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Reasoning versus prior beliefs: The case of COVID-19 fake news

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Abstract

We conduct a survey on a large representative sample of Slovak population to examine the role of analytic thinking, scientific reasoning, conspiracy mentality, and conspiracy beliefs in trust in COVID-19 fake news and willingness to share it. We find that the ability to distinguish between fake and real news about COVID-19 is significantly negatively correlated with conspiracy mentality and with beliefs in pandemic-related conspiracy theories. Analytic thinking is not a significant predictor. Although fake news is generally less likely to be trusted and shared than real news, when fake news is consistent with preexisting opinions, people are more willing to share it compared with belief-consistent real news. We also find that people are mostly overconfident in their ability to distinguish between fake and real news, and we identify a subpopulation of people that refuse to get vaccinated who trust fake COVID-19 news significantly more than real news. Thus, consistency with one's beliefs is the best indicator of trust in fake news and willingness to share such news.

KEYWORDS

analytic thinking, COVID-19 fake news, prior beliefs, sharing fake news, vaccination

1 | INTRODUCTION

Fake news usually refers to disinformation (i.e., deliberate dissemination of false or inaccurate information intending to cause harm) that mimics the output of the news media in form, but not in underlying editorial processes (Lazer et al., 2018). Given that compared with real news, fake news spread faster and wider (Chua & Banerjee, 2018; King & Wang, 2021; Shin et al., 2018) and also receive higher engagement on social media platforms, such as Facebook (Silverman et al., 2016), fake news poses a problem for democracies. While citizens have the right to information and to express their beliefs freely, if they are unable to distinguish disinformation from accurate information, disinformation can distort public discourse and undermine trust in democratic institutions (e.g., McKay & Tenove, 2021).

Most of the extant fake news research focuses on political disinformation (e.g., linked to the Brexit referendum or Donald Trump presidency; Guess et al., 2018; Marshall & Drieschova, 2018; Pennycook & Rand, 2019a). In this domain, the studies usually report that the ability to distinguish politically oriented fake news is positively correlated with

analytic thinking, regardless of whether the news is consistent with one's prior beliefs or not (Farágó et al., 2023; Pennycook & Rand, 2019b). However, a considerable volume of fake news has recently emerged also in novel (and nonpolitical) contexts, in which analytic thinking and belief consistency might have different relative effects on distinguishing fake news from real news. In this paper, we focus on the willingness to trust and share fake news regarding the COVID-19 pandemic and examine (1) the role of both analytic thinking and scientific reasoning, (2) the role of conspiracy mentality and related unsubstantiated prior beliefs, and (3) the association between pandemic-related beliefs and actual behavior, represented by vaccination status.

We conduct a survey on a large representative sample, using a battery of eight real and eight fake COVID-19-related stories designed in social media style format. In the survey, each story is presented to each participant in one of four frames (neutral, emotional image, clickbait title, high number of interactions), and the participants rate how trustworthy the story is, whether they would be willing to share the story and whether the story is consistent with their prior beliefs.

We find that the best indicator of trust in fake news and willingness to share such news is its consistency with one's beliefs. Fake news is generally less likely to be trusted and shared than real news, especially for people with higher scientific reasoning. Importantly, however, if fake news is consistent with their preexisting opinions, people are willing to share it more compared with belief-consistent real news. We also find that fake news discernment (i.e., the ability to distinguish between fake and real news about COVID-19) is significantly negatively associated with conspiracy mentality and with beliefs in conspiracy theories about COVID-19. Thus, while analytic and/or scientific thinking is important in distinguishing fake news from real news, once individuals hold strong opinions on the topic, such thinking may not be sufficient to overcome prior beliefs. We also find that people are generally overconfident in their ability to distinguish between real and fake news, and that the correlation between fake news discernment and our behavioral measure (i.e., vaccination status) is stronger compared with the correlation between fake news discernment and self-assessed media literacy. Finally, we report that people who are refusing to get vaccinated believe in fake COVID-19 news more than in real ones and are more willing to share it.

2 | RELATIONSHIP TO THE LITERATURE AND HYPOTHESES

A prominent explanation of fake news susceptibility is motivated reasoning, that is, the notion that people believe information that aligns with their beliefs and/or ideology (Van Bavel & Pereira, 2018). For example, in Bago et al. (2020), participants judge (political) fake news headlines concordant with their ideology as more accurate than discordant news. On a similar note, Moravec et al. (2018) report that labeling political headlines as fake does not diminish trust in concordant ones, even though cognitive activity increases. However, trust in fake news might be relatively independent from willingness to share it (Pennycook, Epstein, et al., 2021; Pennycook, McPhetres, et al., 2021; Pennycook & Rand, 2021). Pennycook, Epstein, et al. (2021) find that only 33% of false headlines sharing can be explained by trust in their accuracy, while in 16% of the cases, participants are willing to share false headlines despite knowing that these headlines are not accurate, in consistence with political identity account. Nevertheless, the majority of false headlines sharing (51%) in the study is attributable to inattention (i.e., lack of reflective thinking).

Hypothesis 1. People consider both real and fake news more trustworthy and are more willing to share it if the news is consistent with their prior beliefs.

Trust in fake news and willingness to share it might also be affected by how the fake news is presented. Since reliance on emotion in general has been found to be associated with higher belief in fake (but not real) news (Martel et al., 2020), in our study we also examine the framing effect, namely whether people are sensitive toward emotional manipulation of news by the means of emotional

picture and clickbait title, and toward endorsement of news by others, indicated by the number of social media interactions. Extant research suggests that while exposure to negatively framed fake news can increase negative feelings such as fear or anger, these feelings do not necessarily lead to a change in willingness to share such news (Corbu et al., 2021). Another manipulation technique often used to increase visibility and spread of news is so-called clickbait title, which attracts readers to (often) fabricated pseudoscientific or misleading articles (Veszelszki, 2017). However, while clickbait titles increase arousal, their effect on attitudes seems to be rather small, if any (Greškovičová et al., 2022; Munger et al., 2020). These results suggest that (at least young) people are aware of using clickbait as a manipulation technique and generally do not trust messages with clickbait titles more. Finally, a higher number of interactions can induce a “bandwagon effect” and increase the credibility of both fake and real news (Kim, 2018; Luo et al., 2022). On the other hand, it might not affect people with strong prior opinions who may rely more on motivated reasoning (Moravec et al., 2018).

