Using first-person narratives about healthcare workers and people who are incarcerated to motivate helping behaviors during the COVID-19 pandemic

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A B S T R A C T

Rational: Overcoming the COVID-19 pandemic requires large-scale cooperation and behavior change on an unprecedented scale. Individuals can help reduce the burden of the pandemic by participating in behaviors that benefit people whose life circumstances make them especially vulnerable.
Objective: We tested the effect of reading narrative (i.e., story-like) as opposed to expository (i.e., factual recounting) messages on beliefs about protecting others in groups vulnerable during the pandemic through increased message transportation (i.e. immersing the reader into the story). Additionally, we examined if reading narratives, as opposed to expository messages, increased intentions to engage in prosocial behaviors that benefit these groups through increased transportation.
Methods: The study used a between-subjects design where participants either read narrative or expository messages about the experiences of people who were at greater exposure to SARS-CoV-2 due to social and political factors, namely people who were incarcerated or working in healthcare during the onset of the COVID-19 pandemic.
Results: In line with pre-registered hypotheses, participants in the narrative (vs. expository) condition reported greater transportation into the message. We also observed indirect effects of narrative (vs. expository) messages, through increased message transportation, on: (1) beliefs that by physical distancing, one can protect vulnerable people (2) beliefs that members of the target groups (i.e., healthcare workers and people who are incarcerated), were vulnerable during the pandemic, (3) intentions to engage in prosocial behaviors that help family and friends, and (4) intentions to engage in prosocial behaviors that help members of vulnerable groups.
Conclusion: Together these results suggest that narratives can be used to motivate prosocial action during the COVID-19 pandemic to the extent that the narratives elicit transportation.

1. Introduction

The COVID-19 pandemic has increased stressors to people's lives, including worrying about getting infected, spreading the disease to others, and adapting to social distancing guidelines (American Psychiatric Association, 2020). People from certain groups are especially vulnerable to contracting and dying from the coronavirus that causes COVID-19 due to social and political factors, such as residing in cramped conditions without proper sanitation, or working with populations who

have contracted the virus without sufficient personal protective equipment (Office for the Coordination of Humanitarian Affairs, 2020). Individuals can help reduce COVID-19 health disparities by participating in behaviors that benefit people whose life circumstances make them especially vulnerable. In this context vulnerable refers to groups of people who are put at a higher risk of exposure to COVID-19, without adequate protection, due to social factors including their living or working conditions.

Building on message effects research before the pandemic (Hamby

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et al., 2016; Johnson, 2012), and recent research about message interventions in the context of the COVID-19 pandemic (Heffner et al., 2021; Kowalski and Black, 2021; Pfattheicher et al., 2020; Ye et al., 2021), we examined the effects of narrative messaging on prosocial beliefs and behaviors. We propose that narrative messages detailing the experiences of people who are especially vulnerable to infection may be one promising approach to (1) change beliefs about the vulnerability of different groups and therefore motivate actions that can protect vulnerable groups during the pandemic, and (2) motivate more people to engage in behaviors that help others, and in turn lessen the impact of the pandemic for all. We chose to test how narrative messages impact COVID-related beliefs and behavioral intentions because beliefs and intentions are intermediary steps in persuading people to engage in behaviors that reduce the impact of the pandemic for vulnerable groups. According to the Integrative Behavioral Model, messages that change beliefs about a behavior can change behavioral intentions and action (Fishbein and Cappella, 2006). Additionally, the model posits that a behavior is most likely to occur when there is strong intention to perform that behavior.

We focus on messages aimed at changing beliefs and behaviors of the general population. The messages describe experiences and risk factors of two groups who are put at a higher risk during the pandemic due to their living and working conditions, namely incarcerated individuals and healthcare workers. Since incarcerated individuals have not been afforded sufficient protections to keep themselves healthy during the pandemic, the coronavirus spreads easily if an infected person, such as a prison staff member, enters the prison. Also, many incarcerated people cannot practice social distancing because they live in close quarters with others. In many prisons, alcohol-based hand sanitizer and multiple bars of soap are considered contraband (Gross, 2020). Healthcare workers have also been especially vulnerable during the COVID-19 outbreak. The healthcare system has been flooded with COVID-19 cases, and at the start of the pandemic, many healthcare practitioners were caring for COVID-19 patients without adequate personal protective equipment (Mann, 2020). The hardships faced by incarcerated individuals and healthcare workers were especially acute during the period of data collection for this study (April 30 - May 2, 2020).

1.1. Narrative transportation and persuasion

Throughout history, people across cultures have used stories (i.e., narrative messages) to communicate. One benefit of storytelling is that narratives are a particularly effective means to understand others' perspectives (Smith et al., 2017). Smith et al. (2017) found that the presence of good storytellers in hunter-gatherer societies is associated with an increase in prosocial behaviors. In recent years, communication research has demonstrated that messages presented in a narrative format can change beliefs, attitudes, and behavior intentions, which leads to improved health and prosocial behaviors (Hamby et al., 2016).

Transportation, or the extent to which someone is immersed into the story world of a message, is one core mechanism underlying the persuasive effects of narratives on beliefs, attitudes, and behavior (Hamby et al., 2016). According to transportation theory, transportation occurs when an individual is cognitively and emotionally engaged in a message, experiences mental imagery, and feels so absorbed in the message that they momentarily disconnect from the real world (Green and Fitzgerald, 2017). In turn, narrative messages that increase transportation can persuade people to change their beliefs and behavioral intentions to become more consistent with what is communicated in the message (Green and Brock, 2000). Specifically, messages that increase transportation persuade readers to change beliefs and behavioral intentions by connecting with the central character, heightening perceptions of realism, prompting story-relevant mental imagery, reducing counterarguing, and increasing emotional engagement (Green and Fitzgerald, 2017). Greater transportation into messages about people's experiences during COVID is desirable because it can help readers

connect with the people in the message and lead to belief and behavioral change that helps others in the pandemic and reduce the spread of the virus. Most work on transportation has been studied in the context of narrative messages, however the persuasive effects of other message formats, like expository messages without central characters, may also work via transportation (e.g., if people imagine themselves or others in contexts relevant to the message). To test if the persuasive effects of transportation are stronger for narrative messages, we compared matched narrative and expository messages in the current study.

1.1.1. Narratives help improve attitudes and beliefs about others

People are often less receptive to messages about groups of people with whom they do not identify (Murphy et al., 2013). This might contribute to health disparities because people may be less persuaded by messages that promote the well-being of vulnerable groups. Narrative messages help circumvent such resistance by prompting transportation into the message (Green and Brock, 2000; Dal Cin et al., 2004), which in turn allows the message recipient to gain a better understanding of vulnerable social groups and populations, and highlight their specific needs because it is difficult for readers to counterargue with the lived experiences of people (Dal Cin et al., 2004). A recent study found that people who evaluated the SARS-CoV-2 virus as more severe, and believed their behaviors were more effective in reducing the spread of the virus, were more likely to engage in COVID prevention behaviors recommended by the CDC (Kowalski and Black, 2021). This suggests messages that increase beliefs about the severity of the virus (e.g., narratives highlighting how the pandemic is especially severe for certain groups) and messages that increase beliefs about how one's own behaviors can help others, will motivate people to engage in behaviors that help reduce the spread of the virus. Ultimately, narrative messages can increase awareness of health disparities and social determinants of health (Niederdeppe et al., 2008), which can lead to engaging in behaviors that improve health outcomes for those most at risk during the pandemic.

For instance, readers who were highly transported into a story about a gay man encountering homophobia reported more positive beliefs towards gay men afterwards (Green, 2004). The effect of narrative transportation on beliefs held for participants with and without personal relevance to the central character (i.e., without identifying as, or being close to, someone who identifies as LGBT+). In a separate study, Gillig and colleagues (2017) found that exposure to a narrative featuring transgender individuals on *Royal Pains* (USA Network) was associated with more positive beliefs about transgender people. These results suggest that connecting with the central characters of a narrative (one component of transportation) changes beliefs about vulnerable groups, even if people do not identify with the group prior to being transported. Transportation also lowers counterarguing that results from ideological beliefs, which typically impede attitude change (Escalas, 2007).

