Replication: Experimental evidence that changing beliefs about mask efficacy and social norms increase mask wearing for COVID-19 risk reduction: Results from the United States and Italy

Bokemper, S. E., Cucciniello, M., Rotesi, T., Pin, P., Malik, A. A., Willebrand, K., ... & Melegaro, A. (2021). Experimental evidence that changing beliefs about mask efficacy and social norms increase mask wearing for COVID-19 risk reduction: Results from the United States and Italy. *PloS one*, *16*(10), e0258282.

Introduction

During COVID-19, governments and public health officials highly advocated for the public to wear masks during the pandemic, including in the United States. The decision to wear a mask in public is likely affected by both beliefs about its efficacy and the prevalence of the behavior. Greater mask use in the community may encourage others to follow this norm, but it also creates an incentive for individuals to free ride on the protection afforded to them by others. A past study conducted two vignette-based experiments in the United States (n = 3,100) and Italy (n = 2,659) to examine the causal relationship between beliefs, social norms, and reported intentions to engage in mask promoting behavior.

The original experimental study in both the United States and Italy have found that providing information about how masks protect others increases the likelihood that someone would wear a mask or encourage others to do so in the United States, but not in Italy. Based on the same experimental finding, however, there is no effect of providing information about how masks protect the wearer in either country.

In my replication exercise, I will only be analysing data from the United States. This replication focuses on the influence of beliefs about mask efficacy in increasing mask wearing in a real-list situation during COVID-19. The respondents were randomised into two treatment groups who were each given different vignettes about how masks stop the spread of COVID-19 virus from being inhaled by both healthy and sick people.

Variables

The independent variables in this replication involve the two treatment groups as the independent variables, as well as the outcome variable. The two treatment groups are the Mask Efficacy Treatments. It contains results from a survey after reading a vignette explaining how masks stop some percentage of COVID-19 virus particles in the air from being inhaled by oneself (Treatment 1 - “Masks Protect You”) and about how masks stop COVID-19 particles from being inhaled by other people (Treatment 2 - “Masks Protect Others”).

The following is the text for Treatment 1: “Scientists have shown that wearing a face covering over your mouth and nose substantially reduces your risk of COVID-19 infection by decreasing the amount of virus that you inhale into your nasal passages and lungs.”. Furthermore, the following is the text for Treatment 2: “Scientists have shown that wearing a face covering over your mouth and nose substantially reduces your risk of spreading COVID-19 to others by

decreasing the amount of virus that makes it into the air where it can infect other people." Emphasis on the differences between the treatments are underlined.

After being given the treatments, respondents were asked about their level of agreement with two statements about how masks might work to slow the spread of COVID-19. The statements read: "A mask reduces the risk that sick people spread COVID-19 into the air around them" and "A mask reduces the risk that healthy people get COVID-19 from the air around them". The former measured the belief that masks protect others from contracting COVID-19 and the latter measured the belief that masks protect the wearer from getting COVID-19 from those around them. Respondents reported their level of agreement on a five-point scale with anchors of "Strongly disagree" and "Strongly agree". Answers of the first statement were coded as mskblfs_prtctothers and binary_mskblfs_prtctothers (for the binary version of the data). Answers of the second statement were coded as mskblfs_prtctyou and binary_mskblfs_prtctyou (for the binary version of the data).

After the treatments, respondents were given behavioural scenarios regarding their OWN masking behaviour (what respondents would do if they had forgotten a mask), as well as scenarios regarding what they would do if someone else was not wearing their mask properly (labelled OTHER).

The first outcome variable is coded as pool_self (and pool_self_binary for the binary version of the data). This refers to the pooled outcome data of mask wearing behaviour of the individual selves (which refers to OWN scenario outcome). The four response options were variations of: 1) continue the activity as normal, 2) continue the activity, but keep your distance from others, 3) abandon the activity or 4) go retrieve their mask and then proceed with the activity.The second outcome variable is coded as pool_other (and pool_other_binary for the binary version of the data). This refers to the pooled outcome data of behavior toward the person who is not correctly wearing a mask (labelled as OTHERS scenario outcome). The four response options were variations of: 1) continue the activity as normal, 2) continue the activity, but keep your distance, 3) abandon the activity, and 4) ask the person who is not wearing their mask properly to adjust it so it is covering their mouth and nose.

These scales that were used to measure this are called the Self Action Scale. The original study also measures an evaluation of a THIRD PARTY who was not wearing their mask properly, but this replication will only focus on OWN and OTHERS mask wearing behaviour.

Furthermore, at the vignette level, the original experiment includes multiple real-life scenarios, which include a scenario at an ATM, PARK, and MEETING. However, this replication will only analyse the pooled scenario data as the outcome variables, which is the combination of results from all types of scenarios, and not analyse them individually.

Replication Process

After reevaluating my replication, I was able to produce very similar numbers to the author's

original results. I changed two things with my replication: 1) I switched the independent variable from mskblfs_prtctyou into T_mask_protectyou, and 2) I changed the way I coded the OLS regression. Once I applied these changes, my replication results became very similar to the original results, with some minor differences.