Hypothesis 2. Emotional framing of both real and fake news does not have a strong consistent effect on the trustworthiness of given news or willingness to share it.

Besides examining the effect of prior beliefs and emotional framing, we also study whether susceptibility to fake news can be influenced by thinking styles. Previous research shows that individuals with higher analytic thinking (i.e., those who engage in cognitive reflection) are better at discerning between fake and real news, regardless of whether the information is aligned with their ideology (Bago et al., 2020, p. 201; Pennycook & Rand, 2019b, 2021). In addition, Bago et al. (2020) experimentally demonstrate that beliefs in fake news can be reduced by manipulating participants' level of deliberation (Pennycook & Rand, 2021). Finally, some evidence suggests that deficient analytic thinking affects sharing intentions of fake news. In particular, individuals with lower levels of analytic thinking share a greater proportion of dubious news content on Twitter (Mosleh et al., 2021).

Most of the studies to date focus on political fake news and do not measure prior beliefs directly. Instead, political partisanship is usually used as a proxy for beliefs. Such approach is suitable for strongly ideologically polarized environments, in which beliefs are forming for a long time. However, it is questionable whether analytic thinking has the same relative effect on susceptibility to fake news in novel situations and contexts, such as the COVID-19 pandemic. Analytic thinking may not improve fake news discernment if people hold heavily inaccurate prior factual knowledge about a given topic (e.g., scientific principles of vaccines, climate change, etc.; Tappin et al., 2021). Therefore, in the current study focused on COVID-19-related fake news, we measure prior beliefs directly, and in addition to analytic thinking, we also measure scientific reasoning. Recent studies show that compared with analytic thinking, scientific reasoning may be a stronger predictor of susceptibility to fake health messages (Greškovičová et al., 2022) as well as general pandemic-related disinformation (Čavojová et al., 2022).

COVID-19-related fake news often includes various conspiracy theories about its origin and/or pseudoscientific remedies on how to treat the disease. Since the strongest predictor of the tendency to trust a new conspiracy theory is having some other conspiracy/unfounded belief (Čavojová et al., 2020; Lobato et al., 2014), some scholars postulate the existence of so-called conspiracy mentality (Imhoff & Bruder, 2014; Sutton & Douglas, 2020), which can also drive one's susceptibility to fake news (Grzesiak-Feldman & Irzycka, 2009; Szebeni et al., 2021). However, it is necessary to distinguish between a conspiracy mindset as a generalized (political) attitude (Bruder et al., 2013) and susceptibility to specific conspiracy beliefs (Sutton & Douglas, 2020). Therefore, we include both general and more specific measures of conspiracy beliefs in our study and conjecture that conspiracy mentality is negatively associated with fake news discernment.

Hypothesis 3. Trust in fake news and willingness to share it is negatively correlated with analytic thinking and scientific reasoning and positively correlated with conspiracy mentality and with trust in related conspiracy theories.

Another phenomenon often observed in relation to fake news is that although people in general think that the problem of fake news is widespread and pressing, they themselves feel quite confident in their ability to recognize false content from real one. This is in line with a body of research showing that people tend to overestimate their cognitive abilities and that people with the worst abilities tend to be the most vulnerable to believing in online “bullshit” (i.e., meaningless statements) and fake news (Kartal & Tyran, 2022; Littrell & Fugelsang, 2021; Lyons et al., 2021; Pennycook et al., 2017; Serra-Garcia & Gneezy, 2021). When people feel overly confident, it may prevent them to slow down and engage in more analytical thinking (Pennycook et al., 2015). Therefore, we also examine the self-assessed ability of media literacy and expect our participants to overestimate their ability to distinguish between real and fake messages, especially if their actual ability is relatively low, effectively replicating the Dunning-Kruger effect (Kruger & Dunning, 1999) in the domain of fake news discernment.

Hypothesis 4. People are overconfident in estimation of their ability to discern between fake and real COVID-19-related stories.

Finally, fake news is also blamed for decreased immunization against measles, rubella, and mumps because of its alleged connection with autism (Carrieri et al., 2019; Hansen & Schmidtlaicher, 2021; Kata, 2010) and refusal of the COVID-19 vaccines (Galhardi et al., 2022; Kanozia & Arya, 2021; Mamak, 2021; Montagni et al., 2021). While most of these studies focus on stated vaccination intentions, the unique timing of our data collection (i.e., midway through the pandemic when attitudes toward COVID-19 vaccination were highly polarized) allows us to focus on a behavioral measure, represented by actual vaccination status. We conjecture the

vaccination status to strongly positively correlate with the ability to distinguish between real and fake pandemic-related news.

Hypothesis 5. Believing in COVID-19 fake news is associated with lower vaccination rate.

3 | METHODS

To test our hypotheses, we designed an online survey using Qualtrics software and recruited a total of 2335 participants from the Slovak general population. Our survey was part of the larger data collection on COVID-19 pandemic outcomes, unfounded beliefs about COVID-19, conspiracy mentality, social attitudes, financial attitudes and behaviors, and personality and cognitive characteristics.ⁱ The entire survey took approximately 40 min to complete. Participants were remunerated for their participation by the survey agency. In this study, we only report responses to real and fake news questions along with responses to measures outlined in the previous chapter, which we treat as conjectured predictors of trust in fake news and willingness to share it.ⁱⁱ

3.1 | Context of data collection

Although COVID-19 pandemic was global, its negative effects as well as spread of related fake news varied among countries, often due to differences in effectiveness of governments' pandemic management efforts. According to the Globsec poll, Slovakia belongs to the countries with a high prevalence of conspiracy thinking (Globsec, 2021). For example, 39% of Slovaks believed that COVID-19 is fake to manipulate the population and the agreement with the statement “Official number of COVID-19 cases is lower than my country's public authorities tell us.” increased from 36% in 2020 to 46% in 2021.

