Leveraging Evidence-Based Messaging to Prevent the Spread of COVID-19

Anastasia M. Browning, Melissa E. Moss, Elliot T. Berkman

University of Oregon

Author Note

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Anastasia Browning can be contacted at abrowni3@uoregon.edu.

Abstract

With cases of COVID-19 still spreading in America, and vaccines still inaccessible or undesired by many, individual mitigation behaviors, such as mask-wearing, remain critical defenses against this deadly virus. This study assessed whether approach-versus-avoidance message framing and goal-orientation affect people's intentions to follow COVID-19 preventative procedures. N = 832 subjects were randomly assigned to view mitigation messaging with either approach or avoidance framing, and either self-protective or altruistic goal-orientation. We observed a significant effect of goal-orientation, such that altruistic (versus self-protective) goal-orientations in messaging lead to stronger intentions to follow mitigation procedures. No significant effect of approach or avoidance framing was found on intentions to follow mitigation procedures. These results suggest an immediate need to address the wording of our public health messages. Adjusting the framing of COVID-19 preventative communications to reflect altruistic goals might increase the effectiveness of communications to protect at-risk populations.

Keywords: COVID-19, goal-orientation, message-framing, motivation, self-regulation, health messaging, health behaviors, randomized controlled trial, science communication, mitigation, approach, avoidance, altruism, self-protective, intentions, individual differences, self-transcendence.

Leveraging Evidence-Based Messaging to Prevent the Spread of COVID-19

The World Health Organization (WHO) declared the COVID-19 crisis an official pandemic as of March 11th, 2020 (WHO, 2020). In response, the US Centers for Disease Control (CDC) implemented COVID-19-related preventative measures to decrease the spread of the virus and ease the burden on our healthcare system (CDC, 2020). With vaccines still inaccessible or undesirable to many, our country requires effective and persuasive messaging around personal mitigation behaviors (e.g., mask wearing) if we hope to diminish the spread of this deadly virus (Anderson et al., 2020).

The rapid progression of this crisis, along with the need for behavioral modification in the quelling of the spread, makes it critical for social scientists to determine best practices for disseminating government-issued protocols, even with vaccines widely available. It is equally important for public health officials to consider the effects that their messaging might have on the mental health of the population. Elements within our public health messages have the ability to induce feelings of fear and stress which may negatively affect both mental and physical health outcomes (Bavel et al., 2020; see also Coupet et al., 2021). Public health communicators have yet to identify the most efficacious and compassionate approach to achieving public adherence to this pandemic's preventative and mitigative practices as a means to address the threat posed to our nation's mental health.

Many theories from psychology are relevant to communication about health behavior. Scholars of motivation have conceptualized goal-pursuit and self-regulation as bipolar constructs, yielding the prediction that goal framing might have a direct effect on the success and

timely accomplishment of these goals (Carver & Scheier, 1990; 2001). In one direction are approach-framed goals: these are considered to be purpose-driven (active) goals motivated by the attainment of a desired (positive) outcome. In the other direction are avoidance-framed goals: these are conceptualized by the avoidance of unwanted (negative) outcomes (Carver & Scheier, 1990; see also Gray, 1990).

Research on approach/avoidance motivation depicts a complex functional relationship between motives, behavior, and emotion whereby affect serves as an internal feedback mechanism on progress toward (or away from) goals. Positive affect signals that the rate of progress toward a desired endpoint is adequate or exceeds an internal threshold for satisfactory progress, whereas negative affect (specifically feelings of anxiety) signals that an individual is at risk of failing to avoid an unwanted outcome (Carver & Scheier, 2001). Additionally, positive affect is utilized as information in making judgements, suggesting that pairing health messaging with positive affect might influence an individual's behavioral judgements to follow public policy (Kramer & Yoon, 2007). In contrast, avoidance-framed goals have been found to be associated with negative affect (Oertig et al., 2013). Taken together, these lines of research suggest that approach-framing of health messages may bolster positive affect, decrease negative affect, and increase the likelihood that individual's will make judgements to follow public policies.

The relationship between avoidance-framed goals and subjective well-being can be partially explained by stressful life events, which often precede the creation of avoidance-framed goals (Elliot et al., 2011). People set avoidance goals that help them avoid stressful events.

Research also suggests that self-regulatory processes such as self-discipline and stress-resistance mediate the relation between negative affect and avoidance-framed goals relationship.

Specifically, the less stress-resistant an individual is, the more negative affect they feel when using avoidance-framing in their goal-pursuits (Oertig et al., 2013). This theoretical model predicts that the relation between goal framing (approach versus avoidance) and affect is regulated by perceived stress, suggesting that public-health messaging should include stress reduction techniques to promote approach framing and, thereby, greater adherence to public-health policies. Designing health messaging to reduce, rather than compound, the estimated negative impact of COVID-19 on mental health and well-being could also help to prevent future rates of comorbidity.

