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Face-Saving Strategies Increase Self-Reported Non-Compliance with COVID-19 Preventive Measures: Experimental Evidence from 12 Countries

Abstract

Studies of citizens' compliance with COVID-19 preventive measures routinely rely on survey data. While essential, public health restrictions provide clear signals of what is socially desirable in this context, creating a potential source of response bias in self-reported measures of compliance. In this research, we examine whether the results of a face-saving-strategy that was recently proposed by Daoust et al. (2020) to loosen this constraint are generalizable across twelve countries, and whether the treatment effect varies across subgroups. Our findings show that the face-saving strategy is a very useful tool in every country included, increasing respondents' proclivity to report non-compliance by 9 to 16 percentage points. This effect holds for different subgroups based on gender, age and education. We conclude that the inclusion of this strategy should be the new standard for survey research that aims to provide crucial data on the current pandemic.

Keywords: COVID-19; Public health; Pandemic; Compliance; Measurement; Social desirability bias; Experimental method

In the fight against the spread of the COVID-19 virus, research that aims to explain compliance with public health preventive measures is of utmost importance. The severity of virus activity is, in no small part, a function of citizens' behaviours (Chan et al. 2020; Haushofer & Metcalf 2020). Therefore, much research has focused on understanding who complies, and what are the socio-demographic and attitudinal correlates of (non)compliance. Answering these questions is critical, pushing governments and public health agencies to gather reliable data on compliance with preventive measures (e.g. social distancing, the use of face masks, etc.). A great deal of this data comes from survey research.

The need for high quality data on compliance with public health measures has led some researchers to investigate the reliability of survey data more closely. In particular, several studies have examined the possibility that public health restrictions in the pandemic context have created common social norms for behaviours that are valued (e.g. social distancing). In turn, these norms create an incentive for respondents to under-report behaviours that are proscribed (e.g. social gatherings). The resulting social desirability bias can considerably affect the quality of data used by policy-makers and public health officials in their decision-making. Both Larsen et al. (2020) and Munzert and Selb (2020) considered the possibility that citizens' reported compliance with public health measures was affected by social desirability bias. These two studies relied on a list experiment approach (e.g., unmatched item count technique). Reassuringly, they failed to detect social desirability in the self-reported behaviour of Danish (Larsen et al. 2020) and German (Munzert and Selb 2020) citizens. Findings from these list experiments, however, stand in contrast to the results of a recent study by Daoust et al. (2020), which tested different "face-saving strategies" designed to loosen the social norm of compliance with public health measures in the

context of three surveys conducted in Canada. The goal was to reduce social desirability in respondents' answers.

When treated with a short preamble combined with guilty-free answer choices, experimental respondents in the Daoust et al. (2020) study were substantially more likely than untreated respondents to report non-compliant behaviour in the context of the COVID-19 pandemic. This suggests there is a social desirability bias in citizens' self-reported behaviour when no face-saving option is provided. While promising, these results are based on a single country, i.e. Canada. We do not know how effective the strategy is beyond the Canadian case. The question of generalizability is particularly important given that the list experimental approaches used in Denmark and Germany showed no signs of social desirability.

In this research, we extend the most effective face-saving strategy identified by Daoust et al. (2020) to twelve countries. Doing so, we examine whether results are generalizable beyond Canada. In addition, we test whether the impact of the face-saving answer option is homogenous across different subsets of the population to assess potential differentiated effects conditional on individual characteristics (Barari et al. 2020; Brouard et al. 2020). To preview our results, we show that the face-saving strategy is a very useful tool in every country examined, increasing respondents' proclivity to report non-compliance by 9 to 16 percentage points. This effect holds for different subgroups based on gender, age and education. We conclude that this method should become the new standard for survey research of citizens' compliance with COVID-19 preventive measures, ultimately providing higher-quality data to governments and public health agencies.

Measuring citizens' compliance with COVID-19 preventive measures

Social desirability bias has been a problem in survey research well before the COVID-19 pandemic and researchers have tackled the issue in several ways. This work suggests that survey mode is an important factor, as the presence of a live interviewer can create greater incentives for respondents to provide more socially desirable answers. A meta-analysis on the topic suggests that an online mode is the best way to allow people to report undesirable behaviour (Gnambs and Kaspar 2014). But even with online surveys, there can still be social desirability bias. Survey researchers are therefore interested in developing additional ways and methodological tools to reduce social desirability and obtain more accurate estimates of undesirable behaviour (see for example Becher et al. 2020). Focusing on the current pandemic context, Larsen et al. (2020) and Munzert and Selb (2020) both used an unmatched item count technique to conclude that there is little evidence of social desirability bias within their Danish and German samples. However, these results contrast sharply with Daoust et al. (2020) who develop the "face-saving" strategy as a methodological tool to provide better data on citizen compliance with COVID-19 public health measures.

The objective of the face-saving strategy is to reduce social desirability in respondents' answers by adding a (short) preamble and one or more guilty-free answering options. These steps should loosen the norm around a desirable response and make it more acceptable for respondents to admit non-compliance with the desirable outcome. Such an approach has been applied to topics such as voter turnout (Morin-Chassé et al. 2017) where there is a clear norm that voting is the right thing to do, and recently to the COVID-19 pandemic by Daoust et al. (2020). This latter work showed that face-saving strategies can increase the proportion of citizens who self-report non-compliance with a range of public health preventive measures in Canada. They argue that this increase in self-

reported non-compliance is a consequence of reduced social desirability. They substantiate this claim by showing that a similar increase in self-reported non-compliance is not observed when the same face-saving strategy is applied to a series of placebo behaviours that are not prohibited (e.g., grocery shopping).