We conducted our data collection in October 2021. While vaccines against COVID-19 were widely available in Slovakia since May 2021, vaccination was surrounded by a lot of conspiracy theories. Moreover, pandemic management in Slovakia suffered many scandals, resulting in resignation of Prime Minister Igor Matovič in March 2021 after controversial purchase of Sputnik vaccine. Therefore, at the time of our data collection, vaccination was a highly polarized topic within the Slovak population.

3.2 | Sample

Out of 2335 participants who started the survey, 497 were excluded from the sample due to not consenting with the study (97 participants), failing first or second attention check (176 and 47 participants, respectively), or not completing the survey (177 participants). Thus, our final sample consists of 1838 participants, aged 18 to 85, with a mean age of 45 years, and 53% female. A total of 6% of these participants have only primary education, 29% have incomplete secondary

education, 43.4% have complete secondary education with a high school diploma, and 21.7% have a college education or higher.

3.3 | Materials and procedure

Replicating a selection procedure of Pennycook, Binnendyk, et al. (2021), we picked eight real news stories from reliable media sources and eight fact-checked fake news stories from disinformation websites. All stories were related to the COVID-19 pandemic and were presented in Facebook format, that is, containing image, title, and brief text (see Figure 1 for examples). We opted for Facebook format (instead of tweets or Instagram) because Facebook is by far the most popular social network in Slovakia (StatCounter Global Stats, 2024), with 60% of population using it (NapolenCat Stats, 2021). Moreover, Facebook is popular also among the older participants, and during the pandemic, it was a major source of information for large segments of population (Lazer et al., 2023). We generated four different frames for each story—the neutral frame, the emotionally charged image frame, the clickbait title frame, and the high number of interactions (i.e., likes, comments and shares) frame.

Each participant was shown each of the 16 stories exactly once, in a randomly selected frame and for each story was asked to rate (a) the trustworthiness of the story, (b) their willingness to share the story, and (c) whether the information contained in the story was consistent with their beliefs. We controlled for the order effect by randomly assigning participants into two conditions—the condition in which the trustworthiness question was always asked first and the condition in which the willingness to share question was always asked first. The consistency question was asked as the last one in both conditions.

3.4 | Predictors of fake news discernment

Analytic thinking was measured by the number of correct answers to the six items from the modified cognitive reflection test: two from the numerical version (Frederick, 2005) and four from the verbal version (Sirota et al., 2020). For example, the question “If you run a race, and you pass the person in second place, which place are you at now?” has a correct answer of “second” and incorrect but perhaps more intuitive answer of “first.”

Our measure of scientific reasoning was based on the Scientific Reasoning Scale (Drummond & Fischhoff, 2017). We measured the number of correct answers to the six items developed by Bašnáková et al. (2021). For example, in the “causation versus correlation” item, participants indicated whether they agree or disagree with the statement “A researcher wants to find out how to increase natality. He asks for statistical information and sees that there are more children born in cities that have more hospitals. This finding implies that building new hospitals will increase the birth rate of a population.”

To measure conspiracy mentality, we used five-item questionnaire from Bruder et al. (2013), in which statements were modified to COVID-19 context, for example, “There are secret organizations that greatly influence political decisions about COVID-19 pandemic.” Participants indicated their agreement with the statements on a 7-point Likert scale (from 1 = completely disagree to 7 = completely agree).

Unfounded beliefs about COVID-19 were measured by 18 items from the C19-NP scale (Teličák & Halama, 2023). The scale consists of five items ($\alpha = .88$) measuring pseudoscientific beliefs about prevention measures (e.g., “Antigen testing for COVID-19 is dangerous and harmful to health.”), six items ($\alpha = 0.85$) measuring pseudoscientific beliefs about treatment (e.g., “Alternative medicine shows to be one of the best