In the initial months of the COVID-19 outbreak, the CDC recommendations of COVID-19-related preventative measures were framed in avoidance terms, focusing almost exclusively on protecting oneself against COVID-19 by avoiding contact with others (CDC, 2020). Approach-avoidance theory posits that the pursuit of health-related avoidance goals leads to poor outcomes in both health and longitudinal subjective well-being (Elliot et al., 1997; see also Elliot & Sheldon, 1998). This theory would predict that such COVID-19-related health messaging might have had a counterproductive effect on behavior change and a deleterious effect on subjective well-being (Carver & Scheier, 1990;). It is possible that reframing COVID-19-related preventative measures to an approach-framing of these protocols would increase receptivity and responsiveness in the population, decrease negative emotions, and increase subjective well-being (Elliot et al., 1997; see also Elliot et al., 2011).

A particular challenge in preventing the spread of COVID-19 is to persuade younger cohorts of their critical role in preventing contagion. Many young adults, who were not considered to be as vulnerable to the effects of COVID-19 in early 2020 - and therefore less concerned with self-protection - ignored CDC recommendations of COVID-19-related preventative measures in the initial months of the outbreak (Masters et al., 2020; see also Coroiu, Moran, Campbell, & Geller, 2020; Jordan, Yoeli, & Rand, 2020). This cohort's self-concerned mindset posed a dangerous threat to other generations, as younger infected people are often asymptomatic and thus are at greater risk of unwittingly spreading COVID-19 to more vulnerable populations (Dowd et al., 2020). Identifying effective ways to reach this population and transcend their priorities to focus on others was critical for slowing the spread of this pandemic in the initial months of the COVID-19 outbreak.

Self-transcendence is the ability to step outside of individualistic or ego-focused perspectives by focusing on the interconnectedness between the self, the environment, and others (Reed, 2008). Theories of self-transcendence posit that self-transcendent values can promote self-regulation and behavior change by increasing an individual's responsiveness to new input (Kang et al., 2018; see also Reed 2008; 2014; Crocker et al., 2008). The presence of self-transcendent messaging in preventative health communications can reduce psychological reactance and attenuate the negative effect of threats to an individual's personal freedoms on behavioral intentions (Han & Kim, 2019). This effect has also been demonstrated in the context of health-messaging pertaining to healthy living behaviors. Specifically, sedentary individuals who were primed in self-transcendent oriented mindsets showed an association with higher

levels of physical activity-related behavior change later (Kang et al., 2018). The effects of self-transcendence are hypothesized to operate through reductions in stress, reactance, and defensiveness and increases in openness and beliefs in self-transcendent values (Kang et al., 2017).

Preliminary research conducted in the beginning of the COVID-19 pandemic suggests that behavioral intentions can be significantly affected by manipulating the goal of following suggested COVID-19 preventative messages to an altruistically framed one - or one persuading the reader to follow COVID-19 preventative messages to protect the greater good (Jordan, Yoeli, & Rand, 2020). Similarly, through the pandemic, messages targeting self-transcendent values were reported as the most persuasive messages about COVID-19-related health messaging by public respondents (Lake et al., 2021). It is suggested that self transcendence can foster a larger sense of connectedness to generations that are younger and older than your own (Levenson et al., 2005). Encouraging self-transcendent mindsets through public health messages may promote adherence to follow preventative guidelines by individuals who consider themselves to be low-risk.

The Present Study

The present randomized controlled trial investigated whether people's acceptance of COVID-19-related preventative measures would be affected by message framing. We tested whether re-orienting focus to the effects that COVID-19-preventative behaviors have on others could promote intentions to follow suggested COVID-19 preventative measures. We hypothesized that framing messages describing COVID-19-related preventative measures with

an altruistic goal-orientation and an approach-framing would lead to decreases in negative affect and self-reported levels of stress, and increases in positive affect, self-transcendent attitudes (STA), and intentions to adhere to COVID-19-related preventative procedures. Altruistic message framing was chosen to generate a more self-transcendent mindset about COVID-19 relative to the self-focused messages used by the CDC. Data were collected from participants in April, 2020 from a representative and diverse sample of individuals living in the United States. Participants were randomized into four conditions in which they viewed suggested COVID-19-related preventative measures varying in levels of framing and goal-orientation and then completed self-report assessments of their intentions to follow COVID-19-related preventative measures, their subjective well-being, their perceived stress, and their STA.

Specific Aim 1 was to test if intentions to follow suggested COVID-19-related preventative measures were affected by altruistic vs. self-protective goal-orientations and approach vs. avoidance message framing of these goals. We hypothesized that altruistic goal-orientation and approach-framing of protocols would lead to more reports of intentions to follow COVID-19-related preventative measures than the self-protective goal-orientation and avoidance-framing group.