While promising, the results from Daoust et al. (2020) suffer from a key limitation: Their focus on a single context – the Canadian case. In this paper, we address this issue by implementing the experimental approach from Daoust et al. (2020) in twelve different countries. By doing so, we can ascertain whether results are specific to a single context and time period, or whether the effectiveness of a face-saving answer option to reduce social desirability in self-reported compliance with public health measures applies more generally. In the next section, we detail our data and how we implemented the face-saving strategy.

Data and Indicators

We ran a face-saving experiment in twelve countries: Australia, Austria, Brazil, France, Germany, Italy, New Zealand, Poland, Spain, Sweden, the United Kingdom and the United States. The online surveys were conducted by three different data collection firms: IPSOS (for all countries except Australia, United States and Spain), CSA (for Australia and the United States) and Netquest (Spain). While it does not entail major differences, having different firms involved in data collection reduces the risk of bias due to potential "house effects." Data collection occurred in mid- June 2020 within a period of a few days (maximum five), producing a nationally representative sample of about 1,000 respondents in each country. Countries included in the study experienced different levels of infection and death rates (Bosancianu et al. 2020) ranging from a low in Australia and New-Zealand (with less than .5 deaths per 100 000 inhabitants) to a high

experienced in the United Kingdom (with more than 59 deaths per 100 000 inhabitants). Although the countries in our sample were similarly influenced by public health guidelines established by global health authorities, the timing, stringency and components of public health measures adopted to combat the pandemic also strongly varied from Sweden (the least stringent) to New Zealand (the most stringent). Moreover, the countries in our sample also reflect different levels of politicization, with relatively more politicization of the pandemic response in Brazil and the USA than in other countries. Table A.1 of the Supplementary Material lists the exact dates of data collection in each country, as well as the number of observations. Table A.2 shows the population per country and the death rates (per 100 000 inhabitants) as of June 15th.

Here, we make use of the most effective face-saving strategy identified by Daoust et al. (2020), which is also the strategy they recommend for future work (their Study 3). Extending this work to other countries, half of each national sample was randomly allocated a direct question while the other half received the face-saving treatment. The direct question was: "Have you done any of the following activities in the last week?" followed by a set of four items and yes/no answer choices.[1] The face-saving question preamble was:

> "Some people have altered their behaviour since the beginning of the pandemic, while others have continued to pursue various activities. Some may also want to change their behaviour but cannot do so for different reasons. Have you done any of the following activities in the last week?"

Respondents in the treatment group received the answer options yes/occasionally/only when necessary/no. The first three answer choices indicated (and were coded as) non-compliance with

[1] Respondents could skip the question. Less than 0.5% did so in every country.

the items. Of these three options, 'occasionally' and 'only when necessary' were the guilty-free answer choices. The four items, displayed in a random order, were:

- Go shopping or take public transportation without a face mask or taking it off during it
- Meet friends, family or colleagues greeting them by shaking hands, hugging or kissing
- Have a group of friends or family over at your place
- Participate in social activities (work, sport, religious ceremony…) without respecting physical distancing

These items refer to behaviour that is known to be crucial to minimize the spread of the disease among the population, that is, wearing a face mask and different forms of physical distancing (Chu et al. 2020; Courtemanche et al. 2020). Moreover, greeting people by shaking hands, hugging or kissing was clearly not recommended, while hosting a gathering at one's place was allowed though not without some level of risk (Center for Disease Control and Prevention 2020, see the "Hosting gatherings or cook-outs" section).

In a second step, we explore whether the effects of the treatments are heterogeneous. We consider respondents' gender (female or male), age (treated as linear, from 18 to 91), and their level of education.[2] For descriptive statistics on how much these preventive measures were respected in the twelve countries, see Figure B.1 of the Supplementary Material.[3] Descriptive statistics for gender, age and education, are reported in Appendix B of the Supplementary Material.

[2] Education was measured using different categories in each country given their different educational systems. We use a 0 to 1 "university graduate" scale in order to consistently model the effect of having obtained a university education in each country. We also provide individual analyses for each country.

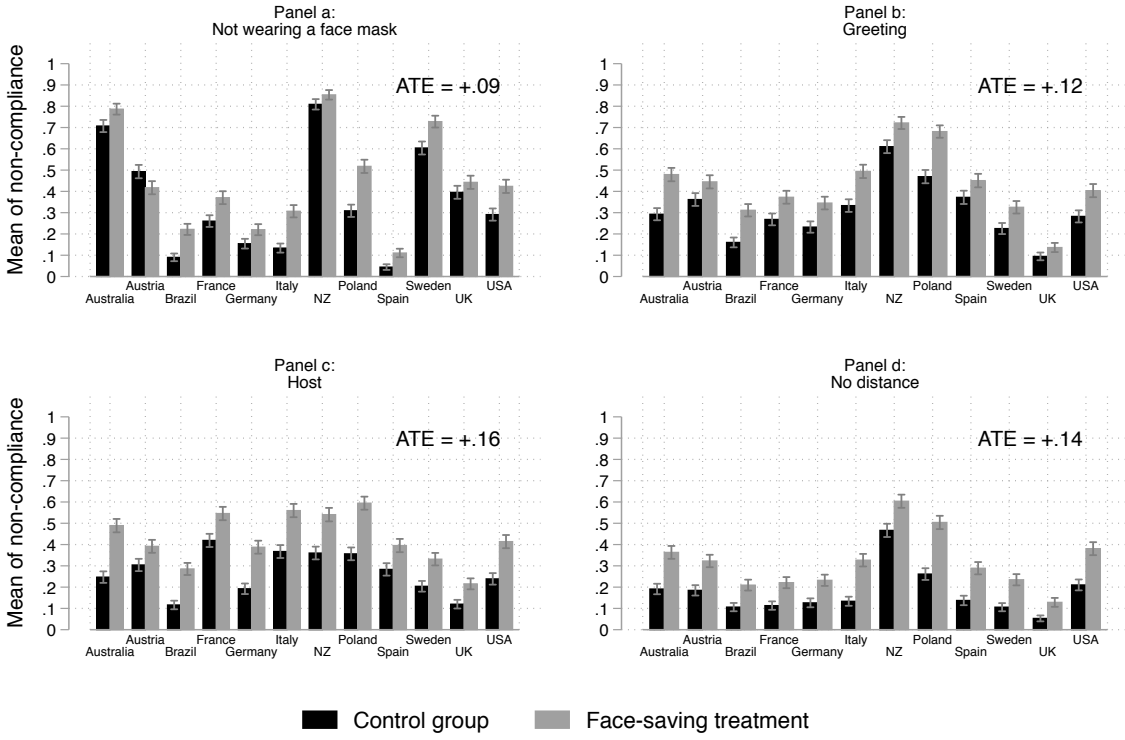
[3] Figure B.2 in the appendix distinguishes between the two guilty-free answer choices ("Occasionaly" and "Only when necessary"), showing that there are no substantial differences between them with the only two exceptions being Brazil and Spain, where non-compliers tend to prefer the "only when necessary" answer choice.

