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Should health communication regarding COVID-19 emphasize self- or other-focused impacts of mitigation behaviors? Insights from two message matching studies

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Abstract

Mask-wearing, social distancing, and vaccination remain effective ways to mitigate the spread of COVID-19. Yet, many hesitate to enact some or all these preventive behaviors. We created three persuasive messages—framed to promote benefits to either (1) oneself, (2) close-others, or (3) distant-others—to determine whether the effectiveness of these messages varied based on personality differences (specifically independent/interdependent self-construal and chronic construal level). In two online experiments (N = 862), we measured individual differences and showed participants one of the three messages. Consistent interactions between interdependent self-construal and message conditions showed that those high in interdependent self-construal responded most positively to the self-focused messages promoting mask-wearing, social distancing, and COVID-19 vaccination. Those low in interdependent self-construal responded most negatively to the self-focused messages. Although no interaction effect was observed for independent self-construal, and inconsistent evidence

emerged for construal level, other-focused messages performed either better or equally well to the self-focused messages for most participants and may thus be promising for future public health communication efforts.

INTRODUCTION

As of April 2023, over 762,000,000 cases of COVID-19 and over 6,800,000 deaths due to COVID-19 have been confirmed worldwide; in the United States alone, there have been over 102,800,000 confirmed cases and over 1,100,000 reported deaths (WHO, 2023). With well over a million new cases globally every week, there continues to be a need for higher adoption of COVID-19 mitigation behaviors such as vaccination—especially in areas with high community levels of COVID-19 (CDC, 2022a,b; WHO, 2020). Given that individual adherence to recommendations has varied highly (Dong et al., 2020; Haischer et al., 2020; Thu et al., 2020), finding ways to optimize public health communication is warranted.

Since the start of the pandemic, there has been interest in whether individuals are more likely to engage in COVID-19 preventive behaviors for self-focused versus other-focused reasons (e.g., Campos-Mercade et al., 2021; Jordan et al., 2021; Sheth & Wright, 2020; Thunström et al., 2020), and a few studies have directly examined whether health-related messages can make use of this distinction (Banker & Park, 2020; Falco & Zaccagni, 2020; Jordan et al., 2021; Heffner et al., 2021; Luttrell & Petty, 2021). Findings in this area have been somewhat inconsistent—some studies have found that messages are more effective when they emphasize other-related outcomes (e.g., Jordan et al., 2021; Luttrell & Petty, 2021), while other studies do not find this pattern (e.g., Banker & Park, 2020; Falco & Zaccagni, 2020; Miyajima & Murakami, 2021; Yuan & Shu, 2021). Quite possibly, the relative effectiveness of these types of messages is moderated by individual differences and specific variations in what the messages emphasize. For example, "other-focused" messages can emphasize effects on close-others (i.e., immediate family or friends) or distant-others (i.e., the broader community or general public), and individual differences in people's values could impact which variation they are most receptive to.

The goal of the current project is to investigate how health messages that are constructed to promote benefits for either the self, close-others, or distant-others will perform for improving (1) adherence to mask-wearing and social distancing and (2) intentions to receive the COVID-19 vaccine. We also examine how such messages vary in their effectiveness depending on personality differences in self-construal (i.e., independent and interdependent self-construal) and construal level (i.e., abstract versus concrete thinking).

Message matching

Message matching is a strategy that aims to increase the effectiveness of persuasive messages by matching their content to account for characteristics of their audience (Carpenter, 2012; Joyal-Desmarais, 2020; Joyal-Desmarais et al., 2022; Rothman et al., 2020; Snyder & DeBono, 1985). For example, people who hold collectivistic values may be more persuaded by messages that emphasize benefits to members of their ingroup. In contrast, those who hold individualistic val-

ues may be more persuaded by messages emphasizing personal benefits (Han & Shavitt, 1994). A meta-analysis of over 700 studies found that matching persuasive messages to individuals' motivations (e.g., personal values) reliably swayed people's attitudes, intentions, and behaviors across many behavioral domains, including health (Joyal-Desmarais et al., 2022). So far, however, only a few studies have applied message matching to understand the differential impact of self- and other-focused messages on COVID-19 mitigation behaviors. That said, their findings support the importance of considering individual differences (e.g., Luttrell & Petty, 2021; Yuan & Chu, 2021). Luttrell and Petty (2021), for instance, find that other-focused messages are more effective than self-focused messages to promote social distancing when individuals view public health as a moral domain. The current project extends such works by examining two additional factors: i.e., individuals' self-construal and construal level tendencies.

Self-construal

According to research on self-construal, people differ in the extent to which they define themselves independently or interdependently in relation to other members of their social circles (Markus & Kitayama, 1991). Whereas some individuals see members of their ingroup as a fundamental part of their identity (i.e., having a strong interdependent self-construal), others may not ascribe much influence of other people in how they construe themselves and instead construct their identities based on their own independent characteristics and experiences (Markus & Kitayama, 1991; Tropp & Wright, 2001).

Interdependent and independent self-construal correspond closely to the distinction between collectivism and individualism, and reflect a larger class of individual differences that influence the degree to which people tend to focus on seeking benefits for themselves versus others when making decisions (Abele & Wojciszke, 2014; Joyal-Desmarais et al., 2018). These motivational underpinnings have made self-construal an individual difference variable frequently used in message matching research (Joyal-Desmarais et al., 2022; Sherman et al., 2011). Unsurprisingly, many studies have indeed found self-construal to significantly moderate the effects of emphasizing self-focused versus other-focused benefits on persuasion (Chang, 2009; Joyal-Desmarais et al., 2020; Yang et al., 2017). Though findings in this area can be heterogeneous (sometimes even finding advantages for mismatched messages: e.g., Joyal-Desmarais et al., 2022; Yuan & Shu, 2021), the most common finding is that people high in independent self-construal respond more favorable to self-focused appeals, whereas those with interdependent self-construal respond more favorably to other-focused appeals (Chang, 2009; Hornikx & O'Keefe, 2009; Uskul & Oyserman, 2010). We sought to examine whether this pattern would hold in promoting COVID-19 mitigation behaviors.

Construal level

Whereas self-construal focuses on the extent to which individuals construct their sense of self in relation to or independently from others, *construal level* concerns the degree of abstraction with which individuals conceive of psychological objects (e.g., items, persons, or events; Trope & Liberman, 2010). According to Construal Level Theory, the extent to which individuals view objects in concrete terms (low construal level) or abstract terms (high construal level) is integrally linked to the psychological distance of that object in relation to the self (Trope & Liberman, 2010; Trope et al., 2007). Objects are construed as more *abstract* as an object becomes more distant

from the self, and abstract objects are perceived as more distant. In contrast, an object becomes more *concrete* the more it is perceived as being close to the self, and close objects are perceived in more concrete terms. Psychological distance itself is understood to vary across many dimensions, including spatial, temporal, and social dimensions. For example, community members are generally seen as more distant than friends and family members (and conceived of most abstractly), whereas the self is seen as most proximal (and conceived of most concretely). Of importance to the current work, construal level also varies as an individual difference variable, with some individuals consistently operating at higher (more abstract) versus lower (more concrete) construal levels (Vallacher & Wegner, 1989).

Communication-based studies generally hold that message features are more persuasive to the extent that they match the construal level/distance of those viewing the message (e.g., Fujita et al., 2008; Kim et al., 2016; Ramirez et al., 2015), as individuals are more likely to experience a fluent processing of the message when the information conveyed matches the mindset they are in already (Hernandez et al., 2015; White et al., 2011). So far, research has been consistent with such claims. For instance, Fujita and colleagues (2008) have found that abstract (vs. concrete) messages are more persuasive when individuals are asked to evaluate objects they perceive as distant (vs. close), and Nan (2007) has found that societally focused (vs. self-focused) appeals are more persuasive to individuals in high (vs. low) construal mindsets.