1.1.2. Narratives encourage prosocial behaviors

Narratives are also an effective tool for persuading people to engage in prosocial behaviors. People are more willing to donate money to charity after reading a narrative about one identified individual in need than reading expository or statistical accounts of a group of people who need help (Västfjäll et al., 2014). One study showed that reading a fictional narrative led to higher transportation and favorable attitudes towards characters, which in turn predicted prosocial behaviors in the experiment (Johnson, 2012). Another study showed that story involvement–one facet of being transported into a narrative–was higher for narrative news stories about stigmatized groups compared to the expository news stories about stigmatized groups (Oliver et al., 2012). Moreover, story involvement had an indirect effect on intentions to engage in prosocial behaviors that would benefit the stigmatized groups. Furthermore, transportation into a message increases empathy for the people in the message, which predicts prosocial behavior (Johnson, 2012). In the context of the COVID-19 pandemic, narratives that

induced empathy increased motivation to engage in prosocial behaviors that help others during the pandemic (Pfattheicher et al., 2020).

Thus, narratives are persuasive messages, and testing their effects on intentions, through being transported into the stories, in the context of COVID-19 has potential real-world implications; even relatively small effects could translate into larger amounts of prevention at scale. For example, a meta-analysis examining the causal relationship between intention to behavior found that there was a 0.36 standard deviation in actual behavior change for each standard deviation of changes in behavioral intentions (Webb and Sheeran, 2006). Assuming a similar correspondence between behavioral intentions and actual behaviors, if a government campaign were to reach a million people using narratives instead of didactic messages leading to a standard deviation change in people's intentions to donate money, this could translate to an additional $360,000 in prosocial donations (assuming the sample's standard deviation for donations were $1). However, much of the existing research on narratives uses one narrative per study, and most studies do not compare the effects of narratives to a message detailing similar information in a non-narrative format. To address these gaps, we followed O'Keefe's (2015) guidelines for evidence-based persuasive message designs by using a multiple-message design to test whether narratives lead to greater transportation than expository messages, and whether this, in turn, has greater impact on behaviors that help people from vulnerable groups in the context of the COVID-19 pandemic.

1.1.3. Targeted prosocial behaviors

We explored the effect of our message manipulation on prosocial behaviors benefiting vulnerable groups during the COVID-19 pandemic. Behaviors included donating to charities that benefit the vulnerable groups in the messages (i.e., healthcare workers and people who are incarcerated), supporting family and friends who are experiencing hardships brought on by the pandemic, and sharing messages on social media during the COVID-19 pandemic (which would shift norms about the needs of vulnerable groups).

It is important to test which messages increase intentions for those prosocial behaviors because surviving a pandemic requires many people to help each other. Those most at risk for contracting the virus can benefit from additional support. Donating to charities that support healthcare workers can help provide them with the personal protective equipment they need and sorely lacked at the onset of the pandemic, and help assist them during their long shifts by providing food or childcare. Donating to charities that assist people who are incarcerated during the COVID-19 pandemic can help them have access to better COVID protective measures, pay for COVID testing and medical care as some incarcerated people had to pay out of pocket, and pay for bail to reduce crowding in prisons and jails. Supporting family and friends who are experiencing hardships brought on by the pandemic is also important because most people faced increased stressors during the onset of the pandemic and needed extra support in different ways, including social support. While the messages in the current study mainly focus on the plight of people who were especially vulnerable during the pandemic, we wanted to test whether the messages would affect only outcomes that are very directly aimed at the target groups, or if they also have more general effects on other behaviors that reduce the burden of the pandemic more broadly, and hence benefit both the target groups and others.

Sharing messages on social media about people who are vulnerable during the pandemic raises awareness of their plight and encourages broader engagement in prosocial behaviors, which is why advocacy groups often share narratives on social media to promote prosocial actions (Gupta et al., 2016). People have a variety of motives for sharing information on social media, including perceptions of the message's relevance to oneself and one's peers (Scholz et al., 2020). Testing which message features motivate increases in intentions to share COVID-related messages on social media is desirable because it helps raise awareness of the hardships some groups are facing in relation to

risk of contracting COVID-19, which could lead to more people engaging in behaviors that reduce the impact of the pandemic.

1.2. Hypotheses and research questions

The current study uses a randomized controlled design to examine the persuasive effects of reading narrative messages about two groups who are put at a higher risk during the pandemic due to their living and working conditions, namely incarcerated individuals and healthcare workers, compared to reading messages detailing the same information in an expository format. We chose to include these two target groups to test the robustness of the effects across groups who were vulnerable during the onset of the pandemic, but hold different amounts of power and status in society. Healthcare workers and incarcerated people faced extreme hardships at the onset of the pandemic, yet healthcare workers are often seen as heroes and incarcerated people as undeserving of empathy, so by including both groups we can better generalize the effects of narratives. We also compared both message conditions to a no-treatment control to determine the total effects of the messages, relative to the status quo of no messages.

We hypothesized that narrative messages (vs. expository messages) would lead to greater transportation into each message (H1) and that participants in the narrative (vs. expository) condition would report greater intentions to share the messages on their social media (H2). Additionally, we hypothesized that higher transportation would mediate the effect of message type on increasing participants' beliefs about their ability to protect vulnerable groups during the pandemic (H3a), and increasing beliefs about perceived vulnerability of the target group described in the messages (H3b). We also expected that higher transportation would mediate the tendency for narrative messages to increase intentions for prosocial behaviors (e.g., calling/texting friends who are vulnerable to COVID-19, donating to reputable charities that benefit people who are vulnerable to COVID-19) (H4). Lastly, exploratory analyses tested whether the effects of narratives on transportation, sharing, beliefs, and behavior intentions were moderated by the target group presented in the messages (incarcerated people or healthcare workers). All hypotheses and the exploratory research question listed here were pre-registered before data collection (see https://osf.io/tfqhc/).

2. Methods

2.1. Experimental design overview

Participants were randomly assigned to one of three message conditions (narrative, expository, and no-message control) using the randomization function in Qualtrics. Participants in the narrative and expository message conditions were randomly assigned to either read about healthcare workers or incarcerated people. After each message, participants rated how transported they were into the message and how likely they were to share that message on social media. Participants in the no message condition did not rate transportation or sharing for any messages because they were not exposed to any messages. Next participants in all three conditions reported their COVID-related beliefs and behavior intentions. We included the no-message condition to test if a message intervention was useful to change beliefs and behaviors that help reduce the impact of the COVID-19 pandemic, relative to the status-quo of no message.

2.2. Participants

We aimed to recruit 1000 participants from Amazon Mechanical Turk (MTurk). Our sample size was determined a-priori by conducting a power analysis using the PANGEA power calculator (Westfall, 2016). Preliminary estimates from a pilot study using the same messages (see supplemental materials for notes on the pilot study), we needed to recruit 906 participants across conditions (302 participants in each

condition) to have 90% power to detect the smallest effect of interest (Cohen's $d = 0.24$, H2). This smaller effect can translate into potentially important changes at scale (Bakker et al., 2019), given that messaging interventions can reach large audiences. Guided by participant exclusion estimates from other COVID-19 MTurk studies and recommendations from the World Health Organization that samples should include approximately 1000 participants for the sake of generalizability (World Health Organization, 2020), we aimed for an initial sample size of 1000 participants prior to exclusions.

