BRIEF REPORT

# Impressions of science and healthcare professionals who share anti-science conspiracy theories [version 1; peer review: 3 approved]

Ricky Green, Daniel Toribio-Flórez, Karen M. Douglas

School of Psychology, University of Kent, Canterbury, Kent, CT2 7NP, UK

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## Abstract

**Background:** The majority of science and healthcare professionals agree with the scientific consensus on issues such as anthropogenic climate change and the safety and efficacy of vaccines. However, a small number of professionals diverge from this consensus and espouse conspiracy theories arguing, for example, that climate change is a hoax and that the dangers of vaccines are being hidden by greedy pharmaceutical companies. What impressions do people make of conspiracy-sharing professionals and, importantly, would people follow their advice? We aimed to answer these questions in a brief report comprising of two preregistered experiments.
**Methods:** In Experiment 1 (*N* = 296) participants rated their impressions of a scientist who endorsed (vs. refuted) climate change conspiracy theories, and indicated their willingness to follow the scientist's advice. Experiment 2 (*N* = 280) followed a similar method but focused on a healthcare professional who endorsed (vs. refuted) mRNA vaccine conspiracy theories. In a control condition, the professional provided neutral information.
**Results:** In both experiments, people formed negative impressions of the conspiracy-sharing professional, perceiving them to be less trustworthy, honest, brave (Experiment 1 only), credible, intelligent, less able to effect change, and more of an outsider and a fraud. They also showed less willingness to follow the professionals' advice. However, participants' own conspiracy beliefs shaped these impressions, with stronger negative impressions found among participants with weaker conspiracy beliefs. Notably, higher conspiracy believers perceived the conspiracy-sharing professionals as braver.
**Conclusions:** These findings suggest that scientific and healthcare professionals who share conspiracy theories are perceived negatively, and people are less willing to follow advice. However, this is moderated by participants' own conspiracy beliefs.

**Open Peer Review**

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1. **Jasna Milošević-Đorđević**, Singidunum University, Belgrade, Serbia
2. **Shauna Bowes**, Vanderbilt University, Nashville, USA
3. **Matt Motta**, Boston University, Boston, USA

Any reports and responses or comments on the article can be found at the end of the article.

**Keywords**
conspiracy theories, conspiracy beliefs, vaccines, climate change, impression-formation, consequences

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**Corresponding author:** Ricky Green (r.green-458@kent.ac.uk)

**Author roles: Green R**: Conceptualization, Data Curation, Formal Analysis, Investigation, Methodology, Project Administration, Resources, Visualization, Writing – Original Draft Preparation, Writing – Review & Editing; **Toribio-Flórez D**: Conceptualization, Investigation, Methodology, Writing – Review & Editing; **Douglas KM**: Conceptualization, Funding Acquisition, Investigation, Project Administration, Supervision, Writing – Review & Editing

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## Introduction

Recently, the ecologist and co-founder of Greenpeace, Dr Patrick Moore, questioned the consensus on climate change, stating that it is "bought and paid for" and that scientists and the media are "all in cahoots together, making a whole pile of money out of this" (BizNewsTv, 2023). A UK National Health Service consultant surgeon, Mohammad Iqbal Adil, recently posted videos online declaring COVID-19 a hoax (Dyer, 2020; see also Dyer, 2023). Professionals and other trusted sources in scientific and medical fields sometimes share conspiracy theories such as these, and the current research examined the reputational consequences for professionals who do so. Specifically, we examined the effects of sharing conspiracy theories on perceptions of professionals' credibility, trustworthiness, and on people's intentions to follow their advice. We also examined the extent to which people's own conspiracy beliefs influence their impressions of professionals who share them.

## Conspiracy theories and their reputational consequences

Conspiracy theories are beliefs that two or more people have coordinated in secret to achieve an outcome, and that their conspiracy is of public interest, but not public knowledge (Douglas & Sutton, 2023). Conspiracy theories surround many events and circumstances of public importance, and are prevalent in the domains of science and health (Andrade, 2020; Uscinski *et al.*, 2017). Research suggests that such conspiracy theories can have negative consequences such as increasing vaccine hesitancy (Bertin *et al.*, 2020), and reducing people's commitment to climate change initiatives (Biddlestone *et al.*, 2022).

Research also suggests that conspiracy theories are stigmatized beliefs (Lantian *et al.*, 2018). Indeed, people are reluctant to use the label "conspiracy theory" to describe their own beliefs (Douglas *et al.*, 2022). Recent research suggests that this concern may be legitimate. For example, Green and colleagues (2023a) demonstrated that a fictitious politician who shared a political conspiracy theory was viewed as less trustworthy, predictable, competent, and less likely to win votes. However, not all impressions were necessarily negative. The conspiracy-sharing politician was also perceived as a political outsider or "rogue" who seems able to effect change. Importantly, these effects were conditional on participants' own conspiracy beliefs, being more pronounced among people with stronger conspiracy beliefs. In the current research, we extend these findings to investigate the consequences for professionals who share conspiracy theories about science and health.

## The current research

We conducted two experiments. In Experiment 1 (preregistration: https://doi.org/10.17605/OSF.IO/7W32G) we examined people's perceptions of a scientist who endorsed (vs. refuted) climate change conspiracy theories, and their intentions to follow the scientist's advice. In Experiment 2 (preregistration: https://doi.org/10.17605/OSF.IO/KZ4PQ), we examined people's perceptions of a healthcare professional who endorsed (vs. refuted) mRNA vaccine conspiracy theories, and their intentions to follow the healthcare professional's advice. In Experiment 2, we also introduced a control condition in which the professional shared neutral information about how mRNA vaccines achieve immunity. We did so to clarify whether any observed effects were primarily driven by the healthcare professional's stance on conspiracy theories (endorsing vs. refuting), or also by general discussion of vaccines. Additionally, in both experiments we explored whether participants' own climate change and mRNA vaccine conspiracy beliefs, respectively, moderated their impression-formation and intentions to follow the professionals' advice.[1] All materials and data can be found here: https://osf.io/mxswr (DOI: 10.17605/OSF.IO/MXSWR).

In both studies, we hypothesised that professionals who shared conspiracy theories (vs. refuted or neutral in Experiment 2) would be rated as less honest, trustworthy, intelligent, and credible, and more fraudulent. However, we also predicted that the conspiracy-sharing professionals would be viewed as more of an outsider or "rogue", brave, and capable of effecting change. Finally, we hypothesised that participants would be less likely to follow the conspiracy-sharing professional's advice.