Specific Aim 2 was to assess changes in stress due to altruistic vs. self-protective goal-orientation and approach vs. avoidance message-framing of suggested COVID-19-related preventative measures. We hypothesized that altruistic goal-orientation and approach-framing would lead to lower stress levels in self-reports than self-protective goal-orientation and avoidance-framing.

Specific Aim 3 was to examine changes in affect due to altruistic vs. self-protective goal-orientation and approach vs. avoidance message-framing of suggested COVID-19-related preventative measures. We hypothesized that altruistic goal-orientation and approach-framing of suggested COVID-19-related preventative measures would lead to more self-reports of positive affect and fewer self-reports of negative affect than self-protective goal-orientation and avoidance-framing.

Specific Aim 4 was to study whether altruistic vs. self-protective goal-orientation and approach vs. avoidance message-framing of suggested COVID-19-related preventative measures affected STA. We hypothesized that altruistic goal-orientation and approach-framing would lead to higher scores of self-transcendence and more willingness to support those in need during the COVID-19 pandemic.

Method

Participants and Procedure

This study was approved by the Committee for the Protection of Human Subjects Research Compliance Services at the University of Oregon. In April, 2020, participants (ages 18 to 78, $M = 37.78$, $SD = 11.61$; 475 men, 352 women, 2 transgender, and 3 non-binary (for descriptive statistics of demographics, see Table 1) were recruited using Amazon's MTurk ($N = 862$). Participants provided written and informed consent and were then randomized, using Qualtrics' random ID generator and randomization tool, into four conditions: altruistic/approach, altruistic/avoidance, self-protective/approach and self-protective/avoidance. In each condition, participants viewed a virtual pamphlet, adapted from CDC recommendations for

COVID-19-related preventative measures (CDC, 2020), using either approach or avoidance-framing and either self-protective or altruistic goals embedded within the message. The language in the avoidance/self-protective framing was unmodified from the CDC's language. Immediately after viewing the pamphlet, participants completed a set of self-report measures. Participants who took less than 3 minutes to read the virtual pamphlets and complete the total of 54 items within our measures were screened from our study and therefore excluded from analysis. 30 participants met this exclusion criterion, leaving our total sample at $N = 832$ (for diagram of the process through the phases of this randomized controlled trial, see Figure 1).

Table 1

Descriptive Statistics for Demographics (N=832)

<i>Variable</i>	<i>M</i>	<i>SD</i>	<i>%</i>
Age	37.78	1.46	
Race/Ethnicity			
Black/African American			11.30
White			72.36
Asian			6.73
Hispanic/Latinx			4.33
Indigenous/American Indian			0.24
Hispanic/Latinx/White			1.32
Asian/White			0.96
Hispanic/Latinx/Indigenous/American Indian/White			0.24
Hispanic/Latinx/Other			0.12
Indigenous/American Indian/Other			0.48
Hispanic/Latinx/Asian			0.24
Black/Hispanic/Latinx			0.24
Black/African American/White			0.48
Black/African American/White/Other			0.12
Black/African American/Hispanic/Latinx/White			0.24
Asian/Pacific Islander/White			0.24
Hispanic/Latinx/Pacific Islander			0.12
Pacific Islander/White			0.12
Other			0.12
Gender			
Female			42.31
Male			57.09
Non-Binary			0.36
Transgender			0.24
Income			

\$0-\$25,000	14.24
\$25-\$50,000	28.25
\$50,000-\$75,000	25.84
\$75,000-\$100,000	16.59
\$100,000+	14.9
Employment Status	
Employed	72.24
Furloughed (COVID-19)	11.54
Furloughed (not COVID-19)	0.48
Unemployed (COVID-19)	3.97
Unemployed (not COVID-19)	11.78
Political Affiliation	
Democrat	47.24
Republican	28.73
Independent	22.48
Other	1.56
Religious Affiliation	
Christian	54.57
Jewish	1.08
Muslim	1.08
Hindu	0.6
Buddhist	1.68
Atheist	13.7
Agnostic	18.03
Unaffiliated	7.09
Other	2.16
Education Level	
Some High School	0.36
High School	10.7
Some College	25
Bachelor's Degree	46.03
Master's Degree	16.11
Doctorate degree	1.8

Figure 1. Flow diagram of the process through the phases of this randomized controlled trial.

Treatments and Measures

Following informed consent, participants read a virtual information pamphlet highlighting expert recommendations for mitigating the spread of COVID-19. The communicative framing (approach vs. avoidance) and goal-orientation (altruistic vs. self-protective) were randomized between participants. Approach-framing suggested that participants should consider taking actions towards a common goal, which would vary depending on the manipulated goal-orientation. Goal-orientation was to either protect others or protect oneself. An example of approach-framing with an altruistic goal-orientation would be,

"protect others by practicing community care and giving 6-ft of distance to your friends and neighbors". Avoidance-framing asked participants to consider taking actions to protect either themselves (with self-protective goal-orientation) or others (with altruistic goal-orientation) from the common threat of COVID-19. In this framing, COVID-19 is the anti-goal which participants were encouraged to avoid (Carver, 2006). An example of avoidance-framing with a self-protective goal would be, "protect yourself from the threat of COVID-19 by practicing social distancing and avoiding contact with others". The language used in the self-protective/avoidance framing messages was drawn verbatim from the CDC's messaging at the time. This group represented the control group as no manipulations were made to the framing of these messages (CDC, 2020).