Whereas some COVID-19 researchers have identified the potential importance of considering construal level in messaging, these have only examined how message-based factors interact with one-another (i.e., how all elements in a message should be either high or low construal level; Jiang & Dodoo, 2021), and have not considered individual-level differences. Consequently, we examine how trait-level differences in individuals' construal levels moderate the effectiveness of messages that vary in psychological distance (e.g., in the message's focus on benefits to the self, close-others, or distant-others).

The present research

The present research consists of two experiments that examine whether matching health messages to individual differences in self-construal and construal level can increase the persuasiveness of these messages. In each study, we measured individual differences and developed three persuasive messages: a *self-focused* message that appealed to the benefits of mask-wearing/social distancing or vaccinations for oneself, a *close-other-focused* message that appealed to the benefits for close friends and family, and a *distant-other-focused* message that appealed to the benefits for the general public (distant-others). Building on past research, we predicted that: (1) higher independent self-construal should lead to increased receptivity to the self-focused message compared to the other-focused messages; (2) higher interdependent self-construal should lead to increased receptivity to the other-focused messages, relative to the self-focused message, and; (3) higher (vs. lower) chronic construal level should lead to increased receptivity to the more socially distant messages—that is, the distant other message, followed by the close other message (with lower construal level instead leading to increased receptivity to the self-focused message). In addition, we also explored which messages would, overall, be most effective for promoting COVID-19 mitigation behaviors (regardless of individual differences).

Study 1 examined these predictions in the context of mask-wearing and social distancing behaviors. Study 2 did so in the context of COVID-19 vaccination. Given that message matching studies infrequently examine their predictions longitudinally (Joyal-Desmarais et al., 2022)—a limitation

that applies more generally to health messaging for promoting COVID-19 mitigation measures (e.g., Banker & Park, 2020; Heffner et al., 2021; Jordan et al., 2021; Luttrell & Petty, 2021)—Study 1 assessed the effectiveness of messages not only immediately upon message receipt (e.g., on attitudes, intentions) but also 7 days after receiving messages (e.g., on intentions and behavior).

Both studies were preregistered a priori with the Open Science Framework (https://osf.io/r7cbu/) and were approved by the University of Minnesota Institutional Review Board (STUDY00011058). We have reported all measures, conditions, data exclusions, and sample size considerations in this manuscript and in our study preregistration.

STUDY 1

In Study 1, we examined message matching hypotheses within the context of mask-wearing and social distancing. To do so, we developed three persuasive messages, each with a different type of appeal. First, a *self-focused* message appealed to the benefits of mask-wearing and social distancing for oneself (e.g., "wearing a face mask … in public may protect you…"). Second, a *close-other-focused* message appealed to the benefits of mask-wearing and social distancing for close friends and family (e.g., "wearing a face mask … around friends and family protects them…"). Third, a *distant-other-focused* message appealed to the benefits of mask-wearing and social distancing for the general public (e.g., "wearing a face mask … in public protects those around you…").[1] In an experimental design, we examined the differential effects of these messages on attitudes, intentions, and behaviors relevant to mask-wearing and social distancing as COVID-mitigating practices and the extent to which the effectiveness of the messages was moderated by individual differences in self-construal and construal level.

Method

Participants

The study was conducted as an online survey in October and November 2020 using Prolific (Prolific, 2020). A screening survey was first given to 1250 participants who resided in the United States to identify participants who exhibited higher-risk behavior, namely not abiding by social distancing and/or mask-wearing guidelines.[2] Following screening, 515 participants were enrolled into the study and completed an initial survey, and 447 people completed a follow-up survey 1 week later. We conducted an a priori power analysis using G*Power version 3.1 (Faul et al., 2007) to determine the minimum sample size required to test the study hypothesis. Results indicated the required sample size to achieve 95% power for detecting an effect size $f = 0.05$, at a significance criterion of $\alpha = .05$, was $N = 402$ across all experimental conditions. Thus, the obtained sample

[1] We also developed an effectiveness statement that emphasized the overall benefits mask-wearing and social distancing, resulting in a 3×2 (self/close-other/distant-other x effectiveness statement/no statement) design. However, we found no effects for the effectiveness statement, and all results are collapsed across that condition.

[2] We specifically recruited individuals who engaged in higher-risk behavior because we were interested in those who were *not* already engaging in our behaviors of interest (i.e., social distancing and mask-wearing in study 1 and vaccinations in study 2). This helped us to avoid ceiling effects and to better gauge the effects of our manipulations.

TABLE 1 Sociodemographic characteristics of participants (Study 1)

	Time 1 ($N = 515$)		Time 2 ($N = 447$)	
	N	**(%)**	***N***	**(%)**
Gender				
Male	265	51.5	228	51.0
Female	241	46.8	213	47.7
Race				
White	397	77.1	345	77.2
Black	55	10.7	46	10.2
American Indian	7	1.4	5	1.1
Asian	59	11.5	56	12.5
Native Hawaiian	2	0.4	1	0.2
Urban-rural classification				
Urban	173	33.6	149	33.3
Suburban	265	51.5	232	51.9
Rural	75	14.6	66	14.8
Political Identification				
Republican	128	24.9	104	23.3
Democrat	224	43.4	198	51.9
Independent/Other/No Preference	161	31.3	145	32.4

Note: Mean ages of participants for both Time 1 and Time 2 were 32.1 with a range of 18–71.

size of $N = 447$ is adequate to test the study hypotheses. Demographic characteristics of the sample are reported in Table 1.

We compensated participants $0.10 for completing the screening survey, $1.00 for completing the first part of the study, and $1.50 for the follow-up 1 week later.

Personality measures

Self-construal

Participants completed the 30-item Self-Construal scale to assess their independent and interdependent self-construal levels at Time 1 (Singelis, 1994). Each item used a seven-point Likert response format (1 = "strongly disagree"; 7 = "strongly agree"). Internal reliability was good for both independent ($\alpha = .83$) and interdependent ($\alpha = .82$) self-construal.

Construal level

We used the 25-item Behavior Identification Form (BIF) to assess individual differences in construal level at Time 1 (Vallacher & Wegner, 1989). Each item in the scale describes a behavior (e.g., "Making a list") in either a low-level/concrete construal ("Writing things down") or a high-level/abstract construal ("Getting organized"). Participants selected which of the two descriptions they would use to describe each behavior. The number of high-level construal items that a participant selected was summed to determine the participant's BIF construal score. This measure had acceptable internal consistency, *KR-20* = .85.

Dependent measures

Intentions

At both time points, participants answered two items on their intentions to wear a mask and two items on their intentions to practice social distancing. Each item used a seven-point Likert format (1 = "Strongly Disagree"; 7 = "Strongly Agree"). Item pairs were highly correlated (mask-wearing: Time 1 $r = .89$, Time 2 $r = .87$; social distancing Time 1 $r = .92$, Time 2 $r = .88$) and were summed to create a composite score at each time point.

Attitudes

To assess attitudes toward mask-wearing and social distancing, participants completed semantic differential items related to both behaviors at both time points. For each domain there were six items (e.g., "My wearing a mask in public would be…", "My practicing social distancing in public would be…"). Participants indicated where the item fell between six adjective pairs: "Good-Bad", "Healthy-Unhealthy", "Necessary-Unnecessary", "Useful-Useless", "Beneficial-Harmful", and "Responsible-Irresponsible" on a seven-point bipolar scale. All Cronbach's alphas were high: Time 1: $\alpha_{\text{MaskWearing}} = .98$; $\alpha_{\text{SocialDistancing}} = .97$; Time 2: $\alpha_{\text{MaskWearing}} = .98$; $\alpha_{\text{SocialDistancing}} = .98$.

Behaviors and expected behaviors

At the 1-week follow-up (Time 2), we asked participants about their behavior during the preceding week, specifically the number of days they were within six feet of someone outside of their household and the percentage of times they wore a face mask when they were within six feet of someone outside of their household. We also asked participants how many days they expected to be within six feet of people outside of their household in the next 7 days.