Results

Our main goal is to ascertain whether providing a face-saving answer option increases citizens' likelihood of reporting non-compliance with important public health measures like mask-wearing and social distancing. To shed light on this question, we analyze the data discretely across the four items as well as across the twelve countries. We thus provide a complete picture of the experimental effects and avoid pooling to ensure that the results are not driven by certain items or countries.

Figure 1 displays the proportion of non-compliers with the preventive measures for the control (direct question) and the treatment (face-saving) groups. The treatment group is depicted in grey, while the black bars indicate levels of reported compliance in the control condition. We also include 84% confidence intervals in the graphs to allow for the visual presentation of differences between the control and treatment group that are roughly significant at the .05 level (Macgregor-Fors & Payton 2013). With four items in twelve countries, Figure 1 plots a total of 48 effects of interest.

Figure 1. Non-compliance in the control and treatment (face-saving) groups



Note: 84% confidence intervals included. ATE=Average treatment effect.

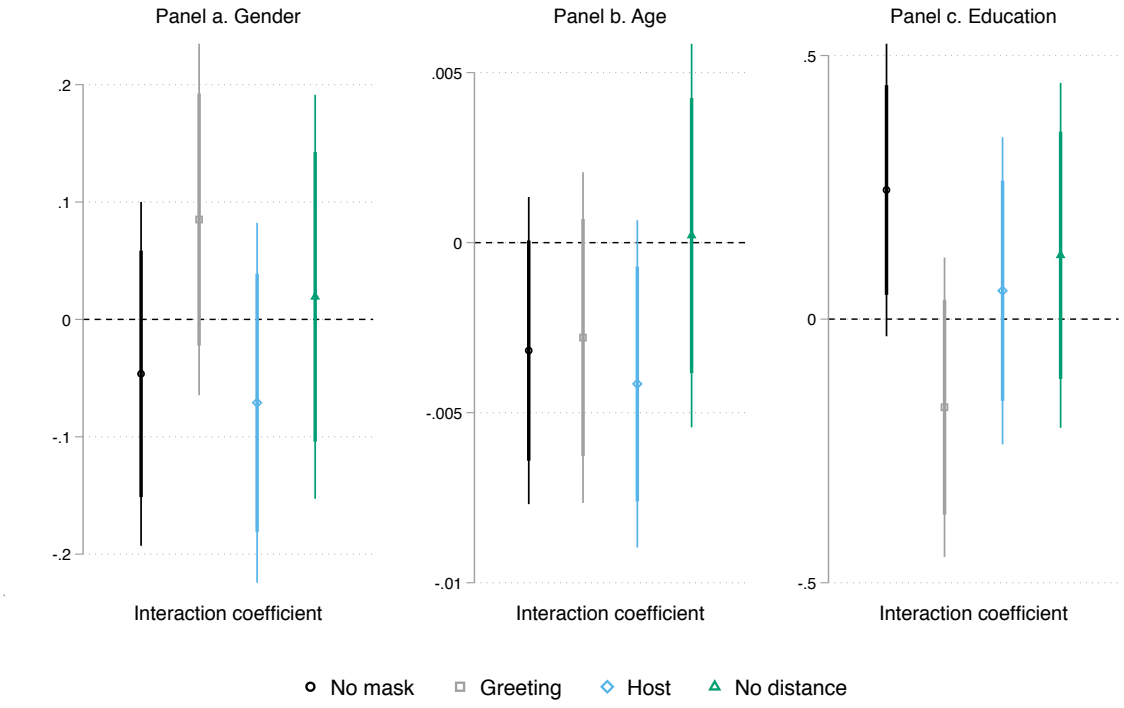
As clear from eyeballing the graphs, the means of non-compliance are higher in the face-saving group (the grey bars). More precisely, the impact of the treatment is positive in 47 out of 48 cases (the single exception being Austria for the face mask item). More substantially, the average treatment effect (averaged across all countries) of receiving the treatment ranges from 9 (the face mask) to 16 percentage points (hosting at home). Greeting people with non-recommended behaviours and not respecting physical distancing have an ATE of 12 and 14 percentage points, respectively. While we prefer to focus on the substantive effect, we note that in most cases (45 out of 47 positive effects), the differences are significant at $p<.05$ (based on two-sided t-test).

It is not impossible, however, that the impact of the face-saving treatment differs across various subgroups of the population. In an exploratory fashion, we look at the potential moderation effect

from gender, age and education, which are known to be linked to compliance with preventive measures (Barari et al. 2020; Brouard et al. 2020). For this analysis, we rely on a pooled dataset that includes the information from all countries. Figure 2 shows the average treatment effect of the treatment for different groups. The full regression outputs can be found in Table C.1-3 of Appendix C.