## Ethical approval

The experiments were approved by the University of Kent Research Ethics Committee (Experiment 1: approval 202316727640278098, January 1, 2023; Experiment 2: approval 202216696461028046, November 28, 2022). Informed consent was obtained from all participants prior to their participation, and no participants were under the age of 18.

## Experiment 1

### Methods

***Participants and design.*** We used Qualtrics survey software to collect data. Participant recruitment started and finished on January 19, 2023. As pre-registered, we stopped data collection when 300 participants had been recruited and excluded those who incorrectly answered an attention check from the main analyses.

Participants were recruited via Prolific ($n$ = 301). We excluded five participants who failed an attention check. The final sample was 296 participants (49.8% male, 46.8% female, 2.7% other, 0.7% rather not say; $M_{age}$ = 39.06, $SD_{age}$ = 14.18, range = 18–79 years). All participants were paid a small fee. On average, participants took 6 minutes and 5 seconds ($SD$ = 4 minutes and 10 seconds) to complete the survey.

The experiment was a two-group (pro-conspiracy vs. anti-conspiracy) between-subjects design. Sensitivity power analysis in G*Power (Version 3.1, Faul *et al.*, 2007) revealed that a sample size of $N$ = 296 has 90% power to detect effect sizes as small as $d$ = .38 between two groups ($n$ = 145 and $n$ = 151) when assuming an alpha level of 0.05 and a two-tailed test.

[1] Due to space constraints, in both experiments we do not report some exploratory findings related to participants' perception that other professionals would share the information, their behavioural intentions regarding climate change and vaccines, their trust in scientific institutions generally, and their general conspiracy beliefs.

***Materials and procedure.*** Participants were randomly allocated to one of the two experimental conditions. In both conditions, participants were presented with a fictious statement from an unnamed scientist. The pro-conspiracy scientist stated that global warming was a myth propagated for financial gain (i.e., "There is ample evidence that global warming is a myth. … Climate scientists make so much money from their research that they are motivated to cover up their findings that show the truth…"), and the anti-conspiracy scientist stated that global warming was a human-induced and emphasised the reality of the problem (i.e., "There is ample evidence that the globe is warming. … Climate scientists have conducted careful research over decades that show the reality of the problem…").

All participants then indicated their impressions of the scientist across different impression measures, presented in random order. We used three-item measures of honesty, trustworthiness, credibility, intelligence, fraudulence, ability to effect change, bravery and being an outsider. Participants also indicated their intentions to follow the scientist's advice. Participants then reported their own climate change conspiracy beliefs (six items; all responses were from 1 = strongly disagree, 7 = strongly agree). Finally, participants indicated their age and gender.

## Results

We cleaned and analysed the data using IBM SPSS Statistics (Version 29) and used Model 1 of the PROCESS macro (Version 4.3.1, Hayes, 2022) for moderation models.

***Main analyses.*** See Table 1 for zero-order correlations, means, standard deviations, and scale reliability coefficients. We used multivariate ANOVA to test for mean differences in impressions of the scientist between the pro-conspiracy and anti-conspiracy conditions. There was a significant difference in intentions to follow advice and the impression variables, $F(9, 286) = 51.91$, $p < .001$; Pillai's trace = .620, $\eta_p^2 = .62$. Confirming our hypotheses, compared to the anti-conspiracy condition, participants in the pro-conspiracy condition reported lower intentions to follow the scientist's advice, and rated them as being less honest, trustworthy, credible, intelligent, but more of an outsider and a fraud. Contrary to our hypotheses, participants rated the pro-conspiracy (vs. anti-conspiracy) scientist as less brave and less able to effect change (see Table 2 and Figure 1).

We then explored whether impressions of the pro-conspiracy and anti-conspiracy scientists were moderated by participants'

**Table 1. Means, standard deviations, zero-order correlations, and Cronbach's alpha (Study 1).**

| Measures | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. Follow Advice | - | | | | | | | | | |
| 2. Honest | .93 (< .001) | - | | | | | | | | |
| 3. Trustworthy | .94 (< .001) | .96 (< .001) | - | | | | | | | |
| 4. Effect Change | .81 (< .001) | .77 (< .001) | .81 (< .001) | - | | | | | | |
| 5. Brave | .70 (< .001) | .73 (< .001) | .72 (< .001) | .69 (< .001) | - | | | | | |
| 6. Credible | .92 (< .001) | .94 (< .001) | .96 (< .001) | .78 (< .001) | .73 (< .001) | - | | | | |
| 7. Intelligent | .87 (< .001) | .89 (< .001) | .89 (< .001) | .80 (< .001) | .76 (< .001) | .90 (< .001) | - | | | |
| 8. Fraudulent | -.85 (< .001) | -.89 (< .001) | -.88 (< .001) | -.70 (< .001) | -.64 (< .001) | -.88 (< .001) | -.80 (< .001) | - | | |
| 9. Outsider | -.30 (< .001) | -.32 (< .001) | -.32 (< .001) | -.15 (.010) | .02 (.731) | -.33 (< .001) | -.25 (< .001) | .37 (< .001) | - | |
| 10. Conspiracy Belief | .01 (.852) | .07 (.226) | .06 (.331) | .06 (.343) | .11 (.060) | .05 (.426) | .12 (.044) | -.05 (.386) | .19 (.001) | - |
| *M* | 3.78 | 4.24 | 4.03 | 3.48 | 4.52 | 4.25 | 4.12 | 3.30 | 3.49 | 3.21 |
| *SD* | 2.24 | 2.11 | 2.10 | 1.73 | 1.59 | 2.16 | 1.76 | 2.20 | 1.76 | 1.48 |
| α | .99 | .98 | .99 | .97 | .88 | .98 | .95 | .99 | .89 | .82 |

Note: *df* = 294. Conspiracy Belief = Climate change conspiracy belief.

