Effects of cooperative and uncooperative narratives on trust during the COVID-19 pandemic: Experimental evidence

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Abstract

To help contain the COVID-19 pandemic, many policymakers and health experts and the media have promoted responsible health behavior by using public narratives highlighting uncooperative behavior, including the lack of social distancing and resistance to various pandemic restrictions and COVID-19 vaccination. However, whether these uncooperative narratives may have detrimental consequences on trust is unclear. Hence, we conducted an online experiment to explore how the exposure to uncooperative and cooperative pandemic narratives affects people's trust in each other. We hypothesized that providing individuals with narratives depicting behaviors that violate (uncooperative narratives) and support pandemic social norms (cooperative narratives) would decrease and increase their trust in others, respectively. We showed that neither of the narratives had any effect on trust.

Keywords: COVID-19 pandemic, health attitudes, narratives, social norms, trust game, vaccines

JEL codes: C91, D9, D91, I12, Z1

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Declaration of interest: none.

1. Introduction

In 2020, the humanity was struck by one of the most severe health emergencies in history—the COVID-19 pandemic [1]. It is well-documented in the existing literature that health crises can affect people's trust in others [2-6], but the direction and the size of this effect may depend on how the health crises are communicated to the society [2]. Previous findings in the literature showed that, depending on the content of the message, exposure to information spread through mass media can fuel animosity between people [7-9] as well as help build interpersonal trust [10-11].

To fight the COVID-19 pandemic, many policymakers, health experts, and the media have engaged in active communication, which has often included the sharing of different *narratives*. In a broad sense, narratives are "stories people tell themselves, and each other, to make sense of human experience—that is, to organize, explain, justify, predict and sometimes influence its course" [12] (p. 1). Narratives do not necessarily have to be entirely true—according to Bruner [13], narratives "are a version of reality whose acceptability is governed by convention and 'narrative necessity' rather than by empirical verification and logical requiredness" (p. 4).

Many narratives related to the COVID-19 pandemic have been expressed as messages or stories evaluating society's behavior during the COVID-19 pandemic in terms of (non)compliance to pandemic norms. Such narratives are referred to as "norm-based narratives." During the COVID-19 pandemic, narratives depicting behaviors that violate pandemic social norms (uncooperative narratives) were often more common than narratives depicting behaviors that support pandemic social norms (cooperative narratives) [14]. Uncooperative narratives highlight the widespread non-compliance to pandemic health measures, such as violations of social distancing and mask-wearing requirements (e.g., [15]) and resistance to pandemic restrictions and COVID-19 vaccination (e.g., [16-18]).

However, it is unclear how norm-based communication might affect individuals' trust in each other. This understanding is important, as changes in trust could eventually impact many economic outcomes, such as financial [19] and economic development [20-21], entrepreneurship [22], international trade and investment [23] as well as aggregate productivity [24]. Furthermore, a deeper understanding of the effects of norm-based communication on trust can inform the design of policy interventions aimed at addressing emergencies that require collective action (e.g., health or environmental crises), and managing the consequences of such communication on interpersonal trust. This study, therefore, seeks to investigate the causal relationship between norm-based (cooperative and uncooperative) pandemic narratives and people's trust in strangers. Additionally, it tests how the salience of the COVID-19 pandemic affects trust and how the norm-based narratives impact health attitudes, in particular, toward pandemic emergency and vaccination.

Existing empirical evidence suggests that observed or perceived violation and promotion of social norms might have an impact on trust. Iacono et al. [25] found that people who perceived other people as not adhering to pandemic health measures had lower levels of self-reported interpersonal trust after the first wave of the COVID-19 pandemic. Peysakhovich and Rand [26] demonstrated that when people are exposed to environments that either support or do not support cooperation, there is a corresponding effect on their trust behavior and self-reported trust in others. Banerjee [27] found that social norm violations decrease people's beliefs about the trustworthiness of others and consequently their trust in them.

Bénabou et al. [12] showed how certain "moral narratives" can serve as excuses for individuals to behave selfishly or can increase the pressure on individuals to behave morally. Some authors have demonstrated that moral nudges, that is, messages that make norms salient, can promote prosocial behavior [28-32]. Similarly, priming of norm-related concepts can also affect prosociality. For example, priming "cooperation" increased contributions in the public

good game [33], and similarly, priming "trust" and "distrust" increased and decreased trust in the trust game, respectively [34]. Overall, the use of language that triggers moral considerations can account for many human behaviors in social interactions (for a literature review, see [35]).

Our contribution to the literature is threefold. First, to the best of our knowledge, we are the first to study the effects of norm-based narratives, including both cooperative and uncooperative types, on individuals' trust. Second, our study adds to the ongoing research about the general relationship between the COVID-19 pandemic and trust, which, so far, has provided mixed results [3-6, 25, 36-38] Third, our study was conducted at a later stage of the COVID-19 pandemic than the other studies exploring the impact of the COVID-19 pandemic on trust. At that time most pandemic-related restrictions in the United Kingdom (UK) —the country, in which we conducted our experiment—were removed [38] and over 74% of the British population was fully vaccinated [39]. This timing of the experiment provides a less noisy experimental environment compared to earlier pandemic phases.

To study the effects of the COVID-19 pandemic and norm-based pandemic narratives on trust behaviors, we conducted an online experiment with four treatments in the UK. Participants were assigned to one of the following treatments: "cooperative narrative," "uncooperative narrative," "COVID-19 salience," or "neutral." All participants read a short article. In the cooperative narrative and uncooperative narrative treatments, participants read an article that emphasized cooperative (compliant) and uncooperative (non-compliant) behaviors of British citizens during the COVID-19 pandemic, respectively. In the COVID-19 salience treatment, participants read an article that reminded them of the COVID-19 pandemic only. Participants in the baseline condition—the neutral treatment—read a neutrally worded article unrelated to the COVID-19 pandemic. After reading the articles, participants played an incentivized trust game [40], wherein the amount of money trustors sent to trustees represented the level of trust. We also elicited trustors' beliefs about the trustworthiness of trustees and

distributed a questionnaire on participants' interpersonal and institutional trust, experience with COVID-19, attitudes toward the pandemic emergency and vaccination, and socio-demographic information.