The results for potential heterogenous effects across subgroups based on gender, age and education are quite clear: overall there is no substantial moderation effect. The interaction coefficients never reach statistical significance at $p<.05$. The direction of the effects is perfectly split for gender, three out of four coefficients are negative for age while three are positive for education.

Figure 2. Interaction coefficients for the face-saving treatment, by gender, age and education



Note: 95% and 84% confidence intervals included. Regression outputs shown in Tables C.1-3.

All in all, we find that the face-saving strategy is effective. In total, 47 out of 48 effects are positive, and, their effects are substantive, ranging from 9 to 16 percentage points. Moreover, the impact of the treatment effect is fairly homogenous among several important subgroups of the population including gender, age and education.

We made sure that our conclusions were robust in several ways. First, although we should be cautious about randomization checks in an experimental context (Mutz et al. 2019), we verified that both control and treatment groups were similar in terms of age, gender and education.[4] Second, using weights for age, sex, education and region does not alter our conclusions. More specifically, we replicated Figure 1 and 2 for the weighted dataset (see Figure D.1 and D.2 in the Supplementary Material). One interaction reaches $p<.05$ for age but the single significant interaction for education now fails to pass that threshold. Focusing on the coefficients rather than *p*-values, our findings are very similar. Third, we made sure that our results of the tests for heterogeneous treatment effects were not driven by particular countries by estimating the effects with a model that includes country fixed effects. Figure D.3 and D.4 replicate and Table D.1-4. shows the results of this test and leads to essentially the same conclusion.

Fourth, we tackle the possibility that our results in fact are a "false positive" (Hoglinger and Jann 2018). In a nutshell, our experimental design is based on the assumption that the differences in the proportion of self-reported non-compliance between the direct and the face-saving questions are related to a reduction of incentives to report socially desirable behaviours. We are fairly confident about the validity of this assumption because we fail to conceive what other mechanism our face-

[4] The average age was identical at 47, (control v/s treatment), 52% of people the control group were women compared to 51% in the treatment and means for education were the same at .60.

saving strategy would tap. Still, we examine this possibility using a Canadian survey that was in field during the same period as the twelve surveys examined here. In this Canadian survey, we used the same face-saving strategy but with a broader battery of items, 8 instead of 4. This larger battery included behaviours that were not officially prohibited, i.e. where there should be much less social desirability. In panel A of Figure D.5., we show that there is a strong effect of the treatment (about 10 percentage points) for behaviours that the government prescribed, such as wearing a face-mask in public, and that this effect is much less important in panel B (average of about 3 percentage points) for behaviours that perhaps entail a risk, but that the government did not proscribe – such as taking public transportation or shopping for non-essential products. While we do not have these 'placebo' items for twelve countries included in the analyses, this result for Canada is reassuring and increases our confidence that the greater proportion of self-reported non-compliance in the face-saving group is not a 'false positive.'

Discussion and implications

West et al. (2020: 451) argued that "there is an urgent need to develop and evaluate interventions to promote effective enactment of these behaviours and provide a preliminary analysis to help guide this." We fully agree with the authors and tackle the issue of social desirability and its impact on reported compliance with public health measures. While the work of Daoust et al. (2020) on this topic showed a face-saving strategy is a promising approach to attenuate social desirability, we did not know whether this face-saving strategy was effective beyond Canada.

In this research, we tested the face-saving strategy using a survey experiment in twelve countries to examine the benefits of this approach. We replicated the findings of Daoust et al. (2020) and most importantly, did so in a diverse set of contexts, with different countries and political systems,

in different stages of the pandemic (deconfinement in most countries), with different levels of infections, etc. Based on four public health preventive measures related to the wearing of face masks, greetings, hosting gatherings at one's home, and social distancing, we found that the face-saving strategy increased the proportion of citizens who readily answer that they did not comply for 47 out of 48 cases. Most importantly, the effects were substantial. They ranged from 9 percentage points (the mask item) to 16 percentage points (hosting at home) and are robust to several additional tests.

There have already been major advances in the development of observational measures of citizens' behaviour (i.e. not from survey data). Among others, France has recently used cameras in its subway stations to quantify the proportion of people who wear a mask when in public transport, and several countries are developing applications to track the inter-regional movement of their residents (Olivier et al. 2020). While very useful, we cannot rely solely on behavioral data in the fight against the pandemic. First, observational measures are not available for several important preventive public health measures, as many measures cannot be examined in public, such as the respect of social distancing if one hosts a gathering at their private home. Second, even behavioral data like that obtained from cameras or tracing applications have some major drawbacks. Most importantly, this approach does not provide any other information about who complies and what makes people comply or not. For these reasons, we believe that survey research is a crucial complement to other data sources.

In summary, policy-makers and public health experts require survey data, and we should aim for data of the best possible quality. Our research confirms that using a face-saving strategy is an effective approach and is relevant to anyone who aims to provide data on citizens' compliance

with COVID-19 preventive measures. This type of data is crucial for governments and public health agencies to make enlightened decisions. Moreover, as the strategy simply implies the addition of a very short preamble and guilty-free answer choices, there are very limited additional costs involved to implement this method compared to a direct question. While replications would be welcome to strengthen the validity of the approach, we believe that our comparative research provides a firm ground for what should become the standard when measuring citizens' compliance with public health preventive measures.

