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Well-being in the time of COVID-19: Do metaphors and mindsets matter?

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Communications about the Coronavirus Disease 2019 (COVID-19) often employ metaphors, which can help people understand complex issues. For example, public health messages may focus on "fighting" the disease, attempting to rouse people to action by instilling a sense of urgency. In contrast, change-focused metaphors may foster growth mindsets and self-efficacy—cornerstones of well-being and action. We randomly assigned participants to read one of two articles—either an article about coronavirus that focused on fighting the war or an article that highlighted the possibility of change. In Study 1 (N = 426), participants who read the war, relative to the change, message reported lower growth mindsets and self-efficacy and these in turn, predicted lower well-being and weaker intentions to engage in health behaviours. In Study 2, (N = 702), we sought to replicate findings and included a no treatment control. We failed to replicate the effects of message condition, although both messages predicted greater self-efficacy compared to the control. Similar to Study 1, growth mindsets predicted intentions to engage in recommended health behaviours and self-efficacy predicted both well-being and action. We discuss theoretical reasons for discrepancies as well as practical applications for developing public health communications.

Keywords: COVID-19; Metaphors; Mindsets; Self-efficacy; Well-being; Health behaviours.

The Coronavirus Disease 2019 (COVID-19) is a global public health emergency. In addition to the threats to people's physical health and the global economy, the disease poses challenges for mental health. For example, in a study of over 1,000 participants in China, more than half of the respondents rated the psychological impact of COVID-19 as moderate to severe, with many reporting increased anxiety, depression, and stress (Wang et al., 2020). Although there are myriad sources of this increased psychological distress, one potential contributor is the way the media describe and portray the disease. Information about the COVID-19 pandemic is ubiquitous, filling endless hours of news and dominating social media. Many of the early communications included metaphors that may impact individuals' beliefs about their ability to manage and cope with the pandemic.

One such message about COVID-19 focuses on "fighting the war," attempting to rouse people to action by instilling a sense of urgency (e.g. Wicke & Bolognesi, 2020). For example, on April 28, 2020 the New York Times published an article titled "*Hundreds of Miles from Home, Nurses Fight Coronavirus on New York's Front Lines*" (Gross, 2020). However, such war-focused medical rhetoric may come with mental health costs, as it conjures up war-related emotional states and a sense of powerlessness (e.g. Degner et al., 2003). Another common message, uses a "break the chain" metaphor, which highlights the potential to change coronavirus-related

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outcomes via one's behaviour. In emphasising that people's actions matter, these messages should foster a belief that change is possible (i.e. a growth mindset) and enhance confidence (i.e. self-efficacy). Both of these beliefs are cornerstones of well-being (e.g. Burnette et al., 2020; Karademas, 2006).

The goals of the current research are twofold. First, we investigate if war-focused messages, relative to change-focused ones, might come with costs—weaker growth mindsets and reduced self-efficacy. Second, we explore if these beliefs about the inability to manage COVID-19, in turn, predict more anxiety, less well-being, and fewer intentions to engage in recommended health behaviours such as handwashing and social distancing.

Metaphorical thinking

A metaphor is figurative language in which one idea is used instead of another to be more descriptive. Metaphors enable people to both explain and understand complex phenomenon by taking a well-known object or idea and applying it to something not yet comprehended. Metaphors influence how individuals think about and frame a particular topic—that is, they establish a mindset. Research on conceptual metaphor theory shows that metaphors shape not only how we think but also impact our emotions, motivation, and behavioural intentions (Landau et al., 2018; Wallis & Nerlich, 2005).

War metaphors

War metaphors are one of the most common metaphors used to discuss topics ranging from political campaigns, to crime, to drugs. War metaphors draw on shared knowledge, grab attention, express a sense of urgency, and can be a call to action (Flusberg et al., 2018). However, when the language of war is used to describe diseases it can come with costs such as leading to the view that cancer treatment is difficult and, therefore, the language of war often fails to rouse action (Hauser & Schwarz, 2020). Battle-related rhetoric can lead to decreased intentions to engage in self-limiting, but not active self-bolstering, protective behaviours (Hauser & Schwarz, 2015). This is notable because the very actions needed to help curb the spread of COVID-19 are those that are self-limiting such as avoiding attending indoor social activities (e.g. Semino, 2020). Extending research on the costs of war-focused metaphorical writing, we suggest that war metaphors about COVID-19 may prompt people to question the potential for change as well as their own ability to make an impact.