Self-report survey measures. Immediately following exposure to the virtual pamphlets, participants completed a set of self-report measures. These measures included reliable and valid measures of affect and stress, measures of self-transcendence created for the purpose of this study, a measure of participant intentions to follow mitigation procedures, and measures of pandemic attitudes and demographics (the Appendix contains a full list of measures).

To measure individual intentions to follow mitigation procedures, participants completed a three-item scale (*Cronbach's* $\alpha = .75$) with the following questions: "After reading this message, how likely is it that you will always wash your hands whenever you enter work or come home, for at least 2 weeks, even if you don't feel sick?", "After reading this message, how likely is it that you will avoid social gatherings for at least 2 weeks, even if you don't feel sick?", and "After reading this message, how likely is it that you will stay at home and avoid all social contact for at

least 2 weeks, even if you don't feel sick?". Ratings were on a Likert scale, ranging from 0-4 for each item, where 0 represented not at all likely and 4 represented extremely likely. Total scores ranged from 0 (no intentions to follow mitigation procedures) to 12 (strong intentions to follow mitigation procedures)..

Eleven items from the Perceived Stress Scale-14 (PSS; Cohen, 1983) (*Cronbach's* α = .89) measured each participant's levels of stress after reading suggested COVID-19-related preventative measures. Ratings were on a Likert scale, ranging from 0-4 for each item, where 0 represented extremely and 4 represented not at all. Individual scores on the PSS ranged from 0 to 44 with higher scores reported higher perceived stress. Scores ranging from 0-14 would be considered low stress. Scores ranging from 15-29 would be considered moderate stress. Scores ranging from 30-44 would be considered high perceived stress.

Items were selected from the Positive and Negative Affect Scale (PANAS; Watson, Clark, & Tellegen, 1988) (*Cronbach's* α = .81) to measure participant's affect after reading suggested COVID-19-related preventative measures. The prompt for this scale was prefaced with: "Please indicate the extent to which you feel these emotions right now". Participants then rated specific emotions such as distress and determination. Ratings were on a Likert scale, ranging from 0-4 for each item, where 0 represented extremely and 4 represented not at all. For both the Positive Affect and Negative Affect subscales, scores ranged from 0 – 24, with higher scores representing higher levels of the respective affect (positive or negative).

Additionally, STA was quantified through self-report measures created for this study assessing the extent to which a participant's intent to change their behavior was due to concerns

for the well-being of others or for their personal well-being. Items in this survey were posed as questions, such as "How important is it to you to protect others from the spread of COVID-19?". Individual scores on the STA measure ranged from 0 to 40 with higher scores indicating higher STA.

Behavioral Measure. The assessment battery featured an opportunity for participants to make a real donation to test if any effects of the manipulations on STA would also extend to actual behavior. Following the survey measures, participants were given the option to donate to Feeding America's COVID-19 Relief Fund. They could donate all of their study earnings or none of their study earnings (i.e., keep all of their earnings for themselves). Participant choice concerning this donation opportunity was used as a behavioral measure of STA. If participants chose the option to donate their funds, they were then directed to instructions on how to do so on the website for Feeding America's COVID-19 Relief Fund. Donations were not forced or coerced; all donations were completely voluntary.

Data Sharing Statement

Individual de-identified participant data, scripts, and codebooks are available at https://osf.io/3ewcq/?view_only=24c50072a7f04d08b05c460a8ab4b862.

Results

This study used a 2×2 between-subjects factorial design. Dependent variables (stress, affect, STA, and intentions to follow mitigation procedures) were tested for the assumption of normality (descriptive statistics of dependent variables are listed in Table 2). A Shapiro-Wilk test of normality revealed that stress ($p < .001$), positive affect ($p < .001$), negative affect ($p < .001$),

STA ($p < .001$), and intentions to follow mitigation procedures ($p < .001$) were significantly non-normally distributed. Because of this, it was determined that a Kruskal-Wallis nonparametric rank-sum test would be more powerful than a factorial ANOVA estimated using an ordinary least squares procedure and was therefore used for our data analysis (Kruskal & Wallis, 1952).