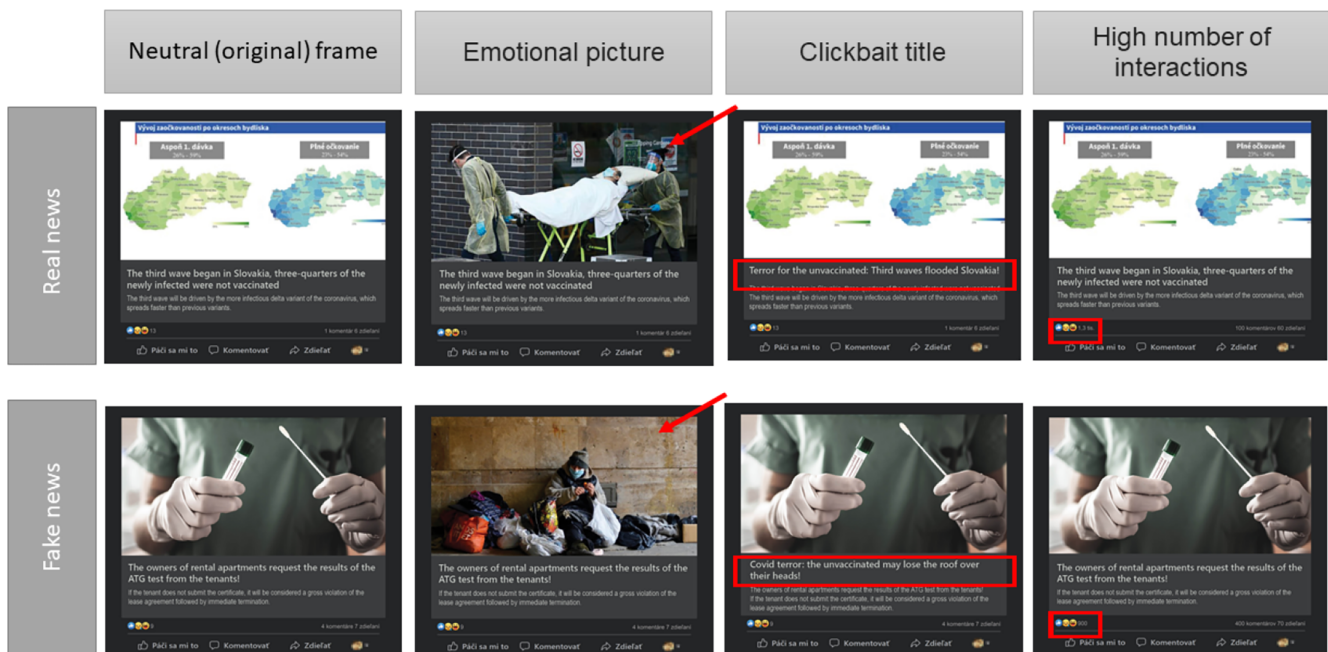


FIGURE 1 Implemented framing of fake and real news stories. Full set is available at: <https://osf.io/25gns/>.

TABLE 1 Descriptive statistics of conjectured predictors.

	Mean	SD	Min	Max	α
Analytic thinking	2.47	1.62	0	6	.64
Scientific reasoning	3.95	1.55	0	6	.56
Unfounded beliefs about C19	43.64	18.27	18	90	.96
Conspiracy mentality	4.01	1.80	1	7	.92
Self-assessed fake news discernment	7.56	2.03	1	10	-
Number of observations	1838	1838	1838	1838	1838

Note: The table shows means, standard deviations (SD), scale range, and Cronbach's α .

TABLE 2 Outcomes (means and standard deviations) for real and fake news by emotional frames.

Frame	Real news—mean (SD)			Fake news—mean (SD)		
	Trustworthiness	Willingness to share	Cons. with prior beliefs	Trustworthiness	Willingness to share	Cons. with prior beliefs
Neutral	2.51 (1.39)	1.75 (1.20)	2.42 (1.41)	1.93 (1.21)	1.55 (1.09)	1.90 (1.26)
Picture	2.46 (1.39)	1.72 (1.21)	2.37 (1.41)	1.88 (1.21)	1.51 (1.06)	1.87 (1.26)
Title	2.37 (1.38)	1.71 (1.19)	2.29 (1.39)	1.90 (1.21)	1.57 (1.10)	1.89 (1.26)
Likes	2.50 (1.37)	1.75 (1.21)	2.38 (1.39)	1.90 (1.21)	1.52 (1.06)	1.86 (1.24)
Total (N = 14,704)	2.46 (1.38)	1.73 (1.20)	2.37 (1.40)	1.90 (1.21)	1.54 (1.08)	1.88 (1.26)

Note: All outcomes are measured on a 1–5 Likert scale.

treatments of COVID-19.”), and seven items ($\alpha = 0.96$) measuring conspiracy beliefs, (e.g., “COVID-19 pandemic was artificially created to spread fear so that population is controlled more easily.”). Participants indicated their agreement with the statements on a 5-point Likert scale (1 = completely disagree to 5 = completely agree).

Self-assessment of media literacy was measured by asking participants to rate their agreement with a statement “To what extent do you think you can distinguish trustworthy from untrustworthy information?” on a scale from 1 (= not at all) to 10 (= completely). The descriptive statistics and reliability estimates for our conjectured predictors of fake news discernment are presented in Table 1.

3.5 | Behavioral measure

Finally, we asked participants about their vaccination status on a scale of: 1 = I am not vaccinated and I do not plan to get vaccinated (33.8%), 2 = I am not vaccinated, but I plan to get vaccinated (5.4%), 3 = I am partly vaccinated (one dose of two doses) (1%), and 4 = I am fully vaccinated (59.7%).

4 | RESULTS

Summary statistics of trustworthiness, willingness to share, and belief consistency in all four emotional frames for both real and fake stories are presented in Table 2 and Figure 2. These summaries show that our participants judged real news as significantly more trustworthy than fake news ($t = 36.84, p < .001$, Cohen's $d = 0.43$) and were also

more willing to share them ($t = 14.79, p < .001$, Cohen's $d = 0.17$). Real news used in the survey were also more likely to be consistent with our participants' beliefs ($t = 31.26, p < .001$, Cohen's $d = 0.36$).

Full correlational matrix presenting relationships between the main variables is presented in Appendix (Table A.1). Table 3 presents the results of ordinary least squares (OLS) regressions with clustered standard errors at the participant level testing the effects of belief consistency, question order and emotional frame on trustworthiness, and willingness to share presented news. Models 1 and 2 confirm our earlier analysis and show that fake stories are being considered significantly less trustworthy and are significantly less likely to be shared than real ones. In addition, we find that order of questions matters. If the question about trustworthiness comes first, participants express more trust in the stories but are less willing to share them compared with the condition in which the question about willingness to share comes first and vice versa. However, the explanatory power of these models is rather weak. Therefore, we also include Models 3 and 4 in which we control for the consistency with prior beliefs, which strongly correlates with both trustworthiness and willingness to share, and substantially increases the explained variance. Interestingly, Model 4 shows that when consistency with prior beliefs is controlled for, participants are more willing to share fake news compared with real news.

Result 1. Consistency with prior beliefs is the strongest predictor of trustworthiness as well as willingness to share both real and fake news. Belief-consistent fake news is more likely to be shared than belief-consistent real news.