Procedure

After completing the screening survey, eligible participants viewed a consent form and, following consent, were enrolled into the primary study. Participants then completed measures of the moderator variables (self-construal scale, BIF) before being randomly assigned to read one of three persuasive messages that promoted social distancing and mask-wearing. Messages emphasized the benefits of these behaviors either to (a) the self, (b) close-others, or (c) distant-others (see Appendix A for the full messages). Following this, participants reported their intentions and attitudes towards the behaviors, and answered demographic questions.

One week later, participants were contacted to participate in the follow-up survey, for which they completed the same measures of intentions and attitudes. Additionally, participants reported on their behaviors. Finally, participants were debriefed.

Results

To test for matching effects, we ran a series of linear regression models for each dependent variable in which we examined the interaction between the message condition and one of three individual difference variables: independent self-construal score, interdependent self-construal score, and construal level. All predictor variables were standardized, and the self-focused message

condition was used as the reference group in all models (across outcomes, the close-other and distant-other message conditions were never significantly different from one another). We summarize our findings in the text and present our full set of results in the supplemental files (Tables S1–S3). Descriptive statistics and correlations for our dependent variable measures in Study 1 are presented in Table 2.

Independent self-construal

Contrary to hypotheses, we found no significant interaction between participants' independent self-construal scores and message conditions for any dependent variable at Time 1 or Time 2. Additionally, there were no significant main effects for independent self-construal on any of the outcome variables. ANOVA results for Study 1 are reported in Table 3 below.

Interdependent self-construal

Effects on attitudes and intentions

We found a significant main effect of interdependent self-construal in nine of the eleven dependent variables. Participants with higher levels of interdependent self-construal showed more favorable outcomes (i.e., higher intentions) toward mask-wearing and social distancing. There was no significant effect of independent self-construal on either anticipated behavior to engage in these behaviors in time two or on potential exposure to COVID-19 in the previous 7 days.

We found significant interactions between message condition and participant interdependent self-construal scores for seven of the eight measures of attitudes and intentions: mask-wearing intentions (at both time points), attitudes towards mask-wearing (at both time points), social distancing intentions (at Time 1 only), and attitudes towards social distancing (at both time points). Significant findings are presented in Figure 1.

A positive effect of interdependent self-construal (higher scores leading to more positive outcomes) was significantly more pronounced in the self-focused message condition than in the distant-other message condition. This was true for intentions to wear a mask at both time points, attitudes towards mask-wearing at both time points, intentions to social distance at Time 1, and attitudes towards social distancing at both time points.

Similarly, we also found a positive effect of interdependent self-construal to be significantly more pronounced in the self-focused message condition than in the close-other message condition in three of the eight measures of attitudes and intentions: intentions to wear a mask at Time 1, attitudes towards mask-wearing at Time 1, and attitudes towards social distancing at Time 1.

Although all significant interactions were consistent with one another, the specific pattern of the findings was counter to the hypothesized matching effect. Specifically, the effect was driven primarily by positive response to the self-focused message as interdependent self-construal increased but was also driven by negative response to the self-focused message as interdependent scores decreased. Regions of significance are presented as shaded areas in Figure 1.

TABLE 2 Descriptive statistics and correlations for dependent variable measures (Study 1)

	M	*SD*	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Independent self-construal	76.08	12.59	—												
2. Interdependent self-construal	70.8	10.46	0.13*	—											
3. BIF	15.16	5.47	0.22**	0.14*	—										
4. Mask intentions (Time 1)	11.81	3.05	−0.05	0.22**	0.01	—									
5. Mask intentions (Time 2)	11.91	3.01	−0.07	0.17**	−0.02	0.84**	—								
6. Mask attitudes (Time 1)	36.19	8.72	−0.05	0.20**	0.04	0.76**	0.69**	—							
7. Mask attitudes (Time 2)	36.49	8.54	−0.07	0.18**	0.05	0.73**	0.74**	0.85**	—						
8. Mask behavior (Time 2)	67.7	29.81	0.02	0.08	0.05	0.52**	0.55**	0.42**	0.43**	—					
9. Social distancing intentions (Time 1)	11.44	2.92	0.03	0.19**	0.07	0.73**	0.67**	0.66**	0.61**	0.46**	—				
10. Social distancing intentions (Time 2)	11.65	2.85	0.03	0.15*	0.05	0.66**	0.75**	0.58**	0.61**	0.49**	0.83**	—			

(Continues)

TABLE 2 (Continued)

	M	*SD*	1	2	3	4	5	6	7	8	9	10	11	12	13
11. Social distancing attitudes (Time 1)	36.47	8.01	−0.02	0.20**	0.07	0.68**	0.63**	0.90**	0.76**	0.39**	0.72**	0.64**	—		
12. Social distancing attitudes (Time 2)	37.01	7.65	−0.01	0.17**	0.07	0.64**	0.66**	0.78**	0.89**	0.41**	0.67**	0.69**	0.82**	—	
13. Past 7 days exposure (Time 1)	4.87	2.00	0.01	0.01	0.01	−0.10	−0.14*	−0.08	−0.08	−0.07	−0.15*	−0.21**	−0.15*	−0.12	—
14. Anticipated future exposure (Time 2)	4.82	2.06	0.05	0.00	0.04	−0.10	−0.14*	−0.11	−0.12	−0.06	−0.14*	−0.23**	−0.15*	−0.15*	0.82**

*$p < .05$. **$p < .01$.

TABLE 3 ANOVA results for study 1

Dependent Variable					Close other message		Distant other message		Self message	
	df	*F*	*p*	η^2	*M*	*SD*	*M*	*SD*	*M*	*SD*
Mask intentions (Time 1)	2, 511	3.38	0.035	0.013	0.073	0.95	0.088	0.875	−0.162	1.144
Mask intentions (Time 2)	2, 444	2.4	0.092	0.011	0.09	0.981	0.056	0.899	−0.143	1.097
Mask attitudes (Time 1)	2, 511	5.25	0.006	0.02	0.063	0.92	0.133	0.878	−0.197	1.157
Mask attitudes (Time 2)	2, 444	4	0.019	0.018	0.087	0.92	0.103	0.868	−0.186	1.162
Social distance intentions (Time 1)	2, 511	1.35	0.26	0.005	0.046	0.991	0.056	0.938	−0.103	1.066
Social distance intentions (Time 2)	2, 444	1.23	0.294	0.005	0.033	1.066	0.071	0.86	−0.101	1.054
Social distance attitudes (Time 1)	2, 511	4.95	0.007	0.019	0.067	0.949	0.123	0.862	−0.193	1.147
Social distance attitudes (Time 2)	2, 444	2.64	0.072	0.012	0.072	0.943	0.083	0.914	−0.152	1.117
Mask-wearing behavior (Time 2)	2, 444	0.97	0.379	0.004	−0.071	1.067	0.089	0.927	−0.014	0.998
Past 7-day exposure (Time 2)	2, 443	0.72	0.488	0.003	−0.066	1.023	−0.006	0.966	0.072	1.01
Anticipated future exposure (Time 2)	2, 444	1.76	0.173	0.008	−0.102	1.03	−0.012	0.965	0.113	0.997