Change metaphors

In contrast to war rhetoric, metaphors that evoke attainable problem-solving approaches to addressing the COVID-19 crisis are more likely to foster growth mindsets and self-efficacy (Landau et al., 2018). We focus on two such metaphors about COVID-19 that illustrate how individuals' actions matter: flattening the curve, and breaking the chain of transmission. These metaphors should provide a growth mindset perspective and thus enhance confidence to engage in behaviours that bring about change.

Growth mindset and self-efficacy. Just as scientists advance theories to explain the world, people also develop implicit theories, what are now called mindsets, to help them understand the nature of human attributes (e.g. Dweck, 1999). Individuals with growth mindsets assume that human attributes (e.g. intelligence) and traits (e.g. resilience) can grow and develop. Growth mindsets are predicated on the assumption that humans and their characteristics can and do change as a result of experience, education, and maturation. In contrast, individuals with fixed mindsets believe human characteristics to be static entities. These individuals think of attributes as "carved in stone" (Dweck, 2006, p. 6). Mindsets are typically assessed along a continuum of fixed to growth, but can also be manipulated via metaphors (e.g. the brain is like a muscle) and explicit messaging (e.g. intelligence can change).

Research generally supports the idea that mindsets create cognitive frameworks that drive the meaning assigned to events especially when individuals try to cope with stressful, novel, or threatening situations. Individuals with growth mindsets tend to react more adaptively than those with fixed mindsets. For example, individuals with growth mindsets respond to anticipatory stress with problem-focused coping and sustained motivation, whereas individuals with fixed mindsets respond with emotion-focused coping and behavioural disengagement (e.g. Compas et al., 2001). Despite evidence for links between growth mindsets and reduced psychological distress as well as active coping (Burnette et al., 2020), within an academic context, recent work questions the magnitude of impact on scholastic aptitude (e.g. Bahník & Vranka, 2017; Sisk et al., 2018) and within stigma-relevant domains, research highlights the potential dark side of growth mindsets (Hooper et al., 2018; Hoyt & Burnette, 2020).

Despite potential downsides, a fairly robust literature links growth mindsets to greater self-efficacy (e.g. Burnette et al., 2013). Self-efficacy is the belief in the ability to plan and strategize ways to progress toward desired end states (Bandura, 1977). Individuals with growth mindsets view challenges as part of human development and thus acquire a more resilient sense of self-efficacy. Believing that one has the capacity to make a change can build confidence, especially when encountering novel situations. For example, in a longitudinal study, believing intellectual capacity can be developed fostered self-efficacy,

which in turn, predicted academic achievement (Blackwell et al., 2007). Furthermore, growth mindset interventions themselves lead to greater self-efficacy (Burnette et al., 2020).

Growth mindsets and self-efficacy, similar to optimism and hope, are beliefs that a future positive prognosis can be achieved and such thinking can help to offset depression, anxiety, and worry. Additionally, both growth mindsets and self-efficacy are critical motivators of engagement in active mastery-oriented health behaviours. For example, growth mindsets are linked to greater value placed on health-enhancing behaviours such as treatment seeking (e.g. Burnette et al., 2020). Furthermore, experimental interventions designed to increase self-efficacy also improve targeted health behaviours (Sheeran et al., 2016).

Hypotheses: Building on the above theoretical overview, we offer the following hypotheses and one exploratory question[1]:

1. Participants reading a war, relative to a change-focused, message will report weaker growth mindsets.
2. Participants reading a war message, relative to a change-focused message, will report weaker self-efficacy.
3. Growth mindsets and self-efficacy will relate positively to greater psychological well-being, marked by lower levels of anxiety and higher levels of global well-being, and positively to intentions to engage in health-related behaviours.

Exploratory question

4. Do the messages directly impact the more distal outcomes of anxiety, well-being, and behavioural intentions?

METHODS STUDY 1

Participants and procedure

We used the participant sourcing platform CloudResearch to recruit participants from the United States from Amazon's Mechanical Turk, an internet marketplace for online samples (Buhrmester et al., 2018). We collected data between March 30 and April 1, 2020. Participants were given $0.75 to complete the study. We limited to U.S.-based MTurk workers with at least a 95% approval rating for previous tasks. Altogether, 520 participants took part in the study. Of those, 94 individuals failed to pass our attention and engagement check items resulting in a final sample size of 426 (38.3% female; 60.8% male; .9% non-binary) with a mean age of 37.04 years ($SD = 11.31$).