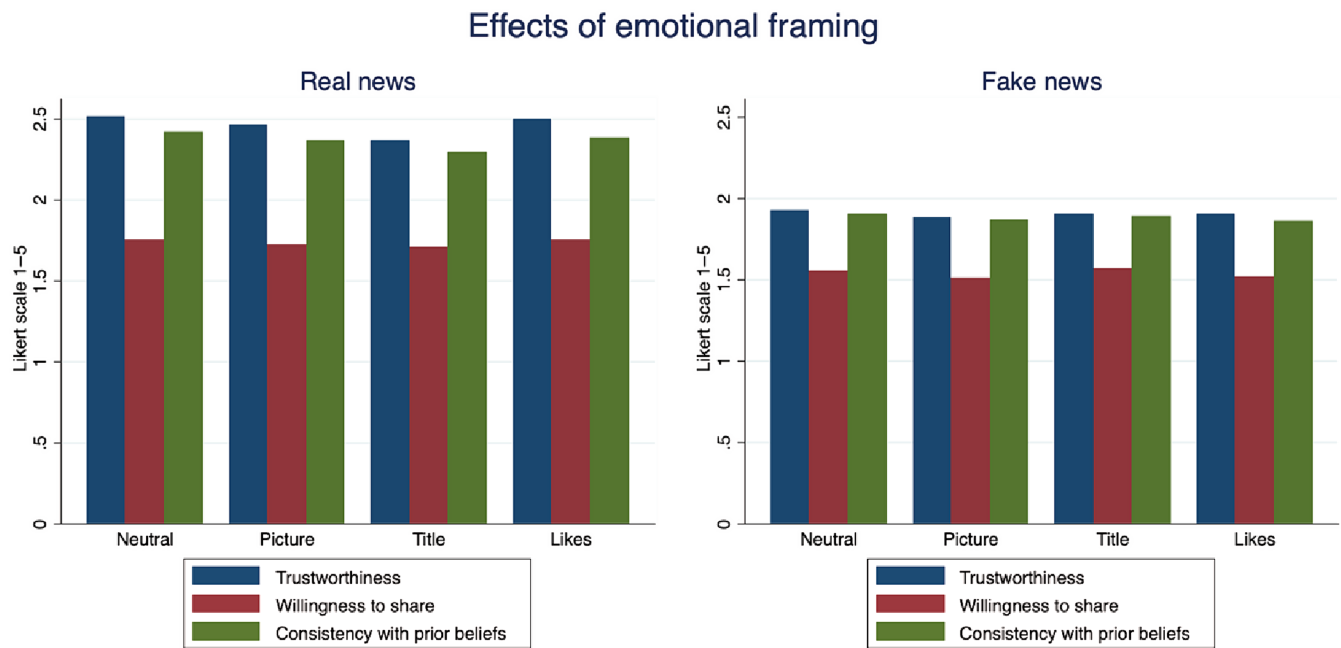


FIGURE 2 Ratings of trustworthiness, willingness to share, and belief consistency for real and fake news by emotional frame.

TABLE 3 Effect of experimental manipulations and belief consistency on trust and sharing.

	(1)		(2)		(3)		(4)	
	Trust		Share		Trust		Share	
	<i>b</i>	(SE)	<i>b</i>	(SE)	<i>b</i>	(SE)	<i>b</i>	(SE)
Trust question first	0.10***	(0.03)	−0.08*	(0.04)	0.08***	(0.02)	−0.10***	(0.03)
Fake news	−0.56***	(0.03)	−0.20***	(0.02)	−0.18***	(0.01)	0.05***	(0.01)
Picture	−0.05*	(0.02)	−0.03	(0.02)	−0.02	(0.01)	−0.01	(0.02)
Title	−0.08***	(0.02)	−0.01	(0.02)	−0.03*	(0.01)	0.02	(0.02)
Likes	−0.02	(0.02)	−0.02	(0.02)	0.01	(0.01)	0.01	(0.02)
Belief consistency					0.78***	(0.01)	0.50***	(0.01)
Constant	2.45***	(0.03)	1.79***	(0.03)	0.58***	(0.02)	0.59***	(0.03)
<i>N</i>	29,408		29,408		29,408		29,408	
<i>R</i> ²	.05		.01		.66		.35	

Note: Entries are coefficients from ordinary least squares regressions, with standard errors (SE) in parentheses. All independent variables (except for belief consistency variable) are dummy variables with a value of 1 if true and 0 otherwise.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Next, we examine the effects of emotional framing. OLS regressions presented in Table 3 show that clickbait title has negative effect on trustworthiness, even after controlling for belief consistency. While Model 1 shows significant negative effect of emotional picture on trustworthiness, when consistency with prior beliefs is controlled for in Model 3, the effect becomes insignificant. Finally, we find that number of interactions yield no significant effects on trustworthiness or willingness to share presented stories.

Result 2. Emotional pictures and higher number of interactions have no effect on trustworthiness and

willingness to share fake or real news. Clickbait title has a weak negative effect on trustworthiness and no effect on willingness to share.

To test our Hypothesis 3 regarding cognitive and belief predictors of trustworthiness and willingness to share real and fake news, we run OLS regressions presented in Table 4. The regressions show mixed support for our hypothesis. In particular, we find that both analytic thinking and scientific reasoning are significantly negatively associated with willingness to share presented stories, regardless of whether the stories are real or fake. When it comes to trustworthiness, participants with

TABLE 4 Effects of cognitive and belief variables on trust and sharing of the news.