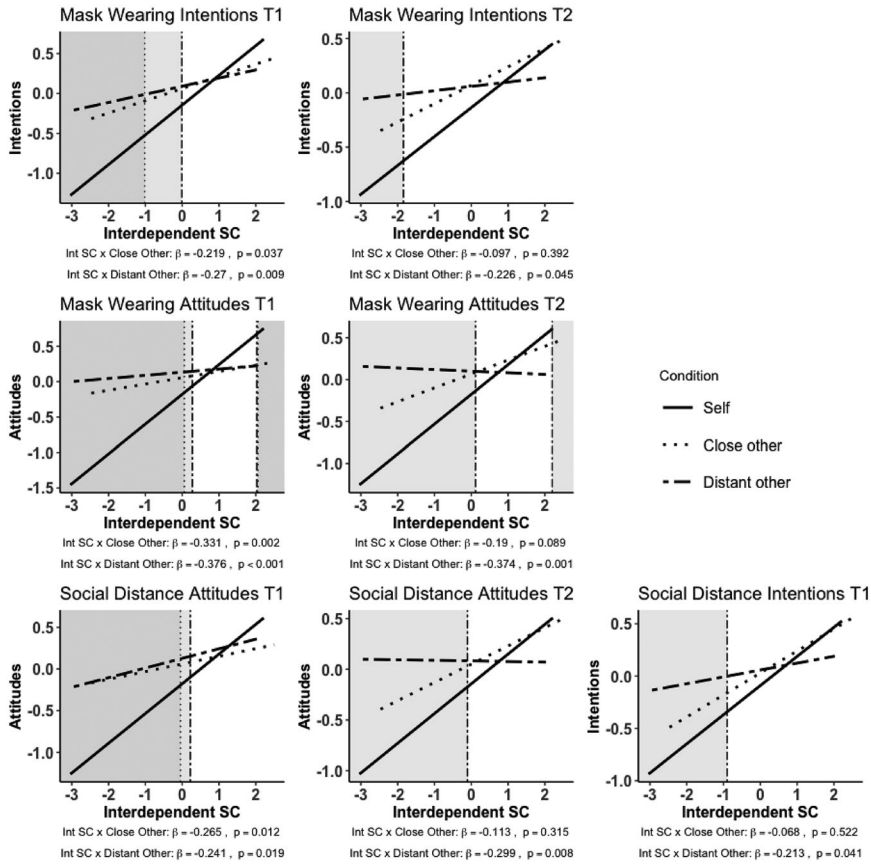

FIGURE 1 Significant interactions between interdependent self-construal and dependent variables. The shaded areas indicate regions in which the close- and/or distant-other condition(s) were significantly different from the self-condition. For example, in the upper left panel, the shaded area to the left of the distant-other (dot-dash) vertical line is the range of interdependent self-construal scores in which the distant-other message was more effective at eliciting mask-wearing intentions at Time 1 than the self-focused message; the shaded area to the left of the close-other (dotted) vertical line is the range of interdependent self-construal scores in which the close-other-focused message was more effective at eliciting mask-wearing intentions at Time 1 than the self-focused message. Similarly, any shaded region to the right of a vertical line indicates the range of interdependent self-construal values for which the self-message was more effective. Note: not all figures have shaded regions for both the close- and distant-other conditions.

Effects on behaviors

No interactions between interdependent self-construal scores and message conditions were significant for the behavioral outcome variables. These non-significant interactions are depicted in Figures 2 and 3.

Construal level

There were significant interaction effects between message condition and construal level for four of the eleven dependent variables. Specifically, the effect of construal level was significantly differ-

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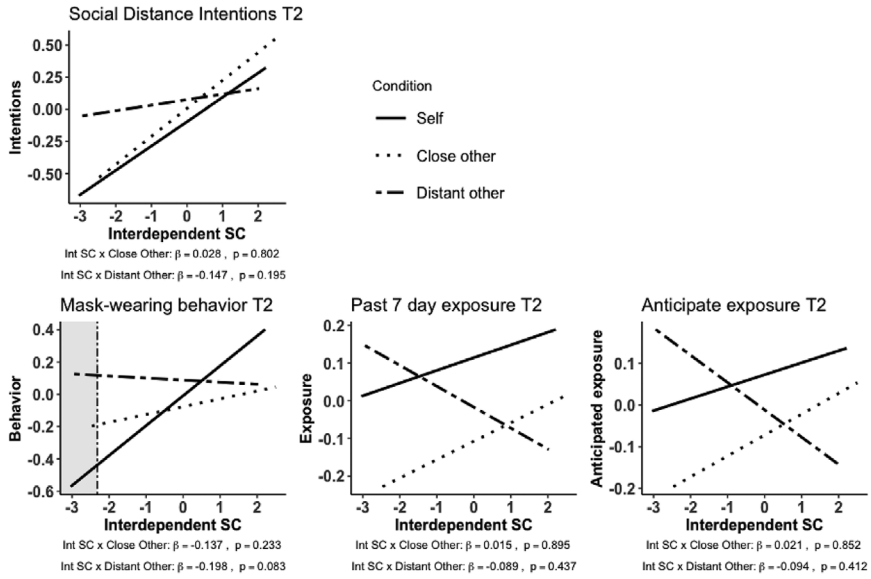


FIGURE 2 Non-significant interactions between interdependent self-construal and dependent variables. See Figure 1 caption for interpretation.

ent between the self and close-other-focused message conditions for social distancing intentions at Time 1, attitudes towards social distancing at Time 1, and anticipated exposure at Time 2. The effect of construal level also differed between the self and distant-other message conditions for social distancing intentions at Time 1. Interactions did not reach statistical significance for any other dependent variables (see Table S3). Regions of significance in the models that had statistically significant interactions are depicted in Figure 4. Non-significant interactions are depicted in Figure 5.

Overall message effectiveness

To test which of the messages was most effective (regardless of individual difference variables), we ran a series of one-way ANOVAs on each dependent variable. We found that the close-other and distant-other messages both outperformed the self-focused message regarding mask attitudes at Time 1, mask attitudes at Time 2, and social distancing attitudes at Time 1.

Discussion

In Study 1, we sought evidence of whether matching messages to individual differences in independent/interdependent self-construal and construal level would improve the effectiveness of these messages in promoting engagement in mask-wearing and social distancing. Our findings do not support matching messages to independent self-construal, as no interaction effect was found between independent self-construal and the three types of messages. In contrast, we found a significant interaction between interdependent self-construal and the message types, but this was in the opposite direction than past literature would suggest; specifically, interdependent

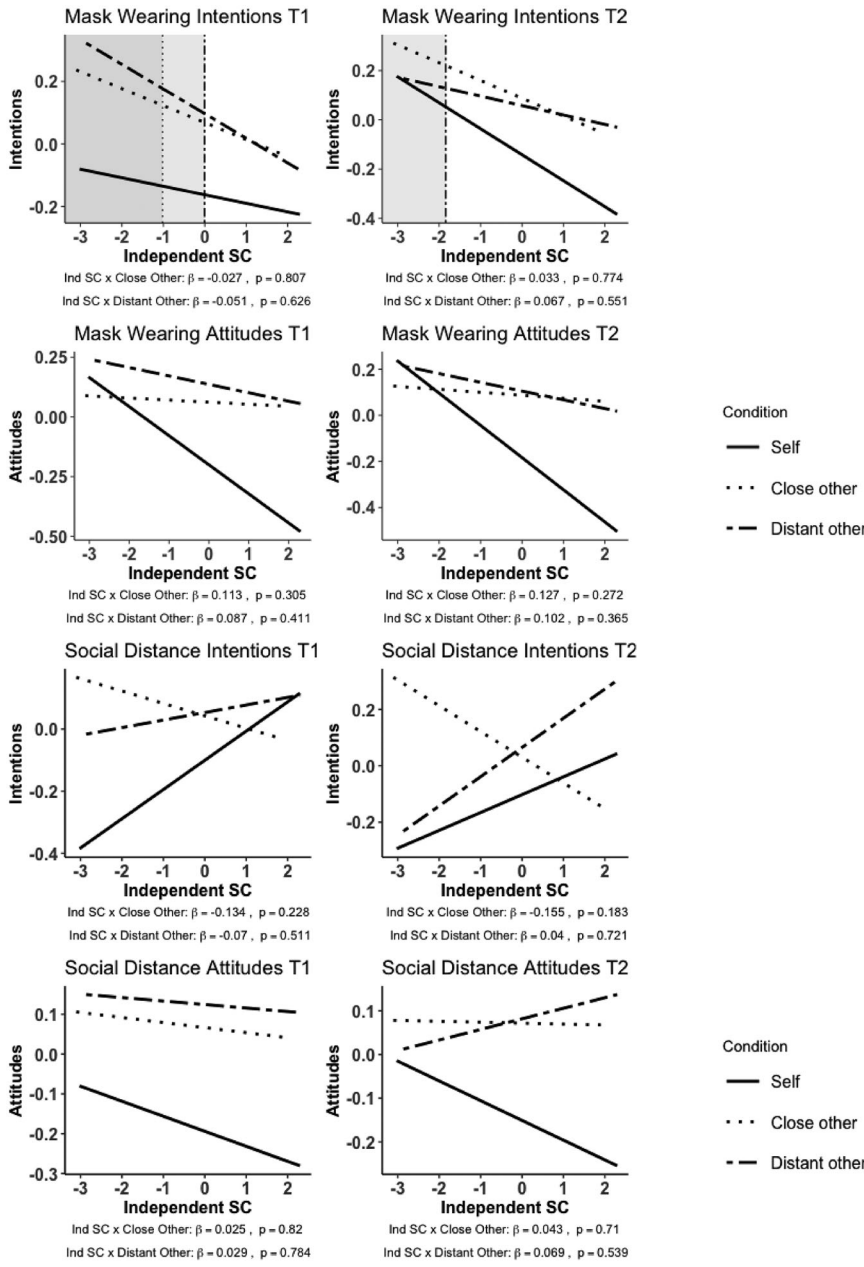


FIGURE 3 (Non-significant) interactions between independent self-construal and dependent variables. See Figure 1 caption for interpretation.