We hypothesized that reminding participants of the COVID-19 pandemic (COVID-19 salience treatment) and of the uncooperative behavior of individuals during the pandemic (uncooperative narrative treatment) will reduce their trust in others. We also expected that receiving information that emphasizes the widespread compliance to pandemic norms (cooperative narrative treatment) will have a positive effect on trust. However, we did not find evidence that priming of the COVID-19 pandemic or of the pandemic narratives (cooperative or uncooperative) has any significant effect on trust. In addition, we expected that the exposure to the uncooperative narrative treatment will raise the perceived pandemic emergency level and the general support for vaccination. We found support for this hypothesis, that is, that emphasizing instances of the society violating pandemic norms (the uncooperative narrative) induces people to view the pandemic as a greater health emergency and to be more in favor of vaccination in general.

The rest of the paper is organized as follows: Section 2 describes the experimental design and procedures and outlines the hypotheses. Section 3 presents the manipulation check and the main results of the study. Section 4 discusses the findings and presents the conclusion.

2. Experimental design and procedures

2.1. Experimental treatments

We designed an online between-subject experiment with four treatments: uncooperative narrative, cooperative narrative, COVID-19 salience, and neutral.[1,2] In all treatments, the participants read one short article.[3] The articles were based on publicly available information obtained from media articles, statistical reports, and other online information sources. As much as possible, all articles were designed symmetrically in terms of their structure and length. The treatment conditions are described below. The transcripts of the articles are provided in Appendix A.

Uncooperative narrative treatment. The participants read an article that provided them with an uncooperative narrative of British citizens' behavior during the COVID-19 pandemic. This narrative emphasized the violations of pandemic norms: Some people refuse to maintain social distancing, decline to wear face masks, break travel rules, refuse vaccinations, use fake COVID-19 passes, and protest pandemic measures. The text also outlined the negative consequences of such behaviors on people's personal health as well as society's health, including the increased spread of the virus and the potential collapse of the National Health Service (NHS)—the publicly funded healthcare system of the UK.

Cooperative narrative treatment. The participants read an article that provided them with a cooperative narrative of British citizens' behavior during the COVID-19 pandemic. This

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[1] This experiment received ethical approval from the WZB Research Ethics Committee, application no. 2022/4/151.

[2] The experiment was pre-registered at AsPredicted (https://aspredicted.org/81B_9BB). This pre-registration does not include the hypotheses on health-related attitudes. We decided to explore the effects of norm-based narratives on health-related attitudes ex post.

[3] Similar priming techniques to study the effects of the COVID-19 pandemic were used by Daniele et al. [41], Harrs et al. [42], and Aassve et al. [4].

narrative emphasized the compliance to pandemic norms: Most people maintain social distancing, wear face masks, adhere to travel rules, and get fully vaccinated. The article also outlined the positive effects of vaccines on people's personal health and other people's health, including the reduced spread of COVID-19 and the prevented collapse of the NHS.

COVID-19 salience treatment. The participants read an article that reminded them of the COVID-19 pandemic. The text briefly explained what COVID-19 is, where and when it originated, and how it turned into a pandemic. It also outlined the most common symptoms of COVID-19, possible variations in the severity of the disease, and length of recovery from the disease. The article did not provide any information on health-related behaviors of other people or behaviors considered appropriate during the pandemic.

Neutral treatment (baseline). The participants read a neutrally framed nature-related article. The text described a tern, a specific type of a bird. It outlined some details about the bird's physical appearance, geographical distribution, habitat, and breeding behavior. This article did not provide any information on the COVID-19 pandemic.

2.2. Experimental design and procedures

We conducted the experiment from May to June 2022 on Prolific. A total of 880 participants completed the experiment.[4] Five participants were excluded from the analysis, leaving a sample size of 875 participants (Table 1).[5] The recruitment was restricted to residents of the UK with a UK nationality. Approximately 50.5% of the participants were men; 49.3% were women; and

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[4] The sample size was selected such that we have enough power to identify a treatment effect of 5 percentage points with a power of at least 80%. For power calculations we used the mean of sent fraction of endowment by the trustors (0.502) and the standard deviation (0.124) from Johnson and Mislin [43]. Power calculations were based on a two-tailed test. According to our preregistered power calculations, it would have been sufficient to have 92 trustors per treatment.

[5] Participants who did not provide a summary of the articles they had to read as a treatment were excluded from the analysis.

0.2% indicated their gender as "other." The mean age of the participants was 40 years. More detailed descriptive statistics of the participants as well as the balance checks are provided in Appendix B. We detected some imbalances in several socio-demographic characteristics (age and political orientation) across some experimental groups, indicating the need to control for these characteristics in the regression analysis.

Table 1. Participants and dates by treatment

Treatment	Number of participants			Date
	All	Trustors	Trustees	
Uncooperative narrative	220	109	111	May 30, 2022
Cooperative narrative	217	108	109	May 31, 2022
COVID-19 salience	218	109	109	June 14, 2022
Neutral	220	109	111	June 15, 2022

The participants were paid a participation fee of £1.5 (approximately $1.8), and, depending on their role and decisions in the experiment, they could receive an additional reward. It took an average of 16 min for the participants to complete the experiment, and the average pay amounted to £4.6 (approximately $5.6). The experiment was implemented using the oTree software [44].

To reduce concerns about the experimenter demand effect, we asked the participants to memorize a phone number within 30 s at the beginning of the experiment. The participants were requested to recall the phone number at a later stage of the experiment. This distraction task was intended to prevent the participants from identifying the true objectives of the experiment [42]. After the distraction task, the participants were exposed to one of the four articles (see subsection 2.1. Experimental treatments). They were asked to read and memorize it within 3 min. When the time ran out, the participants were automatically directed to the next page where they were asked to summarize the text within 3 min. This task was aimed at strengthening the manipulation and identifying the participants who did not read the article. All participants, that

is, both the trustors and the trustees, were exposed to the same manipulation and participants had common knowledge about it.

After the manipulation, the participants were informed that they would be matched with another participant, with whom they would play a game. The participants were provided with the instructions of a slightly modified version of the trust game developed by Berg et al. [40] and were asked to answer three comprehension questions about the game (see Appendix A for detailed instructions of the experiment). Before the participants were matched to play the game, they were again reminded of the articles they read at the beginning of the experiment: They had to answer three true-or-false questions about the content of the articles.