	(1)		(2)		(3)		(4)		(5)	
	Trust—real		Share—real		Trust—fake		Share—fake		Fake news discernment	
	<i>b</i>	(SE)	<i>b</i>	(SE)	<i>b</i>	(SE)	<i>b</i>	(SE)	<i>b</i>	(SE)
Analytic thinking	0.01	(0.01)	−0.06***	(0.01)	0.01	(0.01)	−0.03**	(0.01)	−0.01	(0.01)
Scientific reasoning	−0.00	(0.01)	−0.06***	(0.01)	−0.02*	(0.01)	−0.04***	(0.01)	0.01	(0.01)
Conspiracy mentality	−0.02	(0.01)	−0.03	(0.02)	0.00	(0.01)	−0.03*	(0.01)	−0.10***	(0.02)
C19 unfounded beliefs	−0.00*	(0.00)	0.01***	(0.00)	0.01***	(0.00)	0.01***	(0.00)	−0.03***	(0.00)
Belief consistency (real)	0.77***	(0.02)	0.56***	(0.02)						
Belief consistency (fake)					0.72***	(0.03)	0.59***	(0.03)		
Constant	0.79***	(0.08)	0.51***	(0.09)	0.33***	(0.05)	0.44***	(0.07)	2.44***	(0.08)
<i>N</i>	1838		1838		1838		1838		1838	
<i>R</i> ²	.72		.34		.75		.52		.52	

Note: Entries are coefficients from ordinary least squares regressions, with standard errors (SE) in parentheses.

**p* < .05.

***p* < .01.

****p* < .001.

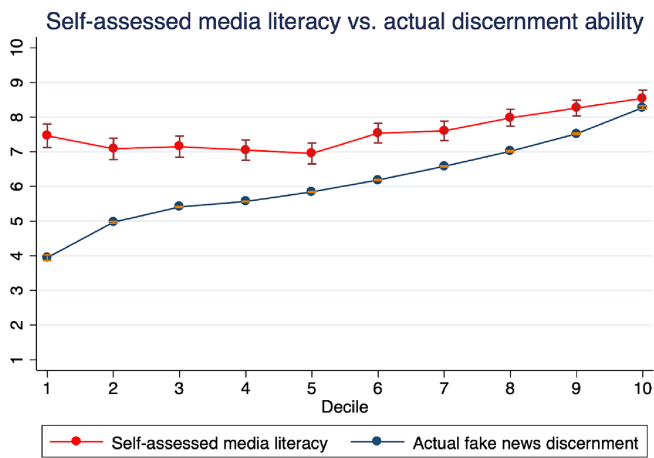


FIGURE 3 Self-reported media literacy versus actual fake news discernment ability.

higher scientific reasoning put significantly less trust in fake stories but we find no effect on real stories. Analytic thinking shows no apparent association with trust in real nor fake stories. Finally, the regressions show that participants who scored higher on COVID-19 unfounded beliefs scale put less trust in real and more trust in fake stories and are more willing to share both types of stories. However, we note that all the presented effects of cognitive and belief-based predictors are rather small in their size.

We also test the effects of cognitive and belief predictors on fake news discernment (i.e., the ability to distinguish between real and fake stories, calculated by subtracting fake news trustworthiness ratings from real news trustworthiness ratings, see e.g. Pennycook & Rand, 2019a, 2019b). The regression Model 5 in Table 4 shows that fake news discernment is lower with higher conspiracy mentality and COVID-19 unfounded beliefs scores. We find no association between fake news discernment and analytic thinking nor scientific reasoning.

Result 3. Scientific reasoning significantly negatively correlates with trust in fake news. Willingness to share fake news is significantly negatively associated with both analytic thinking, and scientific reasoning. Holding unfounded beliefs correlates significantly positively with trust in related fake news and willingness to share it, while significantly negatively with the ability to distinguish between real and fake news. Fake news discernment is strongly negatively associated also with conspiracy mentality.

Next, we investigate how accurately our participants can self-evaluate their ability to distinguish between real and fake stories. Similarly to studies regarding political content knowledge (Amazeen & Bucy, 2019; Brashier et al., 2021; Vegetti & Mancosu, 2020), we find significant positive correlation between fake news discernment and self-assessed media literacy ($r = .20, p < .001$). In addition, we investigate how closely fake news discernment and self-assessed media literacy match in absolute terms. We divide participants into deciles based on their actual discernment scores, calculate the average discernment score for each decile, rescale these averages to the scale on which we measure self-assessed media literacy (from 1 to 10), and then compare the two measures for each decile. Results are presented in Figure 3. We find that self-assessed media literacy is higher than actual fake news discernment in all deciles (t -test, $p < .001$ in all deciles except for 10th decile where $p = 0.03$), meaning that our participants generally show overconfidence in their discernment ability. The overconfidence is most pronounced for those with the lowest discernment score.

Result 4. While people can estimate their true ability to distinguish between real and fake COVID-19-related news to some extent, they are mostly overconfident.

TABLE 5 Comparison of vaccinated and nonvaccinated participants in measured variables.

	Anti-vax (N = 621)		Pro-vax (N = 1217)		t-test	p-value	Cohen's <i>d</i>
	Mean	(SD)	Mean	(SD)			
Real news—trust	2.04	(0.73)	2.67	(0.82)	−16.15	<.001	−0.80
Real news—share	1.62	(0.77)	1.79	(0.92)	−4.11	<.001	−0.20
Real news—consistency	1.93	(0.78)	2.59	(0.87)	−16.03	<.001	−0.79
Fake news—trust	2.34	(0.86)	1.68	(0.69)	17.85	<.001	0.88
Fake news—share	1.91	(1.00)	1.35	(0.66)	14.46	<.001	0.71
Fake news—consistency	2.36	(0.91)	1.63	(0.74)	18.51	<.001	0.91
Fake news discernment	−0.30	(0.84)	1.00	(0.94)	−29.00	<.001	−1.43
Analytic thinking	2.33	(1.57)	2.54	(1.63)	−2.68	0.008	−0.13
Scientific reasoning	3.80	(1.50)	4.03	(1.57)	−2.95	0.003	−0.15
Conspiracy mentality	5.28	(1.44)	3.36	(1.60)	25.10	<.001	1.24
C19 unfounded beliefs	58.23	(14.27)	36.20	(15.37)	29.77	<.001	1.47

Finally, we examine whether beliefs in fake COVID-19 news manifest in actual behavior represented by vaccination status. Since we find strong correlation between fake news discernment and vaccination status ($r = .58, p < .001$), we proceed to investigating whether our key measures (i.e., trust in presented stories, willingness to share them, and their belief consistency) differ across individuals with different COVID-19 vaccination attitudes. We divide our participants into two groups by their response to the vaccination question. The “Anti-vax” group consists of 621 participants who indicated that they are not vaccinated and also have no intentions to get vaccinated in the future, while the “Pro-vax” group consists of 1217 participants who were already vaccinated at the time of the survey or at least planned to get vaccinated. Table 5 presents summary statistics for our measures by the two groups and also *p*-values of *t*-tests comparing the respective outcomes.