After responding to a captcha and giving consent, participants first completed demographic questions including a measure of trait anxiety. Next, we randomly assigned participants ($n = 426$; 213 each condition) to read one of two articles—either an article that focused on the war metaphor of the COVID-19 disease or to an article that illustrated how changing the course of the pandemic is possible. The war-metaphor article highlighted the need to battle the enemy, whereas the change article provided metaphors that illustrated how personal actions can make a difference. More specifically, the war-metaphor article described COVID-19 as a crisis and a wartime situation with health care workers on the front line. It concluded with the message that we must unite to fight the enemy. The change-focused article, in contrast, described COVID-19 as a challenge that individuals can meet head-on by taking individual action to flatten the curve. It concluded with the message that people can change how much and how fast the virus spreads. Both articles offered the same suggestions for individual action relevant to helping to reduce the spread (e.g. wash your hands with soap).

After reading their respective article, participants answered questions to confirm engagement and comprehension and then responded to assessments of mindsets of virus transmission and self-efficacy, all of which were presented in randomised order. Participants also responded to the following measures in random order: state anxiety, well-being, and intention to engage in recommended health-related behaviours (e.g. handwashing, social distancing). The articles, a list of full measures, including those not listed above, and the data are available on the Open Science Framework.[2]

Measures

Engagement-check items

Participants responded to two open-ended questions: "If a friend asked you the main message of the article, what would you tell them?" and "What evidence from the article did you find most convincing?" We used participants' responses here to determine engagement and, thereby, suitability for inclusion in the data analysis. Two authors coded responses using the following inclusion rules. First, participants needed to answer at least one of the short answer questions in a manner showing that they

[1] It is important to note that Study 1 is exploratory in nature and we did not pre-register hypotheses. We pre-register these hypotheses in Study 2 (https://osf.io/nkasr/?view_only=22cccfbab29941478c00397f847cd777).

[2] https://osf.io/nkasr/?view_only=22cccfbab29941478c00397f847cd777

knew the article was about the virus. Second, they needed to include information other than "corona," "symptoms," or "testing." Overall, it needed to be clear that the participant got the message. This process resulted in 97.69% agreement among the two coders. The two coders discussed disagreements to reach consensus.

Mindsets of the virus

We created a 4-item measure of virus mindset by modifying well-validated growth mindset scales (e.g. Dweck, 1999). Participants responded to items using a scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*), on items such as, "No matter what people do, the chance of the getting the virus is fixed" ($\alpha = .78$). We recoded such that higher numbers represent agreement with a growth mindset.

Self-efficacy to manage the virus

We assessed self-efficacy regarding personal ability to manage the virus using an adapted measure (McAuley et al., 1992). We asked participants to indicate on a scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*) how much they disagree or agree that COVID-19 is manageable by you, something you can regulate, and something you have power over (self-efficacy; $\alpha = .90$). Higher scores represent greater self-efficacy.

Anxiety

We assessed state anxiety with the 6-item short form of the Spielberger State–Trait Anxiety Inventory (STAI, Marteau & Bekker, 1992). On a scale from 1 (*not at all*) to 4 (*very much so*), participants indicated how they feel at the moment (after the manipulation; $\alpha = .85$) to six items: calm, tense, upset, relaxed, content, and worried. Higher numbers represent greater anxiety.

Well-being

Participants indicated their overall well-being on the Arizona Integrative Outcomes Scale (AIOS; Bell et al., 2004). The AIOS is a one-item, self-rating scale asking participants to "reflect on your sense of well-being right now, taking into account your physical, mental, emotional, social, and spiritual condition." Participants moved a slider to the point that summarises their overall sense of well-being from 1 ("*worst you have ever been*") to 100 ("*best you have ever been*").

COVID-19 Behavioural Intentions Scale

In Study 1, we developed a 7-item scale to assess participants' intentions to engage in the seven behaviours suggested at the end of both articles. Using a scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*), participants indicated the extent to which they agree that, within the upcoming week, they intend to engage in the behaviours (e.g. stocking up on needed supplies; $\alpha = .74$).