Prior to exclusions, our total MTurk sample size was 1016, and based on our a priori exclusion parameters (see https://osf.io/tfqhc/for details), 54 participants were excluded (see Table 1 for exclusion counts by condition). This left us with a total sample of 962 participants after exclusions. Since there were over 302 participants in each condition, the study was over 90% powered to detect meaningful direct effects for the main hypotheses if there were any. All participants were over the age of 18 and resided in the United States. See Table 2 for all demographic information.

2.3. Stimuli

Participants each read 5 messages that were each preceded by the following prompt: "Many of us need support during the COVID-19 pandemic. We can help each other by spreading awareness on social media, checking in on each other, and offering time or money when possible." We crafted this general statement to be inclusive of participants who may also need support during the pandemic, and to promote financial and nonfinancial prosocial behaviors that could benefit the target groups in the messages. We also included a no-message control ($n = 326$) condition where participants did not read any message at all.

Participants assigned to the narrative condition ($n = 317$) read five first-hand experiential narratives, with an average word count of 226 ($SD = 40.4$), from the perspective of incarcerated people ($n = 160$) or people working in healthcare ($n = 157$) during the COVID-19 pandemic. Each participant only saw messages about one target group, but we included both in analysis to assess the generalizability of our findings across contexts. All narratives were adapted from social media posts, online articles, or press releases to be in the first-person voice and were similar in length and complexity (for all 10 narratives, see supplemental materials).

Participants assigned to the expository condition ($n = 319$) read five messages that conveyed the same information as the narrative messages but were written in an expository format, with an average word count of 211.5 ($SD = 38$). They were adapted from the narratives to present a matter-of-fact account of the same information from a third-party perspective without a central character. The word counts for the expository and narrative condition did not significantly differ, $t(18) = 0.83$, 95% CI = [−22.35, 51.35], $p = 0.419$. As in the narrative condition, participants in the expository condition were randomly assigned to read messages about a specific target group (incarcerated people [$n = 160$] or healthcare workers [n = 159]). To reduce the likelihood of participants skimming messages while still allowing enough time to read the messages, participants were not allowed to advance from each message screen for 20 s (informed by the reading times of research

Table 1
Participant exclusions by intervention condition.

Criterion	Narrative	Expository	No message control	χ^2 [a]
English Comprehension	13	12	14	0.133
Response Invariance	4	7	3	1.845
Attention Check	0	1	0	2.009

Note. Non-independence of participant exclusions was tested sequentially for each criterion.
[a] Chi-square tests of non-independence were non-significant at each exclusion step, p > 0.36.

Table 2
Demographics across conditions.

Characteristic	Expository, N = 319	Narratives, N = 317	No-message control, N = 326	p-value
Gender				0.2
Female	155 (49%)	162 (51%)	146 (45%)	
Male	160 (50%)	153 (48%)	180 (55%)	
Other	1 (0.3%)	0 (0%)	0 (0%)	
Prefer not to say	3 (0.9%)	2 (0.6%)	0 (0%)	
Age	37 (12)	38 (13)	38 (13)	0.5
Unknown	1	0	0	
Latinx = yes	45 (14%)	45 (14%)	50 (15%)	>0.9
Race				0.8
American Indian/ Alaska Native	2 (0.6%)	2 (0.6%)	3 (0.9%)	
Asian	29 (9.1%)	35 (11%)	28 (8.6%)	
Black/African American	41 (13%)	34 (11%)	45 (14%)	
Multiracial	3 (0.9%)	7 (2.2%)	10 (3.1%)	
Native Hawaiian/ Other Pacific Islander	0 (0%)	1 (0.3%)	0 (0%)	
Other	7 (2.2%)	7 (2.2%)	7 (2.1%)	
White	236 (74%)	231 (73%)	233 (71%)	
Unknown	1	0	0	
Education				0.4
Less than high school	0 (0%)	4 (1.3%)	1 (0.3%)	
High school	31 (9.7%)	24 (7.6%)	28 (8.6%)	
Some college	53 (17%)	48 (15%)	56 (17%)	
Associate's degree	40 (13%)	42 (13%)	25 (7.7%)	
Bachelor's degree	137 (43%)	138 (44%)	148 (46%)	
Master's degree	48 (15%)	56 (18%)	54 (17%)	
Professional degree	5 (1.6%)	2 (0.6%)	5 (1.5%)	
Doctorate degree	4 (1.3%)	3 (0.9%)	7 (2.2%)	
Unknown	1	0	2	
Household Income				0.8
<5000	3 (1.0%)	1 (0.3%)	4 (1.2%)	
5000–11999	13 (4.2%)	11 (3.5%)	11 (3.4%)	
12000-15999	6 (1.9%)	8 (2.5%)	8 (2.5%)	
16000-24999	28 (9.1%)	18 (5.7%)	16 (5.0%)	
25000-34999	29 (9.4%)	37 (12%)	45 (14%)	
35000-49999	53 (17%)	50 (16%)	49 (15%)	
50000-74999	73 (24%)	83 (26%)	82 (26%)	
75000-99999	52 (17%)	51 (16%)	56 (18%)	
>100000	51 (17%)	55 (18%)	49 (15%)	
I don't know	0 (0%)	0 (0%)	0 (0%)	
No response	0 (0%)	0 (0%)	0 (0%)	
Unknown	11	3	6	
Subjective SES	5.64 (1.93)	5.60 (1.78)	5.49 (1.77)	0.4
Unknown	48	30	36	

Note. Size of sample with corresponding percentage listed for gender, Latinx = yes, race, education, and household income, with p-values derived from Fisher's exact test. Mean with corresponding standard deviation listed for age and subjective SES, with p-values derived from Kruskal-Wallis test. If a participant did not respond to a given question, we list their response as 'Unknown'.

assistants who tested the survey before formal data collection).

2.4. Measures

2.4.1. Message transportation

The Transportation Scale Short Form (TS-SF: Appel et al., 2015) was used to measure the extent to which participants were transported into each message. We used the five-item shortened scale, adapted from the full 15-item transportation scale (Green and Brock, 2000), to minimize participant fatigue. Participants indicated how much they agreed or disagreed with each item on a 7-point scale (1 = not at all, 7 = very much). We adapted the scale to say 'message' rather than 'narrative' so it could be used for both message format conditions (see https://osf.io/tfqhc/). The Cronbach alpha from a set of studies in Appel et al. (2015) that validated this shortened scale ranged from 0.80 to 0.87, and the

Cronbach alpha in the current study was 0.70. The Cronbach alpha in the current study was calculated by first calculating the Cronbach alpha for each message, and then averaging across all the messages.

2.4.2. Message sharing

Participants were asked "After reading this message, how likely is it that you will/would share this message to your own social media?" which they rated on a seven-point scale (1 = extremely unlikely, 7 = extremely likely).

2.4.3. Protecting vulnerable groups

Participants were asked to rate how much they agreed or disagreed with six beliefs about their ability to protect vulnerable groups through their own implementation of specific behaviors. For example, "If I stay home every day for the next two weeks, and avoid physical contact, even if I'm not sick I will keep vulnerable people in my community safe". These beliefs were piloted using the validated Hornik and Woolf method (Hornik et al., 2019) and determined to be promising beliefs to target with messages on the basis of their likelihood of influencing people's intentions and behaviors to practice physical distancing early on during the COVID-19 pandemic, and the likelihood that changing these beliefs would in turn change intentions, computed as the "percent to gain" statistic described by Hornik and Woolf (1999). See supplemental materials for the full set of beliefs about protecting vulnerable groups. The Cronbach alpha for this set of beliefs in the present study was 0.94.

2.4.4. Perceived vulnerability of others

On a sliding scale from 0 (not at all vulnerable) - 100 (extremely vulnerable), we asked participants how much they perceived four groups to be vulnerable during the COVID-19 outbreak. We asked about each vulnerable target group presented in the messages (incarcerated people and healthcare workers). Two other groups were included as comparison groups corresponding to each target group (people who live in a house and people working from home, respectively). In contrast to the vulnerable target groups, these comparison groups comprise of people who are less likely to come in contact with the coronavirus due to their living or working conditions.