self-construal appeared to predominantly influence the effectiveness of the self-focused message (rather than the other-focused messages), such that having a higher level of interdependence led participants to respond more favorably to the self-focused message. Similarly, findings for construal level were also in a direction opposite to what past literature would suggest; having a higher construal level (i.e., a more abstract mindset) led to more favorable responses to the self-focused message (i.e., the least psychologically distant, and lowest construal level message).

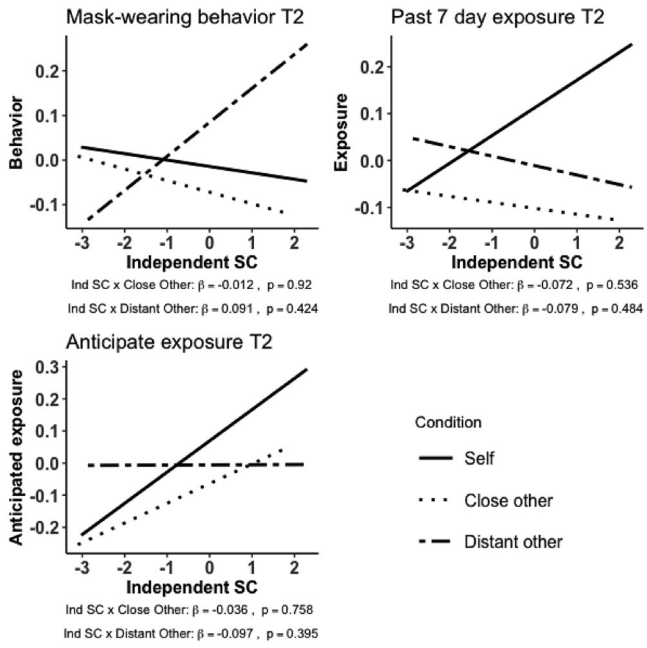
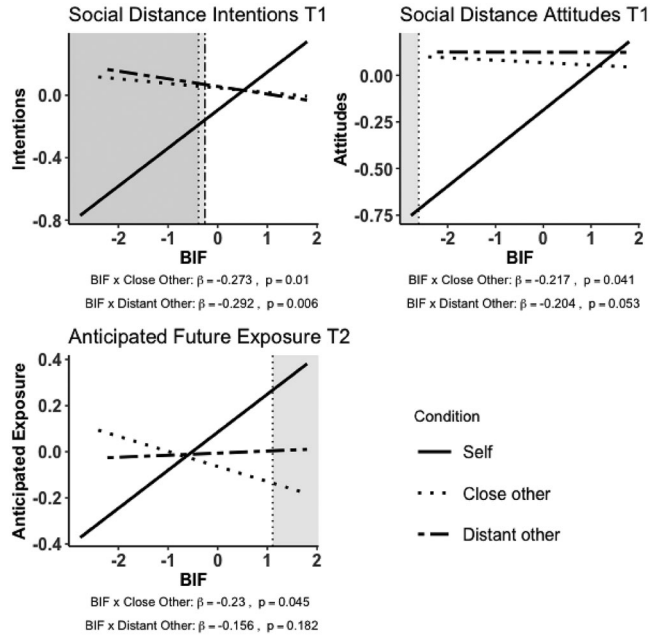


FIGURE 3 Continued

FIGURE 4 Significant interactions between construal level (as measured by the BIF) and dependent variables. See Figure 1 caption for interpretation.



Our findings generally suggest that, although self-focused messages can sometimes outperform other-focused messages (e.g., at very high levels of interdependent self-construal and construal level), other-focused messages are usually either just as effective or more effective than self-focused messages.

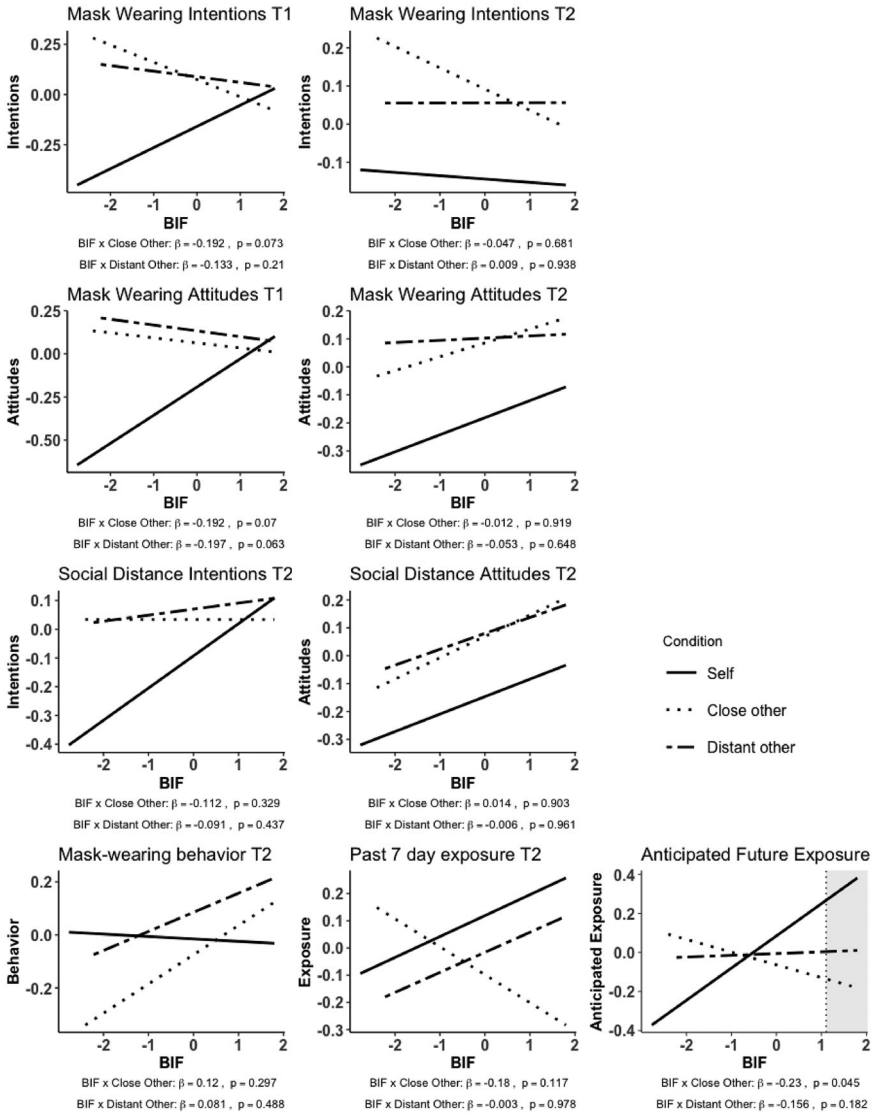


FIGURE 5 Non-significant interactions between construal level (as measured by the BIF) and dependent variables. See Figure 1 caption for interpretation.