RESULTS STUDY 1

See Table 1 for means, standard deviations, and correlations of measures included in primary analyses. We conducted analyses in SPSS V27. Participant numbers slightly vary across analyses due to missing data.[3]

Mindsets and self-efficacy

To test hypotheses 1–2, we ran a multivariate analysis of variance (MANOVA) with message condition (war or change) as the predictor and mindsets and efficacy as the outcomes. The overall MANOVA was significant, Wilks Lambda = .95; $F(2, 422) = 11.95$, $p < .001$, $\eta^2_p = .05$. The follow-up analyses of variance (ANOVA) revealed a main effect for mindsets, $F(1,423) = 6.07$, $p = .014$, $\eta^2 = .01$. Participants in the war-metaphor condition reported that they were less likely to believe that the rate of virus transmission is malleable ($M = 5.48$, $SD = 1.14$) relative to those in the change condition ($M = 5.75$, $SD = 1.08$). The results also revealed an effect for self-efficacy, $F(1,423) = 19.92$, $p < .001$, $\eta^2 = .05$. Participants in the war-metaphor condition reported lower levels of self-efficacy to manage the virus ($M = 4.39$, $SD = 1.52$) relative to those in the change condition ($M = 4.99$, $SD = 1.26$).

Mindsets, self-efficacy, well-being, and behavioural intentions

Next, we examined hypothesis 3, that mindsets and self-efficacy would predict anxiety, well-being, and behavioural intentions. Mindsets and self-efficacy were only weakly related $r(423) = .13$, $p = .009$, indicating that these are indeed unique constructs. Additionally, growth mindsets predicted less anxiety $r(422) = -.16$, $p = .001$ and stronger intentions to engage in recommended health behaviours $r(422) = .18$, $p < .001$. However, growth mindsets failed to predict well-being $r(419) = -.00$, $p = .970$. Furthermore, as expected,

[3] In terms of skewness and kurtosis, the behavioural intentions scale is slightly negatively skewed at −1.09. No results change when running analyses using transformations.

Table 1
Scale means, standard deviations, and intercorrelations

	M	*SD*	*1*	*2*	*3*	*4*	*5*
1. Condition	—	—					
2. Virus mindset	5.61	1.12	−.12*				
3. Self-efficacy	4.69	1.43	−.21***	.13**			
4. Anxiety	2.22	.74	.06	−.16**	−.20***		
5. Well-being	60.25	19.91	−.10*	−.00	.26***	−.53***	
6. Behaviour	5.81	.80	−.05	.18***	.22***	.06	−.02

Note. Condition coded: war = 1, change = 0. Behaviour is behavioural intentions. $^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

greater levels of self-efficacy related to lower levels of anxiety $r(422) = -.20$, $p < .001$, higher levels of overall well-being, $r(419) = .26$, $p < .001$, and greater intentions to engage in important health behaviours, $r(422) = .22$, $p < .001$.

Finally, we ran a MANOVA with message condition (war or change) as the predictor and anxiety, well-being, and behavioural intentions as the outcomes. The overall MANOVA was not significant, Wilks Lambda = .987; $F(3, 417) = .1.84$, $p = .139$, $\eta^2_p = .01$. However, the metaphor condition did have an effect on well-being, $F(1,419) = 4.20$, $p = .041$, $\eta^2 = .01$. Specifically, participants in the war-metaphor condition reported lower levels of well-being ($M = 58.27$, $SD = 20.40$) relative to those in the change condition ($M = 62.24$, $SD = 19.24$).

In summary, war messaging, relative to change-focused communications, led to weaker growth mindsets and less self-efficacy. These psychological processes, in turn, predicted anxiety and lower intentions to engage in recommended behaviours. Furthermore, self-efficacy correlated with well-being and the messages directly impacted this outcome as well.

Despite support for the majority of our hypotheses, there are a number of limitations worth noting. First, this initial study was purely exploratory. Additionally, due to the lack of a true control, we were unable to test if war messaging is undermining important outcomes or if change-focused messaging is enhancing these outcomes. Rather, our findings can only be expressed in terms of relative differences between conditions. Furthermore, we had to eliminate quite a bit of data due to poor responses, a common drawback in recent MTurk studies (e.g. Kennedy et al., 2020). Another potential concern is that the impact of different metaphors and messages is as dynamic as the pandemic. For example, the influence of war metaphors depends on the context in which they are deployed (Flusberg et al., 2018). Thus, it is possible that the effect of messaging on outcomes will not replicate in the same way later in the course of the pandemic.