We find that “Anti-vax” participants trust fake COVID-19 stories significantly more and real COVID-19 stories significantly less than “Pro-vax” participants, and the same holds for willingness to share these stories and for consistency of these stories with their prior beliefs.ⁱⁱⁱ Furthermore, we find that “Anti-vax” participants believe in fake stories even more than in real ones and are more willing to share them. We also find that “Anti-vax” participants score significantly less on both scientific reasoning and analytic thinking scale while significantly more on conspiracy mentality and unfounded beliefs scale. These results imply that some groups of people may be significantly more vulnerable to fake news than others.

Result 5. Refusal to get vaccinated is associated with higher beliefs in COVID-19 fake news and lower beliefs in COVID-19 real news.

5 | DISCUSSION

In this paper, we examine the role of emotional framing as well as cognitive and belief predictors on trusting and sharing of real and fake

news about the COVID-19 pandemic. Our main aim was to expand on previous research by examining the role of analytic thinking, scientific reasoning, conspiracy mentality and related unsubstantiated prior beliefs on trust in and sharing of fake news, and to explore the association between pandemic-related beliefs and actual behavior, represented by vaccination status. Similarly to results of Luo et al. (2022), we observe that our participants are rather suspicious toward all news in general, meaning that ratings of trustworthiness are below scale average for both real news and fake news. In line with previous research (e.g., Faragó et al., 2023; Pennycook & Rand, 2019b), fake news in our study are on average trusted significantly less than real news, and people are also less willing to share it.

However, we identify a substantial subpopulation (approximately one-third of our sample) consisting of people that refuse to get vaccinated, for which the results are exactly the opposite. These participants put significantly more trust in fake than real COVID-19 news and are also more willing to share it. In addition, they have stronger beliefs in other unfounded COVID-19-related content, which further increases the chances to fall for any new disinformation (Lobato et al., 2014), and score lower on both analytic thinking and scientific reasoning scales. These findings seem to be in line with research suggesting that scientific reasoning helps to prevent acquiring unfounded beliefs, which are an important driver of unwanted behavior, including noncompliance with recommended health practices (Čavojová et al., 2023). Our results also suggest that people who are more vulnerable to believing fake news about COVID-19 may be identified, besides cognitive and belief predictors, also on the basis of their vaccination behavior.

Our findings, highlighting strong association between conspiracy beliefs, lack of discernment of fake news and taking unnecessary health risks by refusing vaccination pose serious implications for public health. While our cross-sectional design does not allow us to draw causal conclusions, our results corroborate previous findings that vaccination hesitancy can be a result of exposure to conspiracy beliefs (Jolley & Douglas, 2014; van Mulukom et al., 2022). Moreover, given that many conspiracy narratives (especially those about COVID-19)

target authorities, such as government and medical establishment, they undermine trust in these institutions (Merva et al., 2024).

In addition, beliefs in conspiracy theories often lead people to look for “alternative” sources of information, usually those that support their views (Jonas et al., 2001; Stanovich, 2021; Vedejová & Čavojová, 2021). These alternative sources then usually strengthen beliefs in other conspiracy theories as well (Campbell, 2002), making people even more vulnerable to misinformation. This can be exploited by politicians and public figures spreading disinformation for their political and monetary gains and can result in public health threats, such as refusal of vaccination and increased death rates (Pažitný et al., 2023). In fact, Slovakia has one of the lowest vaccination rates against COVID-19 (47% of population fully vaccinated vs. 67% world average) (Holder, 2021). Distrust in COVID-19 vaccination in Slovakia was actively fueled by opposition political parties, which employed conspiracy theories to undermine pandemic measures and trust in government, thereby effectively linking the issue of vaccination with political preferences.

We also find that while in general, willingness to trust and share real news is higher compared with fake news, participants are more willing to share belief-consistent fake news than belief-consistent real news. Perhaps people find accurate but mundane news unworthy of sharing and are more likely to share more obscure news in case they find it “interesting” and generally in line with their attitudes (“Even if this particular piece might not be true, COVID is overrated and it could be true.”). Such behavior can be explained by preference-based account (Pennycook & Rand, 2021) which posits that people place their preference for (political) identity or other motives (e.g., virtue signaling) above the truth despite recognizing that the content is probably not true. In Pennycook’s study (Pennycook, Epstein, et al., 2021), this was true for 16% of false headlines. Such sharing behavior may contribute to the observation that fake news spreads faster and wider (Chua & Banerjee, 2018; King & Wang, 2021; Shin et al., 2018) and receives more interactions on social media in comparison with real news (Silverman et al., 2016). This, coupled with the evidence that prior exposure to fake news headlines increases the perceived accuracy of fake news (Pennycook et al., 2018), creates a worrisome trend. Perhaps, future studies could design and test interventions specifically aimed at such sharing of belief-consistent fake news as a means of communicating one’s (political) identity or virtue signaling.