The participants were then informed that they would play the game with an anonymous British national residing in the UK. They were randomly matched and played an incentivized trust game. The game was played by two people: player 1 (trustor) and player 2 (trustee). The participants were assigned to their roles randomly. At the start of the game, both players received an endowment of £2 (approximately $2.4) each. Thereafter, player 1 chose an amount (x) from his/her endowment to send to player 2. Player 1 was under no obligation to send anything and could keep the entire endowment to himself/herself ($0 \leq x \leq 2$). The amount player 1 decided to send was tripled by the researcher, and player 2 received $3x$. Player 2 chose an amount (y) to return to player 1 from the tripled amount and was under no obligation to return anything ($0 \leq y \leq 3x$). The final payoff of player 1 was $2 - x + y$, while that of player 2 was $2 + 3x - y$. The game was played once. The x amount was the behavioral measure of "trust" by player 1 in an anonymous player 2.

When the amount player 1 chose to send to player 2 was non-zero, we elicited the beliefs of player 1 about the trustworthiness of his/her partner, that is, player 2. To elicit accurate beliefs of trustworthiness, we used a simple incentivized interval method [45]. We asked player 1 how much he/she expected player 2 to return to him/her. Player 1 was also informed that he/she

would earn £0.5 (approximately $0.6) when his/her answer fell within a 10% interval around the actual amount returned by player 2. The participants were not informed about their earnings from the game and the belief elicitation procedure until the very end of the experiment.

The game and belief elicitation were followed with a questionnaire survey. Using the questionnaire, we elicited survey-based measures of social trust [46][6] and trust in the government. We also asked about the participants' risk attitudes [47]. We then requested the participants to answer three questions about their own and their family's experiences with COVID-19 and regarding whether they were at a high risk of getting severely sick with COVID-19. Thereafter, we elicited health-related attitudes using two additional survey questions: We asked the participants whether they considered the COVID-19 pandemic one of the largest health emergencies in human history and whether they thought that vaccines were necessary to prevent the spread of infectious diseases. The questionnaire concluded with socio-demographic questions.

As the final part of the experiment, the participants were asked to read the articles again and indicate whether the information provided in the articles described cooperative behavior, uncooperative behavior, or neither during the COVID-19 pandemic in Britain.[7] We also asked whether the participants thought the information provided in the articles was accurate [49]. This final part of the experiment served as a manipulation check. We also included three attention checks in the experiment. The first attention check was provided at the very beginning of the experiment, that is, before the distraction task; the second, before the provision of the

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[6] Social trust refers to general trust in other people and is often also called "generalized trust." It is most often elicited by asking the Rosenberg question: "Generally speaking, would you say that most people can be trusted or that you can't be too careful in dealing with people?" [46]

[7] Similar manipulation checks were provided by Marreiros et al. [48].

instructions of the trust game; and the third, after answering the comprehension questions about the game.

2.3. Hypotheses

2.3.1. Main hypotheses

We postulated that exposing individuals to information about the widespread non-compliance to pandemic health measures (uncooperative narratives) demonstrates violations of social norms, which might reduce people's beliefs of the trustworthiness of other people and consequently their trust in others [25, 27]. Similarly, showing information that most people comply with social norms in a pandemic (cooperative narratives) might increase individuals' beliefs in other people's trustworthiness, leading to higher interpersonal trust. An alternative mechanism for the effect is that uncooperative narratives provide individuals with moral excuses to behave selfishly without compromising their social and/or self-image, while cooperative narratives increase the reputational benefits of being viewed by others or by themselves as having high moral values and thus increase the pressure to behave more pro-socially [12].

On the basis of these considerations, we derive the following hypotheses: **Hypothesis 1a.** Trustors exposed to the uncooperative narrative treatment will, on average, send less amount than will those exposed to the COVID-19 salience treatment. **Hypothesis 1b.** Trustors exposed to the uncooperative narrative treatment will, on average, send less amount than will those exposed to the cooperative narrative treatment. **Hypothesis 1c.** Trustors exposed to the cooperative narrative treatment will, on average, send more amount than will those exposed to the COVID-19 salience treatment.

In response to the question of whether a pandemic itself increases or decreases interpersonal trust, there are arguments and evidence to suggest that it can go either way. Experiencing a pandemic may increase people's sense of belonging and cooperation [50-51].

Further, acts of generosity during the pandemic could improve people's beliefs about the trustworthiness of strangers, and the increased health risk could make people more dependent on others, which may increase their trust in other people [52]-54]. Several studies have found that similar to some natural disasters [55-57], the COVID-19 pandemic had a positive effect on self-reported trust in other people [4-5, 36].

However, priming individuals with the COVID-19 pandemic is expected to reduce their trust in other people. The viral transmission of a disease, such as COVID-19, reduces social interactions between people, which are essential for the ability to trust others [58-59]. A pandemic also induces fear and anxiety [60], which can lead to lower judgments of trustworthiness of others [61]. A pandemic is a traumatic event [62-63], and a recent traumatic experience is associated with lower self-reported trust in others [64]. Aassve et al. [2] showed that the Spanish flu pandemic had a negative effect on interpersonal trust. Similarly, several empirical studies have shown that in the aftermath of the COVID-19 pandemic, people trust others less than they did before the pandemic both in terms of experiment- [3] and survey-based measures of trust [25].

Against this backdrop of evidence, we formulate the following hypothesis: **Hypothesis 2**: Trustors exposed to the COVID-19 salience treatment will, on average, send less amount than will those exposed to the neutral treatment.

2.3.1. Additional hypotheses

Regarding the relationship between norm-based narratives and health-related attitudes, we expected that being exposed to uncooperative pandemic narratives might increase the perceived pandemic awareness and general support for vaccines. The logic is that providing instances of others violating pandemic norms and outlining the negative consequences of such behaviors induce guilt in people, which makes them more supportive of responsible health behaviors, including the support for vaccines [65-66]. A negative message is expected to affect people's

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health attitudes more than a positive one because people tend to respond more strongly to negative information [67-68], potentially also during the COVID-19 pandemic [69-70]. Hence, we test two additional hypotheses: **Hypothesis 3a.** Trustors exposed to the uncooperative narrative treatment will, on average, have greater pandemic emergency perceptions than will those exposed to the cooperative narrative treatment and neutral treatment. **Hypothesis 3b.** Trustors exposed to the uncooperative narrative treatment will, on average, have more favorable attitudes toward vaccination than will those exposed to the cooperative narrative treatment and neutral treatment.

3. Results

3.1. Manipulation check

To evaluate the effectiveness of the manipulations, we exploited the fact that at the end of the experiment, we asked the participants to indicate whether the information provided in the articles described cooperative behavior, uncooperative behavior, or neither during the COVID-19 pandemic in Britain. The effectiveness of the manipulations could also depend on whether the participants thought that the provided information was accurate. Thus, we also explored the responses to the question on the accuracy of the information provided in the articles [49].