STUDY 2

Given the contrast of these findings with past research, the goal of Study 2 was to examine whether the same pattern of results found in Study 1 would emerge in the context of COVID-19 vaccination. Specifically, we examined whether interdependent self-construal positively predicts people's reactions to self-focused messages as we found in Study 1 or whether findings would instead align with past research and theory (e.g., that interdependent self-construal positively predicts people's responses to other-focused messages). We also sought to replicate the main findings from Study 1 to confirm whether other-focused messages generally outperform self-focused messages when promoting COVID-19 vaccinations as they did with mask wearing and social distancing

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TABLE 4 Sociodemographic characteristics of participants (Study 2)

	N	(%)
Gender		
Male	215	51.8
Female	188	45.3
Race		
White	321	77.3
Black	36	8.7
American Indian	11	2.7
Asian	55	13.3
Native Hawaiian	2	<0.1
Urban-rural classification		
Urban	108	26.0
Suburban	236	56.9
Rural	71	17.1
Political Identification		
Republican	59	14.2
Democrat	188	45.3
Independent/Other/		
No Preference	168	40.5
Total	415	-

Note: Mean age of participants was 33.6 with a range of 18–75.

intentions in Study 1. It is possible that other-focused messages will again be more effective in vaccination appeals, consistent with the results of our previous study. However, it is also possible that self-focused messages will be more effective in the vaccine domain because the explicit benefits of vaccination (as opposed to mask-wearing and social distancing) are to the self rather than to others.

Method

We recruited participants for Study 2 in March 2021 using Prolific. About 800 participants who resided in the United States completed a screening survey. To avoid ceiling effects, only those who had not been vaccinated and who did not have a scheduled vaccination appointment were eligible to participate, as determined through the screening. About 415 participants enrolled in this study. We conducted an a priori power analysis using G*Power version 3.1 (Faul et al., 2007) to determine the minimum sample size required to test the study hypothesis. Results indicated the required sample size to achieve 95% power for detecting an effect size $f = 0.05$, at a significance criterion of $\alpha = .05$, was $N = 402$ across all experimental conditions. Thus, the obtained sample size of $N = 415$ is adequate to test the study hypotheses. Demographic characteristics of the sample are reported in Table 4.

We compensated participants $0.11 each for completing the two-question screening survey and $1.00 for completing the focal survey.

Personality measures

Self-construal

Participants completed the 30-item Self-Construal (Singelis, 1994) scale to assess their level of independent and interdependent self-construal. Internal reliability was sufficient for both independent ($\alpha = .81$) and interdependent ($\alpha = .82$) subscales.

Construal level

Participants completed the 25-item BIF to assess individual differences in construal level. This measure had acceptable internal consistency, *KR-20* = .88.

Dependent measures

Intentions

Participants answered an item related to their intent to receive a COVID-19 vaccination once available to them on a seven-point Likert scale (1 = "Strongly Disagree"; 7 = "Strongly Agree").

Attitudes

Participants answered an item to indicate whether they found the message convincing on a seven-point Likert scale (1 = "Strongly Disagree"; 7 = "Strongly Agree"). Participants also completed semantic differentials related to receiving a COVID-19 vaccination. Participants responded to the prompt, "My receiving a COVID-19 vaccination would be…" by indicating where on a seven-point bipolar scale where, each of the eight following items fell: "Good-Bad," "Healthy-Unhealthy," "Necessary-Unnecessary," "Useful-Useless," "Beneficial-Harmful," "Responsible-Irresponsible," "Safe-Risky," and "Cautious-Reckless". The Cronbach's alpha was high, $\alpha = .986$.

Procedure

After completing screening items, eligible participants were invited to enroll in the primary study. After consenting to participate, individuals completed measures of the moderator variables: the self-construal scale and the BIF. To address our questions about message matching and vaccinations, we developed three persuasive message frames: a self-focused message that appealed to the benefits of the participant receiving a vaccination for oneself, a close-other-focused message, and a distant-other-focused message. Participants were randomly assigned to an experimental condition and read one of the three persuasive messages (see Appendix B). Following the manipulations, participants completed similar dependent intentions and attitudes measures, COVID-19 exposure questions, and demographic questions as in Study 1, with items in Study 2 modified to relate to vaccinations rather than mask-wearing and social distancing.

Results

We ran a series of linear regression models for each of the three dependent variables (intentions to vaccinate, ratings of message convincingness, and attitudes towards vaccination). We examined

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TABLE 5 Descriptive statistics and correlations for dependent variable measures (Study 2)

	M	*SD*	1	2	3	4	5
1. Independent SC	74.83	12.38	—				
2. Interdependent SC	68.64	10.53	0.03	—			
3. BIF	14.99	5.97	0.12	0.19**	—		
4. Vaccine intentions	5.39	2.09	−0.12	0.14*	0.07	—	
5. Vaccine attitudes	45.74	13.73	−0.14*	0.16*	0.05	0.90**	—
6. Message is convincing	5.37	1.44	−0.01	0.24**	0.12*	0.71**	0.76**

*$p < .05$. **$p < .01$.

the interaction between message conditions and one of the three individual difference variables. We summarize our findings in text and present the full results in the supplemental files (Tables S4–S6). Descriptive statistics and correlations for our dependent variable measures in Study 2 are presented in Table 5.

Independent self-construal

Contrary to matching hypotheses, we again found no significant interaction between participants' independent self-construal scores and message conditions for any dependent variable (see Table S4). We did find a significant main effect for independent self-construal in the models predicting vaccine attitudes, $t(408) = -3.183$, $p = 0.002$, and vaccine intentions, $t(408) = -2.803$, $p = 0.005$, such that individuals higher in independent self-construal were less likely to hold positive attitudes towards the vaccine and were less likely to intend to get the vaccine. ANOVA results for Study 2 are reported in Table 6 below.

Interdependent self-construal

Consistent with Study 1, there was a significant interaction between message condition and participants' interdependent self-construal when predicting intentions to get a COVID-19 vaccination (see Table S5 for complete results). We saw the same pattern as in Study 1, where individuals low in interdependent self-construal were more likely to intend to get a COVID-19 vaccine after reading other-focused messages compared to self-focused messages. However, we also saw that self-focused messages outperformed other-focused messages in individuals high in interdependent self-construal. Additionally, there were marginally significant results in the same direction when predicting attitudes towards the vaccine and ratings of message convincingness. In all three models, there was a significant marginal effect for interdependent self-construal. Individuals with higher scores were more likely to hold positive attitudes towards the vaccine, to think the message was convincing, and to intend to receive the vaccine. All three models are depicted in Figure 6. Non-significant interactions are depicted in Figures 7 and 8.

TABLE 6 ANOVA results for study 2

Dependent Variable					Close other message		Distant other message		Self message	
	df	*F*	*p*	*η2*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Vaccine attitudes	2, 412	0.31	0.737	0.001	−0.021	0.993	−0.033	1.08	0.054	0.928
Vaccine intentions	2, 412	0.12	0.883	0.001	−0.006	1.017	0.033	0.999	−0.026	0.99
Message is convincing	2, 412	0.1	0.906	0	−0.031	1.023	0.017	1.008	0.014	0.976

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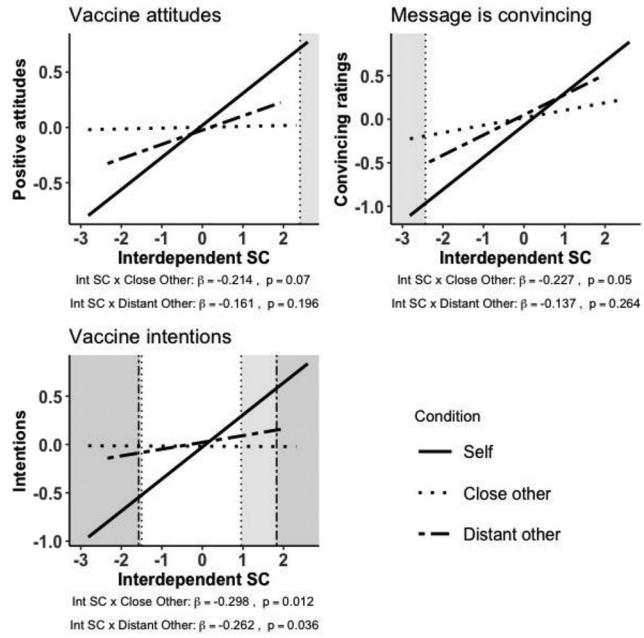