Table 2

Descriptive Statistics for Intentions to Follow Mitigation Procedures, Perceived Stress, Positive Affect, Negative Affect, STA, and the Behavioral Measure (N=832)

	Intentions	Stress	Positive Affect	Negative Affect	STA	Behavioral Measure
<i>M</i>	10.69	34.78	14.12	23.37	25.42	1.06
<i>SD</i>	2.02	8.75	4.88	6.25	2.29	0.24
Minimum	0	6	6	6	19	1
Maximum	12	50	30	30	37	2
Skewness	-2.38	-0.32	0.42	-0.88	0.61	3.62
<i>SE skewness</i>	0.08	0.08	0.08	0.08	0.08	0.08
<i>Shapiro-Wilk p</i>	< .001	< .001	< .001	< .001	< .001	< .001

In support of our hypothesis that intentions to follow suggested COVID-19 preventative measures would be affected by altruistic vs. self-protective goal-orientations (Specific Aim 1), a Kruskal-Wallis test revealed that there was indeed a significant difference between conditions on intentions to follow mitigation procedures ($\chi^2(3) = 9.18, p = 0.027$ (Table 3 and Figure 2). Pairwise comparisons using a Dwass-Steel-Critchlow-Fligner test showed that altruistic goal-orientation led to significantly greater reports of intention to follow mitigation procedures

than self-protective goal-orientation ($W = 4.03, p = .004$). There was no significant difference in intentions to follow mitigation procedures between the approach and avoidance message-framing groups and no significant interaction between framing and goal-orientation.

Table 3

Kruskal-Wallis Test of Framing vs. Goal-Orientation on Intentions to Follow COVID-19 Mitigation Procedures, Perceived Stress, Positive Affect, Negative Affect, and STA

	χ^2	df	p	ϵ^2
Intentions	9.18	3	0.027	0.01
Stress	2.40	3	0.494	0.00
Positive Affect	1.04	3	0.791	0.00
Negative Affect	3.75	3	0.290	0.00
STA	1.25	3	0.742	0.00
Behavioral Measure	3.79	3	0.285	0.00

Figure 2. Difference in effects between goal-orientation (altruistic vs. self-protective) and framing (approach vs. avoidance) on average intentions to follow COVID-19 mitigation procedures. The interaction between framing and goal-orientation was non-significant.

Contrary to our hypothesis for Specific Aims 2-4, Kruskal-Wallis tests revealed that there was no significant difference between conditions on perceived stress ($\chi^2(3) = 2.40, p = 0.494$), positive affect ($\chi^2(3) = 1.04, p = 0.791$), negative affect ($\chi^2(3) = 3.75, p = 0.290$), STA ($\chi^2(3) = 1.25, p = 0.742$), and whether or not participants chose to donate their funds (behavioral measure) ($\chi^2(3) = 3.79, p = 0.285$) (see Table 2).

A linear regression model showed that older age ($B = .03, p < .001$), being non-male ($B = .23, p = .042$), and having less secure employment ($B = .10, p = .025$) significantly predicted higher intentions to follow COVID-19 preventative procedures. Identifying as White ($B = -.73, p = .001$) and White/Indigenous ($B = -3.71, p < .001$) were significant predictors of fewer intentions to follow COVID-19 preventative procedures. Nonetheless, the effect of goal-orientation ($B = -.31, p = .226$) on intentions to follow mitigation procedures remained significant when controlling for age, race, gender, employment status, and religious affiliation. This result indicates that altruistic goals lead to greater intentions to follow mitigation procedures, even when accounting for the effects of individual differences that are predictive of behavioral intentions.

Discussion

With or without a vaccine, the strongest behavioral defense in limiting the spread of COVID-19 has been the practice of mitigative behaviors such as social distancing. This study tested whether message-framing (approach- vs. avoidance-framing) and goal-orientation (altruistic vs. self-protective goal-orientation) influenced intentions to adhere to mitigation procedures. Other outcomes were emotional responses to the messages, stress, and STA. Participants in the avoidance-framing/self-protective goal-orientation condition constituted our comparator group by viewing pamphlets directly adapted from COVID-19-related preventative procedures used at the time of testing. This group represented an appropriate and rigorous control as our messages were carefully replicated on content, format, and length to those presented by the CDC at the time of testing (CDC, 2020).

As predicted, our results suggest that altruistic goal-orientations within COVID-related health messages led to greater intentions to follow mitigation procedures than the CDC's standard self-protective messaging. Preliminary research supported these findings, showing that using altruistic goal-orientation within COVID-19 messages significantly increased reported intentions to follow mitigation procedures (Jordan, Yoeli, & Rand, 2020). Research should investigate these key message-framing mechanisms to inform public health policies that effectively and consistently increase receptivity to follow mitigation procedures.

