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Lauren L. Saling, James G. Phillips & Daniel B. Cohen

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Accuracy-sensitisation promotes the sharing of pro- (but not anti-) vaccine information

Lauren L. Saling[a], James G. Phillips[b] and Daniel B. Cohen[c]

[a]School of Health and Biomedical Sciences, RMIT University, Bundoora, Victoria, Australia; [b]Department of Psychology and Neuroscience, Auckland University of Technology, Auckland, New Zealand; [c]School of Social Work and Arts, Charles Sturt University, Wagga Wagga, New South Wales, Australia

ABSTRACT

Objective: This study investigated (i) factors predicting the seeking and sharing of vaccinerelated information, and (ii) the effect of an accuracy-sensitisation prime on sharing intentions. Design:This was a preregistered online survey with 213 participants. Participants were randomly assigned to an intervention group (who were exposed to an accuracy-sensitisation prime) or a control group.

Design: This was a preregistered online survey with 213 participants. Participants were randomly assigned to an intervention group (who were exposed to an accuracy-sensitisation prime) or a control group.

Main Outcome Measures: Measures included decision-making style, COVID-19 anxiety, and percentages of pro and anti-vaccine friends. We also measured preferences to seek pro or anti-vaccine-related information and sharing intentions with respect to this information.

Results: Compared with those seeking both pro and anti-vaccine information, participants seeking only pro-vaccine information had lower hypervigilance and buck-passing and higher COVID-19 anxiety. The likelihood of sharing anti-vaccine information was positively predicted by the percentage of one's anti-vaccine friends, the size of one's social network, and conservative political orientation. Conversely, the likelihood of sharing pro-vaccine information was positively predicted by the percentage of one's pro-vaccine friends, and liberal political orientation. Participants sensitised to accuracy were significantly more likely to share provaccine information; however, accuracy-sensitisation had no effect on anti-vaccine information sharing.

Conclusions: Individuals who seek anti-vaccine information have a tendency towards disorganised and impulsive decision-making. Accuracy-sensitisation may prime people to internalise a norm promoting truth-sharing.

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misinformation; anti-vaccine information; pro-vaccine information; information accuracy; decision-making style

Introduction

The COVID-19 pandemic has created a massive demand for information; at the same time, it has provided a fertile environment for the generation of

CONTACT Lauren L. Saling lauren.saling@rmit.edu.au School of Health and Biomedical Sciences, RMIT University, Bundoora, Victoria, Australia.

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misinformation (Horton, 2020). Belief in vaccine misinformation promotes vaccine hesitancy (Roozenbeek et al., 2020). The sharing of vaccine misinformation is additionally problematic because it can engender false beliefs in others (Garrett & Weeks, 2017). For instance, it has been shown that repeated exposure to misinformation increases belief in its veracity (Pennycook & Cannon, 2018). Interestingly, the likelihood of sharing misinformation is not correlated with the belief in misinformation (Pennycook et al., 2021).

Anti-vaccine sentiment, in the context of the COVID-19 vaccine, is on the rise. Given that vaccination reduces the likelihood of serious illness resulting from COVID-19, vaccine hesitancy is concerning (Russell & Greenwood, 2021). Therefore, it is essential to identify predictors of anti-vaccine content seeking and sharing as well as mechanisms to reduce its spread.

Individual differences in information sharing

The inclination to share misinformation varies as a function of individual differences and contextual factors. A key contextual factor is the sharing platform used (Stoycheff et al., 2017). For instance, misinformation is readily diffused on social media because even if one doubts its truth value, credence is given to misinformation shared within like-minded friend networks (Del Vicario et al., 2016). In this study, we investigated factors which predict the seeking and sharing of both pro- and anti-vaccine information, including the size of an agent's social network and the percentage of an agent's friends who are pro or anti-vaccination.

A key individual difference that predicts misinformation-sharing is political orientation. Specifically, conservatives are more likely than their liberal counterparts to spread misinformation (Guess et al., 2019). Thus, we investigated the role played by political orientation in predicting the seeking and sharing of pro- and anti-vaccine information.

Decision-making style

A decision concerning whether to share information is also influenced by the way that one processes information. Hence decisional style was investigated here.

Janis and Mann (1977) model decision-making as involving a potentially stressful conflict between subjective and objective factors; they argue that the quality of a decision is predicted by the degree of stress experienced by an agent. The model recommends a vigilant decisional style: before making a decision, vigilant agents carefully evaluate the available evidence, canvass all options, assign sufficient time to the decision and review all information. Hypervigilance, in contrast, manifests as impulsive, disorganised decision-making where options are not carefully canvassed (Mann & Tan, 1993). Janis and Mann (1977) also describe two other maladaptive decisional styles: procrastination, where agents defer decision-making, and buck-passing, where agents avoid decision-making.