**Table 2. Means and standard deviations by condition, between-subjects effects, and estimated marginal means of experimental manipulation on different types of impressions (Study 1).**

| | Means and standard deviations | | Between-subjects effects | | | | Estimated marginal means | |
|---|---|---|---|---|---|---|---|---|
| | Pro-Conspiracy | Anti-Conspiracy | | | | | | |
| | *M* (*SD*) | *M* (*SD*) | *F* | *p* | $\eta_p^2$ | 95% CI | $p_{Bonf}$ | *d* |
| Follow Advice | 2.31 (1.88) | 5.19 (1.53) | 210.18 | < .001 | .42 | [.32, .52] | < .001 | 1.50 |
| Honest | 2.85 (1.89) | 5.57 (1.31) | 209.12 | < .001 | .42 | [.32, .51] | < .001 | 1.68 |
| Trustworthy | 2.63 (1.80) | 5.38 (1.36) | 219.75 | < .001 | .43 | [.33, .52] | < .001 | 1.72 |
| Effect Change | 2.56 (1.64) | 4.36 (1.31) | 109.50 | < .001 | .27 | [.18, .37] | < .001 | 1.21 |
| Brave | 4.02 (1.79) | 5.00 (1.19) | 31.17 | < .001 | .10 | [.04, .16] | < .001 | 0.65 |
| Credible | 2.79 (1.86) | 5.65 (1.33) | 233.72 | < .001 | .44 | [.35, .54] | < .001 | 1.77 |
| Intelligent | 3.11 (1.73) | 5.08 (1.14) | 134.82 | < .001 | .31 | [.23, .41] | < .001 | 1.34 |
| Fraudulent | 4.76 (1.99) | 1.91 (1.31) | 213.34 | < .001 | .42 | [.33, .54] | < .001 | 1.68 |
| Outsider | 4.53 (1.54) | 2.49 (1.31) | 149.74 | < .001 | .34 | [.25, .43] | < .001 | 1.16 |

Note: *df* = 1, 294. Pro-conspiracy *n* = 145, anti-conspiracy *n* = 151.

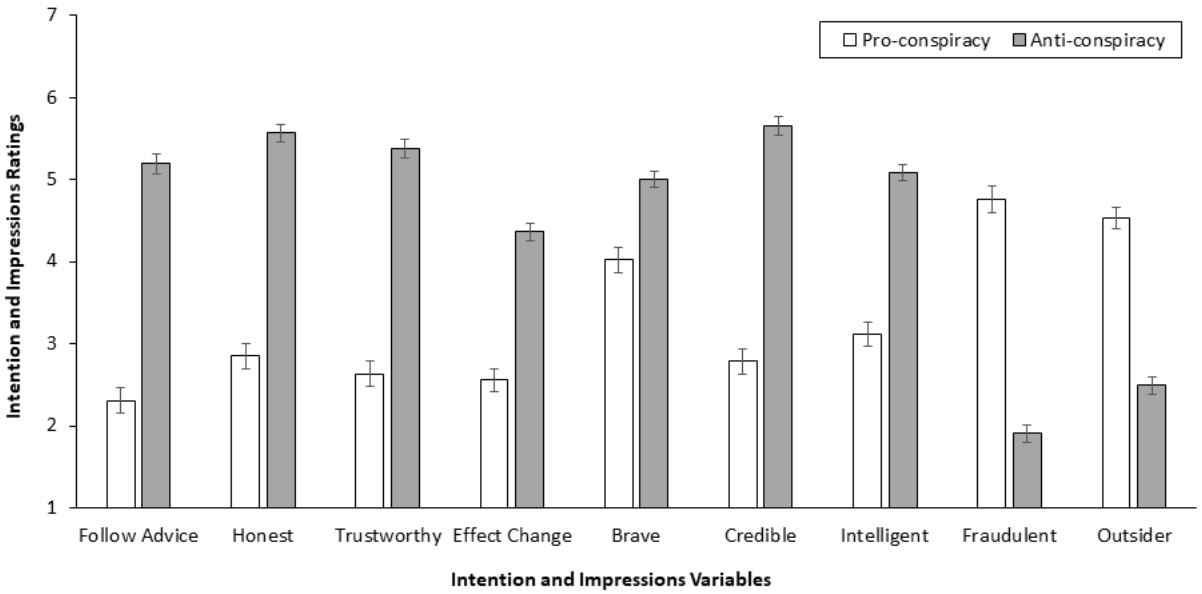


**Figure 1. Impressions of scientist who shares versus refutes a climate change conspiracy theory.** Error bars show standard errors.

own climate change conspiracy beliefs. Significant interactions were found for all variables except for impressions of the scientist being an outsider (see Table 3). For all significant interactions, the effects of the condition were larger among participants with weaker climate change conspiracy beliefs. For impressions of bravery, there was a crossover interaction, indicating that participants with higher climate change conspiracy beliefs perceived the pro-conspiracy scientist as braver than the anti-conspiracy scientist, whereas this effect reversed among participants with lower climate change conspiracy beliefs.

In summary, we found that sharing conspiracy theories negatively affected participants' impressions of a scientist who endorsed (vs. refuted) climate change conspiracy theories. Participants' own climate change conspiracy beliefs moderated

**Table 3. Conditional univariate effects of experimental condition at different levels of climate change conspiracy belief (Study 1).**

| Conditional effects (X on Y) at ± 1 SD of W | | Pro-Conspiracy vs. Anti-Conspiracy | | | |
|---|---|---|---|---|---|
| | | Interaction | -1SD | Mean | +1SD |
| Follow Advice | *b* (*SE*) | **-1.52 (0.10)** | 5.14 (0.21) | 2.89 (0.15) | 0.65 (0.22) |
| | 95% CI | **[-1.72, -1.32]** | [4.72, 5.56] | [2.60, 3.19] | [0.22, 1.07] |
| Honest | *b* (*SE*) | **-1.36 (0.10)** | 4.77 (0.21) | 2.75 (0.15) | 0.74 (0.21) |
| | 95% CI | **[-1.56, -0.17]** | [4.37, 5.18] | [2.47, 3.04] | [0.33, 1.15] |
| Trustworthy | *b* (*SE*) | **-1.35 (0.10)** | 4.78 (0.20) | 2.77 (0.14) | 0.77 (0.20) |
| | 95% CI | **[-1.54, -1.16]** | [4.38, 5.17] | [2.49, 3.06] | [0.37, 1.18] |
| Effect Change | *b* (*SE*) | **-0.85 (0.11)** | 3.07 (0.22) | 1.82 (0.16) | 0.57 (0.22) |
| | 95% CI | **[-1.05, -0.64]** | [2.64, 3.51] | [1.52, 2.13] | [0.14, 1.01] |
| Brave | *b* (*SE*) | **-1.04 (0.10)** | 2.55 (0.21) | 1.01 (0.15) | -0.53 (0.22) |
| | 95% CI | **[-1.24, -0.84]** | [2.13, 2.97] | [0.71, 1.31] | [-0.95, -0.10] |
| Credible | *b* (*SE*) | **-1.36 (0.10)** | 4.90 (0.21) | 2.89 (0.15) | 0.88 (0.21) |
| | 95% CI | **[-1.56, -1.16]** | [4.50, 5.31] | [2.60, 3.18] | [0.47, 1.29] |
| Intelligent | *b* (*SE*) | **-1.07 (0.10)** | 3.60 (0.20) | 2.02 (0.14) | 0.44 (0.20) |
| | 95% CI | **[-1.26, -0.88]** | [3.21, 3.99] | [1.74, 2.29] | [0.04, 0.83] |
| Fraudulent | *b* (*SE*) | **1.36 (0.11)** | -4.90 (0.22) | -2.88 (0.16) | -0.86 (0.22) |
| | 95% CI | **[1.16, 1.57]** | [-5.33, -4.46] | [-3.18, -2.57] | [-1.30, -0.42] |
| Outsider | *b* (*SE*) | -0.17 (0.11) | -1.74 (0.23) | -1.99 (0.17) | -2.25 (0.24) |
| | 95% CI | [-0.39, 0.05] | [-2.20, -1.28] | [-2.32, -1.67] | [-2.71, -1.78] |