Our results contribute to research that supports self-transcendence as a mechanism of self-regulation and behavior change (Kang et al., 2018; see also Reed 2008; 2014; see also Crocker et al., 2008; see also Han & Kim, 2019) and that this mechanism holds during the current pandemic (Pfattheicher, Nockur, Bohm, Sassenrath, & Petersen, 2020; see also Jordan, Yoeli, & Rand, 2020). Future research should focus on clarifying the influence of self-transcendence on health-related motivation and behavior change and its mechanisms of action. Research should specifically focus on the trans-diagnostic effects of self-transcendence, as it seems to have a wide scope of applicability when targeting changes in health behaviors (Kang et al., 2018; see also Reed 2008; 2014; see also Crocker et al., 2008; see also Han & Kim, 2019). Further, research should assess whether self-transcendence enhances self-regulation and impacts health-related behavior change more so for particular groups of people or if its effects hold regardless of individual differences. In support of the current literature, our findings suggest that self-transcendence might indeed generate a sense of interconnectedness between generations — demonstrated by influencing younger generations to follow COVID-19 preventative procedures, which may or may not have a direct benefit to them.

The magnitude of even the significant effects that we observed was modest. For instance, the effect size of goal orientation on intentions was $\epsilon^2 = .01$. The relatively small effect speaks to several challenges in translating psychology for public impact: the complexity and multi-determined nature of human motives and behavior, the limitations of theoretical models in psychology to explain a substantial proportion of variance in intentions, and the challenges in obtaining robust and reliable measurements of human behavior. Nonetheless, small effects can still have substantial impact at a population level. For instance, if only 2% of people in the U.S. engaged in only one additional COVID-protective behavior per day, that would translate to more than 6.5 million additional health behaviors per day, any one of which could prevent a new infection.

In contrast to our hypotheses, the results of the present study showed no significant effect of altruistic-framing vs. avoidance-framing when manipulated within our mitigation messaging. One implication of these findings is that prominent theoretical models of motivation can fall short in their application to pressing societal needs. Why might the approach/avoidance distinction have so little effect in this messaging? It could be that our manipulation of approach versus avoidance framing was too subtle or its effect was washed out by extensive other (typically avoidance-focused) messaging around COVID in the initial months of the COVID-19 outbreak.

Many have argued that psychological theories lack applicability outside of laboratory settings and with populations other than undergraduate students (Berkman & Wilson, 2020; see also Moreau & Conway, 2014). The inadequacy in our practical application of theoretical models has been coined by Berkman and Wilson (2020) as a Practicality Crisis. This study addresses

these issues by asking policy-relevant questions and measuring features of message communication in real world applications that can directly inform public health approaches. This real world application of approach/avoidance theory might explain the lack of effect found within our data. Future research should aim to address the lack of external validity of approach and avoidance-framing suggested by the results of this study.

Several limitations of the present study are worth noting. We measured participants' intentions to follow COVID-19 preventative procedures, but we were not able to assess whether these intentions tracked with participant's behaviors following testing.. Our donation measure was an attempt to capture the STA of our participants following exposure to messaging, by assessing their willingness to donate to others in need. Though this measure captured behaviors to help others suffering from the effects of COVID-19, it did not accurately gauge compliance regarding COVID-19 preventative behaviors of our participants. Therefore, we are unable to infer whether reported intentions reflected our participant's future behaviors. Behavioral health researchers disagree about the magnitude and significance of the intention/behavior gap (Hassan et al., 2016; see also Sheeran & Webb, 2016). However, there is strong evidence that reported intentions in intervention research are predictive of behavior change, specifically, when behavior change is dependent on some form of direct change to intentions (Webb & Sheeran, 2006; see also Gollwitzer & Brandstätter 1997). One hypothesis is that intentions are a stronger predictor of health behaviors when the behavior is health protective, as opposed to a health risk behavior, suggesting that reports of intentions to change COVID-19 health-protective behaviors might be robust predictors of actual behaviors (Gibbons et al., 1998; see also Webb & Sheeran, 2006).

Nonetheless, future research should test whether the intentions reported in the present study are confirmed through longitudinal behavioral assessment.

Barriers to COVID-19 prevention have arisen in the United States in the politicizing of mask wearing and other protective practices (Makridis & Rothwell, 2020; see also Van Bavel, 2020). Ongoing research suggests that political affiliation is strongly associated with an individual's behavioral adherence to COVID-19-related preventative procedures (Gollwitzer et al., 2020). Interestingly, the present study suggests that intentions to follow guidelines are significantly affected when self-transcendent messaging is used within COVID-19 preventative communications, even after controlling for key individual differences including political affiliation. Self transcendence is thought to promote detachment from external self-definitions and remove the hard lines created by separating the self from others (Levenson et al., 2005). Indeed, research affirms that self-transcendence can lessen the negative effects of group exclusion and perceived threats to an individual's self-worth (Burson et al., 2012). Further, research suggests that value affirmation can reduce defensiveness when offered information that is contrary to your beliefs by encouraging self-transcendence (Crocker et al., 2008). Together, these observations might explain why self-transcendent messaging would have an effect on intentions to comply with COVID-19 preventative procedures even for those whose beliefs contradict the consensus among experts about the effectiveness of the preventive measures. There are now theoretical and empirical reasons to expect that self-transcendent messaging might transcend identity politics and be effective in promoting COVID-protective behaviors across the political spectrum.