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Supplementary Material

Face-Saving Strategies Increase Self-Reported Non-Compliance with COVID-19 Preventive Measures: Experimental Evidence from 12 Countries

Appendix A: Description of the samples and national contexts

Table A.1. Description of the samples

Country	Dates on the field (June)	Number of observations
Australia	15th – 19th	1,003
Austria	23rd – 27th	1,011
Brazil	23rd – 28th	1,000
France	22nd – 25th	1,006
Germany	23rd – 27th	1,004
Italy	24th – 27th	1,003
New Zealand	23rd – 28th	1,000
Poland	24th – 27th	1,014
Spain	6th – 10th	961
Sweden	23rd – 27th	1,017
United Kingdom	21st – 24th	1,014
United States	16th – 22nd	1,001
Canada*	16th – 24th	1,002

*Note. *: used for robustness checks only.*

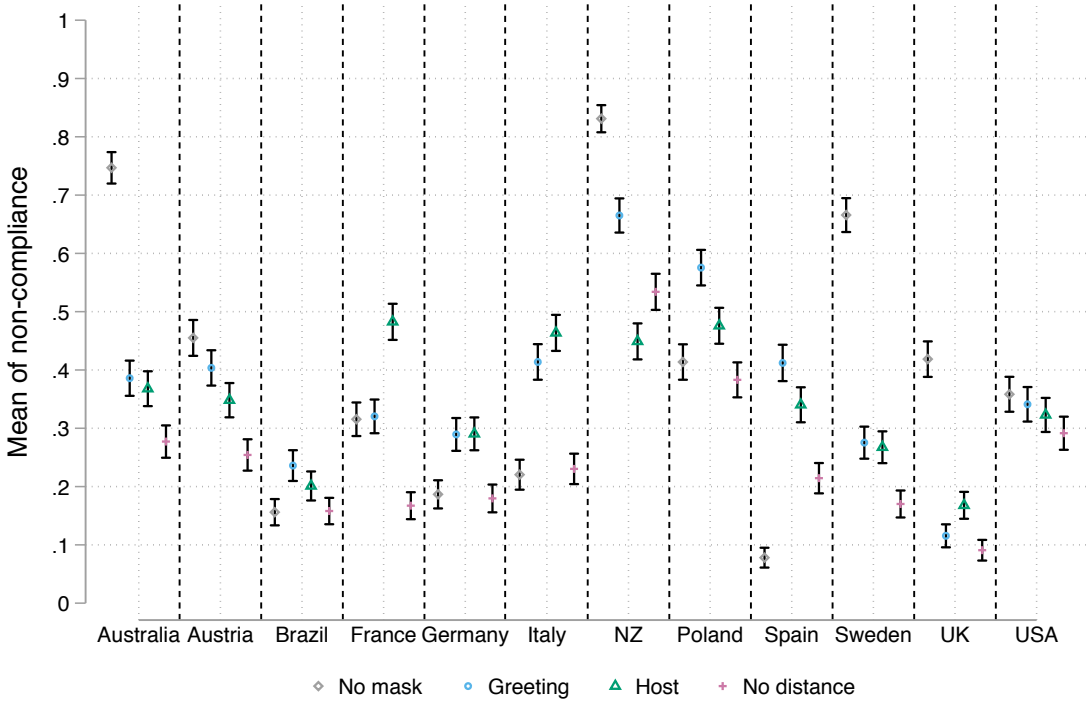
Table A.2. Population and mortality rate across countries

Country	Population (million)	COVID-19 Mortality rate per 100 000 inhabitants (June 15)
Australia	25.36	0.40
Austria	8.87	7.63
Brazil	211.05	20.82
France	67.06	43.80
Germany	83.13	10.59
Italy	60.29	57.00
New Zealand	4.91	0.44
Poland	37.97	3.30
Spain	47.07	57.64
Sweden	10.28	47.55
US	328.24	36.19
United Kingdom	66.83	58.94
Canada*	37.58	21.88

*Note: Source for the population is the World Bank and the Mortality rates and computed using John Hopkins Coronavirus Resource Center data (accessible on github). *: used for robustness checks only.*

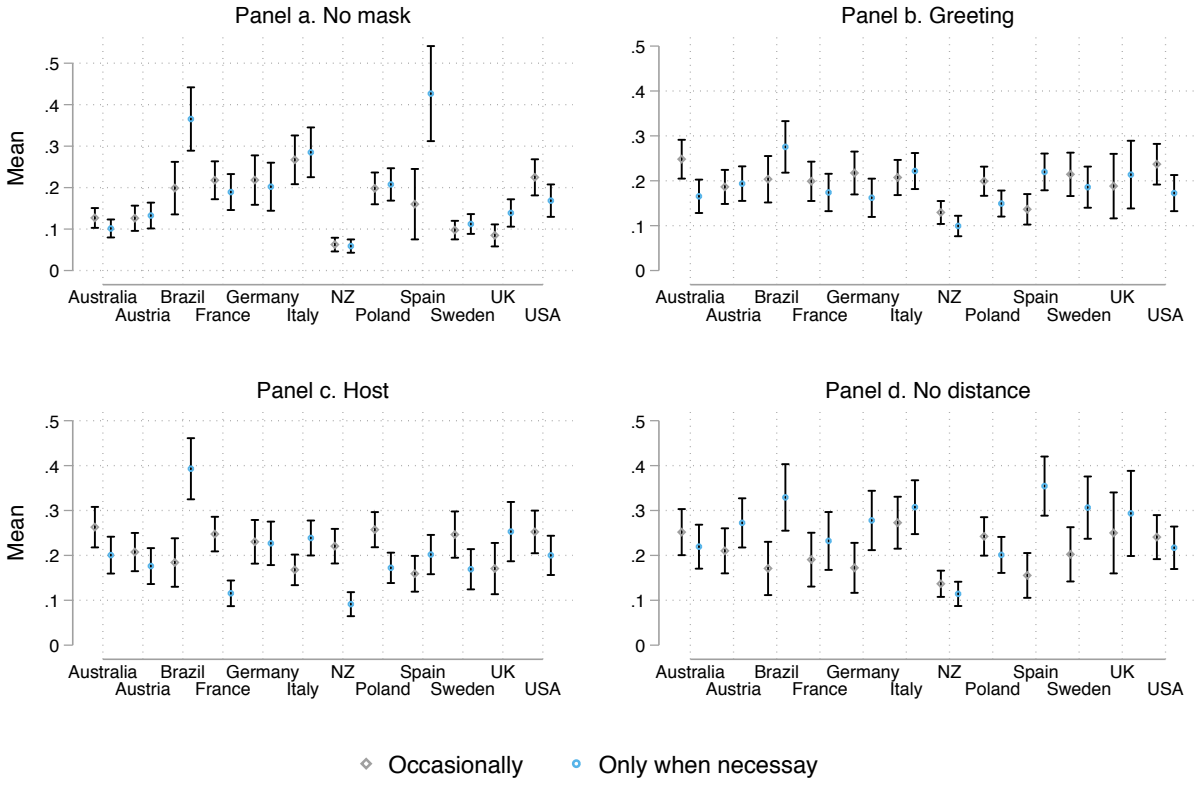
Appendix B: Descriptive statistics, by country