Note: Significant interactions between the experimental conditions and moderation variables are highlighted in bold.

these effects, with more negative impressions found among participants with lower conspiracy beliefs. Notably, high conspiracy believers perceived the scientist who endorsed conspiracy theories as braver.

## Experiment 2

### Methods

***Participants and design.*** We used Qualtrics survey software to collect data. Participant recruitment started on November 30, 2022, and finished on April 19, 2023. As pre-registered, we stopped data collection when 300 participants had been recruited and excluded those who incorrectly answered an attention check from the main analyses.

Student participants were recruited from the University of Kent ($n$ = 189) and Prolific ($n$ = 110). We excluded 15 participants who failed an attention check. The final sample was 284 participants (66.4% female, 32.5% male, 0.7% other, 0.4% rather not say, $M_{age}$ = 21.25, $SD_{age}$ = 5.65, range = 18–55 years). Participants from the University of Kent were given course credits and participants from Prolific were paid a small fee. On average, participants took 27 minutes and 17 seconds ($SD$ = 4 hours, 17 minutes and 50 seconds) to complete the survey[2]. The experiment was a three-group (pro-conspiracy vs. anti-conspiracy vs. control) between-subjects design.

Sensitivity power analysis in G*Power (Version 3.1, Faul *et al.*, 2007) revealed that a sample size of $N$ = 282 has 90% power to detect effect sizes as small as $d$ = .48 between two groups ($n$ = 90 and $n$ = 97) when assuming an alpha level of 0.05 and a two-tailed test.

***Materials and procedure.*** Participants followed the same procedure as Experiment 1 with some modifications. Participants were randomly allocated to one of the three experimental conditions. In all three conditions, participants were presented with a fictitious statement from an unnamed doctor. The

[2] This was skewed by 10 participants who took more than 30 minutes to complete the survey. The average completion time not considering these participants was 5 minutes and 44 seconds ($SD$ = 3 minutes and 15 seconds).

*pro-conspiracy* doctor stated that pharmaceutical companies are covering up the fact that mRNA vaccines are harmful in order to make more money (i.e., "There is evidence that mRNA vaccines, such as some of the COVID-19 vaccines, are dangerous. … Pharmaceutical companies make so much money from vaccines that they continue to cover up the harmful effects the vaccines have on the population."), the *anti-conspiracy* doctor stated that there is no evidence that mRNA vaccines are dangerous and that pharmaceutical companies are open and honest about potential harmful effects (i.e., "There is no evidence that mRNA vaccines, such as some of the COVID-19 vaccines, are dangerous. … Pharmaceutical companies openly and honestly report all harmful effects of vaccines on the population."), and the *neutral* doctor stated information on how mRNA vaccines achieve immunity (i.e., mRNA vaccines work by introducing a small piece of a protein found on the outer membrane of a virus, for example, COVID-19. … Antibodies help protect the body against infection by recognizing individual viruses or other pathogens, attaching to them, and marking them for destruction.").

Participants then reported their intentions to follow the doctor's advice and their impressions as in Experiment 1. They then reported their vaccine conspiracy beliefs (Shapiro *et al.*, 2016; seven-items; 1 = strongly disagree, 7 = strongly agree) and their age and gender.

## Results

We cleaned and analysed the data using IBM SPSS Statistics (Version 29) and used Model 1 of the PROCESS macro (Version 4.3.1, Hayes, 2022) for moderation models.

***Main analyses.*** See Table 4 for zero-order correlations, means, standard deviations, and scale reliability coefficients. We used multivariate ANOVA to test for mean differences in impressions of the doctor across the pro-conspiracy, anti-conspiracy, and control conditions. There was a significant difference in intentions to follow advice and the impression variables, $F(18, 548) = 10.260$, $p < .001$; Pillai's trace = .504, $\eta_p^2 = .25$. We conducted post-hoc tests to examine these differences (see Table 5 and Figure 2). Confirming our hypotheses, compared to the anti-conspiracy and control conditions, participants reported lower intentions to follow the doctor's advice, and perceived them as being less honest, trustworthy, credible, intelligent, but more of an outsider and a fraud. Contrary to our hypotheses, participants perceived the pro-conspiracy (vs. anti-conspiracy and control) doctor as less able to effect change. Further, we found no differences between these conditions for impressions of bravery.

We then explored whether impressions of the pro-conspiracy, anti-conspiracy and control doctors were moderated by participants' own vaccine conspiracy beliefs. We specified that