Additional future directions for research on COVID-19 messaging should focus on applying psychological theories, particularly theories related to self-transcendence, to more thoroughly uncover the mechanisms behind individual and contextual differences in message effectiveness. Successfully identifying mechanisms, such as self-transcendence, psychological distancing, perspective taking, or value-affirmation, that might influence public adherence to our mitigation strategies could be central to efforts to prevent further spread of COVID-19. Research should also test if this knowledge might translate to COVID-19 messaging regarding vaccine acceptance. Targeting mechanisms that might help us achieve herd immunity are crucial for decreasing the burden on our health care workers, and decreasing growing mortality rates, while at the same time allowing for states to reopen safely and economies to begin rebuilding.

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Declaration of Conflicting Interests

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Appendix

Full List of Items within Self-Report Measures

Self-transcendent attitudes (STA):

Not At All	A Little	Moderately	Quite a Bit	Extremely
0	1	2	3	4

1. How important is it to you to protect others from the spread of COVID-19?
2. How important is it to protect yourself from COVID-19?
3. How important is it for you to help your community to follow social distancing protocols for COVID-19?
4. How important is it for you to stay personally informed about COVID-19?
5. How important is it for you to inform others about COVID-19?
6. How much do you believe that we must work together to slow the outbreak of COVID-19?
7. How important is it to you to personally follow social distancing protocols for COVID-19?
8. How important do you think it is to focus on your own role in slowing the outbreak of COVID-19?
9. How important to you is the concern that you may spread COVID-19 to others?
10. How important to you is the concern that you may contract COVID-19 yourself?

Scoring:

Scores are created by reversing the scores on the five individualistic items, e.g., 0=4, 1=3, 2=2, etc., and then summing across all 14 items. Items 2, 4, 7, 8, and 10 are the individualistic items.

Intentions to change behaviors. Adapted from (Everett, Colombotto, Chituc, Brady, & Crockett, 2020):

Not At All Likely	A Little Likely	Moderately Likely	Quite Likely	Extremely Likely
0	1	2	3	4

1. After reading this message, how likely is it that you will always wash your hands whenever you enter work or come home, for at least 2 weeks, even if you don't feel sick?

2. After reading this message, how likely is it that you will avoid social gatherings for at least 2 weeks, even if you don't feel sick?
3. After reading this message, how likely is it that you will stay at home and avoid all social contact for at least 2 weeks, even if you don't feel sick?

Pandemic Attitudes. Adapted from (Everett, Colombotto, Chituc, Brady, & Crockett, 2020):

1. How responsible do you feel about your own role in preventing further outbreak of COVID-19? (0 = not at all responsible, 2 = moderately responsible, 4 = extremely responsible)
2. If someone does NOT stay at home and avoid social contact for the next 2 weeks, how responsible do you think they are for further outbreak of COVID-19? (0 = not at all responsible, 2 = moderately responsible, 4 = extremely responsible)
3. How much control do you think that people have over whether they stay at home and avoid social contact? (0 = no control, 2 = moderate control, 4 = absolute control)
4. How much of a threat do you think that COVID-19 is? (0 = none at all, 2 = moderate threat, 4 = extreme threat)
5. How likely do you think it is that you yourself will die as a result of COVID-19? (0 = not at all likely, 2 = moderately likely, 4 = extremely likely)
6. How likely do you think it is that someone you know will die as a result of COVID-19? (0 = not at all likely, 2 = moderately likely, 4 = extremely likely)
7. How unpleasant would it be for you personally to stay at home and avoid social contact for the next 2 weeks? (0 = not at all unpleasant, 2 = moderately unpleasant, 4 = extremely unpleasant)
8. Over the past week, how often have you sought out information about the COVID-19 Pandemic? (0 = never, 1 = a couple of days, 2 = most days, 3 = once a day, 4 = more than once a day)
9. Are there currently any cases of COVID-19 in the city where you live? yes/no
10. Has anyone you known personally tested positive for COVID-19? yes/no

Perceived Stress Levels:

Adapted from the PSS (Cohen. S, 1983): Please indicate on a scale of 0 to 4, how strong your thoughts and feelings that are being asked about are right now. Try not to overthink these questions, work quickly, but please read each individual question thoroughly. Many of them have similarities, however, each is individual.

Please answer these questions about how you are feeling **right now** (as opposed to in general or over the past weeks).