Figure B.1. Non-compliance with preventive measures



Note: 95% confidence included.

Figure B.2. Non-compliance, by guilty-free answer choices



Note: 95% confidence included.

Table B.1. Descriptive statistics for gender, age and education.

	Australia		Austria		Brazil		France		Germany		Italy	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Age	46.64	14.43	47.30	16.47	41.33	15.01	3.97	1.70	51.02	15.91	47.68	16.48
Gender	0.52	0.50	0.47	0.50	0.52	0.50	0.49	0.50	0.51	0.50	0.53	0.50
Education	0.46	0.27	0.49	0.22	0.63	0.15	0.72	0.31	0.62	0.28	0.57	0.19
	NZ		Poland		*Spain*		Sweden		UK		USA	
Age	48.37	15.58	43.96	15.37	48.27	17.54	51.45	16.14	46.65	16.03	46.41	17.90
Gender	0.53	0.50	0.53	0.50	0.52	0.50	0.49	0.50	0.51	0.50	0.53	0.50
education	0.55	0.26	0.71	0.26	0.54	0.19	0.65	0.34	0.61	0.29	0.58	0.21

Note: For gender, female=1

Appendix C. Regression tables

Table C.1. Regressions outputs for panel a of Figure 2

	Face mask	Greeting	Host	Distance
Gender (1=Female)	-0.14	-0.08	-0.03	-0.22
	(0.05)	(0.06)	(0.06)	(0.07)
Treatment	0.40	0.48	0.76	0.78
	(0.05)	(0.05)	(0.06)	(0.06)
Gender × treatment	-0.05	0.09	-0.07	0.02
	(0.07)	(0.08)	(0.08)	(0.09)
Constant	-0.50	-0.77	-0.99	-1.44
	(0.04)	(0.04)	(0.04)	(0.05)
Observations	12026	12026	12023	12028

Note: Logistic regression coefficients with standard errors in parentheses

Table C.2. Regressions outputs for panel b of Figure 2

	Face mask	Greeting	Host	Distance
Age	-0.0089	-0.0284	-0.0168	-0.0316
	(0.0017)	(0.0018)	(0.0018)	(0.0022)
Treatment	0.5295	0.6885	0.9339	0.8246
	(0.1151)	(0.1200)	(0.1202)	(0.1327)
Age × treatment	-0.0032	-0.0028	-0.0042	0.0002
	(0.0023)	(0.0025)	(0.0025)	(0.0029)
Constant	-0.1536	0.5044	-0.2233	-0.1353
	(0.0822)	(0.0859)	(0.0881)	(0.1009)
Observations	12026	12026	12023	12028

Note: Logistic regression coefficients with standard errors in parentheses

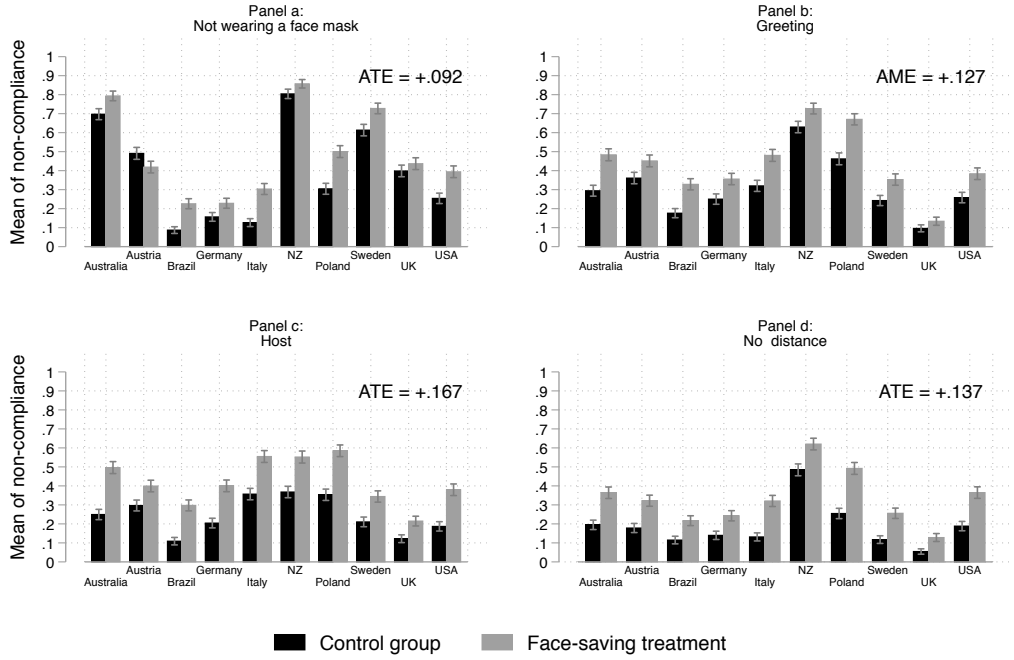
Table C.3. Regressions outputs for panel c of Figure 2