FIGURE 6 Interactions between interdependent self-construal and dependent variables. Only the model of vaccine intentions has significant interaction terms. Refer to Figure 1 caption for guidance on interpreting significant regions

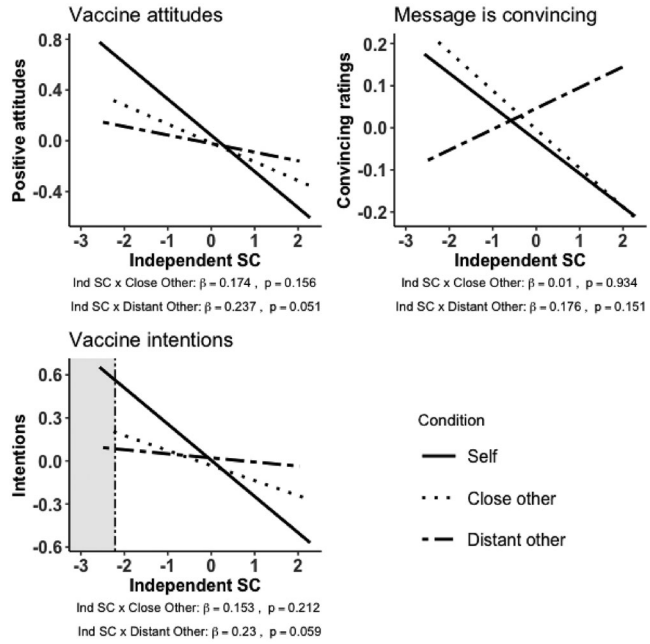

FIGURE 7 (Non-significant) interactions between independent self-construal and dependent variables. Refer to Figure 1 caption for guidance on interpreting significant regions.

Construal level

We found no significant effects (main effect or interaction effects) when examining models predicting vaccine attitudes, message convincingness, or vaccine intentions. Full results are available in Table S6.

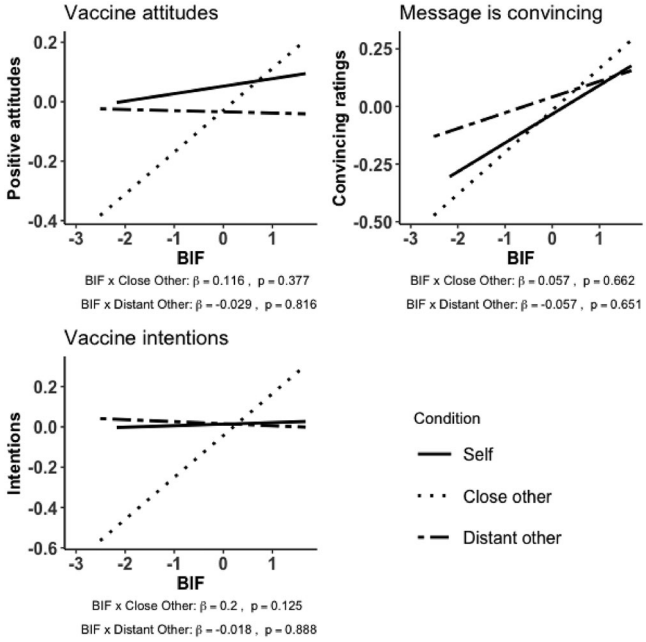

FIGURE 8 (Non-significant) interactions between construal level (as measured by the BIF) and dependent variables. See Figure 1 caption for interpretation.

Overall message effectiveness

Using one-way ANOVAs, we found no significant differences between any of the message conditions for any of the three dependent variables.

Discussion

The results in Study 2 are largely consistent with those of Study 1. We did not find interaction effects between independent self-construal and the message types and, again, found significant interactions between interdependent self-construal and message type. Specifically, we found that those with higher interdependent self-construal were predominantly predisposed to react more favorably toward COVID-19 vaccinations in response to the self-focused message, compared to the other-focused messages. However, in contrast to Study 1, we did not find any interaction between construal level and the three messages. As with Study 1, Study 2 does not support the message matching patterns predicted from the existing literature.

We again found that close- and distant-other-focused messages were consistently effective across varying levels of self-construal and construal levels. Self-focused messages did occasionally outperform other-focused messages (at high interdependent self-construal levels) but also reduced persuasion at other times (at low interdependent self-construal levels).

GENERAL DISCUSSION

Achieving a better understanding of persuasive messaging related to COVID-19 mitigation is crucial to health promotion efforts. Encouraging vaccination remains a dominant priority for controlling COVID-19 and, considering the need for regular boosters and potential waning in the

vaccine's efficacy over time (e.g., against infections from new variants; Wu et al., 2023), measures such as social distancing and mask-wearing also remain important tools in the public health toolbox. Generally, we found that messages were more effective at promoting adherence to mask-wearing and social distancing when they emphasized benefits to others (either close or distant) rather than to the self. However, each message performed similarly, on average, when promoting vaccination.

Theoretical considerations

Based on past research that found self-construal to significantly moderate the effects of emphasizing self-focused versus other-focused benefits (Chang, 2009; Hornikx & O'Keefe, 2009; Uskul & Oyserman, 2010), we predicted that higher independent self-construal would lead to increased receptivity to the self-focused message, whereas higher interdependent self-construal would lead to increased receptivity to the other-focused messages. However, though we consistently found interdependent self-construal (though not independent self-construal) to moderate the effectiveness of different message types, this effect was in the opposite direction than predicted and most pronounced for messages promoting benefits to the self. At low levels of interdependent self-construal, self-focused messages frequently performed worse than other-focused messages. Still, at very high levels of interdependent self-construal, self-focused messages occasionally performed better (with this latter finding mainly being observed for the vaccination outcome).

One possible explanation for our findings is that COVID-19 behaviors may generally be perceived as other-focused, and best nudged by using other-focused messages to prime such a disposition in people. In such a scenario, those who are least interdependent would benefit the most from an other-focused message, whereas more interdependent individuals would engage in the behavior even without such a nudge (i.e., or when viewing a self-focused message). In line with this interpretation, we note that we generally found higher interdependent self-construal scores to predict more positive dispositions towards each mitigation behavior—a finding echoed in other COVID-related research as well (Pei et al., 2020). That said, not all evidence supports this interpretation. For instance, such a "nudging" account does not explain why self-focused messages outperformed other-focused messages among interdependent individuals for vaccination. Further, there is substantial research showing the benefits of matching to other-focused orientations (e.g., interdependence) in prosocial domains like charity, and of matching to self-focused orientations in individual-focused domains (e.g., personal purchases; Hornikx & O'Keefe, 2009; Joyal-Desmarais et al., 2022; van Baaren & Ruivenkamp, 2007; Xu, 2017). Such findings do not negate the possibility of a nudging explanation, but rather highlight that matching effects to individual differences could still operate above such nudging. Future research may therefore wish to disentangle such factors by examining how self-/other-focused messages induce different self-construals, and how matching messages to a behavioral domain (e.g., using other-focused messages to promote other-focused behaviors) may interact with matching to individual-level factors (e.g., matching other-focused messages to interdependent self-construal).

With regards to construal level, we predicted that higher chronic construal level would lead to increased receptivity to the more socially distant messages (and lower construal levels would lead to increased receptivity to the less socially distant messages), based on previous studies that found that message features tied to self-construal were more persuasive to the extent that they matched the construal level of those viewing the message (e.g., Fujita et al., 2008; Kim et al., 2016; Ramirez et al., 2015). However, we found that at low levels of construal level, self-focused messages were

less effective than their other-focused counterparts. From a theoretical viewpoint, these findings are at odds with predictions we would make from matching research and Construal Level Theory. These "mismatching" patterns also echo those we observed for interdependent self-construal.