One's decisional style will likely influence whether one adopts a considered, an impulsive or an avoidant way of managing vaccine-related information; it also likely influences one's decision whether to get vaccinated. Anxiety about

COVID-19 may exacerbate a maladaptive decisional approach which, in turn, may affect how one searches for and deliberates about vaccine-related information (Herek et al., 1987). For instance, Freiling et al. (2023) found that COVID-19 anxiety positively predicts the belief in and sharing of COVID-19 misinformation. COVID-19 anxiety was, therefore, investigated here.

Awareness of accuracy

In addition to investigating predictors of vaccine-related information seeking and sharing, we also investigated an intervention to reduce the sharing of anti-vaccine content.

Priming participants to consider information accuracy prior to sharing has been demonstrated to reduce the sharing of false information. Fazio (2020) asked participants to explain why a headline is true or false prior to indicating their sharing intentions regarding that headline. Participants primed in this way were less likely to share false information compared to controls. Similarly, Pennycook et al. (2020, 2021) investigated the impact on sharing intentions of a different prime, where participants were asked *whether* a headline was accurate. In a series of studies, participants were assigned to either a treatment group (accuracy sensitisation) or a control group (sharing intentions only). Pennycook et al. (2020) found that, unlike participants in the control group, those in the accuracy group were significantly more likely to share true headlines than false headlines. Pennycook et al. (2020) also investigated the impact of this prime on participants' judgements about the truth-value of a headline: they found that participants' judgements were more reliable in the accuracy group than in the control group. Pennycook et al. (2021) found that participants in the accuracy group were significantly less willing to share false headlines than participants in the control group.

Roozenbeek et al. (2021) attempted to replicate Pennycook et al. (2020). Like the target study, participants were shown 15 true and 15 false headlines. In Stage 1, participants in the accuracy group were no less likely to share false headlines and no more likely to share true headlines compared with the control group. The study was then run again using an additional pool of participants, and new data were added to the original data set; this expanded data set was analysed and presented as Stage 2. A small effect was found whereby the accuracy group was less likely to share false headlines than the control group. The authors conclude that the effect of the accuracy prime is small and inconsistent.

In light of these findings, we explored the effect of an accuracy prime on the seeking and sharing of vaccine-related information. Note that both Roozenbeek et al. (2021) and Pennycook et al. (2020) rely on a 'single statement' accuracy prime, where participants rate the accuracy of a single statement and then indicate sharing intentions with respect to a different series of statements. However, in study 6 of Pennycook et al. (2021), the authors employ a 'full' accuracy prime, where participants rated the accuracy of each statement prior to indicating their willingness to share that statement. We adopted the full accuracy prime in our study in order to maximise prime efficacy.

The present study

The primary aims of this preregistered study were as follows: (i) to investigate predictors of pro- and anti-vaccine information seeking and sharing and (ii) to determine whether priming participants to consider information accuracy would impact on intentions to share pro- and anti-vaccine statements, and, if so, whether a differential effect would be seen as a function of information type.

The following hypotheses were tested:

1. The percentage of one's friends who are anti-vaccine, COVID-19 anxiety and political orientation will positively predict one's inclination to seek and share anti-vaccine information.
2. The percentage of one's friends who are pro-vaccine will positively predict one's inclination to seek and share pro-vaccine information.
3. Procrastination, gender, size of social network and political orientation will predict inclination to share vaccine claims.
4. Procrastination will predict time spent looking at vaccine-related claims.
5. Participants in the accuracy condition will be less likely to share anti-vaccine claims than those in the control condition.

Method

Participants

An *a priori* power analysis using G*Power v3.1 with power = 0.8, alpha = 0.05, effect size = 0.3 revealed that a minimum of 84 participants was required. This effect size refers to Cohen's *d*. We relied on this benchmark following the model of G*Power v3.1, which gives the following definitions: small effect size = 0.2–0.3; medium effect size = 0.5; large effect size = 0.8. This benchmark is consistent with prior studies, which found small-to-medium effect sizes.