	Face mask	Greeting	Host	Distance
Education	-0.24	0.22	0.24	0.21
	(0.10)	(0.11)	(0.11)	(0.13)
Treatment	0.23	0.63	0.69	0.71
	(0.09)	(0.09)	(0.10)	(0.11)
Education × treatment	0.24	-0.17	0.05	0.12
	(0.14)	(0.14)	(0.15)	(0.17)
Constant	-0.44	-0.94	-1.15	-1.68
	(0.07)	(0.07)	(0.07)	(0.09)
Observations	11946	11946	11943	11948

Note: Logistic regression coefficients with standard errors in parentheses

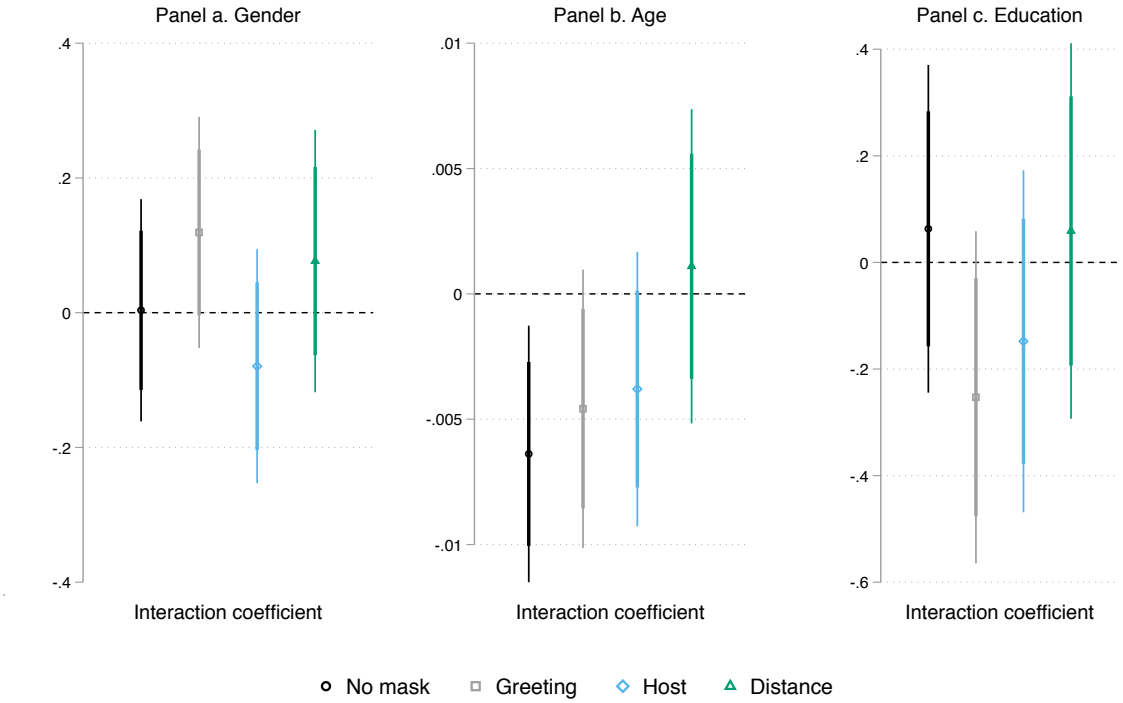
Appendix D. Robustness checks

Figure D.1. Replication of Figure 1 with weights



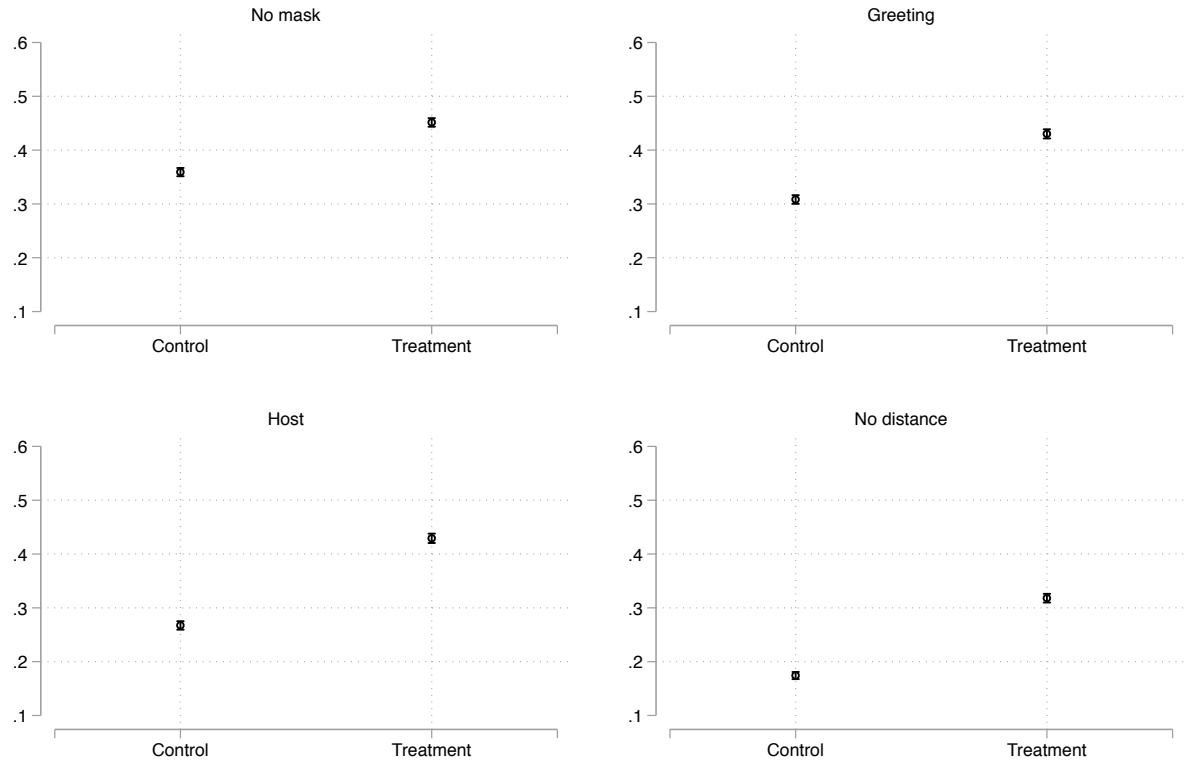
Note: 84% confidence intervals included. ATE=Average treatment effect. Spain is excluded because no weight variable was available.