To address potential limitations of Study 1, we pre-registered hypotheses for a follow-up study, included a no-treatment control for comparison, and collected additional data on Prolific, another online data sourcing platform. We collected data shortly after one of the most contentious elections in U.S. history, at a time when mask-wearing recommendations had become heavily politicised, and so we additionally focused on the impact of political ideology and also examined updated messages that reflected newly recommended behaviours. In Study 2, we first sought to replicate the hypotheses tested and outlined in Study 1. And, additionally, we examined the following exploratory questions:

1. Do war messages undermine growth mindsets and self-efficacy, or do change messages foster growth mindsets and self-efficacy, or are effects only relative to each condition?
2. Do results of condition (war vs. change) on the two primary outcomes of growth mindsets and self-efficacy hold when controlling for political ideology?
3. Does political ideology moderate relations between message condition (war vs. change) and mindsets and self-efficacy?
4. Does political ideology relate to outcomes?

METHODS STUDY 2

Participants and procedure

We recruited participants from the United States using Prolific, collecting data on November 22, 2020. Participants ($N = 703$) were paid an average of $8.22/hour to complete the study. Using the same attention and engagement check items, with the same coding of free-responses from Study 1, we only needed to exclude one participant. The two coders had 100% agreement on whether to keep or remove a participant. Thus, we had a final sample size of 702 (48% female; 49.1% male; 2.6% non-binary; .3% other) with a mean age of 32 years ($SD = 12.20$). We randomly assigned participants to a war rhetoric ($N = 234$) or change-focused ($N = 231$) article or to a true no treatment control ($N = 237$).

Measures

We used the same assessments as Study 1 for growth mindsets of the virus ($\alpha = .78$), self-efficacy ($\alpha = .86$), and

Table 2
Scale means, standard deviations, and intercorrelations

	M	*SD*	*1*	*2*	*3*	*4*	*5*	*6*
1. Condition	—	—						
2. Virus mindset	5.85	.99	−.06					
3. Self-efficacy	4.59	1.41	−.03	.23***				
4. Anxiety	1.92	.80	−.04	.05	−.04			
5. Well-being	59.02	20.24	.00	−.06	.14***	−.52***		
6. Behaviour	6.58	.68	.01	.45***	.13***	.15***	−.05	
7. Political ideology	2.85	1.53	.10*	−.37***	−.03	−.23***	.20***	−.31***

Note. Descriptive statistics and all correlations except those involving condition include the entire data set. The condition correlations include the primary two conditions, coded: war = 1, change = 0. Behaviour is behavioural intentions. $^{*}p < .05$. $^{***}p < .001$.

well-being (single item). However, we updated the anxiety assessment to reflect purely negatively-worded items (α = .93). Additionally, we changed the behavioural recommendations to reflect the current state of the U.S.-based context, focusing in this study on the importance of masks, washing hands, and social distancing, (α = .81). In Study 1, there were recommendations related to stay at home orders, and these were less relevant for Study 2. Additionally, we examined political ideology, which we assessed with a three-item measure asking participants to indicate their political identity on economic and social issues, from 1 (*strongly liberal*) to 7 (*strongly conservative*), and their political party affiliation, from 1 (*strong Democrat*) to 7 (*strong Republican*) (α = .89).[4]

RESULTS STUDY 2

See Table 2 for means, standard deviations, and correlations between scales. Both mindsets and behavioural intentions were negatively skewed. Square root and log transformations decreased the skewness. However, because analyses with transformed variables were not meaningfully different from non-transformed data, we present analyses with non-transformed data. All measures, articles, and data are available on OSF.[5]

Mindsets and self-efficacy

Analyses for the first three replication hypotheses include data for the two message conditions only. To test hypotheses 1 and 2 (from Study 1), we ran a MANOVA with message condition (war or change) as the predictor and mindsets and efficacy as the outcomes. The overall MANOVA was not significant, Wilks Lambda = .996; $F(2, 462) = .98$, $p = .378$, $\eta^2_p = .00$.