We aimed to recruit participants with both pro- and anti-vaccine preferences in order to get a reasonable distribution of attitudes in our sample. To do this, we recruited participants from a wide range of online groups whose function is to provide information about COVID-19 and its vaccines. While some of these groups aim to debunk misinformation, all are apolitical. Participants were recruited from the following online groups:

- Reddit: r/psychology, r/vaccine, r/COVID, r/COVID vaccine, r/Coronavirus
- Facebook: COVID-19 Vaccine, Vaccine Information Awareness, Covid Vaccine Discussion Group, Vaccines Save Lives

There were 417 participants in the initial sample. Data from 204 participants were excluded due to at least 10% missing data and/or for failing the attention check. Of the excluded participants, 6% were under 18 years (so the survey would have terminated immediately), 49% were aged 18–29, 17% were aged 30–39 years, 5% were aged 40–49 years, 2% were aged 50–59, 6% were aged 60–69 and 15.5% did not respond to this question. For gender, 25% were male, 33% were female, 4% were non-binary/third gender, 1% selected 'prefer not to say' and 37% did not respond to

Table 1. Demographic characteristics of final sample.

Variable	*n*	% of sample
Age		
18–29	114	53.5
30–39	50	23.5
40–49	24	11.3
50–59	16	7.5
60–69	7	3.3
70+	2	0.9
Gender		
Male	80	37.6
Female	114	53.5
Non-binary/third gender	16	7.5
Prefer not to say	3	1.4
Highest educational level		
Year 10 or less	1	0.5
Year 12 or equivalent	42	19.7
Apprenticeship	6	2.8
Diploma	19	8.9
Bachelor's degree	85	39.9
Postgraduate degree	49	23
Other	11	5.2
Employment status		
Employed full-time	103	48.8
Employed part-time	40	18.8
Unemployed	52	24.4
Retired	7	3.3
Primary carer for children/other	7	3.3
No response provided	4	1.9
Social media platform		
Facebook	133	62.4
Instagram	117	54.9
WhatsApp	82	38.5
Twitter	95	44.6
YouTube	140	65.7
TikTok	35	16.4
Snapchat	73	34.3
Have you had COVID-19?		
Yes	21	9.9
No	160	75.1
Unsure	32	15

this question. Mean political orientation was 40.24 (SD = 25.74) (where 0 = extremely left wing and 100 = extremely right wing).

The final sample consisted of 213 participants. Sample demographics are presented in Table 1.

Measures and procedure

The pre-registration for this study can be found on OSF (https://osf.io/zbefw). Ethics approval was obtained from the RMIT University's Human Research Ethics Committee (Approval no: 24349). Participants completed an anonymous online survey via Qualtrics comprising all measures outlined below.

Demographics

Participants indicated their gender, age-group, highest educational level, employment status, political orientation and social media platforms engaged with. To gauge the size of an individual's close social network, participants indicated how many people they know who would definitely do them a favour.

Attention check

To check whether participants were paying attention, the following question was included: 'Based on the text below, what would you say your favourite drink is? This is a simple question to see whether you are paying attention. When asked, please select avocado juice'. Response options were apple juice, orange juice, avocado juice, tropical juice and grape juice. Participants passed the attention-check only if they selected 'avocado juice'.

COVID-19-related questions

Participants completed the following question: 'Have you had COVID-19?'. If 'Yes' was selected, participants were asked to indicate illness severity.

Vaccine-related questions

Participants indicated: (a) the number of people they know who are anti- or pro-vaccine, and (b) whether they would like to see anti-vaccine statements, pro-vaccine statements or both. Participants who elected to see anti-vaccine statements were also shown pro-vaccine statements after study completion.

Anti-vaccine statements

Nine anti-vaccine statements were presented to participants selecting 'anti-vaccine' or 'both'. A sample anti-vaccine statement is: 'Mandatory vaccines infringe upon human rights'.

Pro-vaccine statements

Nine pro-vaccine statements were presented to participants selecting 'pro-vaccine' or 'both'. A sample pro-vaccine statement is: 'The ingredients in vaccines are safe in the amounts used'.

Pro- and anti-vaccine statements were selected from https://vaccines.procon.org/ but were edited so that pro- and anti-vaccine statements had broadly the same number of words and characters.

Accuracy manipulation

After selecting which vaccine statements they would like to see (pro, anti, or both), participants were randomly assigned to the accuracy or control condition. This was achieved using the randomisation function within Qualtrics. In the accuracy condition, after reading each vaccine statement, participants answered the following two questions: (i) 'To the best of your knowledge, how accurate is this statement?' (0 = not at all, 100 = extremely accurate); and (ii) 'How likely are you to share this information online, for instance via social media?' (0 = not at all, 100 = extremely likely). In the control condition, sharing intentions were gauged via question (ii) but question (i) was omitted.