We found that almost 93% of the participants exposed to the uncooperative narrative treatment thought that the provided article described uncooperative behavior; more than 98% of the participants exposed to the cooperative narrative treatment considered the article as reflecting cooperative behavior; and more than 78% of the participants exposed to the COVID-19 salience treatment found that the provided article described neither cooperative nor uncooperative behavior. Thus, most participants' responses corresponded to the intended priming by the articles. In addition, 88% of the participants exposed to the uncooperative narrative treatment, 92% of those exposed to the cooperative narrative treatment, more than

98% of those exposed to the COVID-19 salience treatment, and almost 96% of those exposed to the neutral treatment considered the information provided in the articles as accurate.

3.2. Main results

3.2.1. Hypothesis testing

We first tested Hypotheses 1a–1c. The trustors exposed to the uncooperative narrative treatment sent, on average, 50% of their endowment to the trustees. The trustors exposed to the COVID-19 salience treatment sent, on average, 49.5%, which was almost identical to the trust level among the trustors exposed to the uncooperative narrative treatment ($p = 0.916$).[8] Thus, we found no support for Hypothesis 1a. The trustors exposed to the cooperative narrative treatment sent, on average, 52.7%, which was slightly higher than the amount the trustors exposed to the uncooperative narrative treatment sent (50%). However, the difference in the average trust levels between the cooperative narrative and uncooperative narrative treatments was statistically insignificant ($p = 0.547$); thus, we found no support for Hypothesis 1b. The participants primed with the cooperative narrative were, on average, slightly more trusting (52.7%) than those who were reminded of the COVID-19 pandemic only (49.5%), but the difference was statistically insignificant ($p = 0.450$). Thus, we found no support for Hypothesis 1c.

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[8] We conducted a variance-ratio test to assess the equality of variances for the fraction of endowment sent by trustors in different treatments. It failed to reject the hypothesis of the variances being equal. Therefore, for hypothesis testing in this subsection, we used two-sided t-tests, assuming equal variances.
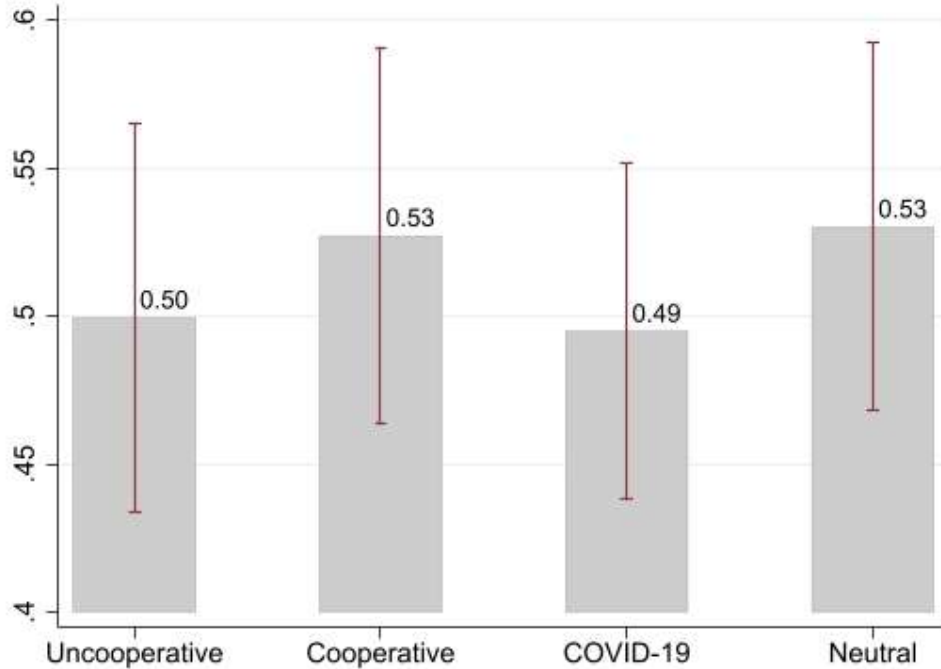
Fig 1. Average trust. The bars correspond to the average fraction of the endowment sent by the trustors to the trustees in the trust game across the treatments. The red vertical lines correspond to the confidence intervals of 95%. N=109 in the uncooperative narrative, COVID-19 salience, and the neutral treatments each, and N=108 in the cooperative narrative treatment.

Next, we tested whether the trustors exposed to the COVID-19 salience treatment trusted others less than did those exposed to the neutral treatment (Hypothesis 2). As shown in Fig 1, the trustors exposed to the COVID-19 salience treatment sent, on average, 49.5% of their endowment to the trustees, compared with 53% among the trustors exposed to the neutral treatment. The difference in the average trust level between the two treatments was not statistically significant ($p = 0.405$), and thus, we did not find support for Hypothesis 2.

Additionally, as an exploratory analysis, we tested for the equality of distributions of trust levels between different treatments. We did not find evidence of a difference between the

distributions (see Appendix C for more details). Graphs outlining the distributions of sent amounts by treatment are presented in Appendix B.

3.2.2. OLS regression

We complemented the analysis on trust with a set of OLS regressions. The regression estimates are reported in Table 2. The dependent variable trust was measured on the basis of the fraction of the endowment sent by the trustors to the trustees in the trust game. In column 1 of Table 2, the results of the regression analysis wherein trust was simply regressed on three treatment dummies—uncooperative narrative, cooperative narrative, and COVID-19 salience—are shown. The neutral treatment was used as a reference. This specification backed up the previous analysis showing that the treatments had no significant effect on trust.

The results did not change when we controlled for the individuals' age, gender, education, and income (column 2). In column 3, we present the results when we additionally controlled for the individuals' political orientation; this factor did not affect the estimates of the treatment variables. In the final specification (column 4), we additionally controlled for the individuals' experience with COVID-19, that is, whether they or their family member had been seriously sick with COVID-19 (sick with COVID-19 and family sick with COVID-19) and whether they were at a high risk of developing severe COVID-19 (at risk of COVID-19). The coefficients of the treatment variables remained insignificant at all conventional levels in all model specifications.

The OLS regression results, reported in columns 2–4, also showed that the women sent less money in the trust game than did the men, consistent with the findings by Buchan et al. [71]. We also found that the individuals with a disposable monthly income of £500–749 and the individuals with the highest disposable monthly income (>£2000) sent less money in the trust game. This result was unexpected, as income has been shown to be positively correlated with survey-based measures of trust [64].