2.4.5. Prosocial intentions

All participants were asked about their intentions to engage in prosocial behaviors in the next two weeks during the COVID-19 pandemic. Prior to analysis, all prosocial intention items were subjected to a factor analysis, which resulted in two distinct factors. One item that did not load on to either factor was excluded from analysis. The first factor included four items related to one's intention to help family and friends (e.g., "intention to call or text my friends or family who are particularly vulnerable during the COVID-19 pandemic", see supplemental materials for all items that loaded onto factor 1). The second factor included three items related to helping vulnerable groups (e.g., "intention to donate to reputable charities that assist prisoners during the COVID-19 pandemic", see supplemental materials for all items that loaded onto factor 2). Consistent with our pre-registration, we averaged the items together from each factor to create an index score for the first factor "intention to help family and friends" (Cronbach alpha = 0.74), and the second factor "intention to help vulnerable groups" (Cronbach alpha = 0.84).

2.5. Procedure

After consenting to the experiment on MTurk, participants were randomly assigned to their condition. After each message, participants in the message conditions were first asked to rate how likely they were to share the message on social media. Next, they filled out the Transportation Scale Short Form to indicate the extent to which they were transported into the message.

After responding to all five messages (or for the no-message control

participants, after consenting), participants were asked to report their intentions to engage in prosocial behaviors in the next two weeks. Then, the participants indicated how much they agreed or disagreed with the beliefs about vulnerable groups. The presentation of the outcome measures was counterbalanced. Next, participants answered various measures about demographics, current stressors, and personality traits that were used as covariates in data analyses. A full list of measures collected in this study is provided in the study's OSF page under files, https://osf. io/tfqhc/.

2.6. Data analysis

2.6.1. Statistical modeling for primary hypothesis tests

To test whether the message condition predicted the transportation scores or likelihood of sharing each message (H1 and H2, respectively), we used the *lme4* package (Bates et al., 2015) in R to run mixed-effects multilevel models. Degrees of freedom were estimated using Satherthwaite estimation provided by the *lmerTest* package (Kuznetsova et al., 2019). All models included random intercepts by participants and by message and did not include any random slopes. Covariates were included as additional independent predictors. We also ran moderation analyses examining the interaction between message type and target group to investigate whether the effects of narratives (vs. expository messages) on transportation and sharing differed by the target group presented in the messages (RQ1).

We used the *mediation* package in R (Tingley et al., 2014) to determine whether message type (narrative vs. expository) would have an indirect effect, through transportation, on beliefs about protecting others through social distancing (H3a), beliefs about group vulnerability (H3b), and prosocial intentions (H4). For the first path common to all these indirect effects (message type → average transportation across all messages), we ran a regression testing the effect of message type on average transportation across all the messages. To test the direct effect of message type on each outcome, we tested the effect of message type on the hypothesis-specific dependent variable while controlling for average transportation. To test for the presence of an indirect effect of message type on each outcome through average transportation, we submitted the message type → transportation model and each direct effect model (in separate calls for each outcome) to the bootstrapping procedures provided by the *mediate* function. The average unstandardized indirect effect and its corresponding 95% confidence interval were computed over 1000 bootstrapped samples.

To explore whether the indirect effect of message condition on each key outcome through transportation differed by the target groups presented in the messages (see H3 and H4), we tested for conditional indirect effects of the message target group (RQ1).

We included a no-message control condition in addition to the narrative and expository message conditions to explicitly test if reading narratives would have any impact on COVID beliefs and behavioral intentions relative to the status quo of no message. We ran separate regressions to analyze the direct effect of no message vs. narrative messages on (1) how one's own behavior could help protect vulnerable groups during the pandemic (2) vulnerability of healthcare workers and incarcerated people during the pandemic, (3) prosocial behavioral intentions to help family and friends, and (4) prosocial behavioral intentions to help vulnerable groups during the pandemic.

All of the statistical models included covariates to make the results drawn from the randomized controlled design even more robust and demonstrate that the results go above and beyond plausible individual personality and sociodemographic differences. In line with our pre-registration, all covariates were chosen a priori and were only included in the model if they significantly correlated with their dependent variable. See our supplemental materials for our covariate selection procedures for all the analyses, and to see results without controlling for covariates. Conclusions remain parallel in these uncontrolled models.

2.6.2. Open data

The anonymized study data and data analysis scripts are all publicly available on the study's Open Science Framework repository, htt ps://osf.io/tfqhc/.

3. Results

3.1. Reading narratives leads to greater transportation but has No direct effect on intention to share

Supporting H1, participants in the narrative condition reported greater transportation than participants in the expository condition (b = 0.17, 95% CI = 0.04, 0.30, SE = 0.07, $t(632)$ = 2.63, d = 0.35, p = 0.009). Our prediction that participants would be more likely to share narrative (vs. expository) messages on social media (H2) was not supported (b = 0, 95% CI = −0.14, 0.15, SE = 0.07, $t(630)$ = 0.06, d = 0.01, p = 0.95).

3.2. Reading narratives indirectly leads to stronger beliefs about the ability to protect vulnerable groups by physical distancing via transportation

We next examined the indirect effects of message type on beliefs about being able to protect vulnerable groups during the COVID-19 pandemic through self-reported transportation (H3a). First, we found that transportation was significantly associated with beliefs about protecting vulnerable groups (b = 0.29, 95% CI = 0.21, 0.36, SE = 0.04, $t(630)$ = 7.96, d = 0.61, p = 0.006). Further, although we did not observe a direct effect of condition (narrative vs. expository) on beliefs (b = −0.02, 95% CI = −0.16, 0.11, d = −0.04, p = 0.76), there was an indirect effect of narrative (vs. expository) messages through transportation on beliefs that physical distancing can protect vulnerable groups (H3a: see Fig. 1 and Table 3; indirect effect b = 0.06, 95% CI = 0.02, 0.11, d = 0.12, p < 0.01). Target group did not significantly modulate this indirect effect (b = 0, 95% CI = −0.12, 0.13, d = 0, p = 0.91) (RQ1).

Table 3

Indirect effect of narrative (vs. expository) messages on beliefs that one can protect vulnerable groups via message transportation.

	b (95% CI)	p - value
Average Indirect Effect	0.06 (0.02, 0.11)	0.006
Average Direct Effect	−0.02 (−0.16, 0.11)	0.762
Total Effect	0.04 (−0.10, 0.18)	0.614
Proportion Mediated	0.58 (−9.96, 8.76)	0.608

3.3. Reading narratives indirectly leads to stronger beliefs about the vulnerability of the targeted groups via transportation

Next, we tested the indirect effects of condition (narrative vs. expository) on the belief that the target group in the messages was vulnerable through self-reported transportation (H3b). First, we found a significant relationship between transportation and the belief that the target group was vulnerable (b = 0.18, 95% CI = 0.11, 0.25, SE = 0.04, $t(630)$ = 5.10, d = 0.27, p < 0.001). Although we did not observe a direct effect of condition on the belief that the target group was vulnerable (b = −0.05, 95% CI = −0.18, 0.09, d = −0.10, p = 0.43), we found a significant indirect effect of narrative (vs. expository) messages, through transportation, on the belief that the target group is vulnerable (H3b: see Fig. 2 and Table 4; indirect effect b = 0.04, 95% CI = 0.01, 0.07, d = 0.08, p = 0.004). Target group did not significantly modulate this indirect effect (b = 0, 95% CI = −0.05, 0.07, d = 0, p = 0.75) (RQ1).

3.4. Reading narratives indirectly leads to stronger intentions to engage in prosocial behaviors via transportation

We then examined the indirect effects of message type on prosocial behavioral intentions through transportation (H4). Transportation was significantly associated with intentions to engage in prosocial behaviors that help family and friends (factor 1, b = 0.50, 95% CI = 0.43, 0.57, SE = 0.04, $t(631)$ = 13.95, d = 1.19, p < 0.001) and prosocial intentions that help vulnerable groups (factor 2, b = 0.43, 95% CI = 0.36, 0.51, SE = 0.04, $t(632)$ = 11.29, d = 0.98, p < 0.001).