Decision-making style

The Melbourne Decision-Making Questionnaire (MDMQ) is a 28-item self-report measure with five subscales, each assessing an individual's tendency towards particular decisional

styles. These are: (i) decisional self-esteem: confidence associated with decision-making, measured with six items, (ii) vigilance: a thorough evaluation of alternatives prior to decision-making, measured using six items, (iii) hypervigilance: a rushed approach to decision-making, measured with five items, (iv) procrastination: delaying decisions, measured with five items and (v) buck-passing: avoiding decisions, measured with six items. Responses were indicated on a 3-point Likert-type scale with the following response options: (i) true for me, (ii) sometimes true for me and (iii) not true for me. Lower scores for each subscale indicate a lower tendency to engage in the relevant process. MDMQ subscales have good internal consistency (Mann et al., 1997): alpha = 0.87 (buck-passing), 0.81 (procrastination), 0.74 (hypervigilance) and 0.80 (vigilance).

COVID-19 anxiety

The Coronavirus Anxiety Scale (Lee, 2020) is a 5-item scale measuring dysfunctional anxiety associated with COVID-19. For each item, participants indicate how often, over the last 2 weeks, they have experienced what is described in the statement. Response options ranged from 'Not at all' to 'Nearly every day'. A sample statement is: 'I felt paralysed or frozen when I thought about or was exposed to information about the coronavirus'. The scale has good reliability and construct validity (Lee, 2020).

Results

Data and materials are available via the following link: https://osf.io/8vxnt/?view_only=aadb5d2112764ec4b7863800b61cfafd.

Data were inspected for skew and violations of normality. Although some variables were substantially skewed, no transformations were undertaken as the assumption of normality of the sampling distribution was met given the large sample size. Little's MCAR test revealed that data were missing at random, x^2 (5,228) = 5,166.68, $p = 0.88$.

Of the total number of participants, 6 (2.8% of the sample) chose to see anti-vaccine statements, 33 (15.5%) chose pro-vaccine statements, and the majority, 173 participants (81.2%), chose both pro- and anti-vaccine statements. Therefore, analyses were only done on the 'pro' and 'both' groups which deviated from pre-registered analyses.

Descriptive statistics for study variables are presented in Table 2. Pearson correlations between study variables included in analyses are presented in Table 3.

Table 2. Descriptive statistics for study variables.

Variable	*M* (SD)	Min	Max	Skew	Kurtosis	Chronbach's *α*
Decision-making style						
(i) Vigilance	7.71 (2.04)	6.0	17.0	1.43	2.32	0.79
(ii) Decisional self-esteem	3.27 (2.44)	0	11.0	0.69	−0.12	0.77
(ii) Hypervigilance	10.49 2.57)	5.0	15.0	−0.26	−0.77	0.76
(iii) Buck-passing	13.16 (3.35)	6.0	18.0	−0.55	−0.34	0.88
(iv) Procrastination	10.72 (2.71)	5.0	15.0	−0.37	−0.84	0.83
COVID-19 Anxiety	5.67 (1.86)	5.0	17.0	4.29	20.30	0.92
How many people would do you a favour?	9.19 (12.16)	0	100	5.00	32.71	
% of Anti-vaccine friends	16.64 (17.51)	0	95	1.62	2.75	
% of Pro-vaccine friends	80.82 (18.55)	20	100	−1.13	1.16	
Political orientation	32.90 (24.83)	0	100	0.65	−0.10	

Table 3. Correlations for variables included in analyses.

		1	2	3	4	5	6	7	8	9	10	11	12	13
1.	Political orientation													
2.	Size of social network	0.02												
3.	% of pro-vaccine friends	−0.25**	−0.12											
4.	% of anti-vaccine friends	0.28**	0.07	−0.95**										
5.	Procrastination	0.04	0.17*	−0.16	0.20**									
6.	Vigilance	−0.06	−0.11	−0.05	−0.05	−0.04								
7.	Hypervigilance	0.07	0.05	−0.12	0.12	0.67**	0.10							
8.	Buck-passing	0.06	0.18*	−0.15	0.23**	0.74**	−0.09	0.66**						
9.	Decisional self-esteem	−0.08	−0.27**	0.07	−0.16*	−0.66**	0.14*	−0.66**	−0.74**					
10.	COVID-19 Anxiety	0.05	0.09	−0.17*	0.04	−0.05	0.03	0.16*	−0.01	0.10				
11.	Likelihood of sharing pro-vaccine statements	−0.25**	0.08	0.29**	−0.27**	0.04	0.02	−0.04	−0.02	−0.06	0.08			
12.	Likelihood of sharing anti-vaccine statements	0.43**	0.24*	−0.36**	0.39**	0.00	0.09	0.01	0.06	−0.09	0.09	−0.04		
13.	Timing	0.17*	0.02	−0.15	0.24**	0.17*	0.02	0.10	0.09	−0.14	−0.02	0.13	0.13	
14.	Gender	−0.22*	0.00	0.03	−0.05	−0.02	0.06	−0.11	−0.10	0.05	0.04	0.08	−0.09	−0.04

* $p < 0.05$, ** $p < 0.01$.