Mindsets, self-efficacy, well-being, and behavioural intentions

Next, we examined the third hypothesis, that mindsets and self-efficacy would predict anxiety, well-being, and behavioural intentions. Here, to replicate findings from Study 1, we used only the data from the two message conditions and thus these correlations differ slightly from Table 2, which presents correlations with all the data. Mindsets and self-efficacy were again related, $r(463) = .29$, $p < .001$, though the strength indicates that these are indeed unique constructs. Additionally, growth mindsets failed to predict less anxiety, $r(463) = .02$, $p = .746$, but did predict stronger intentions to engage in recommended health behaviours, $r(463) = .43$, $p < .001$, and, like Study 1, failed to predict well-being, $r(463) = -.07$, $p = .160$. Furthermore, greater self-efficacy was marginally related to lower levels of anxiety, $r(463) = -.09$, $p = .056$, and significantly related to higher levels of overall well-being, $r(463) = .16$, $p < .001$), as well as greater intentions to engage in important health behaviours, $r(463) = .14$, $p = .002$.

To test for direct links, we ran a MANOVA with message condition (war or change) as the predictor and anxiety, well-being, and behavioural intentions as the outcomes. The overall MANOVA was not significant, Wilks Lambda = .997; $F(3, 461) = .42$, $p = .740$, $\eta^2_p = .00$.

Exploratory analyses: Control condition

We ran a MANOVA with all three conditions (war, change, or control) and mindsets and efficacy as the outcomes. The overall MANOVA was significant, Wilks Lambda = .94; $F(4, 1396) = 11.53$, $p < .001$, $\eta^2_p = .03$. Univariate tests indicated that across conditions, responses to the efficacy measure, $F(2, 699) = 22.65$, $p < .001$, $\eta^2_p = .06$) differed, but there was

[4] Political ideology was assessed at the end of Study 1, but we did not have exploratory predictions. A table of these correlations from Study 1 can be found at OSF.

[5] https://osf.io/nkasr/?view_only=22cccfbab29941478c00397f847cd777

no effect of condition on mindsets, $F(2, 699) = 1.44$, $p = .234$, $\eta^2_p = .00$). LSD post hoc tests revealed that participants in the control condition reported lower levels of efficacy ($M = 4.09$, $SD = 1.52$) than those in the war ($M = 4.79$, $SD = 1.22$; $p < .001$) and change conditions ($M = 4.87$, $SD = 1.37$, $p < .001$).

Exploratory analyses: Political ideology

Because we sought to replicate effects during a political election in the United States, and when mask-wearing mandates had gone into effect (contrary to the conditions under which we tested Study 1), we also examined political ideology as both a potential covariate and as a moderator. Exploratory regression analyses controlling for political ideology revealed no significant effect of message condition on either mindsets or efficacy ($ps > .50$). Furthermore, using PROCESS model 1 (Hayes, 2017) to determine if political ideology moderated relations between message condition and outcomes, we observed no significant relationship between message (war or change) and political ideology on mindsets ($p = .692$) or efficacy ($p = .909$).

Political ideology was significantly related to all variables except for self-efficacy, $r(700) = -.03$, $p = .378$. Specifically, greater conservatism predicted lower levels of growth mindsets, $r(700) = -.37$, $p < .001$, lower levels of anxiety, $r(700) = -.23$, $p < .001$), greater well-being, $r(700) = .20$, $p < .001$, and lower levels of behavioural intentions, $r(700) = -.31$, $p < .001$). Looking at the behaviours individually, ideology predicted each one significantly ($p < .001$), with the strongest relationship being with mask wearing, $r(700) = -.34$, $p < .001$.

DISCUSSION

In the midst of the ongoing COVID-19 pandemic, how should policymakers frame the nature of the disease to the general public? Our results suggest that metaphors used to explain and help prevent the spread of coronavirus may have consequences, especially early in communications about the pandemic. In Study 1, which was conducted in the first few weeks of the virus in the United States, the type of metaphor mattered. We found that participants given information in a way that emphasised how to change the trajectory of the spread of the coronavirus reported stronger growth mindsets and more self-efficacy relative to participants who were given information in a way that emphasised fighting the virus. Additionally, in Study 1, we find that participants in the change, relative to the war, metaphor reported greater overall individual well-being. However, we failed to replicate these effects when we collected data 6–7 months later. Moreover, in Study 2 findings indicated that both the change and the war messaging had positive effects on self-efficacy relative to the control condition.