3.4.1. Family and friends

We did not find evidence of a direct effect of message type on factor 1

Indirect effect of narrative (vs. expository) messages on beliefs that one can protect vulnerable groups via message transportation.
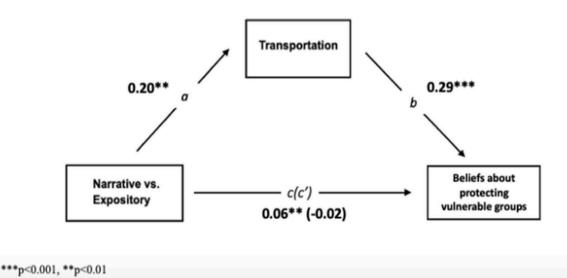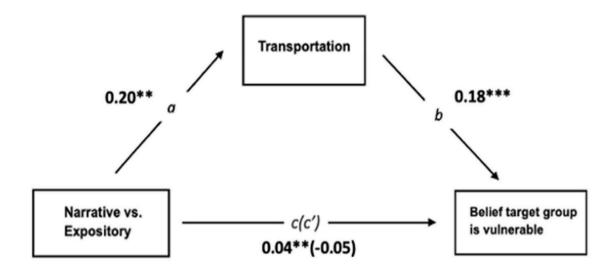
***p<0.001, **p<0.01

Fig. 1. Indirect effect of narrative (vs. expository) messages on beliefs that one can protect vulnerable groups via message transportation.

Indirect effect of narrative (vs. expository) messages on beliefs that the target group was vulnerable via message transportation

Fig. 2. Indirect effect of narrative (vs. expository) messages on beliefs that the target group was vulnerable via message transportation.

Table 4

Indirect effect of narrative (vs. expository) messages on beliefs that the target group was vulnerable via message transportation.

	b (95% CI)	p - value
Average Indirect Effect	0.04 (0.01, 0.07)	0.004
Average Direct Effect	−0.05(-0.18, 0.09)	0.428
Total Effect	−0.01 (−0.15, 0.12)	0.830
Proportion Mediated	−0.25 (−8.12, 12.39)	0.834

(behaviors that help family and friends) ($b = -0.12$, 95% CI $= -0.24$, 0.01, $d = -0.24$, $p = 0.07$). However, there was a significant indirect effect, $b = 0.11$, $d = 0.22$, 95% CI [0.04, 0.19] (see Table 5 for full indirect effect statistics), of narrative (vs. expository) messages, through transportation, on intentions to engage in prosocial behaviors that help family and friends (H4, prosocial factor 1: see Fig. 3).

3.4.2. Vulnerable groups

There also was no direct effect of message type on factor 2 (behaviors that help vulnerable groups) ($b = -0.11$, 95% CI $= -0.24$, 0.03, $d = -0.22$, $p = 0.14$), but there was a significant indirect effect (see Table 6 for full indirect effect statistics), of narrative (vs. expository) messages, through transportation, on intentions to engage in prosocial behaviors that help other vulnerable groups, $b = 0.10$, $d = 0.20$, 95% CI [0.03, 0.16] (H4, prosocial factor 2: see Fig. 4).

The group targeted in the messages did not significantly modulate

Table 5

Indirect effect of narrative (vs. expository) messages on intentions to engage in prosocial behaviors that help family and friends via message transportation.

	b (95% CI)	p - value
Average Indirect Effect	0.11 (0.04, 0.19)	0.006
Average Direct Effect	−0.12 (−0.24, 0.01)	0.074
Total Effect	−0.01 (−0.15, 0.15)	0.962
Proportion Mediated	−0.33 (−15.45, 25.08)	0.968

these indirect effects predicting intentions that help family and friends ($b = -0.05$, 95% CI $= -0.17$, 0.08, $d = -0.10$, $p = 0.46$), or prosocial behavior intentions that help vulnerable groups ($b = 0$, 95% CI $= -0.09$, 0.10, $d = 0$, $p = 0.93$) (RQ1).
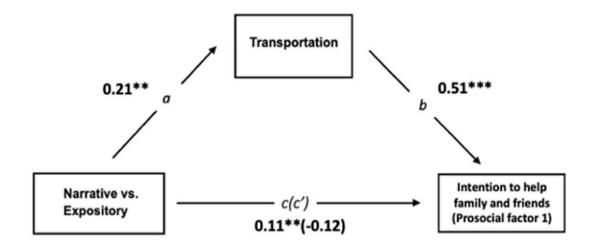
3.5. Participants were more likely to be transported into and share messages about incarcerated people

In line with our pre-registered research questions, we tested whether the effects of narrative (vs. expository) messages on transportation and sharing were moderated by the target group presented in the messages (incarcerated people or healthcare workers). The interaction between message type (narrative vs. expository) and target group (incarcerated people vs. healthcare workers) was not statistically significant for transportation ($b = -0.03$, 95% CI $= -0.28$, 0.23, $d = -0.06$, $p = 0.83$) or sharing ($b = -0.04$, 95% CI $= -0.32$, 0.24, $d = -0.08$, $p = 0.76$). However, participants were more likely to be transported into messages (both narrative and expository) about incarcerated people (vs. people in healthcare) ($b = 0.33$, 95% CI $= 0.21$, 0.46, $d = 0.70$, $p < 0.001$). Similarly, they were more likely to share messages about incarcerated people ($b = 0.40$, 95% CI $= 0.26$, 0.54, $d = 0.87$, $p < 0.001$).

3.6. Reading narratives indirectly leads to stronger intentions to share the message via transportation

We then conducted a post-hoc analysis testing the effect of transportation on sharing using mixed-effect multilevel models with random intercepts by participants and by message. There was a significant effect of transportation on sharing likelihood ($b = 0.40$, 95% CI $= 0.38$, 0.43, $d = 0.87$, $p < 0.001$). Next, we tested if message condition (narrative vs. expository) had an effect on sharing through transportation. In the mediation model, there was a direct effect of message condition on sharing ($b = -0.15$, 95% CI $= -0.27$, −0.04, $d = -0.30$, $p = 0.01$), and an indirect effect of narrative (vs. expository) messages through transportation on sharing ($b = 0.13$, 95% CI $= 0.04$, 0.23, $d = 0.26$, $p =$

Indirect effect of narrative (vs. expository) messages on intentions to engage in prosocial behaviors that help family and friends via message transportation

***p<0.001, **p<0.01

Fig. 3. Indirect effect of narrative (vs. expository) messages on intentions to engage in prosocial behaviors that help family and friends via message transportation.

Table 6
Indirect effect of narrative (vs. expository) messages on intentions to engage in prosocial behaviors that help vulnerable groups via message transportation.

	b (95% CI)	p - value
Average Indirect Effect	0.10 (0.03, 0.16)	0.004
Average Direct Effect	−0.11 (−0.24, 0.03)	0.142
Total Effect	−0.02 (−0.16, 0.14)	0.824
Proportion Mediated	−0.55 (−18.01, 23.91)	0.828

0.004).