Likelihood of sharing anti-vaccine statements correlated positively with size of social network, percentage of friends who are anti-vaccine and political orientation (specifically, the more right-wing a participant's political orientation, the more likely they were to share anti-vaccine statements). Likelihood of sharing pro-vaccine statements correlated positively with percentage of friends who are pro-vaccine and negatively with political orientation (specifically, the more left-wing a participant's political orientation, the more likely they were to share pro-vaccine statements).

A small but significant positive correlation emerged between procrastination and time spent looking at vaccine claims. To investigate Hypothesis 4, a linear regression analysis was undertaken revealing that procrastination positively predicted time spent looking at vaccine claims, $\beta = 0.17$, $t = 2.19$, $p = 0.03$, $R^2 = 0.03$.

Individual differences and type of vaccine-related information sought

As very few participants elected to see anti-vaccine statements alone, we only included data from participants who elected to see pro-vaccine statements alone and those who elected to see both pro- and anti-vaccine statements. In order to test Hypotheses 1 and 2, a one-way between-groups MANOVA was performed to determine differences between these two groups. One category of variables in this analysis concerned decisional style. However, note that no hypotheses were pre-registered regarding the relationship between vaccine statement seeking or sharing and decisional styles other than procrastination. However, these variables were included in our analysis because other decisional styles could impact on the inclination to seek or share information.

Dependent variables were: decisional style (procrastination, buck-passing, vigilance, hypervigilance and decisional self-esteem), COVID-19-related anxiety, political orientation, highest educational level, size of social network, percentage of pro-vaccine friends and percentage of anti-vaccine friends. The independent variable was 'type of vaccine information selected'. Preliminary assumption testing revealed no serious violations.

A significant difference emerged between 'pro' and 'both' vaccine information groups on the combined dependent variables, $F(20, 378) = 2.68$, $p < 0.001$, Wilks' Lambda = 0.77, partial $\eta^2 = 0.13$. The MANOVA revealed that when compared with participants

Table 4. Summary of significant MANOVA results (and those approaching significance).

Dependent variable	df (df error)	Group	Mean(SE)	*F*	*p*	Partial η^2
Hypervigilance	1,194	Pro-vaccine	9.12(2.50)	12.05	0.001	0.06
		Both	10.77(2.53)			
Buck-passing	1,194	Pro-vaccine	11.71(3.36)	8.95	0.003	0.04
		Both	13.54(3.23)			
COVID-19 anxiety	1,194	Pro-vaccine	6.71(3.70)	11.98	0.001	0.06
		Both	5.45(1.29)			
% of pro-vaccine friends	1,194	Pro-vaccine	88.24(3.22)	6.95	0.009	0.04
		Both	79.49(1.48)			
% of anti-vaccine friends	1,194	Pro-vaccine	9.41(2.98)	7.45	0.007	0.04
		Both	18.37(1.37)			
Procrastination	1,194	Pro-vaccine	9.94(2.76)	3.76	0.05	0.02
		Both	10.91(2.64)			
Decisional self-esteem	1,194	Pro-vaccine	4.00(2.47)	3.83	0.05	0.02
		Both	3.14(2.31)			

Table 5. Standardised regression coefficient (β), t-value of b and significance values for predictors of likelihood of anti-vaccine statement sharing.

	β	t	p
Political orientation	0.22	2.16	0.033
Size of social network	0.25	2.55	0.012
% of anti-vaccine friends	0.29	2.84	0.006

who were only interested in pro-vaccine information, participants who elected to see both pro- and anti-vaccine information were more hypervigilant and more prone to buck-passing but were less anxious about COVID-19. This group also had a lower percentage of pro-vaccine friends and a higher percentage of anti-vaccine friends than the group who elected to see only pro-vaccine statements. Key MANOVA results are summarised in Table 4.

Predictors of the likelihood of sharing vaccine-related statements

In order to test Hypotheses 1, 2 and 3, two multiple regression analyses were conducted to identify factors which predict the likelihood of sharing vaccine-related statements. Although a series of independent samples t-tests were pre-registered to assess the impact of the manipulation on sharing intentions, it was judged to be more parsimonious to include the manipulation groups (accuracy and control) in the multiple regression analyses.

