MED)
   7. Doctorate Degree (e.g., PhD, EdD, M.D., J.D.)

Are you a native English speaker or have proficiency in English?
   1. Yes
   2. No

What is your marital status?
   1. Single
   2. Married
   3. Divorced/Separated
   4. Widowed
   5. Partnered/Cohabiting (unmarried)
   6. Other, please specify

What is your current employment status?
   1. Working full time (30 hours or more per week)
   2. Working part time (less than 30 hours per week)
   3. Employed, but currently not at work due to temporary illness, vacation, or strike
   4. Unemployed; laid off; looking for work
   5. Retired and not working
   6. Retired, but now working part time
   7. Other, please specify: ______________________

What best describes your ethnic category? (please circle one)
   1. Hispanic or Latino
   2. Not Hispanic or Latino

What best describes your race? (please circle one)
   1. White or Caucasian
   2. Black or African American
   3. American Indian, Alaska Native
   4. Asian
   5. Native Hawaiian or Other Pacific Islander
   6. Other, please specify: ______________________
Please circle the number that corresponds to your current socioeconomic level:

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower Income</td>
<td>Lower</td>
<td>Middle Income</td>
<td>Upper Income</td>
<td>Middle Income</td>
<td>Upper Income</td>
</tr>
</tbody>
</table>

What is your family’s/year annual household income (before taxes)?

1. Less than $20,000
2. $20,001 - $35,000
3. $35,001 - $50,000
4. $50,001 - $75,000
5. $75,001 - $100,000
6. $100,001 - $150,000
7. Greater than $150,000

Appendix E. Stages of Change Measure

Below are statements describing exercise behavior. Please read each statement and select the one that most accurately describes and represents your current exercise behaviors.

- I currently do not exercise, and I do not intend to start exercising in the next 6 months.
- I currently do not exercise, but I am thinking about starting to exercise in the next 6 months.
- I currently exercise some, but not regularly (i.e., 3 or more times a week for 20 minutes or more each time).
- I currently exercise regularly (i.e., 3 or more times a week for 20 minutes or more each time).
Appendix F. Letter Comparison

Instructions: In this next section, you will be comparing sets of letters.

If you look at the examples below, there are sets of letters on either side of the line. If they are exactly the SAME, select "Same". If they are DIFFERENT in any way, select "Different".

Please begin at the top and work your way down the column, completing as many as you can in 30 seconds. Please work as fast as you can.

We will start with the practice trials below.

YCX _______ YMX
GKLB _______ GKLB
TYXBJ _______ TYJBH
HTRBDP _______ HTRBDP
LNDPRS KQB _______ LNDPRS JQB

The Participant will receive feedback on the practice trials to ensure that they fully understand the task. The correct answers for the practice trials are as follows: Different; Same; Different; Same’ Different.

We will now move on to the actual trials. Click the right arrow when you are ready to begin.

Make sure you go in order, without skipping any. You will have 30 seconds to do as many as you can.
Make sure you go in order without skipping any.

ODKXEA _____ ODRXEA
LMF _____ LZF
QSECAUZGO _____ GSECAUZGO
ASHCNP _____ ASHGNP
UFB _____ UPB
RMBTWU _____ RMBYWU
YXLRSZDOA _____ YXLRSZDOA
IOQEML _____ IOQEML
ANRXSTH MU _____ ANRXZTHMU
KQO _____ KQO
ZYILAWGQC _____ ZYILAXGQC
SKA _____ SKA
DMOQAE _____ DMOQAE
MQLYAX _____ MQLYAX
DFB _____ DFP
EDCQGIYZK _____ EDCQGIYZK
N XS _____ NWS
DTECGQIYA _____ DTECGQIYA
RIAQYD _____ RIAQXD
HZM _____ HZM
KOXYIQGEC _____ KOXYIQGBC
Appendix G. Shipley Vocab Test

Instructions: In the test below, the first word in each line is printed in capital letters. Below that word, there are four other words. Select the one word which means the same thing, or most nearly the same thing, as the first word. A sample below has been worked out for you. If you don't know, guess. Be sure to select the one word that means the same thing as the first word.

Here is an example:

<table>
<thead>
<tr>
<th>LARGE</th>
<th>red</th>
<th>big</th>
<th>silent</th>
<th>wet</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. TALK</td>
<td>draw</td>
<td>eat</td>
<td>speak</td>
<td>sleep</td>
</tr>
<tr>
<td>2. PERMIT</td>
<td>allow</td>
<td>sew</td>
<td>cut</td>
<td>drive</td>
</tr>
<tr>
<td>3. PARDON</td>
<td>forgive</td>
<td>pound</td>
<td>divide</td>
<td>tell</td>
</tr>
<tr>
<td>4. COUCH</td>
<td>pin</td>
<td>eraser</td>
<td>sofa</td>
<td>glass</td>
</tr>
<tr>
<td>5. REMEMBER</td>
<td>swim</td>
<td>recall</td>
<td>number</td>
<td>defy</td>
</tr>
<tr>
<td>6. TUMBLE</td>
<td>drink</td>
<td>dress</td>
<td>fall</td>
<td>think</td>
</tr>
<tr>
<td>7. HIDEOUS</td>
<td>silvery</td>
<td>tilted</td>
<td>young</td>
<td>dreadful</td>
</tr>
<tr>
<td>8. CORDIAL</td>
<td>swift</td>
<td>muddy</td>
<td>leafy</td>
<td>hearty</td>
</tr>
<tr>
<td>9. EVIDENT</td>
<td>green</td>
<td>obvious</td>
<td>skeptical</td>
<td>afraid</td>
</tr>
<tr>
<td>10. IMPOSTOR</td>
<td>conductor</td>
<td>officer</td>
<td>book</td>
<td>pretend</td>
</tr>
<tr>
<td>11. MERIT</td>
<td>deserve</td>
<td>distrust</td>
<td>fight</td>
<td>separate</td>
</tr>
<tr>
<td>12. FASCINATE</td>
<td>welcome</td>
<td>fix</td>
<td>stir</td>
<td>enchant</td>
</tr>
<tr>
<td>13. INDICATE</td>
<td>defy</td>
<td>excite</td>
<td>signify</td>
<td>bicker</td>
</tr>
<tr>
<td>14. IGNORANT</td>
<td>red</td>
<td>sharp</td>
<td>uniformed</td>
<td>precise</td>
</tr>
<tr>
<td>15. FORTIFY</td>
<td>submerge</td>
<td>strengthen</td>
<td>vent</td>
<td>deaden</td>
</tr>
<tr>
<td>16. RENOWN</td>
<td>length</td>
<td>head</td>
<td>fame</td>
<td>loyalty</td>
</tr>
<tr>
<td>17. NARRATE</td>
<td>yield</td>
<td>buy</td>
<td>associate</td>
<td>tell</td>
</tr>
<tr>
<td>18. MASSIVE</td>
<td>bright</td>
<td>large</td>
<td>speedy</td>
<td>low</td>
</tr>
<tr>
<td>19. HILARITY</td>
<td>laughter</td>
<td>speed</td>
<td>grace</td>
<td>malice</td>
</tr>
<tr>
<td>20. SMIRCHED</td>
<td>stolen</td>
<td>pointed</td>
<td>remade</td>
<td>soiled</td>
</tr>
<tr>
<td>21. SQUANDER</td>
<td>tease</td>
<td>belittle</td>
<td>cut</td>
<td>waste</td>
</tr>
<tr>
<td>22. CAPTION</td>
<td>drum</td>
<td>ballast</td>
<td>heading</td>
<td>ape</td>
</tr>
<tr>
<td>23. FACILITATE</td>
<td>help</td>
<td>turn</td>
<td>strip</td>
<td>bewilder</td>
</tr>
<tr>
<td>24. JOCOSE</td>
<td>humorous</td>
<td>paltry</td>
<td>fervid</td>
<td>plain</td>
</tr>
<tr>
<td>25. APPRISE</td>
<td>reduce</td>
<td>strew</td>
<td>inform</td>
<td>delight</td>
</tr>
<tr>
<td>26. RUE</td>
<td>eat</td>
<td>lament</td>
<td>dominate</td>
<td>cure</td>
</tr>
<tr>
<td>27. DENIZEN</td>
<td>senator</td>
<td>inhabitant</td>
<td>fish</td>
<td>atom</td>
</tr>
<tr>
<td>28. DIVEST</td>
<td>dispose</td>
<td>intrude</td>
<td>rally</td>
<td>pledge</td>
</tr>
<tr>
<td>29. AMULET</td>
<td>charm</td>
<td>orphan</td>
<td>dingo</td>
<td>pond</td>
</tr>
<tr>
<td>30. INEXORABLE</td>
<td>untidy</td>
<td>involatile</td>
<td>rigid</td>
<td>sparse</td>
</tr>
<tr>
<td>31. SERRATED</td>
<td>dried</td>
<td>notched</td>
<td>armed</td>
<td>blunt</td>
</tr>
<tr>
<td>32. LISSOM</td>
<td>moldy</td>
<td>loose</td>
<td>supple</td>
<td>convex</td>
</tr>
<tr>
<td>33. MOLLIFY</td>
<td>mitigate</td>
<td>direct</td>
<td>certain</td>
<td>abuse</td>
</tr>
<tr>
<td>34. PLAGIARIZE</td>
<td>appropriate</td>
<td>intend</td>
<td>resolve</td>
<td>maintain</td>
</tr>
<tr>
<td>35. ORIFICE</td>
<td>brush</td>
<td>hole</td>
<td>building</td>
<td>lute</td>
</tr>
<tr>
<td>36. QUERULOUS</td>
<td>maniacal</td>
<td>curious</td>
<td>devout</td>
<td>complaining</td>
</tr>
<tr>
<td>37. PARIAH</td>
<td>outcast</td>
<td>priest</td>
<td>lentil</td>
<td>locker</td>
</tr>
<tr>
<td>38. ABET</td>
<td>waken</td>
<td>ensue</td>
<td>incite</td>
<td>placate</td>
</tr>
<tr>
<td>39. TEMERITY</td>
<td>rashness</td>
<td>timidity</td>
<td>desire</td>
<td>kindness</td>
</tr>
<tr>
<td>40. PRISTINE</td>
<td>vain</td>
<td>sound</td>
<td>first</td>
<td>level</td>
</tr>
</tbody>
</table>