The covariates are age (years), gender, household income, ethnicity (White, Black, Asian, Other), education, partisanship, work status, and previous flu vaccination. In the original dataset, there are multiple variables that were labeled as the same covariates, and the original study did not include information about the coding for these variables (for example, the variable gender had lucid_gender, gender1, gender2, gender1a, gender1b, gender2a). In one of the supplemental files that included the cross tabulation of results (S3 Appendix. Covaiates and text of pre-treatment mask wearing items), they mentioned “See Supplemental Information S-2 for control variable coding”. However, I could not find such information in that file, so I did not include the covariates in the code.

CROSS TABULATION OF RESULTS

Table 1: RESULTS FOR POOLED OWN SCENARIO OUTCOME (the results of the original experiment are in figure 2: Panel A and Panel B and S3 Appendix)

	Pooled OWN scenario outcome			
	Original	Replication	Original (Binary)	Replication (Binary)
Masks Protect You (Treatment 1)	0.027 [0.048]	0.020 [0.050]	0.005 [0.022]	0.003 [0.022]
Masks Protect Others (Treatment 2)	0.139 [0.047]***	0.137 [0.049]**	0.057 [0.021]***	0.057 [0.022]**

Table 2: RESULTS FOR POOLED OTHERS SCENARIO OUTCOME (the results of original experiment are in Figure 2: Panel C and Panel D and S3 Appendix)

	Pooled OTHERS scenario outcome			
	Original	Replication	Original (Binary)	Replication (Binary)
Masks Protect You (Treatment 1)	0.037 [0.049]	0.031 [0.048]	0.004 [0.021]	0.007 [0.021]

Masks Protect Others (Treatment 2)	0.149 [0.047]***	0.145 [0.047]**	0.045 [0.021]**	0.046 [0.021]*

After applying my adjustments to my code, I found that some of my replication results are very close to the author's results, and some are exactly the same as the author's. The replication result that was exactly the same as the author's was in Table 1 for Treatment 2 for the OWN scenario outcome (binary), with a coefficient of 0.057.

I found discrepancies between my results and the author's in the rest of the results, but the differences in the coefficients are very small. For instance, in the OWN scenario outcome, the author's result for Treatment 1 was a coefficient of 0.027, and my replication's result was 0.020. These slight differences are perhaps because I did not include the covariates in the code.

Results and Discussion

The original study had found that providing information about how masks protect the wearer (Treatment 1) has no effect on OWN mask wearing behavior, whether measured using a scale (1 = Continue activity without a mask, 4 = go get a mask) or a binary outcome (1 = go get a mask, 0 = all other behavior). Interestingly, the replication found that information about how masks protect the wearer does have a small but significant effect on OWN mask wearing behaviour, both when measured using a scale or a binary outcome. The replication found that information about how masks protect the wearer increases willingness to get a mask by 18.1%.

Furthermore, the original study had found that providing information about how masks protect others does have a significant effect on OWN mask wearing behaviour, both when measured using a scale and binary outcome, in which that information increases likelihood of mask wearing behaviour. In the original experimental study in the US, focusing on the binary measure of mask wearing, the Masks Protect Others intervention increases willingness to get a mask by 5.7% (95% C.I. = 1.4% to 9.7%, $p < .01$).

In terms of OTHERS (behavior toward the person who is not correctly wearing a mask), the original experiment found that providing information about how masks protect you has small and statistically insignificant effects. However, the replication found a statistically significant effect of Treatment 1 (information about how masks protect you) on the outcome (increased willingness to ask another to fix their mask) with a coefficient of 1.089.

Furthermore, the original experiment also found that providing information about how masks protect others increases both outcomes in the United States. The original study had found that providing information about how masks protect the wearer (Treatment 1) has no effect on behaviour towards OTHERS. However, the original study had found that providing information about how masks protect others (Treatment 2) does have a significant effect on OTHERS mask wearing behaviour, both when measured using a scale and binary outcome, in which that

information increases the willingness to ask another person to fix their mask. The original study found that Treatment 2 increases that willingness by 4.5 percentage points (95% C.I. = 0.3% to 8.5%, $p < .05$). The replication also found similar results, where Treatment 2 increases the willingness to ask another person to fix their mask by 15.5 percentage points (based on the dichotomous measurement). Even though the size of the effect is different between the original experiment and the replication, the trends shown are still quite similar.

These results imply that informational messages that emphasized taking action (in this case, masking behavior during COVID-19) to keep “your community” safe or to “protect others” increased mask wearing intentions in the United States, which is a phenomenon that has been observed in previous studies (Capraro & Barcelo, 2020). Despite having some similar trends between the original data and the replication data, there are still noticeable differences. These could be due to the other variables that were omitted from this replication, such as demographic covariates, or not including other scenarios that were shown in the original study as well.

Link to OSF Code: https://osf.io/kn86t
Link to Replicaton Dataset:
https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/NZYWS5