**Table 4. Means, standard deviations, and zero-order correlations (Study 2).**

| Measures | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. Follow Advice | - | | | | | | | | | |
| 2. Honest | .80 (< .001) | - | | | | | | | | |
| 3. Trustworthy | .84 (< .001) | .87 (< .001) | - | | | | | | | |
| 4. Effect Change | .49 (< .001) | .44 (< .001) | .51 (< .001) | - | | | | | | |
| 5. Brave | .32 (< .001) | .40 (< .001) | .34 (< .001) | .44 (< .001) | - | | | | | |
| 6. Credible | .82 (< .001) | .85 (< .001) | .86 (< .001) | .51 (< .001) | .38 (< .001) | - | | | | |
| 7. Intelligent | .67 (< .001) | .70 (< .001) | .71 (< .001) | .55 (< .001) | .44 (< .001) | .73 (< .001) | - | | | |
| 8. Fraudulent | -.70 (< .001) | -.70 (< .001) | -.69 (< .001) | -.29 (< .001) | -.24 (< .001) | -.70 (< .001) | -.52 (< .001) | - | | |
| 9. Outsider | -.46 (< .001) | -.39 (< .001) | -.43 (< .001) | -.09 (.124) | .07 (.260) | -.40 (< .001) | -.25 (< .001) | .58 (< .001) | - | |
| 10. Conspiracy Belief | -.17 (.004) | -.13 (.025) | -.12 (.048) | .12 (.052) | .12 (.047) | -.08 (.161) | .02 (.975) | .17 (.005) | .19 (.001) | - |
| *M* | 4.42 | 4.60 | 4.43 | 3.81 | 4.66 | 4.65 | 4.48 | 2.77 | 3.25 | 2.86 |
| *SD* | 1.83 | 1.54 | 1.59 | 1.35 | 1.15 | 1.52 | 1.15 | 1.58 | 1.39 | 1.40 |
| α | .97 | .94 | .97 | .93 | .79 | .93 | .82 | .96 | .85 | .94 |

Note: *df* = 282. Conspiracy Belief = Vaccine conspiracy belief.

**Table 5. Means and standard deviations by condition, between-subjects effects, and post-hoc tests of experimental manipulation on different types of impressions (Study 2).**

| | Means and standard deviations | | | Between-subjects effects | | | | Post-hoc tests | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Pro-Conspiracy | Anti-Conspiracy | Control | | | | | Pro-Conspiracy vs. Anti-Conspiracy | | Pro-Conspiracy vs. Control | |
| | *M* (*SD*) | *M* (*SD*) | *M* (*SD*) | *F* | *p* | $\eta_p^2$ | 95% CI | $p_{Bonf}$ | *d* | $p_{Bonf}$ | *d* |
| Follow Advice | 2.95 (1.79) | 5.00 (1.47) | 5.22 (1.33) | 61.03 | < .001 | .30 | [.20, .40] | < .001 | 1.25 | < .001 | 1.44 |
| Honest | 3.54 (1.54) | 4.94 (1.27) | 5.24 (1.25) | 41.39 | < .001 | .23 | [.14, .33] | < .001 | 0.99 | < .001 | 1.21 |
| Trustworthy | 3.22 (1.59) | 4.74 (1.30) | 5.24 (1.15) | 55.68 | < .001 | .28 | [.20, .39] | < .001 | 1.05 | < .001 | 1.46 |
| Effect Change | 3.40 (1.63) | 3.96 (1.26) | 4.06 (1.05) | 6.43 | .002 | .04 | [.01, .12] | .015 | 0.38 | .003 | 0.48 |
| Brave | 4.58 (1.39) | 4.81 (1.13) | 4.54 (0.90) | 1.62 | .199 | .01 | [.01, .05] | .503 | 0.18 | .999 | 0.03 |
| Credible | 3.45 (1.51) | 4.97 (1.15) | 5.45 (1.14) | 62.20 | < .001 | .31 | [.22, .40] | < .001 | 1.32 | < .001 | 1.49 |
| Intelligent | 3.83 (1.35) | 4.68 (0.93) | 4.88 (0.88) | 25.24 | < .001 | .15 | [.08, .24] | < .001 | 0.73 | < .001 | 0.92 |
| Fraudulent | 4.03 (1.52) | 2.30 (1.30) | 2.07 (1.14) | 60.91 | < .001 | .30 | [.21, .40] | < .001 | 1.22 | < .001 | 1.46 |
| Outsider | 4.33 (1.14) | 2.89 (1.29) | 2.59 (1.39) | 57.35 | < .001 | .29 | [.21, .37] | < .001 | 1.18 | < .001 | 1.37 |

Note: *df* = 2, 282. Pro-conspiracy *n* = 90, anti-conspiracy *n* = 97 control *n* = 97.

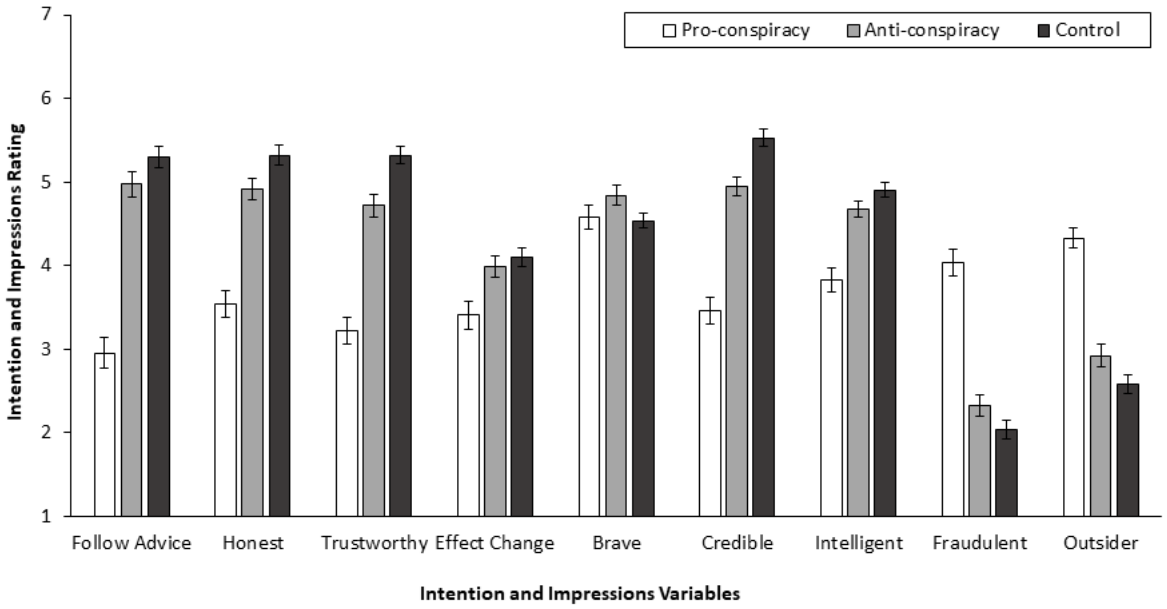


**Figure 2. Impressions of a doctor who shares versus refutes a vaccine conspiracy theory versus provides neutral vaccine information.** Error bars show standard errors.

the predictor variable was multicategorical, which created two dummy-coded variables: pro-conspiracy versus anti-conspiracy, and pro-conspiracy versus control.