Not At All	A Little	Moderately	Quite a Bit	Extremely
0	1	2	3	4
1. How upset do you feel because of something that has happened unexpectedly?				
2. How much do you feel that you are unable to control the important things in your life?				
3. How nervous and “stressed” do you feel?				
4. How confident do you feel that you can successfully deal with day to day problems and annoyances?				
5. How confident do you feel that you can cope with important changes that are occurring in your life?				
6. How confident do you feel about your ability to handle your personal problems?				
7. How much do you feel that you cannot cope with all the things that you have to do?				
8. How well do you feel that you are on top of things?				
9. How angry do you feel because of things that are happening that are outside of your control?				
10. How confident do you feel that you can control the way you spend your time?				
11. How much do you feel that difficulties are piling up so high that you can not overcome them?				

Scores are obtained by reversing the scores on the five positive items, e.g., 0=4, 1=3, 2=2, etc., and then summing across all 11 items. Items 4, 5, 6, 8, and 10 are the positively stated items.

Positive and Negative Affect:

Adapted from the PANAS (Watson, Clark, & Tellegen, 1988). Please indicate on a scale of 0 to 4, the extent to which you feel these indicated emotions **right now**. Try not to overthink these questions, work quickly, but please read each individual question thoroughly. Many of them have similarities, however, each is individual.

Not At All	A Little	Moderately	Quite a Bit	Extremely
0	1	2	3	4

1. Interested
2. Distressed
3. Upset
4. Strong
5. Scared
6. Alert
7. Nervous
8. Determined
9. Attentive
10. Jittery
11. Active
12. Afraid

Scoring:

Positive Affect Score: Add the scores on items 1, 4, 6, 8, 9, and 11. Scores can range from 0 – 24, with higher scores representing higher levels of positive affect.

Negative Affect Score: Add the scores on items 2, 3, 5, 7, 10, and 12. Scores can range from 0 – 24, with lower scores representing lower levels of negative affect.

Demographics:

1. Age
2. Self-identified gender
3. Self-identified race
4. Education
5. Employment status

A. Was this status affected by COVID-19?

- 6. Income
- 7. Political affiliation
- 8. Religiosity

Supplementary Table 1*Correlation Matrix of Demographics and Intentions to Follow COVID-19 Mitigation Procedures*

		Intentions	Gender	Education	Employment Status	Income	Political Affiliation	Religious Affiliation
Intentions	<i>Pearson's r</i>	—						
	<i>p-value</i>	—						
Gender	<i>Pearson's r</i>	0.10	—					
	<i>p-value</i>	0.003	—					
Education	<i>Pearson's r</i>	0.01	-0.03	—				
	<i>p-value</i>	0.865	0.380	—				
Employment Status	<i>Pearson's r</i>	0.09	0.19	-0.20	—			
	<i>p-value</i>	0.009	< .001	< .001	—			
Income	<i>Pearson's r</i>	0.03	-0.06	0.29	-0.22	—		
	<i>p-value</i>	0.365	0.094	< .001	< .001	—		
Political Affiliation	<i>Pearson's r</i>	-0.02	-0.03	-0.08	0.03	-0.04	—	
	<i>p-value</i>	0.652	0.326	0.022	0.453	0.231	—	
Religious Affiliation	<i>Pearson's r</i>	0.12	0.06	-0.13	0.10	-0.15	-0.03	—
	<i>p-value</i>	< .001	0.104	< .001	0.005	< .001	0.414	—

Supplementary Table 2

Linear Regression to Test Whether the Effect of Goal-Orientation on Intentions Remains While Controlling for Individual Differences

	<i>B</i>	<i>SE</i>	<i>t value</i>	<i>p-value</i>
(Intercept)	9.13	0.51	18.10	<0.001
Goal-orientation	-0.31	0.14	-2.28	0.023
Age	0.03	0.01	4.53	<0.001
Gender	0.23	0.11	2.03	0.042
Black/White	-0.25	1.02	-0.25	0.806
Black/White/Other	1.20	1.98	0.61	0.545
Black/White/Latinx	1.04	1.40	0.74	0.459
Black/Latinx	-0.18	1.41	-0.13	0.898
White	-0.73	0.23	-3.25	0.001
Asian/White	-0.73	0.73	-1.00	0.316
Asian/White/Pacific-Islander	0.64	1.42	0.45	0.653
Indigenous/White	-3.71	1.01	-3.67	<0.001
Indigenous/Latinx/White	0.08	1.41	0.06	0.955
Pacific-Islander/White	0.45	1.98	0.23	0.820
Latinx/White	-0.34	0.63	-0.55	0.586
Asian	-0.56	0.34	-1.66	0.097
Asian/Latinx	-0.65	1.41	-0.46	0.646
Indigenous	-1.86	1.40	-1.33	0.185
Other	-3.21	1.98	-1.63	0.104
Indigenous/Latinx	0.23	1.98	0.11	0.908
Pacific Islander/Latinx	-1.35	1.97	-0.69	0.493
Latinx	-0.55	0.39	-1.42	0.157
Education	0.043	0.08	0.55	0.585
Employment	0.10	0.04	2.25	0.025
Income	0.06	0.04	1.42	0.155
Political Affiliation	-0.01	0.08	-0.07	0.947