Taken overall, there are several ways to interpret the current findings for theory and future research. First, our observation of several mismatching effects is not entirely surprising when we consider that null and negative effects (e.g., mismatched messages being more effective than matched messages) are relatively common in the literature on matching (Joyal-Desmarais et al., 2022). Though, on average, matching effects are most common, several circumstances have been theorized to lead mismatched messages to occasionally outperform matched messages (e.g., Fridman et al., 2016; Teeny et al., 2021). For example, authors informed by Regulatory Focus Theory have noted that one of the effects of matching is an increased level of confidence in one's thoughts and feelings towards the topic discussed, and that this can cause matched messages to backfire (relative to mismatched messages) when the topic discussed elicits distress as such distress is amplified (Fridman et al., 2016). To the extent that the pandemic and mitigation behaviors are associated with anxiety for individuals, this could lead matched messages to feel more distressing and elicit greater resistance, a possibility worth examining in future work. Aside from such theory-based reasons, we also note that the distribution of matching effects in the literature (Joyal-Desmarais et al., 2022) also suggests that it is possible the effects we observed were affected by sampling-related error as well. Consequently, future work will be needed to replicate our findings. In doing so, these works would benefit from including measures of mediational processes such as those we discuss (e.g., impacts of messages on self-construal and negative affect).

Practical implications

In terms of practical implications, our results suggest that a generic messaging strategy that focuses on other-focused messages may be helpful in promoting COVID-19 mitigation behaviors more generally. Indeed, we found a general advantage of other-focused messages in promoting mask-wearing and social distancing (Study 1), which is in line with other works such as by Jordan et al. (2021) and Luttrell and Petty (2021). Even for promoting vaccination, our results suggest that other-focused messages perform at least as effectively as self-focused messages on average—this equivalence also being a common pattern in the literature (Jiang & Dodoo, 2021; Miyajima & Murakami, 2021; Yuan & Shu, 2021). Consequently, other-focused messages appear to be a safe strategy during the pandemic.

Of course, a message matching intervention could also be implemented, which would provide self-focused messages for those that respond more positively to such messages (e.g., those with very high interdependent self-construal) and other-focused messages for everyone else. Our findings suggest that such a strategy could have benefits, but they would be limited to only a small population segment. Given that other-focused messages have relatively homogenous effects across different individuals, a widescale public health campaign that uses standardized other-focused messages may be the most cost-effective solution. However, it is worth noting that there may be additional moderators that were not measured in these two studies that may account for the variance in these findings.

Broadly, there is a large literature that supports the idea that messages could be tailored to target specific groups of individuals depending on their levels of independence and interdependence. Research by Markus and Conner (2014) demonstrates that gender, race and ethnicity, economic class, U.S. region, religion, and workplace are all correlated with levels of independence and inter-

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dependence. Using these concepts, public health messages could target individual populations based on the efficacy of those messages to maximize effectiveness.

Strengths and limitations

Our experimental design allowed us to draw strong causal conclusions about the effects of the different messages. We also used strong measurement of our individual difference variables (self-construal, construal level) and our outcome variables. Study 1 used a longitudinal design and assessed the effects of messages on actual behaviors over time, a design that is uncommon in message matching research (Joyal-Desmarais et al., 2022). Further, we replicated our findings across multiple behaviors and across two studies, helping to ensure our pattern of results may be generalizable.

That said, some elements constrain the generalizability of our findings. Notably, our samples were limited to U.S.-based residents recruited through Prolific. Although this allowed us to access a broad sample of participants with high relevance for U.S.-based health messaging, it also means that results may differ for other populations (e.g., in other countries). We collected data during the early throes of the pandemic (October 2020 and April 2021), and thus additional variables such as message fatigue (see Kim & So, 2018) caused by exposure to public health messaging would likely affect the effectiveness of these messages today. Further, we note that we only evaluated a select set of self- and other-focused messages and that future works could use a larger pool of messages to draw more robust conclusions. A manipulation check which assessed participants' comprehension of the focus of the messages to which they were exposed may have helped in reinforcing the strength of our manipulation.

CONCLUSION

Overall, looking at our research in the larger context of research on messaging effects, we gain confidence in those aspects of our findings (e.g., the consistent evidence of the effectiveness of other-focused messages) that converge with past works that have found similar results (e.g., Jordan et al., 2021), as well as other aspects of our findings (e.g., the pattern of interactions between construal and types of messages) serve as reminders of how nuanced the dynamics of messaging can be. Accordingly, our findings have both theoretical and practical implications, with our data suggesting a complex interplay of messages and self-construal as well as the possibility that generic (non-targeted) public health messaging also can have important effects for some recipients; therefore, messages encouraging prevention behaviors should be carefully crafted for their intended recipients.

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CONFLICT OF INTEREST STATEMENT

We have no known conflict of interest to disclose.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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APPENDIX A

Study 1 Experimental Messages: Self vs. Close-Other vs. Distant-Other Messages

"COVID-19 is thought to spread mainly from person-to-person through droplets spread through the air when an infected person coughs, sneezes, or talks. These droplets can land in the mouths or noses of people who are within about 6 feet of one another. Some studies have suggested that COVID-19 may be spread by people who are not showing symptoms."

One of the following messages were then displayed at random to each participant during the survey:

- Self-focused message (effectiveness statement):

"Wearing a face mask and practicing social distancing in public may protect you from droplets in the air, which keeps you safe and can prevent you from getting sick. Additionally, if you wear a mask in public, you are less likely to touch your own face. Wearing a mask and practicing social distancing can reduce your risk of contracting an illness like COVID-19. (Studies have shown that people who consistently wear masks and always practice social distancing have a low risk of catching COVID-19.)"

- Close-other-focused message (effectiveness statement):

"Wearing a face mask and practicing social distancing around friends and family protects them if you have COVID-19, even if you are not showing symptoms. It also makes friends and family feel safer when you wear a mask and practice social distancing around them. Following these behaviors around friends and family also sets a good example for them to be safe as well, which can reduce the likelihood of them getting sick. (Studies have shown that people who consistently wear masks and always practice social distancing have a low risk of catching COVID-19.)"

- Distant-other-focused message (effectiveness statement):

"Wearing a face mask and practicing social distancing in public protects those around you if you have COVID-19, even if you are not showing symptoms. Wearing a mask and practicing social distancing sets a good example to others who might not be well informed about the benefits of wearing masks. It also makes others feel safer when they see that you are following these behaviors around them. (Studies have shown that people who consistently wear masks and always practice social distancing have a low risk of catching COVID-19.)"

APPENDIX B

Study 2 Experimental Messages: Self vs. Close-Other vs. Distant-Other Messages

"COVID-19 is thought to spread mainly from person-to-person through droplets spread through the air when an infected person coughs, sneezes, or talks. These droplets can land in the mouths or noses of people who are within about 6 feet of one another. To prevent this spread, federal, state, and local governments have put restrictions in place that have likely affected you."

One of the following messages were then displayed at random to each participant during the survey:

- Self-focused message:

"Getting a vaccine may protect you from contracting the disease if you are exposed, which keeps you safe and can prevent you from getting sick. If you are vaccinated, you may also be able to more freely travel, spend time with people outside of your household, and frequent businesses and restaurants. Your vaccination can also help us reach herd immunity, which means you may be able to resume your daily life sooner. You have a lot to gain by getting a vaccine!"

- Close-other-focused message:

"Getting a vaccine may protect you from contracting the disease if you are exposed, which keeps your friends and family safe when you are around them. If you are vaccinated, your friends and family may be able to more freely spend time with you without risking their own health. Your vaccination can also help us reach herd immunity, which means your friends and family may be able to resume their daily life sooner. They have a lot to gain by you getting a vaccine!"

- Distant-other-focused message:

"Getting a vaccine may protect you from contracting the disease if you are exposed, which keeps your community safe when you are around them. If you are vaccinated, people may be able to

more safely be around you without risking their own health. Your vaccination can also help us reach herd immunity, which means others may be able to resume their daily life sooner. They have a lot to gain by you getting a vaccine!"

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