**Pro-conspiracy versus anti-conspiracy**. Significant interactions were found for all variables except for impressions of the doctor being an outsider (see Table 6). For all significant interactions, the effects of the dummy-coded variable were larger among participants with weaker vaccine conspiracy beliefs.

**Pro-conspiracy versus control.** Significant interactions were found for all variables (see Table 6). For all significant interactions, the effects of the dummy-coded variable were larger

**Table 6. Conditional univariate effects of experimental condition at different levels of Vaccine Conspiracy Belief (Study 2).**

| Conditional effects (X on Y) at ± 1 SD of W | | Moderator: Vaccine Conspiracy Belief | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | X1: Pro-Conspiracy vs. Anti-Conspiracy | | | | X2: Pro-Conspiracy vs. Control | | | |
| | | Interaction | -1SD | Mean | +1SD | Interaction | -1SD | Mean | +1SD |
| Follow Advice | *b* (*SE*) | **-1.32 (0.14)** | 4.05 (0.28) | 2.20 (0.19) | 0.34 (0.26) | **-1.07 (0.14)** | 3.84 (0.28) | 2.34 (0.19) | 0.84 (0.27) |
| | 95% CI | **[-1.59, -1.06]** | [3.50, 4.61] | [1.82, 2.57] | [-0.17, 0.85] | **[-1.34, -0.79]** | [3.30, 4.39] | [1.96, 2.72] | [0.30, 1.38] |
| Honest | *b* (*SE*) | **-1.12 (0.12)** | 3.11 (0.25) | 1.54 (0.17) | -0.03 (0.23) | **-0.92 (0.13)** | 3.07 (0.25) | 1.78 (0.17) | 0.49 (0.25) |
| | 95% CI | **[-1.36, -0.88]** | [2.61, 3.61] | [1.20, 1.88] | [-0.49, 0.42] | **[-1.17, -0.67]** | [2.68, 3.56] | [1.44, 2.12] | [-0.01, 0.97] |
| Trustworthy | *b* (*SE*) | **-1.04 (0.13)** | 3.11 (0.26) | 1.65 (0.18) | 0.18 (0.24) | **-0.82 (0.13)** | 3.25 (0.26) | 2.10 (0.18) | 0.95 (0.25) |
| | 95% CI | **[-1.29, -0.80]** | [2.60, 3.62] | [1.30, 2.00] | [-0.29, 0.65] | **[-1.08, -0.57]** | [2.75, 3.76] | [1.75, 2.45] | [0.01, 1.45] |
| Effect Change | *b* (*SE*) | **-0.64 (0.13)** | 1.57 (0.27) | 0.68 (0.19) | -0.21 (0.25) | **-0.63 (0.13)** | 1.65 (0.27) | 0.77 (0.19) | -0.11 (0.26) |
| | 95% CI | **[-0.89, -0.38]** | [1.04, 2.11] | [0.32, 1.05] | [-0.70, 0.28] | **[-0.89, -0.36]** | [1.12, 2.17] | [0.40, 1.14] | [-0.63, 0.41] |
| Brave | *b* (*SE*) | **-0.53 (0.11)** | 1.08 (0.24) | 0.34 (0.16) | -0.40 (0.22) | **-0.55 (0.12)** | 0.81 (0.23) | 0.04 (0.16) | -0.73 (0.23) |
| | 95% CI | **[-0.75, -0.31]** | [0.62, 1.55] | [0.02, 0.66] | [-0.83, 0.02] | **[-0.78, -0.32]** | [0.35, 1.27] | [-0.28, 0.36] | [-1.18, -0.27] |
| Credible | *b* (*SE*) | **-1.04 (0.11)** | 3.13 (0.24) | 1.67 (0.16) | 0.21 (0.22) | **-0.99 (0.12)** | 3.47 (0.23) | 2.08 (0.16) | 0.70 (0.23) |
| | 95% CI | **[-1.26, -0.82]** | [2.67, 3.39] | [1.36, 1.99] | [-0.21, 0.64] | **[-1.26, -0.82]** | [3.01, 3.93] | [1.77, 2.40] | [0.25, 1.15] |
| Intelligent | *b* (*SE*) | **-0.62 (0.10)** | 1.84 (0.21) | 0.96 (0.14) | 0.09 (0.19) | **-0.74 (0.10)** | 2.16 (0.21) | 1.12 (0.14) | 0.08 (0.20) |
| | 95% CI | **[-0.82, -0.42]** | [1.41, 2.25] | [0.68, 1.25] | [-0.29, 0.47] | **[-0.95, -0.54]** | [1.75, 2.56] | [0.83, 1.40] | [-0.33, 0.48] |
| Fraudulent | *b* (*SE*) | **1.00 (0.12)** | -3.25 (0.25) | -1.84 (0.17) | -0.44 (0.23) | **0.73 (0.13)** | -3.04 (0.25) | -2.02 (0.17) | -1.00 (0.25) |
| | 95% CI | **[0.76, 1.24]** | [-3.75, -2.75] | [-2.19, -1.50] | [-0.90, 0.02] | **[0.48, 0.97]** | [-3.53, -2.55] | [-2.36, -1.68] | [-1.49, -0.51] |
| Outsider | *b* (*SE*) | 0.22 (0.12) | -1.75 (0.25) | -1.45 (0.17) | -1.15 (0.23) | **-0.36 (0.12)** | -2.19 (0.25) | -1.69 (0.17) | -1.19 (0.24) |
| | 95% CI | [-0.02, 0.45] | [-2.24, -1.26] | [-1.78, -1.12] | [-1.60, -0.70] | **[0.11, 0.60]** | [-2.67, -1.71] | [-2.03, -1.36] | [-1.67, -0.72] |

Note: Significant interactions between experimental condition and moderation variables are highlighted in bold.

among participants with weaker vaccine conspiracy beliefs. For impressions of bravery, there was a crossover interaction, indicating that participants with higher vaccine conspiracy belief perceived the doctor in the pro-conspiracy condition as braver than in the control condition, whereas this effect reversed among participants with lower vaccine conspiracy beliefs.

Results of Experiment 2 therefore largely replicated those of Experiment 1. Sharing conspiracy theories negatively affected participants' impressions of a doctor who endorsed vaccine-related conspiracy theories, compared to those who refuted them or one who shared neutral information about vaccines. Participants' own vaccine conspiracy beliefs moderated these effects, with more negative impressions found among participants with lower conspiracy beliefs. Also as in Experiment 1, high conspiracy believers perceived the doctor who endorsed conspiracy theories as braver, relative to the neutral doctor only.