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The amount that the trustors could send to the trustees was restricted to range from £0 to £2 (or from 0 to 1 in terms of the fraction of the endowment); the choice was censored. Hence, we additionally performed Tobit regressions with trust as the dependent variable. The results of the Tobit regressions, which are reported in Appendix C, were in line with the results of the OLS regressions presented in Table 2. The results of the OLS regressions were easier to interpret; thus, we referred to them as our main findings for the variable trust.[9]

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[9] We ran additional regressions to test if the null result was not driven by observations from individuals who did not respond to the experimental manipulations as intended. The results from these additional regressions, presented in Appendix C, were largely in line with those reported in Table 2. This showed that the null results were not driven by observations from individuals who found the articles inaccurate or those who misperceived the narratives.

Table 2. Regressions on trust

Trust	(1)	(2)	(3)	(4)
Uncooperative narrative	-0.031	-0.016	-0.018	-0.019
	(0.046)	(0.046)	(0.045)	(0.046)
Cooperative narrative	-0.003	0.011	0.005	0.008
	(0.045)	(0.045)	(0.045)	(0.046)
COVID-19 salience	-0.035	-0.018	-0.019	-0.018
	(0.042)	(0.042)	(0.043)	(0.042)
Age		-0.000	0.001	0.000
		(0.001)	(0.001)	(0.001)
Female gender		-0.063**	-0.057*	-0.057*
		(0.031)	(0.031)	(0.031)
University education		0.049	0.044	0.040
		(0.036)	(0.037)	(0.037)
Income: £500–749		-0.116**	-0.112**	-0.100*
		(0.052)	(0.052)	(0.053)
Income: £750–999		-0.021	-0.020	-0.017
		(0.054)	(0.055)	(0.054)
Income: £1000–1249		-0.078	-0.067	-0.061
		(0.059)	(0.059)	(0.061)
Income: £1250–1499		-0.050	-0.043	-0.034
		(0.064)	(0.062)	(0.062)
Income: £1500–1749		0.003	-0.000	0.015
		(0.064)	(0.067)	(0.069)
Income: £1750–1999		-0.098	-0.107	-0.117*
		(0.069)	(0.070)	(0.070)
Income: >£2000		-0.140**	-0.132**	-0.132**
		(0.055)	(0.056)	(0.056)
Political party: Conservative			-0.027	-0.029
			(0.048)	(0.048)
Political party: Lib Dem			0.018	0.026
			(0.061)	(0.060)
Political party: Green			0.093*	0.097*
			(0.055)	(0.055)
Political party: Scottish			-0.134*	-0.134*
			(0.072)	(0.070)
Political party: Reform UK			-0.075	-0.070
			(0.099)	(0.094)
Political party: Other			0.119	0.122
			(0.133)	(0.139)
Political party: None			-0.048	-0.046
			(0.047)	(0.047)
Sick with COVID-19: Yes				0.097
				(0.089)
Family sick with COVID-19: Yes				-0.015
				(0.044)
At risk of COVID-19: Yes				0.084*
				(0.046)
At risk of COVID-19: Do not know				0.042
				(0.069)
Constant	0.530***	0.574***	0.556***	0.553***
	(0.031)	(0.070)	(0.072)	(0.072)
Observations	435	435	435	435
R-squared	0.002	0.037	0.058	0.070

Note: The table reports the OLS estimates with robust standard errors in parentheses. The dependent variable trust is measured on the basis of the fraction of the endowment sent by the trustor to the trustee in the trust game. The neutral treatment is the reference group. All independent variables are binary, except for age, which is a continuous

variable. University education includes those who answered that they have a university bachelor's degree, a graduate or professional degree, or some university but no degree. For the variable income, the omitted category is £500–749. For the variable political party, the omitted category is labor. For the variables sick with COVID-19, family sick with COVID-19, and at risk of COVID-19, the omitted category is no. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

We also conducted regression analyses using trustworthiness beliefs, trustworthiness, social trust, and trust in the government as additional dependent variables. The variable trustworthiness beliefs was constructed using the responses by the trustors to the incentivized question "How much do you expect to receive from player 2?," which were expressed as the fraction of the amount sent by the trustors to the trustees (for more details, see Appendix A). The variable trustworthiness was measured on the basis of the amount returned by the trustee to the trustor, in relation to the received amount by the trustee. The variable social trust was constructed using responses to the following survey question: "Generally speaking, would you say that most people can be trusted or that you can't be too careful in dealing with people?" Possible answers were "most people can be trusted" and "one can't be too careful." To construct the variable trust in the government, we used the responses (on an 11-point Likert scale) to the following survey question: "On a scale from 0 to 10, how much do you personally trust your country's government?" We did not find significant treatment effects for any of the additional dependent variables (for more details see Appendix C).

3.3. Additional analyses

3.3.1. Hypothesis testing

We also tested how the pandemic narratives affected health-related attitudes. We first tested whether the trustors exposed to the uncooperative narrative treatment perceived the pandemic as a greater emergency than did those exposed to the neutral and cooperative narrative treatments (Hypothesis 3a). The attitudes toward the pandemic emergency (pandemic emergency attitudes) were measured using the participants' agreement (on an 11-point scale) to the following statement: "The COVID-19 pandemic has been one of the greatest health emergencies in human history." As shown in Fig 2, the agreement of the trustors exposed to the