Figure D.2. Replication of Figure 2 with weights



Note: 95% and 84% confidence intervals included. Spain is excluded because no weight variable was available.

Figure D.3. Average treatment effects controlling for country fixed effects



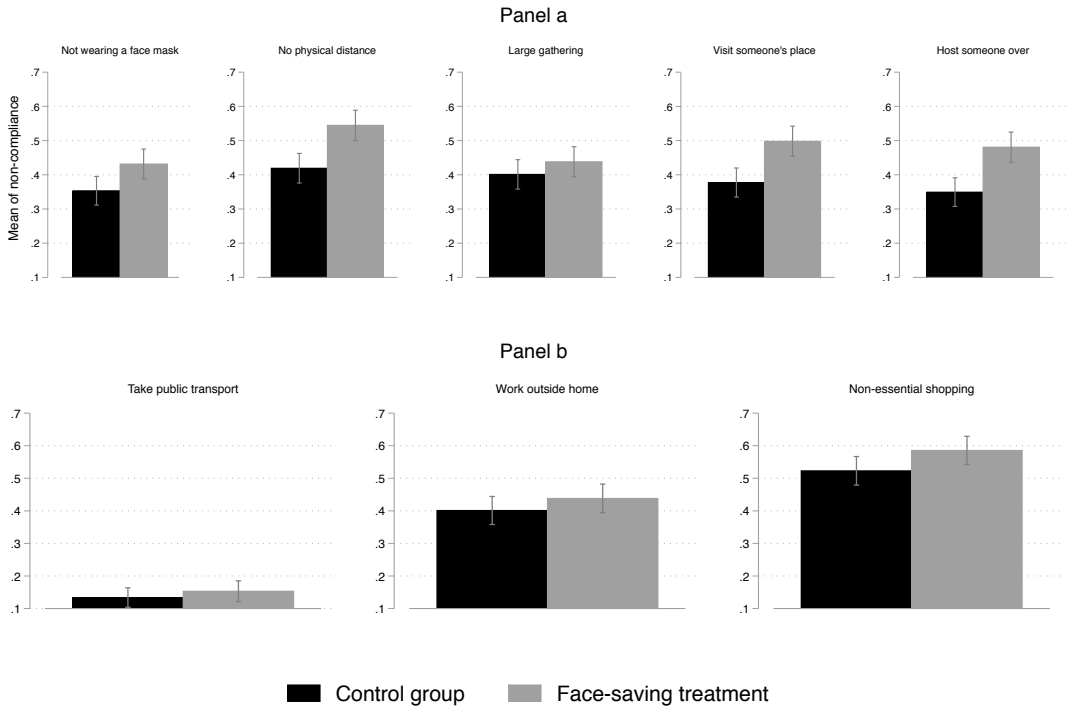
Note: 84% confidence intervals included. Estimated based on Table D.1.

Table D.1. Regressions models with country fixed effects

Dependent variable =	No mask	Greeting	Host	No distance
Face-saving treatment	0.49	0.58	0.76	0.86
	(0.04)	(0.04)	(0.04)	(0.05)
Austria	-1.28	0.07	-0.09	-0.12
	(0.10)	(0.09)	(0.09)	(0.10)
Brazil	-2.81	-0.72	-0.86	-0.74
	(0.11)	(0.10)	(0.10)	(0.11)
France	-1.88	-0.29	0.49	-0.67
	(0.10)	(0.09)	(0.09)	(0.11)
Germany	-2.58	-0.44	-0.37	-0.58
	(0.11)	(0.10)	(0.10)	(0.11)
Italy	-2.38	0.12	0.41	-0.26
	(0.11)	(0.09)	(0.09)	(0.10)
New Zealand	0.52	1.18	0.35	1.15
	(0.11)	(0.09)	(0.09)	(0.10)
Poland	-1.45	0.78	0.46	0.50
	(0.10)	(0.09)	(0.09)	(0.10)
Spain	-3.60	0.11	-0.13	-0.36
	(0.14)	(0.09)	(0.10)	(0.11)
Sweden	-0.40	-0.51	-0.48	-0.64
	(0.10)	(0.10)	(0.10)	(0.11)
United Kingdom	-1.43	-1.59	-1.09	-1.38
	(0.10)	(0.12)	(0.11)	(0.13)
United States	-1.69	-0.19	-0.19	0.09
	(0.10)	(0.09)	(0.10)	(0.10)
Constant	0.85	-0.76	-0.94	-1.43
	(0.08)	(0.07)	(0.07)	(0.08)
Observations	12026	12026	12023	12028

Note. Logistic regression predicting non-compliance. Standard errors in parentheses. The reference category for the countries is Australia.

Figure D.4. Prohibited and non-prohibited (placebo) items



Note: 84% confidence intervals are included