## Discussion

The current research examined the reputational consequences of science and health professionals who endorse conspiracy theories relevant to their field. As hypothesised, both experiments showed that professionals endorsing conspiracy theories were perceived less favourably. Specifically, they were perceived as less credible, trustworthy, honest, and intelligent, but more of an outsider and a fraud, compared to professionals who refuted such theories (Experiments 1 and 2) or had a neutral stance (Experiment 2). Further, participants reported lower intentions to follow advice from the conspiracy-sharing professionals. Unexpectedly, however, the conspiracy-sharing professionals were perceived as less brave (Experiment 1 only) and less capable of effecting change, compared to the conspiracy-refuting and neutral (Experiment 2) professional. Finally, in both experiments, participants' own conspiracy beliefs affected their impressions of the professionals. The lower the participants' own conspiracy beliefs, the more negatively they perceived the conspiracy-sharing professionals. Further, the higher the participants' own conspiracy beliefs, the braver they perceived the conspiracy-sharing professionals to be.

The current findings build on existing literature in two ways. First, the unfavourable impressions (i.e., less intelligent) participants formed of the conspiracy-sharing professionals reinforces that conspiracy theories are stigmatizing beliefs (Lantian *et al.*, 2018). Second, the current findings support and extend Green and colleagues' (2023a) recent findings. As was the case for the politician in their studies, we found here that science and healthcare professionals who shared conspiracy theories were also perceived as less trustworthy and more of an outsider. We further extended the range of impression variables (e.g., credibility and fraudulence). However, unlike Green and

colleagues, we did not find the conspiracy-sharing professionals to be perceived as more capable of effecting change. Perhaps this variable is more relevant to the domain of politics than science, and further research could investigate this possibility.

We note some limitations of the current research. Although we focused on specific professions (e.g., in healthcare) we did not specify the seniority of the professionals (e.g., junior doctor or specialist). The level of professionals' seniority could affect the impact that sharing conspiracy theories has on people's impressions of them personally. For example, a senior professional like the co-founder of Greenpeace who endorses conspiracy theories might be less affected by sharing conspiracy theories than a less prominent professional. It also remains to be tested how sharing conspiracy theories affects people's impressions of the scientific communities that the professionals represent, and how people's own conspiracy beliefs might further moderate these effects. Our results cannot speak to these more complex hypotheses, and future research could therefore examine how aspects such as a professional's seniority could be important, and how conspiracy theories might affect people's attitudes about science and scientific experts more broadly. Finally, the participant samples in our experiments were low in climate change and vaccine conspiracy beliefs (see Table 1 and Table 4, respectively). Future research should therefore aim to recruit participants with a broader range of conspiracy beliefs. Indeed, the moderating effects we found for impressions of bravery suggest that existing conspiracy beliefs could be important.

## Conclusion

In summary, the current research suggests that science and healthcare professionals who share conspiracy theories relevant to their field are likely to damage their reputations, and elicit less willingness to follow their advice, especially among people who tend not to believe in conspiracy theories. However, professionals who endorse conspiracy theories may elicit more favourable impressions among stronger believers in conspiracy theories, with potentially negative consequences which warrant further investigation.

## Data availability

### Underlying data

OSF: Impressions of Professionals Sharing Conspiracy Theories. DOI: https://doi.org/10.17605/OSF.IO/7W32G (Green *et al.*, 2023b)

This project contains the following underlying data:

- Study 1 Data.sav
- Study 2 Data.sav

### Extended data

OSF: Impressions of Professionals Sharing Conspiracy Theories. DOI: https://doi.org/10.17605/OSF.IO/7W32G (Green *et al.*, 2023b)

This project contains the following extended data:

- Study 1 Qualtrics Survey.pdf
- Study 2 Qualtrics Survey.pdf



### Acknowledgements

The authors thank Emily Willis, Olivia Bridger, Lucy Hands, and Abieda Rahman for their assistance with data collection.

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# Open Peer Review

## Current Peer Review Status: ✔ ✔ ✔

**Version 1**

Reviewer Report 02 November 2023

https://doi.org/10.21956/routledgeopenres.19250.r27595



✔ **Matt Motta**
Boston University, Boston, Massachusetts, USA

**Is the work clearly and accurately presented and does it engage with the current literature?**

This work clearly and accurately engages with scholarly literature on this topic. However, I think that the authors could say a bit more about the substantive stakes of their research.

Please see my comments below:

"I'd encourage the authors to say a bit more about the substantive stakes of their work.

What, exactly, do we learn about (say) public trust in experts and/or the opinions dynamics of conspiracy theory acceptance from a study showing that most people place lower levels of trust in experts who eschew scientific consensus? And that those who are themselves misinformed find conspiracy-theory promotion among experts to be comparatively more credible?

I think this pattern of results might strike some readers as fairly obvious. Others might also note that interacting belief in the specific conspiracy theories advanced by the experts featured in the study may -- on some level -- represent "selection on the dependent variable" (i.e., that those who already endorse a belief are simply being given the opportunity to articulate the same position again when evaluating experts who hold similar views).

Of course, none of this necessarily implies that the results presented here are unimportant! Still, I would encourage the authors to engage a bit more with the potential substantive stakes of their work (perhaps in the piece's introductory or concluding sections).

In my view, one potential consequence of this research is the idea that conspiracy theorists often use the *language of science* in order to promote claims at odds with scientific consensus; e.g., citing scientific studies or appealing to credentialed experts who hold positions at odds with scientific consensus. (Sander van der Linden's excellent new book Foolproof discusses this point in detail)..

Consequently, insights gleaned from this research might help provide a psychological mechanism regarding this seemingly-paradoxical position. One reason *why* conspiracy theorists attempt to co-opt the language of science in order to debunk it might be that -- although most people dismiss experts who embrace conspiracy theories as not credible -- those who are more likely to endorse conspiracy theories themselves (and perhaps for those who are more conspiratorially minded, irrespective of context? if the authors collected data measuring respondents' conspiratorial ideation, I might encourage them to report it here; given the potential selection issues noted above) lend comparatively greater credibility to expert endorsements of misinformation."

**Is the study design appropriate and does the work have academic merit?**

The study's design is appropriate, and has academic merit. However, I would encourage the authors to consider adding tests that probe the robustness of their analyses (Study #2 in particular).

Please see my comments below:

"While I appreciate the authors' ability to replicate the general pattern of results found in Study 2 (featuring a student sample, which some might argue might be more-motivated than the general public to arrive at accurate conclusions about the state of the world), I think it's important to point out that the final sample in Study 2 is recruited from two different data vendors (a convenience on-campus sample, and a convenience online sample).