We also explore the relative strength of cognitive and belief predictors on trust and sharing of COVID-19 stories and fake news discernment. In contrast with previous research (Farágó et al., 2023; Pennycook, McPhetres, et al., 2021; Pennycook & Rand, 2019b, 2021), analytic thinking is not an important predictor of trust in our study. On the other hand, scientific reasoning significantly negatively associates with trust in fake news (but not real news). Scientific reasoning proves to be a more important predictor of the endorsement of unfounded beliefs (e.g., conspiracy beliefs and pseudoscience) than analytic thinking/critical thinking in several similar studies (Čavojová et al., 2020, 2022; Čavojová & Ersoy, 2020), probably because COVID-19 disinformation requires more specific skills to evaluate its accuracy. For fake news discernment, we find conspiracy mentality

and COVID-19-related unfounded beliefs to be significant positive predictors, but we find no effects of analytic thinking or scientific reasoning. This is in contrast with Pennycook et al. (2020) study which finds that basic science knowledge is positively associated with truth discernment for COVID-19 (mis)information. Our study, similarly to the discussion of Pennycook and Rand (2021) and Tappin et al. (2021) suggests that prior beliefs are more important predictors of vulnerability to fake news than reasoning.^{iv}

In general, our results are more consistent with identity-based account (Van Bavel & Pereira, 2018) than attention-deficit account (Pennycook & Rand, 2019b). In other words, it seems that even though willingness to engage in more effortful thinking is important when judging whether some new piece of information is trustworthy, people in general rely more on their prior beliefs that are often affected by their ideological beliefs and partisanship. Such conclusion is supported by Rathje et al. (2020) who provide evidence that when people acquire unfounded beliefs from political figures they support, the ideology and prior beliefs play much stronger role than analytic and scientific thinking. Nevertheless, majority of literature engaging in the debate of relative power of analytical thinking versus ideology (such as partisanship) is based on findings from Northern American participants and countries with two-party political system. Our results stress the importance of studying the effects of analytical thinking also in other cultural and ideological environments (Henrich et al., 2010).

When it comes to emotional framing, we find no effects of emotional pictures or high number of social media interactions while finding a weak negative effect of clickbait title on trustworthiness. It seems possible that people are already relatively well aware of techniques that evoke negative emotions such as clickbait titles and thus put less trust in such content (Greškovičová et al., 2022; Roozenbeek et al., 2020; Roozenbeek & van der Linden, 2019). Our manipulation of increasing the number of interactions was not sufficient to induce “bandwagon effect” (Luo et al., 2022), probably because of already strongly held prior beliefs about the topic, as evidenced by the predictive power of COVID-19-related unfounded beliefs and belief consistency, or because different virality metrics (e.g., likes vs. shares) have distinct effects (Kim, 2018).

6 | CONCLUSION

Health-related fake news can pose risk to public health by decreasing willingness to take preventive actions, such as vaccination. Our study shows that unvaccinated people are not only more likely to trust and share fake news about COVID-19 but also hold more conspiracy beliefs in general and have slightly lower analytic and scientific thinking abilities. Given that consistency with prior beliefs is the strongest predictor of trustworthiness as well as willingness to share both real and fake news, our findings highlight the danger of allowing the spread of disinformation into the public discourse. At the same time, our results show that fake news and disinformation are often tailored to match the already-held views of the targeted and most vulnerable populations.

AUTHOR CONTRIBUTIONS

V.Č.: Conceptualization; investigation; methodology; writing—original draft; writing—review and revision. M.L.: Conceptualization; data curation; formal analysis; visualization; writing—original draft; writing—review and revision. J.Š.: Conceptualization; investigation; methodology; writing—review and revision.

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CONFLICT OF INTEREST STATEMENT

The authors declare that there is no conflict of interest.

DATA AVAILABILITY STATEMENT

The materials for the whole project are publicly available at: <https://osf.io/7yuhj/> and the dataset generated and/or analyzed during the current study is available in the OSF repository, <https://osf.io/25gns/>.

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ENDNOTES

ⁱ Project materials are available online at <https://osf.io/28vs4/>. Given that the mentioned larger data collection is a longitudinal project with three planned waves of data collection, the sample size for the first wave (and thus also our study) was determined to be at least 2000 participants, so that accounting for expected 25% attrition rate in each successive wave, the longitudinal dataset will consist of approximately 1000 participants.

ⁱⁱ We report our sample size determination, all data exclusions, all manipulations, and all measures in the study in accordance with JARS (Kazak, 2018). Data were analyzed using STATA software. Study design and analysis were not preregistered. Project materials are available at <https://osf.io/25gns/>.

ⁱⁱⁱ This result is similar to Montagni et al. (2021) study which finds that acceptance of COVID-19 vaccine is associated with ability to detect fake news and health literacy. While in Montagni et al. (2021), participants are asked about their willingness to get vaccinated, our study utilizes actual vaccination status.

^{iv} In addition, Gawronski (2021) criticizes Pennycook's and Rand's (2021) dismissal of partisan bias in fake news discernment, arguing that even in their study, participants show greater overall belief in concordant news and that the effect of prior (ideological) beliefs is larger than the effect of analytic thinking.

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APPENDIX A

TABLE A.1 Correlations between main variables.

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. Conspiracy mentality	-										
2. C19 unfounded beliefs	.828***	-									
3. Scientific reasoning	-.212***	-.265***	-								
4. Analytic thinking	-.202***	-.247***	.359***	-							
5. Real news trust	-.335***	-.350***	.054*	.084**	-						
6. Real news share	-.030	.016	-.173**	-.157***	.491***	-					
7. Real news consistency	-.306***	-.320***	.031	.054*	.843***	.523***	-				
8. Fake news trust	.514***	.594***	-.214***	-.131***	.137***	.273***	.099***	-			
9. Fake news share	.419***	.508***	-.243***	-.192***	.048*	.554***	.085**	.730***	-		
10. Fake news consistency	.517***	.591***	-.197***	-.137***	.082**	.278***	.187***	.856***	.702***	-	
11. Fake news discernment	-.643***	-.715***	.201***	.163***	.674***	.178***	.581***	-.639***	-.507***	-.574***	-
12. Self-assessed media literacy	-.163***	-.229***	.125***	.157***	.117***	-.005	.062**	-.141***	-.123***	-.144***	.196***

Note: N = 1838.

* $p < .05$. ** $p < .01$. *** $p < .001$.