uncooperative narrative treatment with the pandemic emergency statement averaged 7.6 points compared with 6.8 points among the trustors exposed to the neutral treatment; the difference was significant ($p = 0.029$)[10]. Meanwhile, the agreement of the trustors exposed to the cooperative narrative treatment averaged 6.9 points (Fig 2), and the difference between the uncooperative narrative and cooperative narrative treatments was significant ($p = 0.050$). Thus, we found support for Hypothesis 3a.
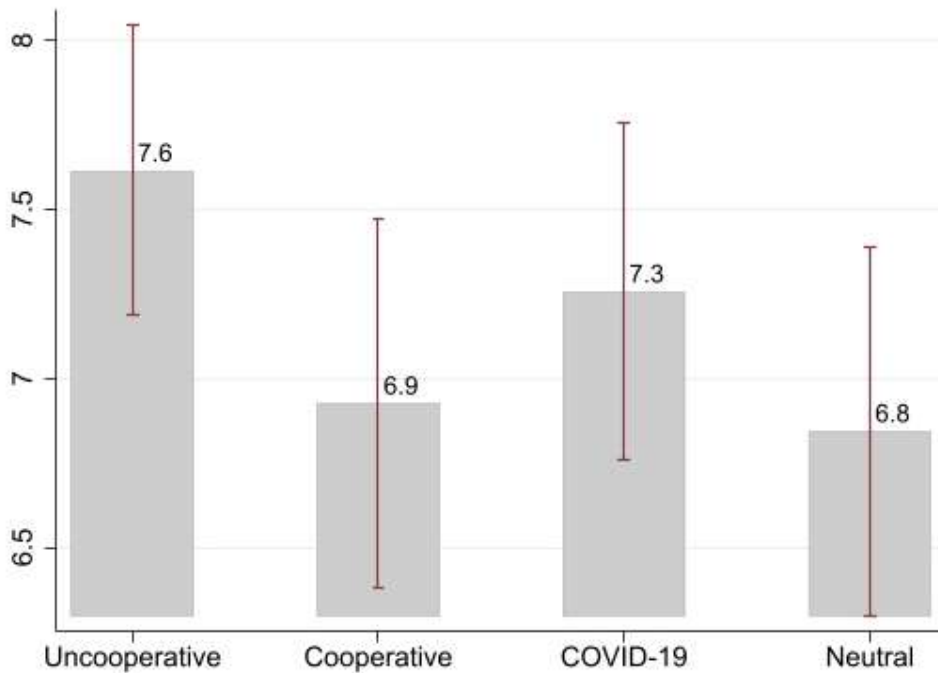

Fig 2. Average pandemic emergency attitudes. The bars correspond to the average pandemic emergency attitudes across the treatments. Pandemic emergency attitudes are measured using the participants' agreement to the statement "The COVID-19 pandemic has been one of the greatest health emergencies in human history" on an 11-point Likert scale, wherein 0 indicates "strongly disagree," and 10 indicates "strongly agree." The red vertical lines correspond to the confidence intervals. N=109 in the uncooperative narrative, COVID-19 salience, and the neutral treatments each, and N=108 in the cooperative narrative treatment.

Next, we tested whether the uncooperative narrative had a positive effect on attitudes toward vaccines (Hypothesis 3b). We measured the attitudes toward vaccines (vaccine

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[10] We conducted the variance-ratio tests to assess the equality of variances for pandemic emergency and vaccine attitudes across different treatments. It rejected the hypotheses of the variances being equal. Therefore, for hypothesis testing in this subsection, we used two-sided t-tests, assuming unequal variances.

attitudes) by asking the participants to state their agreement (on an 11-point scale) to the following statement: "In general, vaccines are necessary to prevent the spread of infectious diseases." The trustors exposed to the uncooperative narrative treatment reported vaccine attitudes that were, on average, 0.8 points higher than those among the trustors exposed to the neutral treatment (9.1 vs. 8.3 points, respectively, Fig 3), and this difference was significant ($p = 0.003$). In addition, the trustors exposed to the uncooperative narrative treatment reported more pro-vaccine attitudes (9.1 points) than did the trustors exposed to the cooperative narrative treatment (8.5 points), and the difference was significant ($p = 0.018$). Thus, we found support for Hypothesis 3b.
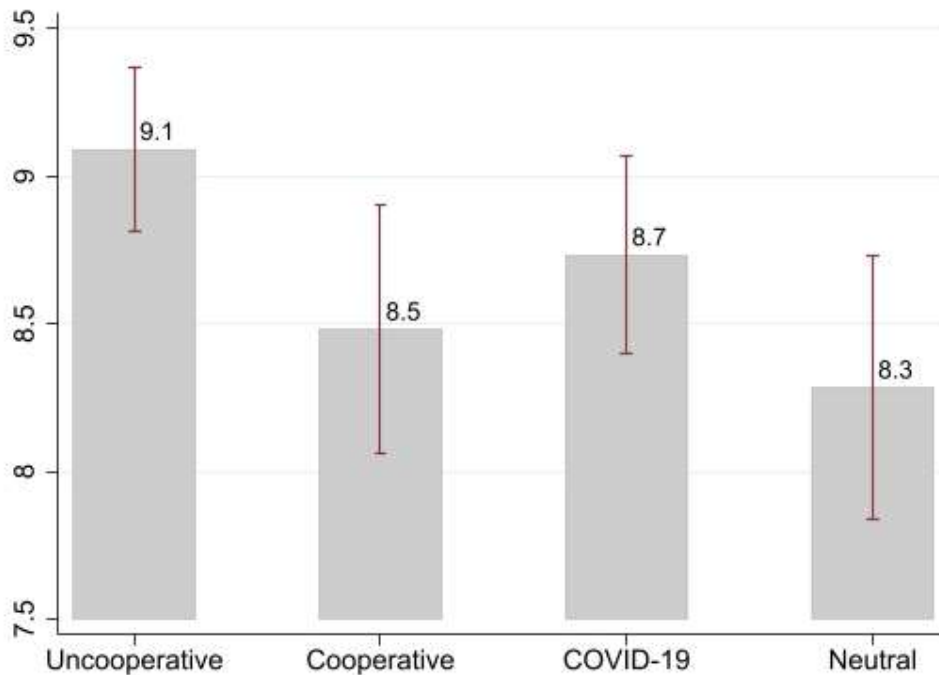

Fig 3. Average vaccine attitudes. The bars correspond to the average vaccine attitudes across the treatments. Vaccine attitudes are measured using participants' agreement to the statement "In general, vaccines are necessary to prevent the spread of infectious diseases" on an 11-point Likert scale, where 0 means "disagree strongly", and 10 means "agree strongly." The red vertical lines correspond to the confidence intervals. $N=109$ in the uncooperative narrative, COVID-19 salience, and the neutral treatments each, and $N=108$ in the cooperative narrative treatment.

3.3.2. OLS regression

To obtain additional insights into the factors that may affect the individuals' attitudes toward the pandemic and vaccination, we performed two sets of OLS regressions. Table 3 reports the results of the regression analysis of pandemic emergency attitudes in relation to the treatment variables as well as some individual characteristics. Table 4 presents the results of the regression analysis with vaccination attitudes as the dependent variable. In Tables 3 and 4, column 1 displays the results wherein the dependent variable was regressed on three treatment dummies (uncooperative narrative, cooperative narrative, and COVID-19 salience), while columns 2–4 present the results with additional model specifications.