To avoid the possibility that differences in recruitment and/or sample composition across sub-samples confound the effects presented in this study, I would encourage the authors to present analyses that control for respondents' method of recruitment when estimating the effects of experimental exposure (i.e., a dichotomous indicator of respondents' sampling origin). While my recommendations regarding the suitability of this piece for publication are not necessarily conditional on having done this, I nevertheless think that these analyses could serve as a useful check on the robustness of the experimental results. "

**Are sufficient details of methods and analysis provided to allow replication by others?**

The authors have provided sufficient detail of their methods and analyses to allow for replication by others. However, I think that the authors could clarify one point about ethical approval for this study.

Please see my comment below:

"I would encourage the authors to note in their Ethical Approval section whether or not respondents were debriefed -- following exposure to the studies' experimental stimuli (and the expert-conspiracy conditions in particular) -- that they were presented with a fictional expert endorsement; i.e., to avoid the possibility that some might exit the survey environment believing that credentialed scientific experts endorse incorrect views about science and medicine.

If so, I would encourage the authors to provide that information here. And, if not, perhaps a statement about how the availability of these claims in externally generalizable contexts might

make unnecessary the need to do so.

**Is the work clearly and accurately presented and does it engage with the current literature?**
Yes

**Is the study design appropriate and does the work have academic merit?**
Yes

**Are sufficient details of methods and analysis provided to allow replication by others?**
Yes

**Are all the source data and materials underlying the results available?**
Yes

**Are the conclusions drawn adequately supported by the results?**
Yes

***Competing Interests:*** No competing interests were disclosed.

***Reviewer Expertise:*** Health Communication; Science Communication; Environmental Communication; Political Communication; Health Policy; Health Attitudes & Behavior; Climate Attitudes & Behavior; Misinformation; Political Psychology; Political Behavior; Survey Methodology

**I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.**

Reviewer Report 02 November 2023

https://doi.org/10.21956/routledgeopenres.19250.r27597



**Shauna Bowes**
Vanderbilt University, Nashville, Tennessee, USA

I found this to be an interesting and important topic. The authors asked a novel question surrounding the perceived credibility (amongst other relevant variables) of scientific and medical experts who endorse conspiracy theories. This is an important and timely issue. The authors found that participants viewed scientific experts less favorably when they shared a conspiracy theory compared to experts who refuted it or provided neutral information.

If the authors were to make edits, I would suggest adding one analysis in Study 2. In Study 1, the “anti-conspiracy” statement seemed to be neutral rather than anti-conspiracy. Specifically, the anti-conspiracy statement did not contain any material that explicitly debunked or contradicted

the global warming conspiracy theory – instead, the expert provided factual information about scientific research. In Study 2, however, the "anti-conspiracy" statement was more explicitly anti-conspiracy theory and the authors also included a "neutral" control. It would have been nice to know whether the ratings differed between the anti-conspiracy and neutral conditions. From eyeballing the means, it seems like the expert in the neutral condition was generally perceived more favorably than the expert in the anti-conspiracy condition. If these differences are significant, it might suggest that there is something slightly off-putting about the expert in the anti-conspiracy condition compared with the expert in the neutral condition. This comparison (coupled with future work in this domain) may provide insights on how to best promote scientific evidence without eliciting negative responses/reactions.

In addition (and a more minor point), the introduction could be more detailed and theoretically grounded. There are myriad reasons why these perceptions of conspiratorial experts are important. For instance, experts sharing conspiracy theories could lead to a conspiracy theory becoming viral, which means more people will see the conspiracy theory. Expanding more on why it's important to focus on experts in this context would have been useful.

I also thought the interaction in Study 2 for bravery was really interesting (that those higher on conspiracy belief perceive the conspiratorial experts as brave whereas the opposite pattern emerges for those lower on conspiracy belief). I would have liked to see more detail on why this interaction matters and how it might play out in the real world. This perception of bravery could be a mechanism by which people who believe in conspiracy theories act on them (I believe in conspiracy theories - now this brave expert says I'm right - now I want to take action).

Altogether, I think this work is interesting and opens the door for several future directions. For example, it would be interesting and important to extend this work to ecologically valid contexts. For instance, if people see a Tweet from an expert espousing a conspiracy theory, what are the effects of viewing that Tweet? How might this impact sharing and reposting intentions and behaviors? Adding in a behavioral measure (in addition to behavioral intention) will also clarify the impact of expert-shared conspiracy theories on the public.

**Is the work clearly and accurately presented and does it engage with the current literature?**
Yes

**Is the study design appropriate and does the work have academic merit?**
Yes

**Are sufficient details of methods and analysis provided to allow replication by others?**
Yes

**Are all the source data and materials underlying the results available?**
Yes

**Are the conclusions drawn adequately supported by the results?**
Yes

***Competing Interests:*** No competing interests were disclosed.

***Reviewer Expertise:*** Conspiracy belief, misinformation, intellectual humility, affective polarization, personality disorders

**I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.**

Reviewer Report 20 October 2023

https://doi.org/10.21956/routledgeopenres.19250.r27598



**Jasna Milošević-Đorđević**
Singidunum University, Belgrade, Serbia

I appreciated the chance to read the manuscript "Impressions of science and healthcare professionals who share anti-science conspiracy theories", which I have read with much interest. I found this brief report that explores the perception of conspiratorial health and science experts in guiding behavior of the population very interesting. I strongly support experimental studies on these topics because they are scarce.

If any suggestions have to be given, that would be the enrichment of the introductory section with discussion about distinction between conspiracies and misinformation, and why it is important to study them among health and science professionals. In addition, the authors might consider the aggregation into the report existent data about the number of science and health professionals sharing conspiracy (if there are any available sources). Furthermore, the moderation effect of conspiracy belief is crucial and novel in this analysis but in this brief experimental report is not emphasized enough, therefore needing to be highlighted in the conclusion part.

**Is the work clearly and accurately presented and does it engage with the current literature?**
Yes

**Is the study design appropriate and does the work have academic merit?**
Yes

**Are sufficient details of methods and analysis provided to allow replication by others?**
Yes

**Are all the source data and materials underlying the results available?**
Yes

**Are the conclusions drawn adequately supported by the results?**
Yes

***Competing Interests:*** No competing interests were disclosed.

***Reviewer Expertise:*** Health behavior including vaccination, conspiracy belief, migration, science communication, trust.

**I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.**