3.7. Reading narratives increased beliefs about the vulnerability of incarcerated people and healthcare workers and motivated prosocial actions relative to reading No messages

The results from the models testing the direct effect of reading narratives compared to the status quo of not being exposed to any messages are summarized in Table 7. These analyses revealed that reading narratives had significantly better or similar effects than viewing no messages on the outcomes of interest, confirming that reading narratives about groups whose circumstances increase their COVID-19 risk is one promising approach to changing individual's beliefs and behaviors and in turn, reduce the impact of the pandemic.
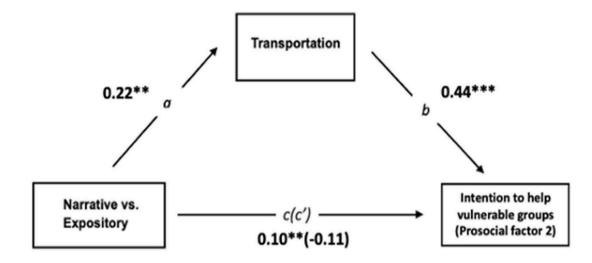
4. Discussion

The COVID-19 pandemic has created extraordinary stressful conditions for people around the world, with some groups experiencing a disproportionately greater burden of disease and death due to their living and working conditions (American Psychiatric Association, 2020). Here, we demonstrate positive effects of reading first-hand narratives (vs. matched expository messages) about people whose circumstances place them at high risk for exposure to SARS-CoV-2. Prior research has also highlighted that other forms of narratives such as gossip or rumor messages can negatively affect people's beliefs and behaviors during the COVID-19 pandemic (Dores Cruz et al., 2021;

Sharma and Kapoor, 2021). Our research highlights one way that a form of story-telling, grounded in people's real experiences, can encourage prevention behaviors. Specifically, narratives promote behaviors that help others and reshape beliefs about public health, through transportation into other people's stories.

4.1. The power of transportation

First, we show that messages presented in a narrative format causally increase transportation into the message more than messages written in an expository format. The results were not only statistically significant but also had medium effect size suggesting potential for important real world effects if scaled up. Going a step further, narratives about people who are incarcerated or working on the frontlines of healthcare during the COVID-19 pandemic changed beliefs and behavioral intentions benefiting public health to the extent that readers experienced greater transportation into the narratives. This is consistent with findings that messages presented in a narrative format can change beliefs, attitudes, and behavioral intentions (Hamby et al., 2016). In our intervention, the narrative (vs. expository) condition resulted in a 0.2 SD increase in narrative transportation. For each SD change in transportation, we observed a 0.4 SD increase in intentions to help vulnerable groups during the pandemic (i.e., donating to charities that support healthcare workers and people who are incarcerated). A change of this magnitude corresponds to increasing intentions to help groups especially vulnerable during the pandemic from somewhat intend (standardized mean = 0) to strongly intend to help for participants who read narrative messages (standardized mean of narrative condition = 0.06). The current study did not measure actual behavior change in addition to change in behavioral intentions. This means that the direct and indirect actual behavioral impact of this narrative intervention will require further study for a more precise estimate. Nonetheless, small to medium effect sizes on beliefs and behavioral intentions have had measurable real-world impact in other contexts (e.g., the relatively small effect size when testing the persuasive effect of narrative messages from the anti-smoking campaign called Tips From Former Smokers on intentions to quit smoking resulted in an estimated 1·64 million smokers who made a

Indirect effect of narrative (vs. expository) messages on intentions to engage in prosocial behaviors that help vulnerable groups via message transportation

***p<0.001, **p<0.01

Fig. 4. Indirect effect of narrative (vs. expository) messages on intentions to engage in prosocial behaviors that help vulnerable groups via message transportation.

Table 7
Direct effect of reading narrative messages compared to reading no-messages on beliefs and intentions.

	b (95% CI)	p - value
Belief that healthcare workers and incarcerated people are vulnerable during the pandemic	0.20 (0.04, 0.36)	0.013
Beliefs that one's behavior can protect vulnerable groups during the pandemic	0.03 (−0.12, 0.18)	0.650
Intentions to engage in prosocial behaviors that help family and friends	0.36 (0.21, 0.52)	<0.001
Intentions to engage in prosocial behaviors that help vulnerable groups	0.23 (0.07, 0.38)	0.004

quit attempt (McAfee et al., 2013)).

The results from the current study lend greater confidence to the generalizability of the persuasive effects of narratives for a few reasons. First, we observed these effects with multiple messages and target groups, with few differences arising between healthcare workers and people who are incarcerated. However, participants were more likely to be transported into messages about incarcerated people regardless of the message condition, which we discuss in more detail below. In addition, the results go above and beyond plausible individual differences in empathy, tendency to be transported into stories, or other sociodemographics, by controlling for those individual differences in the statistical models.

Interestingly, we did not find evidence that narrative (vs. expository) messages directly affected beliefs about vulnerable groups and prosocial intentions. Instead, narratives indirectly increased the participants' beliefs about their ability to protect vulnerable groups, how vulnerable the target group was during the COVID-19 pandemic, and prosocial intentions to help others, via transportation. When individuals are transported into a narrative, they create a mental model of the story world, which allows them to hold beliefs and intentions that align with the information being presented in the narrative (Van Laer et al., 2014). We

observed medium to large effect sizes for the extent of transportation on changing beliefs and motivating prosocial actions. This indicates the effect of transportation of changing beliefs and intentions was not only statistically significant but also potentially practically significant, considering the potential impact of messaging that increases transportation scaled across large numbers of people. Being transported into first-person narratives about incarcerated people or healthcare workers likely allowed the participants to identify with social groups they do not belong to, creating a mental model that reflects the needs of those groups during the COVID-19 pandemic, which in turn influenced their beliefs and behavioral intentions.

4.2. Sharing

Surprisingly, participants in the narrative and expository condition were both equally likely to share the messages. It is possible that our decision to ensure the conditions were informationally equivalent by having both the narrative and expository messages begin with the statement expressing how "We can help each other by spreading awareness on social media …", may have equally promoted sharing to participants in both conditions. It is also possible that transportation influences sharing, regardless of the message condition. To test this possibility, we ran post-hoc analyses that indicated higher transportation into the message led to significantly increased likelihood to share the message, regardless of message type. Further, there was a relationship between message type and likelihood to share the message through transportation.

4.3. Differing effects for messages about incarcerated people and healthcare workers

We also explored whether the target group in the messages had a moderating effect on transportation and sharing. Although we did not find evidence of moderation by target group for our main findings that narratives increase transportation or sharing, we did find some differences by target group in other areas. For instance, regardless of message

type, participants reported more transportation and greater willingness to share messages when those messages were about incarcerated people (vs. healthcare workers). This suggests that participants were more immersed into messages about incarcerated people, and that message targets (incarcerated people vs. healthcare workers) have a larger direct influence on sharing than message type (narrative vs. expository). Although it is unclear why messages about people who are incarcerated elicited more transportation and greater willingness to share, one possible explanation is that stories about incarcerated people (vs. healthcare workers) were more novel in popular media at that time, which had many stories about healthcare workers. Another possibility is that the plight of incarcerated people was more extreme than the hardships endured by healthcare workers during the pandemic which caused a more arousing emotional response when reading messages detailing the experiences of incarcerated people compared to reading messages about healthcare workers. Novelty and arousal have both been shown to increase engagement and sharing (Berger, 2013). Future research should investigate if novelty, arousal, or other factors underpinned the effects of messages about incarcerated people to better inform effective communication tactics during the pandemic.

4.4. Limitations and future directions

Although this study has a number of strengths, including the use of multiple messages and targeted groups, we consider some key limitations and corresponding opportunities for future research.

First, the stories used in this study depict people in exceptional circumstances (e.g., people who are incarcerated and healthcare workers in the time of a global pandemic). It is not yet clear whether narratives about the plight of people experiencing other hardships during the COVID-19 pandemic (e.g., people who are facing a reduction in income or employment) would have a similar impact on narrative transportation and prosocial behavior. For example, if some participants were experiencing something similar to the protagonists in the messages, there might be a moderating effect on one or more of the outcomes we tested, which can be tested in future research. We chose not to include messages about people who were financially struggling during the pandemic because those messages would highlight consequences of COVID-19 which are qualitatively different from the exposure risks described in the messages about healthcare workers and people in prison. However, testing qualitatively different messages in the future could even further increase generalizability of using narrative messages as an intervention to motivate prosocial behaviors. Another limitation is that we did not measure the degree to which participants themselves or those close to them had direct experiences as healthcare workers or being incarcerated. Future research that examines prior experience as a potential moderator could be fruitful in elucidating boundary conditions.