Initially, we analyzed the regression results on pandemic emergency attitudes reported in Table 3. The coefficient for the variable uncooperative narrative remained positive and significant in all model specifications reported in columns 1–4. This confirmed the previous finding that on average, the uncooperative narrative treatment increases the pandemic awareness. No such effect was found in the other treatment variables, as the coefficients for cooperative narrative and COVID-19 salience remained insignificant at all conventional levels even when we controlled for individual characteristics (columns 2–4).

We also found that the political orientation was an important predictor of pandemic emergency attitudes. The individuals who identified most with the Conservative Party or the Reform UK (former Brexit Party) and those who did not identify with any party at all (political party: none) had milder views toward the pandemic as a health emergency.

Table 3. Regressions on pandemic emergency attitudes

Pandemic emergency attitudes	(1)	(2)	(3)	(4)
Uncooperative narrative	0.771**	0.751**	0.703**	0.660*
	(0.351)	(0.358)	(0.352)	(0.359)
Cooperative narrative	0.082	0.116	0.170	0.158
	(0.389)	(0.387)	(0.377)	(0.379)
COVID-19 salience	0.413	0.314	0.413	0.378
	(0.373)	(0.379)	(0.372)	(0.378)
Age		0.014	0.027**	0.026**
		(0.011)	(0.011)	(0.011)
Female gender		0.406	0.293	0.303
		(0.265)	(0.259)	(0.260)
University education		0.371	0.159	0.153
		(0.305)	(0.297)	(0.300)
Income: £500–749		0.033	0.151	0.221
		(0.404)	(0.354)	(0.362)
Income: £750–999		0.040	0.029	0.058
		(0.477)	(0.494)	(0.497)
Income: £1000–1249		-0.562	-0.445	-0.424
		(0.459)	(0.454)	(0.464)
Income: £1250–1499		0.268	0.248	0.290
		(0.528)	(0.490)	(0.492)
Income: £1500–1749		-0.199	-0.248	-0.182
		(0.481)	(0.507)	(0.526)
Income: £1750–1999		-0.491	-0.696	-0.662
		(0.687)	(0.668)	(0.672)
Income: >£2000		0.187	0.260	0.293
		(0.453)	(0.445)	(0.445)
Political party: Conservative			-1.053***	-1.044***
			(0.379)	(0.383)
Political party: Lib Dem			-0.480	-0.494
			(0.441)	(0.449)
Political party: Green			-0.423	-0.436
			(0.408)	(0.411)
Political party: Scottish			-0.282	-0.282
			(0.585)	(0.578)
Political party: Reform UK			-3.997***	-3.990***
			(1.285)	(1.281)
Political party: Other			-0.148	-0.101
			(0.611)	(0.640)
Political party: None			-1.489***	-1.488***
			(0.395)	(0.404)
Sick with COVID-19: Yes				-0.050
				(0.590)
Family sick with COVID-19: Yes				0.375
				(0.371)
At risk of COVID-19: Yes				0.192
				(0.363)
At risk of COVID-19: Do not know				0.138
				(0.510)
Constant	6.844***	5.887***	6.182***	6.121***
	(0.276)	(0.616)	(0.593)	(0.593)
Observations	435	435	435	435
R-squared	0.013	0.032	0.105	0.108

Note: The table reports the OLS estimates with robust standard errors in parentheses. The dependent variable pandemic emergency attitudes is measured using the participants' agreement to the statement "The COVID-19 pandemic has been one of the greatest health emergencies in human history" on an 11-point Likert scale, wherein

0 indicates "strongly disagree," and 10 indicates "strongly agree." The neutral treatment is the reference group. All independent variables are binary, except for age, which is a continuous variable. University education includes those who answered that they have a university bachelor's degree, a graduate or professional degree, or some university but no degree. For the variable income, the omitted category is £500–749. For the variable political party, the omitted category is labor. For the variables sick with COVID-19, family sick with COVID-19, and at risk of COVID-19, the omitted category is no. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

Next, we analyzed the regression results on vaccine attitudes presented in Table 4. The regression analysis confirmed the results obtained from the hypothesis testing: The participants exposed to the uncooperative narrative treatment had, on average, significantly more favorable attitudes toward vaccines than those exposed to the baseline treatment. The coefficient for uncooperative narrative was significant across all model specifications (columns 1–4). The coefficients for cooperative narrative and COVID-19 salience were insignificant across all specifications.

The coefficient estimates of the variables representing the individual characteristics provided some additional interesting insights. We found that the older individuals were more pro-vaccine; although the coefficient for age was relatively small. The individuals with at least some university education also showed attitudes that were more favorable toward vaccines. The women were less in favor of vaccines. However, the coefficient for female gender was significant only in the specifications reported in columns 3 and 4; thus, the result should be treated with caution. Also, individuals who were at a high risk of developing severe COVID-19 were more in favor of vaccines.

Table 4. Regressions on vaccine attitudes

Vaccine attitudes	(1)	(2)	(3)	(4)
Uncooperative narrative	0.807***	0.772***	0.806***	0.825***
	(0.265)	(0.257)	(0.258)	(0.261)
Cooperative narrative	0.197	0.239	0.199	0.229
	(0.311)	(0.304)	(0.292)	(0.293)
COVID-19 salience	0.450	0.390	0.390	0.404
	(0.282)	(0.278)	(0.274)	(0.280)
Age		0.015*	0.027***	0.024***
		(0.008)	(0.008)	(0.008)
Female gender		-0.312	-0.405**	-0.399**
		(0.195)	(0.186)	(0.186)
University education		0.590***	0.438**	0.410*
		(0.225)	(0.212)	(0.213)
Income: £500–749		0.138	0.375	0.396
		(0.300)	(0.244)	(0.248)
Income: £750–999		-0.119	-0.087	-0.058
		(0.387)	(0.398)	(0.405)
Income: £1000–1249		-0.237	-0.131	-0.109
		(0.323)	(0.313)	(0.318)
Income: £1250–1499		-0.396	-0.320	-0.310
		(0.451)	(0.457)	(0.454)
Income: £1500–1749		-0.042	-0.070	-0.010
		(0.392)	(0.389)	(0.399)
Income: £1750–1999		-0.651	-0.737*	-0.823*
		(0.474)	(0.447)	(0.457)
Income: >£2000		-0.114	-0.074	-0.098
		(0.272)	(0.260)	(0.263)
Political party: Conservative			-0.611**	-0.614**
			(0.302)	(0.305)
Political party: Lib Dem			-0.062	-0.020
			(0.282)	(0.289)
Political party: Green			0.457	0.472
			(0.311)	(0.313)
Political party: Scottish			-0.651	-0.657
			(0.597)	(0.598)
Political party: Reform UK			-4.348***	-4.271***
			(1.053)	(1.038)
Political party: Other			-1.093***	-1.034***
			(0.375)	(0.363)
Political party: None			-0.441*	-0.405
			(0.248)	(0.253)
Sick with COVID-19: Yes				0.123
				(0.358)
Family sick with COVID-19: Yes				-0.082
				(0.314)
At risk of COVID-19: Yes				0.475**
				(0.241)
At risk of COVID-19: Do not know				-0.038
				(0.371)
Constant	8.284***	7.528***	7.429***	7.457***
	(0.225)	(0.473)	(0.459)	(0.461)
Observations	435	435	435	435
R-squared	0.023	0.060	0.166	0.173

