A Randomized Controlled Trial Testing the Efficacy of Humor and Framing in Messaging to Correct Misperceptions About COVID-19 Vaccines

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Abstract: More than one million people in the United States have died from COVID-19-related complications.[1] Despite vaccine availability, as of June 2022, approximately 9% of the eligible adult population hadn't received a single dose of the COVID vaccine, and in some states rates of having gotten at least one dose are as low as 71%.[1] The unvaccinated and under-vaccinated remain more susceptible to severe outcomes from COVID, including hospitalization and death.[2] Vaccine hesitancy is partially driven by misperceptions, including the belief that they are not safe, and not effective.[3] Identifying strategies to correct this misperception may potentially increase vaccine uptake. Correcting misperceptions, however, is not a straightforward process, and often fails due to the Continued Influence Effect (CIE). The CIE occurs when misinformation in memory continues to influence inferences and decisions even after correction, which presents a barrier to misperception correction.[4] Additional communication strategies can also be considered. As Conservatives have lower rates of vaccination,[5] framing the consequence of vaccination to resonate with conservative values like freedom (i.e. If you get vaccinated, you'll have the freedom to engage in social activities) and economic recovery (i.e. If you get vaccinated, businesses can stay open and Americans can keep working and supporting their families)[6,7] has the potential to increase message efficacy and reduce reactance by aligning the message with the readers values.[8,9] Likewise, there is evidence that humor can improve message efficacy. Humor can increase attention, message liking, and can produce positive affect that may reduce reactance and motivate effortful message processing.[10–12]

Objectives: This study tests the efficacy of adding a freedom consequent frame, an economic recovery consequent frame, or humor to a coherent corrective message in a randomized controlled experiment to compare their efficacy to a message that is coherent, but does not include a frame or humor. Outcomes include beliefs that FDA-authorized vaccines are safe and effective (e.g. an indicator of message recall and acceptance due to surface updating) and inferential beliefs about the safety and effectiveness of other vaccines that either did or did not received FDA authorization. These related concepts test whether participants updated their mental models of FDA review and can use these updated models to make inferences when asked about the safety and effectiveness of other vaccines (e.g. an indicator of updated conceptual understanding via global updating).

Background: The persistence of misperception has been noted in other disciplines, including cognitive psychology and political science. Many experiments in these fields have demonstrated that exposure to corrective information can elicit correct recall of the corrective information, however, misinformation is often still used to make inferences about related topics, which has come to be known as the Continued Influence Effect (CIE).[4,13,14] It has been theorized that, when presented with corrective messaging, individuals may engage in 'surface updating' (the individual updates only the specific misperception addressed in the message), but fail to engage in 'global updating' (fully integrating information into beliefs so it can be applied via inferential reasoning and behavioral decisions).[4,13,14] Thus, it is possible that after exposure to corrective information about nicotine, an individual could accurately state that nicotine is not the main cancer-causing constituent in tobacco (surface updating), yet fail to accurately characterize the relative harm of a non-combustible nicotine-containing product when compared to a combustible cigarette if that product was not discussed in the message (global updating).[15] This study combines typical corrective strategies with framing and humor to assess effects on misperceptions about the COVID vaccines,

Study Procedures

Participants were recruited online using Amazon Mechanical Turk. After clicking on the tasks, participants first consented to answering questions on a screening questionnaire to determine eligibility. Eligible participants then read an informed consent for the experiment. After agreeing to participate, participants were asked questions about their sociodemographic characteristics, beliefs, behaviors, and

behavioral intentions about the COVID vaccines. Participants were then randomized to view one of four messages using a 1:1:1:1 ratio using the "evenly present elements" option in Qualtrics. All messages had similar information about the COVID vaccines safety and effectiveness. One message had an economic recovery frame, one had a freedom frame, one included humor, and the control didn't include a frame or humor. As randomization was conducted in Qualtrics, both experimenters and participants were blinded to randomization. After message exposure, participants answered questions about the message and their beliefs and intentions to get a COVID vaccine. The survey took between 10-15 mins to complete. The study protocol was approved by the Institutional Review Board at the Johns Hopkins Bloomberg School of Public Health on August 4, 2021 (IRB00015120). No participants were removed while the study was ongoing, but responses that showed signs of being repeat responders or bots (according to metrics from survey platform Qualtrics) were later dropped from analysis.