The inconsistent findings are in line with the argument that war messaging is both complex and dynamic (Flusberg et al., 2018). For example, it is possible that war metaphors lose some of their impact as people tire of such messaging just as they do of literal wars (Flusberg et al., 2018). Furthermore, differences between the studies also likely reflect how our stimuli interacted with the broader changes in the social environment. For example, the flatten the curve metaphor was critiqued and employed less frequently by the time we ran Study 2, perhaps dampening its ability to foster a belief in change. Additionally, when Study 2 data were collected, the United States was in the middle of a contentious political election in which some of the recommended behaviours related to curbing the spread of the virus became political. An additional relevant social change relates to one of our primary outcomes—namely self-efficacy. Two primary sources of self-efficacy are mastery experiences and persuasion. By the time we collected data for the second study, individuals had quite a bit of practice with engaging in the recommended health behaviours, and this could have contributed to the effectiveness of any information. Another difference between the studies is the online sampling platform. Although participants on Prolific are more naïve and less dishonest compared to MTurk workers, data quality seems to be equivalent (Peer et al., 2017). Nonetheless, this highlights another disparity among the studies. Overall, the conflicting findings are likely due to the cumulative impact of stimuli and social-political evolutions that occurred from Study 1 to Study 2.

Despite inconsistent effects of metaphors on self-efficacy, across both studies, self-efficacy was a consistent predictor of well-being as well as action intentions. Furthermore, replicable effects emerged for the link between stronger growth mindsets and intentions to take the actions recommended by policymakers to slow the spread of the virus. These findings extend and complement existing research highlighting how growth mindset messaging and beliefs can encourage mastery-oriented behaviours (Burnette et al., 2013). However, in line with research questioning if growth mindsets are robust predictors of outcomes (e.g. Sisk et al., 2018), we also found some small and inconsistent effects. For example, we found no evidence for a link between growth mindsets and a general measure of well-being, and growth mindsets only correlated with anxiety in Study 1, but not Study 2. This is somewhat in line with empirical work suggesting the importance of domain specificity in assessments (Burnette et al., 2020). Thus, in the current work perhaps it is not surprising that mindsets about the virus related to virus-reducing behaviours but did not consistently relate to anxiety or general well-being.

A clear understanding of both the psychological consequences of different types of public health metaphors

as well as their subsequent impact on both well-being and action can help to establish a framework for crafting nuanced communications. It is our hope that this work encourages researchers to continue to test messages that might help people think about and respond to information related to the COVID-19 pandemic in a more positive way.

Limitations

We note the following limitations and directions for future research. One limitation is that COVID-19 is a global pandemic and we limited our work to convenience samples of U.S.-based participants. More work is need to explore if there are cultural differences that impact the broader generalizability. For example, war metaphors and mindsets about the nature of the virus may differ as a function of different exposures to messaging as well as the related meaning and history of both war and pandemics across different cultures. Additionally, COVID-19 is a dynamic situation, and we failed to replicate all effects when collecting data later in the course of the spread. This leaves open the possibility that attitudes and reactions to different messages can and do change over time. Another limitation is that we do not yet have evidence about whether behavioural intentions will directly translate to an increased uptake in action, nor do we know whether such behavioural change will be durable over context and time. Future work looking at these questions about action and longitudinal effects will be vital for policymakers as they consider the content of their public health messages.

We focused our theoretical argument on war-focused rhetoric relative to growth mindset messaging. Although this provided empirical precision, it does not fully represent the nature of all messaging related to COVID-19. It is important to note, as central scholars in metaphorical language do, that any given metaphor only provides a limited representation of complex phenomenon (Semino, 2020). It is difficult, based on our findings to advocate for a specific message as there are numerous goals and outcomes not discussed. For example, there are many reasons public health experts focus on fighting diseases, including commanding more funding for research, treatment, and prevention—all of which are potential benefits of such communications that we did not examine in the current work. Additionally, we cannot conclude if the metaphors are driving effects or if it is some other aspect of the stimuli, as the articles potentially differed in other meaningful ways. For example, they could be construed differently in terms of personal actions needed in the change-focused messages versus societal actions needed in the war-framed messages. Overall, before applying the findings, more work is needed that continues to use theoretical grounding to understand the impact of metaphors when communicating about COVID-19.

Conclusions

In summary, although the war message was less beneficial in harnessing self-efficacy than the change message in Study 1, our follow-up study failed to replicate this. The second study showed that both messages were better than no message in terms of promoting self-efficacy. Importantly, the most robust and reliable findings of the current work highlight that mindsets and self-efficacy are both psychological drivers for the behavioural responses that policymakers recommend and can contribute to well-being. Thus, metaphors and messaging more focused on promoting resilient beliefs may be effective. We hope that the theoretical approach offered here helps to inform future research and evidence-based decisions about how to converse about COVID-19.

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