Anti-vaccine statement sharing

Predictors for the first multiple regression analysis were: COVID-19 anxiety, size of social network, procrastination, vigilance, hyper-vigilance, decisional self-esteem, political orientation, percentage of anti-vaccine friends and group (accuracy or control). The criterion variable was the likelihood of sharing anti-vaccine information. The analysis revealed that the predictors explained 29.1% of the variance in the likelihood of sharing anti-vaccine statements, [$F(10, 87) = 3.57$, $p < 0.001$]. Specifically, we found that the likelihood of sharing anti-vaccine statements was positively predicted by the percentage of one's friends who are anti-vaccine, the size of one's social network and conservative political orientation (see Table 5). (Only significant predictors are depicted in the table.)

Pro-vaccine statement sharing

Predictors for the second multiple regression analysis were: COVID-19 anxiety, size of social network, procrastination, vigilance, hyper-vigilance, decisional self-esteem, political orientation, percentage of pro-vaccine friends and group (accuracy or control). The criterion variable was likelihood of pro-vaccine statement sharing. The analysis revealed that the predictors explained 28.4% of the variance in the likelihood of sharing pro-vaccine statements, [$F(10, 92) = 3.65$, $p < 0.01$]. Specifically, we found that the likelihood of sharing pro-vaccine statements was positively predicted by the percentage of one's friends who are pro-vaccine, liberal political orientation and being

Table 6. Standardised regression coefficient (β), t-value of b, and significance values for predictors of likelihood of pro-vaccine statement sharing.

	β	t	p
Political orientation	−0.25	−2.62	0.010
% of pro-vaccine friends	0.25	2.60	0.011
Procrastination	0.32	1.97	0.050
Group (accuracy/control)	−0.18	−1.20	0.049

assigned to the accuracy group (see Table 6). Procrastination also approached significance as a positive predictor.

Additional correlational analyses

Additional Pearson correlational analyses were undertaken in order to determine whether, among participants in the accuracy group, accuracy judgements correlated with the likelihood of sharing vaccine-related statements. We found a positive correlation between the likelihood of sharing anti-vaccine statements and accuracy judgments, $r = 0.38$, $n = 64$, $p = 0.004$, reflecting that the more accurate a participant judged a statement to be, the more likely they were to share it. However, we did not find a significant correlation between the likelihood of sharing pro-vaccine statements and accuracy judgements, $r = 0.20$, $n = 99$, $p = 0.081$.

Discussion

The primary aims of this study were: (i) to investigate predictors of the seeking and sharing of pro- and anti-vaccine information and (ii) to investigate whether sensitising people to information accuracy would impact on their sharing intentions and whether this varied as a function of the type of information to be shared (i.e. pro- or anti-vaccine information).

Predictors of vaccine-related information seeking

Given that only 2.8% of participants preferred to see anti-vaccine statements alone, we were only able to undertake analyses on the 'pro' and 'both' groups. We found that individuals who elected to see both pro- and anti-vaccine statements ('fence-sitters') scored more highly on buck-passing and hypervigilance, had a higher percentage of anti-vaccine friends and a lower percentage of pro-vaccine friends, and reported less COVID-19 anxiety than those who elected to see only pro-vaccine statements. Given that a hypervigilant decisional style is characterised by impulsive, disorganised decision-making (Mann & Tan, 1993), it makes sense that hypervigilance predicted fence-sitting. Similarly, as buck-passing involves avoidance of decision-making (Janis & Mann, 1977) the 'both' option could arguably be characterised as a way of avoiding making a choice between pro- and anti-vaccine information.

Predictors of pro- and anti-vaccine information sharing

Consistent with Hypothesis 3, the more left-wing a participant's political orientation and the higher the percentage of their pro-vaccine friends, the more likely they

were to share pro-vaccine statements. Procrastination also approached significance as a positive predictor. Similarly, the more right-wing a participant's political orientation, the higher the percentage of their anti-vaccine friends, and the larger their social network, the more likely they were to share anti-vaccine statements. This coheres with existing literature showing that conservatives are more likely to be opposed to vaccination (Fridman et al., 2021) and to spread COVID-19 misinformation (Guess et al., 2019). Furthermore, vaccine acceptance or hesitancy typically mirrors the attitudes of the majority of one's social network (Latkin et al., 2021) so it is unsurprising that this emerged as a significant predictor of sharing willingness in our study.

Contrary to Hypothesis 1, COVID-19 anxiety was not a significant predictor of the likelihood of sharing anti-vaccine statements.

Consistent with Hypothesis 4, procrastination was a significant, positive (but weak) predictor of time spent looking at vaccine-related statements.