Note: The table reports the OLS estimates with robust standard errors in parentheses. The dependent variable vaccine attitudes is measured using the participants' agreement to the statement "In general, vaccines are necessary to prevent the spread of infectious diseases" on an 11-point Likert scale, wherein 0 indicates "strongly disagree,"

and 10 indicates "strongly agree." The neutral treatment is the reference group. All independent variables are binary, except for age, which is a continuous variable. University education includes those who answered that they have a university bachelor's degree, a graduate or professional degree, or some university but no degree. For the variable income, the omitted category is £500–749. For the variable political party, the omitted category is labor. For the variables sick with COVID-19, family sick with COVID-19, and at risk of COVID-19, the omitted category is no. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Political orientation also played a role in determining vaccine attitudes. Similar to the findings on attitudes toward the pandemic, the individuals who identified with the Conservative and Reform UK Parties generally had less favorable attitudes toward vaccines. The negative coefficient for political party: conservative was significant at the 5% significance level, while that for political party: reform UK was significant at the 1% significance level, as shown in columns 3 and 4.

4. Discussion and conclusion

In this study, we collected experimental evidence during the COVID-19 pandemic in the UK to explore how the health crisis and pandemic narratives, which outlined how the society behaved during the pandemic in terms of compliance to pandemic norms, affected trust in the trust game [40]. We also analyzed how such norm-based pandemic narratives affected health attitudes, in particular, attitudes toward the pandemic emergency and vaccination in general.

First, we found that providing individuals with narratives outlining behaviors that support or violate pandemic social norms does not have a significant effect on trusting behavior. This finding does not support the results by [25] that after the first wave of the pandemic, survey-based measure of trust declined more among individuals who saw others as violating pandemic norms. The null results obtained in our study could be explained by several reasons. First, by the timing of the experiment; norm priming toward the end of the pandemic could be less effective than that in the earlier stages, as people have potentially already formed their own perceptions about others' behavior during the pandemic. Another potential explanation is that exposure to a narrative outlining uncooperative behaviors may, for some individuals, lead to

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increased adherence to the norm of cooperation and thus higher trust, resulting in an overall null result.

Second, we showed that priming individuals with the COVID-19 pandemic does not affect trust in the trust game. This result is in line with the finding by [37], who used a priming technique to study the effects of the COVID-19 pandemic on experiment-based trust measures. This finding provides support for the theory claiming that trust is an inert and hardly malleable cultural component [72-74]. However, one of the potential reasons for the null result could also be that changes in trust have been realized over the course of the pandemic, and thus, the primes may be less effective at inducing changes in trust. For example, Li et al. [3] conducted a trust game experiment in China before and after the start of the COVID-19 pandemic and found that the health crisis significantly reduced trust, which remained low throughout the observation period that lasted for almost 1 year. Although, Casoria et al. [6] showed that in France trust recovered gradually to its initial level after the lifting of the first-wave lockdown measures. In general, the choice of the empirical strategy as well as the timing of the study and geographical location may be important factors contributing to the size as well as to the direction of the effects of the COVID-19 pandemic on trust. A panel study involving many countries that track trust over the course of the whole pandemic could help settle this debate.

Third, we found that uncooperative narratives are effective in altering people's attitudes toward the pandemic as well as vaccination. That is, emphasizing society's non-compliance to pandemic norms and outlining the negative consequences of such behaviors on others induces people to view the pandemic as a greater health emergency and to be more pro-vaccine in general. This confirms findings in the literature showing that people tend to respond more strongly to negative stimuli [67-68]. Also, it supports studies finding positive effects of guilt appeals on health-related attitudes, intentions, and actual behaviors [65-66]. We showed that uncooperative narratives do not result in an immediate negative effect on trust, which provides

some justification in applying this type of negatively worded guilt-inducing narratives to shape individuals' health-related attitudes. This finding can help guide policymakers and communicators in designing more effective messages to alter people's attitudes during the current pandemic as well as in future crises. However, in this study we analyzed only health attitudes and future studies could explore if norm-based narratives can also affect actual health behaviors.

Finally, we noted that health attitudes are related to some individual characteristics. We found that age, education, and gender are important predictors of vaccine attitudes, which is in line with previous research on COVID-19 vaccination intentions [75]. Another important factor associated with health attitudes is political orientation. Individuals who identify most with the Conservative Party and the Reform UK (former Brexit Party) view the pandemic as less of a concern and are more skeptical of vaccines. Contrary to our finding, a report on COVID-19 vaccination intentions showed that during the COVID-19 pandemic, UK Conservative Party voters were more pro-vaccine [76]. However, our result confirms findings from other countries showing that right-leaning individuals tend to have lower anxiety levels toward the COVID-19 pandemic [77] and are less in favor of vaccines [78-81]. This finding is also related to the report by Phalippou and Wu [82] showing a negative relationship between the 2016 Brexit vote and COVID-19 vaccination rates and a positive association with COVID-19 infection and death rates, since the majority of the Conservative Party and former Brexit Party voters who participated in the Brexit referendum casted a "leave" vote [83]. This result could be related to the greater beliefs in conspiracies of right-leaning voters [80, 84]. In general, the results show that political divide plays an important role in the health domain, and policymakers should take this into account when designing vaccination campaigns as well as health-related incentives.

There are several limitations to our study. Firstly, we did not collect information on individuals' own normative views related to the pandemic and the extent to which they identify

with norm violations, which could be important for determining the effect of the narratives. However, in the regression analyses, we controlled for individuals' political identification, which should at least partially capture their own normative views about the pandemic. Secondly, in the additional analysis we rely on self-reported health attitudes, which may diverge from actual health behaviors.

Acknowledgements

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