Inclusion Criteria

1. 21 years of age or older
2. Not yet received a COVID vaccine
3. Not completed the cognitive interview during message development
4. Rated agreement with the following statement as less than or equal to 50 out of 100: "The FDA has only authorized COVID vaccines that are safe and effective"

Exclusion Criteria

1. Under the age of 21.
2. Had already received a COVID vaccine
3. Had completed a cognitive interview during message development.
4. Rated agreement with the following statement as greater than 50 out of 100: "The FDA has only authorized COVID vaccines that are safe and effective"

Study Statistics

a. Primary outcome variable

1. Change in Accuracy of the Belief That FDA Authorized COVID-19 Vaccines Are Safe and Effective
2. Accuracy of Inferential Belief That the FDA Authorized Flu Vaccine is Safe and Effective
3. Accuracy of Inferential Belief That RexVax is Safe and Effective
4. Change in Intention to Get a COVID-19 Vaccine

Statistical plan: Stata version 15 was used for all statistical analyses. Participant characteristics are reported as sample proportions and counts for categorical variables and median and interquartile range for continuous variables due to skewed distributions. Fisher's exact tests were used to assess balancing across conditions by categorical variables to account for the small sample size (e.g. cell sizes with $n<10$).[85] Non-parametric Kruskal-Wallis tests were used to assess differences in continuous variables to assess balancing by condition. Fisher's exact test was also used to assess differences in response to manipulation check questions by condition. Kruskal-Wallis tests were used to assess differences in perceived message credibility and campaign targeted knowledge by condition. Repeated measures t-tests were used to assess the significance of an overall unadjusted change in belief that COVID vaccines are safe and effective between pre and post message exposure (H1). ANCOVAs were used to assess if there was a difference by message condition and 1. Accuracy of belief that FDA-authorized COVID vaccines are safe and effective (H2), 2. Accuracy of inferential beliefs about the safety and effectiveness of FDA-authorized flu vaccines (H3), and 3. Accuracy of inferential beliefs about the safety and effectiveness of ResVax, which did not receive FDA authorization (H4). Baseline belief that the COVID vaccines were safe and effective, race, sex, geographic region, and political affiliation were a priori included as covariates in ANCOVA 1. Race, highest educational attainment, sex, geographic region, and political affiliation were included as a priori covariates in ANCOVAs 2 and 3. Covariates were selected based on their association with vaccine

perceptions in extant literature. Message recall was not included in ANCOVAs because most participants had perfect recall, there were no differences observed in message recall by condition, and including of recall in ANCOVAs did not improve model fit. When condition was significant at $p<.05$, pairwise comparisons comparing each experimental condition (economic recovery, humor, freedom), to the control condition were made using Sidak's adjustment, which is slightly less conservative than Bonferroni and appropriate to control the type I error rate during pairwise comparisons after an ANCOVA when the sample size between groups is not equal.

Risks

a. Risks were minimal and included boredom of discomfort from answering survey questions.
b. To mitigate this risk, participants read in the informed consent that they were free to skip any questions they didn't want to answer or quit their participation at any time.
c. There were no unanticipated problems or deviations during data collection.

Benefits

a. Participants did not participate directly from being in the study. Findings can help to inform what kind of messaging might be helpful to adults who were hesitant to get the COVID vaccine to help correct misperceptions and increase intention to get vaccinated.

Payment and Remuneration

a. Participants were paid $5.00 for completing the survey. Participants who were eligible but did not fully complete the survey were still paid.

Costs

a. No costs were associated with participation.

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