Impact of accuracy priming on sharing willingness

Contrary to Hypothesis 5, our first regression found that participants in the accuracy group were not significantly less likely to share anti-vaccine content than participants in the control group. This is in contrast with Pennycook et al. (2021) and Roozenbeek et al. (2021) who found that participants in the accuracy group were significantly less willing to share false headlines than participants in the control group.

However, we did find a positive correlation within the accuracy group between the likelihood of sharing anti-vaccine statements and judgements of statement accuracy: the more accurate a participant judged an anti-vaccine statement to be, the more likely they were to share it. Pennycook et al. (2021) offer a theory which can explain this finding: they argue that people would rather not share inaccurate information and are thus more likely to share misinformation when they are not attending to the possibility of its inaccuracy (call this 'the attention theory'). The attention theory predicts that when attention is drawn to accuracy considerations, people will become less willing to share false information.

However, our second regression revealed that participants in the accuracy group were, in addition, significantly more likely to share pro-vaccine content than participants in the control group. This finding is not readily explained by the attention theory. While the preference not to share misinformation predicts a disinclination to share information when one considers its possible *falsity*, it does not predict an increased inclination to share information when one considers its possible *truth*. Thus, an alternative theory is required to explain our data. We speculate that the accuracy prime encourages people to internalise a norm that values accurate information. Such a norm has implications for when information should and should not be shared: it entails that you should share information that you believe to be accurate and that you should not share information that you believe to be inaccurate. Upon internalising such a norm, people will be both less likely to share information which they believe to be false and more likely to share information which they believe to be true.

Distribution of attitudes in our sample

One might worry that the reliability of our findings is undermined by an insufficiently broad distribution of pro- and anti-vaccine attitudes in our sample. However, this worry is misplaced as a large proportion of our sample were at least interested in anti-vaccine material (specifically, only 15.5% of participants elected not to see anti-vaccine statements). Furthermore, when participants in the accuracy group were asked to rate the accuracy of pro- and anti-vaccine statements (out of 100), the average accuracy rating for the nine pro-vaccine statements ranged from 28.92 to 42.81 (with an SD of around 38 for each statement) while the average accuracy rating for the nine anti-vaccine statements ranged from 3.87 to 42.51 (with an SD of around 30 for each statement). Although the average credence given to pro-vaccine statements was higher, it is noteworthy that this credence remained below 50%. This suggests that participants in our sample tended to critically assess both pro- and anti-vaccine statements and that very few (if any) judged all pro-vaccine statements to be true or all anti-vaccine statements to be false.

Conclusion

This study demonstrated that those who indicated that they wanted to see both pro- and anti-vaccine information were more hypervigilant, higher on buck-passing, less anxious about COVID-19 and that they have more anti-vaccine friends and fewer pro-vaccine friends compared with those seeking only pro-vaccination content. We also found that sharing-intentions are associated with political orientation whereby conservatives are more likely to share anti-vaccine content and liberals are more likely to share pro-vaccination content. Those with larger social networks are also more likely to share anti-vaccination content. Priming participants to consider accuracy increased their likelihood of sharing pro-vaccine content, which may be accounted for by a norm-sensitisation mechanism. The hypothesis that people's sharing inclinations may reflect unconsciously internalised norms may be tested in future research where participants are primed to adopt alterative norms (i.e. norms which promote values other than accuracy) to determine how this impacts on sharing intentions. For instance, participants primed to value interesting or novel information may be more willing to share such information even at the cost of spreading misinformation.

Author contributions

Lauren Saling: Conceptualisation; data curation; formal analysis; investigation; methodology; project administration; validation; visualisation; writing – original draft; writing – review and editing. Daniel Cohen: Conceptualisation; methodology; writing – original draft; writing – review and editing. James Phillips: Conceptualisation; formal analysis; investigation; methodology; writing – original draft; writing – review and editing.

Context paragraph

Author 1 undertakes research into predictors of the spread of misinformation. Author 2 undertakes research in the area of decision-making. Author 3 undertakes research into decision theory.

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ORCID

Lauren L. Saling http://orcid.org/0000-0003-0722-6232

References

Del Vicario, M., Bessi, A., Zollo, F., Petroni, F., Scala, A., Caldarelli, G., Stanley, H. E., & Quattrociocchi, W. (2016). The spreading of misinformation online. *Proceedings of the National Academy of Sciences of the United States of America*, *113*(3), 554–559. https://doi.org/10.1073/pnas.1517441113

Fazio, L. (2020). Pausing to consider why a headline is true or false can help reduce the sharing of false news. *Harvard Kennedy School Misinformation Review*, *1*, 1–8. https://doi.org/10.37016/mr-2020-009