Lastly, these findings may be limited to the American context, since the narratives are constructed based on U.S. context and the participants were U.S. residents. One potentially relevant cultural characteristic of American samples is high individualism (Kagitcibasi, 1997; see Vandello and Cohen, 1999 for within-country variation). Within our U.S.-based MTurk sample Pei et al. (2020) found that participants with higher collectivist (vs. individualist) traits were more likely to believe they could protect vulnerable groups through their own implementation of specific COVID prevention behaviors and they had higher prosocial behavioral intentions. There may be a similar trend for people from collectivist countries, regardless of message format. Furthermore, there are cultural differences in moral emotions, which have been shown to influence the persuasive effects of messages promoting prosocial behaviors (Kim and Johnson, 2013), as well as objective differences in the conditions of different vulnerable groups. Together, those cultural differences in moral emotions, and differences in conditions, may affect views on vulnerability, and how people across cultures perceive the circumstances healthcare workers and incarcerated people were facing

during the pandemic (e.g., righteousness, attitudes toward punishment). Future research should explore if culture moderates the persuasive effects of narrative messages during public health crises.

5. Conclusion

In conclusion, reading narratives written in the first-person about people experiencing health risks during the COVID-19 pandemic increased transportation into the message more than expository messages with the same facts, but no central character. When readers were transported into a narrative, they were more likely to report message-consistent beliefs and behavioral intentions. In conclusion, sharing first-person narratives detailing the experiences of groups of people whose circumstances increase their health risks is one promising approach to motivate prosocial responses, and in turn, reduce health disparities.

6. Citation diversity statement

Recent work in several fields of science has identified a bias in citation practices such that papers from women and other minority scholars are under-cited relative to the number of such papers in the field (Caplar et al., 2017; Chakravartty et al., 2018; Dion et al., 2018; Dworkin et al., 2020; Maliniak et al., 2013; Mitchell et al., 2013). Here we sought to proactively consider choosing references that reflect the diversity of the field in thought, form of contribution, gender and other factors.

We obtained the predicted gender of the first and last author of each reference by using databases that store the probability of a first name being carried by a woman (Dworkin et al., 2020; Zhou et al., 2020). By this measure (and excluding self-citations to the first and last authors of our current paper), our references contain 23.63% woman(first)/woman (last), 20.14% man/woman, 20.14% woman/man, and 36.10% man/man. This method is limited in that a) names, pronouns, and social media profiles used to construct the databases may not, in every case, be indicative of gender identity and b) it cannot account for intersex, non-binary, or transgender people.

7. Positionality statement

Mindful that our identities can influence our approach to science (Roberts et al., 2020), the authors wish to provide the reader with potentially relevant information about our backgrounds. With respect to race/ethnicity, one of us self-identifies as Black mixed-race, one as Black, and three as White. With respect to gender identity, four of us identify as women and one of us identifies as a man. With respect to the groups of people the current study focuses on, none of us identifies as a healthcare professional or person who is incarcerated, and so we have relied on stories collected from news media, and our interpretations of the stories and experiences of these group members are necessarily limited in this way.

Credit author statement

Mary E. Andrews: Conceptualization, Methodology, Formal analysis, Investigation, Writing – original draft, Writing – review & editing. Bradley D. Mattan: Conceptualization, Methodology, Writing – review & editing. Keana Richards: Formal analysis, Visualization, Writing – review & editing. Samantha L. Moore-Berg: Investigation, Writing – review & editing. Emily B. Falk: Conceptualization, Writing – review & editing, Supervision, Funding acquisition

Study ethics

The study described in the manuscript was deemed exempt by the University of Pennsylvania IRB, reference number 842732. Researchers

from the University of Pennsylvania conducted the study online from April 30 to May 2, 2020.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.socscimed.2022.114870.

References

American Psychiatric Association, 2020. New Poll: COVID-19 Impacting Mental Well-Being: Americans Feeling Anxious, Especially for Loved Ones; Older Adults Are Less Anxious. https://www.psychiatry.org/newsroom/news-releases/new-poll-covid-19-impacting-mental-well-being-americans-feeling-anxious-especially-for-loved-ones-older-adults-are-less-anxious.

Appel, M., Gnambs, T., Richter, T., Green, M.C., 2015. The transportation scale–short form (TS–SF). Media Psychol. 18 (2), 243–266. https://doi.org/10.1080/15213269.2014.987400.

Bakker, A., Cai, J., English, L., Kaiser, G., Mesa, V., Van Dooren, W., 2019. Beyond small, medium, or large: points of consideration when interpreting effect sizes. Educ. Stud. Math. 102 (1), 1–8. https://doi.org/10.1007/s10649-019-09908-4.

Bates, D., Maechler, B., Bolker, B., Walker, S., 2015. Fitting linear mixed-effects models using lme4. J. Stat. Software 67, 1–48.

Berger, J., 2013. Contagious: Why Things Catch on. Simon and Schuster.

Caplar, N., Tacchella, S., Birrer, S., 2017. Quantitative evaluation of gender bias in astronomical publications from citation counts. Nat. Astron. 1 (6), 1–5.

Dal Cin, S., Zanna, M., Fong, G., 2004. Narrative persuasion and overcoming resistance. In: Knowles, E.S., Linn, J.A. (Eds.), Resistance and Persuasion. Taylor & Francis Group. http://ebookcentral.proquest.com/lib/upenn-ebooks/detail.action?docID=335501.

Dion, M.L., Sumner, J.L., Mitchell, S.M., 2018. Gendered citation patterns across political science and social science methodology fields. Polit. Anal. 26 (3), 312–327. https://doi.org/10.1017/pan.2018.12.

Dores Cruz, T.D., van der Lee, R., Beersma, B., 2021. Gossip about Coronavirus: infection status and norm adherence shape social responses. Group Process. Intergr. Relat. 24 (4), 658–679. https://doi.org/10.1177/1368430221991232.

Dworkin, J.D., Linn, K.A., Teich, E.G., Zurn, P., Shinohara, R.T., Bassett, D.S., 2020. The extent and drivers of gender imbalance in neuroscience reference lists. Nat. Neurosci. 23 (8), 918–926.

Escalas, J.E., 2007. Self-referencing and persuasion: narrative transportation versus analytical elaboration. J. Consum. Res. 33 (4), 421–429. https://doi.org/10.1086/510216.

Fishbein, M., Cappella, J.N., 2006. The role of theory in developing effective health communications. J. Commun. 56 (Suppl. l_1), S1–S17. https://doi.org/10.1111/j.1460-2466.2006.00280.x.

Green, M.C., Brock, T.C., 2000. The role of transportation in the persuasiveness of public narratives. J. Pers. Soc. Psychol. 79 (5), 701–721.

Green, M.C., 2004. Transportation into narrative worlds: the role of prior knowledge and perceived realism, discourse processes. Discourse Process 38 (2), 247–266. https://doi.org/10.1207/s15326950dp3802_5.

Transportation theory applied to health and risk messaging. In: Green, M.C., Fitzgerald, K. (Eds.), 2017. Oxford Research Encyclopedia of Communication. Oxford University Press.

Gillig, T.K., Rosenthal, E.L., Murphy, S.T., Folb, K.L., 2017. More than a media moment: the influence of televised storylines on viewers' attitudes toward transgender people and policies. Sex. Roles 78 (7–8), 515–527. https://doi.org/10.1007/s11199-017-0816-1.

Gross, D.A., 2020. "It Spreads like Wildfire": the coronavirus comes to New York's prisons. The New Yorker. https://www.newyorker.com/news/news-desk/it-spreads-like-wildfire-covid-19-comes-to-new-yorks-prisons.

Gupta, K., Ripberger, J., Wehde, W., 2016. Advocacy group messaging on social media: using the narrative policy framework to study twitter messages about nuclear energy policy in the United States. Pol. Stud. J. 46 (1), 119–136. https://doi.org/10.1111/psj.12176.

Hamby, A., Brinberg, D., Jaccard, J., 2016. A conceptual framework of narrative persuasion. J. Media Psychol. 30 (3), 113–124.

Heffner, J., Vives, M.-L., FeldmanHall, O., 2021. Emotional responses to prosocial messages increase willingness to self-isolate during the COVID-19 pandemic. Pers. Indiv. Differ. 170, 110420. https://doi.org/10.1016/j.paid.2020.110420.

Hornik, R., Volinsky, A.C., Mannis, S., Gibson, L.A., Brennan, E., Lee, S.J., Tan, A.S.L., 2019. Validating the Hornik & Woolf approach to choosing media campaign themes: do promising beliefs predict behavior change in a longitudinal study? Commun. Methods Meas. 13 (1), 60–68. https://doi.org/10.1080/19312458.2018.1515902.

Hornik, R., Woolf, K.D., 1999. Using cross-sectional surveys to plan message strategies. Soc. Market. Q. 5 (2), 34–41. https://doi.org/10.1080/15245004.1999.9961044.

Johnson, D.R., 2012. Transportation into a story increases empathy, prosocial behavior, and perceptual bias toward fearful expressions. Pers. Indiv. Differ. 52 (2), 150–155. https://doi.org/10.1016/j.paid.2011.10.005.

Kagitcibasi, C., 1997. Individualism and collectivism. Handbook of Cross-Cultural Psychology 3, 1–49.

Kim, J.-E., Johnson, K.K.P., 2013. The impact of moral emotions on cause-related marketing campaigns: a cross-cultural examination. J. Bus. Ethics 112 (1), 79–90. https://doi.org/10.1007/s10551-012-1233-6.

Kowalski, R.M., Black, K.J., 2021. Protection motivation and the COVID-19 virus. Health Commun. 36 (1), 15–22. https://doi.org/10.1080/10410236.2020.1847448.

Kuznetsova, A., Brockhoff, P.B., Christensen, R.H.B., Jensen, S.P., 2019. Package 'lmerTest': tests in linear mixed effects models. J. Stat. Software 82 (Issue 13). https://doi.org/10.18637/jss.v082.i13.

Maliniak, D., Powers, R., Walter, B.F., 2013. The gender citation gap in international relations. Int. Organ. 67 (4), 889–922.

Mann, B., 2020. Nurses Left Vulnerable to COVID-19: "We're Not Martyrs Sacrificing Our Lives'. NPR. https://www.npr.org/2020/05/02/848997142/nurses-left-vulnerable-to-covid-19-we-re-not-martyrs-sacrificing-our-lives.

McAfee, T., Davis, K.C., Alexander, R.L., Pechacek, T.F., Bunnell, R., 2013. Effect of the first federally funded US antismoking national media campaign. Lancet 382 (9909), 2003–2011. https://doi.org/10.1016/S0140-6736(13)61686-4.

Mitchell, S.M., Lange, S., Brus, H., 2013. Gendered citation patterns in international relations journals. Int. Stud. Perspect. 14 (4), 485–492. https://doi.org/10.1111/insp.12026.

Murphy, S.T., Frank, L.B., Chatterjee, J.S., Baezconde-Garbanati, L., 2013. Narrative versus nonnarrative: the role of identification, transportation, and emotion in reducing health disparities. J. Commun. 63 (1), 116–137. https://doi.org/10.1111/jcom.12007.

Niederdeppe, J., Bu, Q.L., Borah, P., Kindig, D.A., Robert, S.A., 2008. Message design strategies to raise public awareness of social determinants of health and population health disparities. Milbank Q. 86 (3), 481–513.

Office for the Coordination of Humanitarian Affairs, 2020. Covid-19: How to Include Marginalized and Vulnerable People in Risk Communication and Community Engagement. https://reliefweb.int/sites/reliefweb.int/files/resources/COVID-19_CommunityEngagement_130320.pdf.

O'Keefe, D.J., 2015. Message generalizations that support evidence-based persuasive message design : specifying the evidentiary requirements. Health Commun. 30 (2), 106–113.

Oliver, M.B., Dillard, J.P., Bae, K., Tamul, D.J., 2012. The effect of narrative news format on empathy for stigmatized groups. Journal. Mass Commun. Q. 89 (2), 205–224. https://doi.org/10.1177/1077699012439020.

Pei, R., Cosme, D., Andrews, M.E., Mattan, B.D., Falk, E.B., 2020. Cultural Influence on COVID-19 Cognitions and Growth Speed: the Role of Cultural Collectivism. https://doi.org/10.31234/osf.io/fet6z.

Pfattheicher, S., Nockur, L., Böhm, R., Sassenrath, C., Petersen, M.B., 2020. The emotional path to action: empathy promotes physical distancing and wearing of face masks during the COVID-19 pandemic. Psychol. Sci. 31 (11), 1363–1373. https://doi.org/10.1177/0956797620964422.

Roberts, S.O., Bareket-Shavit, C., Dollins, F.A., Goldie, P.D., Mortenson, E., 2020. Racial inequality in psychological research: trends of the past and recommendations for the future. Perspect. Psychol. Sci.: A Journal of the Association for Psychological Science 15 (6), 1295–1309.

Sharma, A., Kapoor, P.S., 2021. Message Sharing and Verification Behaviour on Social Media during the COVID-19 Pandemic: A Study in the Context of India and the USA. https://doi.org/10.1108/OIR-07-2020-0282. Online Information Review.

Scholz, C., Jovanova, M., Baek, E.C., Falk, E.B., 2020. Media content sharing as a value-based decision. Current Opinion in Psychology 31, 83–88. https://doi.org/10.1016/j.copsyc.2019.08.004.

Smith, D., Schlaepfer, P., Major, K., Dyble, M., Page, A.E., Thompson, J., et al., 2017. Cooperation and the evolution of hunter-gatherer storytelling. Nat. Commun. 8 (1), 1–9.

Tingley, D., Yamamoto, T., Hirose, K., Keele, L., Imai, K., 2014. Mediation: R package for causal mediation analysis. J. Stat. Software 59 (5), 1–38.

Vandello, J.A., Cohen, D., 1999. Patterns of individualism and collectivism across the United States. J. Pers. Soc. Psychol. 77 (2), 279.

Van Laer, T., Ruyter, K.D., Visconti, L.M., Wetzels, M., 2014. The extended transportation-imagery model: a meta-analysis of the antecedents and consequences of consumers' narrative transportation. J. Consum. Res. 40 (5), 797–817. https://doi.org/10.1086/673383.

Västfjäll, D., Slovic, P., Mayorga, M., Peters, E., 2014. Compassion fade: affect and charity are greatest for a single child in need. PLoS One 9 (6). https://doi.org/10.1371/journal.pone.0100115.

Webb, T.L., Sheeran, P., 2006. Does changing behavioral intentions engender behavior change? A meta-analysis of the experimental evidence. Psychol. Bull. 132 (2), 249–268. https://doi.org/10.1037/0033-2909.132.2.249.

Westfall, J., 2016. PANGEA: Power ANalysis for GEneral Anova Designs. Jake Westfall. http://jakewestfall.org/publications/pangea.pdf.

World Health Organization, 2020. Survey Tool and Guidance Rapid, Simple, Flexible Behavioural Insights on Covid-19. WHO Regional Office for Europe.

Ye, W., Li, Q., Yu, S., 2021. Persuasive effects of message framing and narrative format on promoting COVID-19 vaccination: a study on Chinese college students. Int. J. Environ. Res. Publ. Health 18 (18), 9485. https://doi.org/10.3390/ijerph18189485.