Freiling, I., Krause, N. M., Scheufele, D. A., & Brossard, D. (2023). Believing and sharing misinformation, fact-checks, and accurate information on social media: The role of anxiety during COVID-19. *New Media & Society*, *25*(1), 141–162. https://doi.org/10.1177/14614448211011451

Fridman, A., Gershon, R., & Gneezy, A. (2021). COVID-19 and vaccine hesitancy: A longitudinal study. *PLoS One*, *16*(4), e0250123. https://doi.org/10.1371/journal.pone.0250123

Garrett, R. K., & Weeks, B. E. (2017). Epistemic beliefs' role in promoting misperceptions and conspiracist ideation. *PLoS One*, *12*(9), e0184733. https://doi.org/10.1371/journal.pone.0184733

Guess, A., Nagler, J., & Tucker, J. (2019). Less than you think: Prevalence and predictors of fake news dissemination on Facebook. *Science Advances*, *5*(1), eaau4586. https://doi.org/10.1126/sciadv.aau4586

Herek, G. M., Janis, I. L., & Huth, P. (1987). Decision making during international crises: Is quality of process related to outcome? *Journal of Conflict Resolution*, *31*(2), 203–226. https://doi.org/10.1177/0022002787031002001

Horton, R. (2020). Offline: Managing the COVID-19 vaccine infodemic. *Lancet (London, England)*, *396*(10261), 1474. https://doi.org/10.1016/s0140-6736(20)32315-1

Janis, I. L., & Mann, L. (1977). *Decision making: A psychological analysis of conflict, choice and commitment*. Free Press.

Latkin, C. A., Dayton, L., Yi, G., Konstantopoulos, A., & Boodram, B. (2021). Trust in a COVID-19 vaccine in the U.S.: A social-ecological perspective. *Social Science & Medicine*, *270*, 113684. https://doi.org/10.1016/j.socscimed.2021.113684

Lee, S. A. (2020). Coronavirus Anxiety Scale: A brief mental health screener for COVID-19 related anxiety. *Death Studies*, *44*(7), 393–401. https://doi.org/10.1080/07481187.2020.1748481

Mann, L., Burnett, P., Radford, M., & Ford, S. (1997). The Melbourne Decision Making Questionnaire: An instrument for measuring patterns for coping with decisional conflict. *Journal of Behavioral Decision Making*, *10*(1), 1–19. https://doi.org/10.1002/(SICI)1099-0771(199703)10:1<1::AID-BDM242>3.0.CO;2-X

Mann, L., & Tan, C. (1993). The hassled decision maker: The effects of perceived time pressure on information processing in decision making. *Australian Journal of Management*, *18*(2), 197–209. https://doi.org/10.1177/031289629301800204

Pennycook, G., & Cannon, T. (2018). Prior exposure increases perceived accuracy of fake news. *Journal of Experimental Psychology General*, *147*(12), 1865–1880. https://doi.org/10.2139/ssrn.2958246

Pennycook, G., Epstein, Z., Mosleh, M., Arechar, A. A., Eckles, D., & Rand, D. G. (2021). Shifting attention to accuracy can reduce misinformation online. *Nature*, *592*(7855), 590–595. https://doi.org/10.1038/s41586-021-03344-2

Pennycook, G., McPhetres, J., Zhang, Y., Lu, J. G., & Rand, D. G. (2020). Fighting COVID-19 misinformation on social media: experimental evidence for a scalable accuracy-nudge intervention. *Psychological Science*, *31*(7), 770–780. https://doi.org/10.1177/0956797620939054

Roozenbeek, J., Freeman, A. L. J., & van der Linden, S. (2021). How accurate are accuracy-nudge interventions? A preregistered direct replication of Pennycook et al. (2020). *Psychological Science*, *32*(7), 1169–1178. https://doi.org/10.1177/09567976211024535

Roozenbeek, J., Schneider, C., Dryhurst, S., Kerr, J., Freeman, A., Recchia, G., van der Bles, A. M., & van der Linden, S. (2020). Susceptibility to misinformation about COVID-19 around the world. *Royal Society Open Science*, *7*(10), 201199. https://doi.org/10.1098/rsos.201199

Russell, F. M., & Greenwood, B. (2021). Who should be prioritised for COVID-19 vaccination? *Human Vaccines & Immunotherapeutics*, *17*(5), 1317–1321. https://doi.org/10.1080/21645515.2020.1827882

Stoycheff, E., Liu, J., Wibowo, K. A., & Nanni, D. P. (2017). What have we learned about social media by studying Facebook? A decade in review. *New Media & Society*, *19*(6), 968–980. https://doi.org/10.1177/1461444817695745