

# “I'll wait for the English one”: COVID-19 vaccine country of origin, national identity, and their effects on vaccine perceptions and uptake willingness

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## Abstract

Vaccines can play a crucial role in reducing the negative outcomes of pandemics. In this paper we explore how vaccine perceptions and uptake willingness can be affected by vaccine-related information, the vaccine's country of origin, and national identity. Study 1 ( $N = 800$ ) showed that a vaccine manufactured by China was perceived more negatively compared to vaccines from the UK, Germany, and Chile. Providing vaccine effectiveness information (83%) increased preference for waiting for an alternative vaccine and reduced perceived effectiveness of a vaccine from China. Brexit supporters perceived vaccines as less safe in general, and particularly thought of a vaccine from China as less competent, effective, and trustworthy, and were less prepared to have it. Study 2 ( $N = 601$ ) largely replicated findings of Study 1 regarding the effects of a vaccine's country of origin. Moreover, participants who reported a higher sense of British superiority reported more negative attitudes towards a vaccine from China. However, apart from the aforementioned main effects of Study 2, our attempt to manipulate British identity *vis a vis* a Global identity in order to examine particular national-identity related outcomes

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was not successful. Overall, vaccine characteristics can interact with various social psychological factors, potentially affecting people's perceptions and willingness to uptake particular measures to support personal and public health.

**KEYWORDS**

Brexit, COVID-19, national identity, pandemic, vaccination, vaccine attitudes, vaccine effectiveness

## 1 | INTRODUCTION

Widespread and rapid vaccination can play a crucial role in reducing pandemic-related deaths (Watson et al., 2022), but public perceptions of vaccines can play a role in facilitating uptake or increasing hesitancy. Trusting a vaccine's safety is associated with higher COVID-19 vaccination intentions (Karlsson et al., 2021). On the other hand, COVID-19 vaccine hesitancy is associated with distrust towards both the flu and COVID-19 vaccines, low institutional and governmental trust, vaccine-related information perceived as contradictory and inconsistent, lower perceived risk of infection and perceived severity, and perceptions of side effects (Pires, 2022; Soares et al., 2021). Kreps et al. (2021) also report that higher levels of perceived vaccine efficacy can increase people's willingness to get vaccinated. For example, a supposed effectiveness rate of 90% increased people's reported willingness to vaccinate by about 20% compared to a 50% effectiveness rate.

Political identities can also play a role in shaping public health-related attitudes, behaviours, and other associated outcomes. For instance, in US samples, Republicans had more negative attitudes towards COVID-19 vaccines compared to Democrats (Fridman et al., 2021). Also, districts with more Brexit supporters reported higher death rates compared to districts with more Remain supporters. In the UK, the COVID-19 vaccination program began in December 2020 and vaccines became available throughout 2021. At the time, the majority of UK adults were prepared to, and eventually would, receive a COVID-19 vaccine, although a substantial proportion were either uncertain or hesitant about accepting a vaccine, or intended to refuse a vaccine when offered (e.g. Butter et al., 2022; Lazarus et al., 2022; Stead et al., 2021). The main reasons for negative sentiments toward vaccines were concerns about side effects, long term effects on health, and vaccine effectiveness.

Prior to the start of the vaccination program, vaccines' countries of origin were regularly the centre of attention. The Oxford-AstraZeneca vaccine was celebrated as a 'British success story' and there were reports of some people turning down the Pfizer-BioNTech vaccine in favour of waiting for the Oxford-AstraZeneca vaccine as they wanted to be vaccinated with 'the English one'.<sup>1</sup> The effectiveness of different vaccines was also regularly discussed alongside each vaccine's country of origin represented by a national flag.<sup>2</sup>

In this paper we examine how vaccine perceptions and uptake intentions could be affected by information regarding the vaccine's effectiveness, the vaccine's country of origin, as well as by national identity. Our first study examined how information about a vaccine's country of origin and regarding its effectiveness affected vaccine perceptions, intentions to receive it, and willingness to wait for alternative vaccines. Our second study explored how different types and characteristics of national social identities (in our case, a Global identity *vis a vis* one of national superiority compared to other countries) could affect intentions to receive the vaccines, estimates of protection by the virus, and post-vaccination adherence intentions.

## 2 | STUDY 1

Our first study explored whether vaccines' countries of origins and the availability of effectiveness information had any effect on participants' attitudes and behavioural intentions in terms of getting vaccinated.

## 2.1 | Methodology

Participants were asked to imagine that they had been offered a COVID-19 vaccine. They were then given some information about that (hypothetical) vaccine. We manipulated two variables (both between-subjects manipulations): (a) the vaccine's country of origin and (b) whether or not information about the vaccine's effectiveness was given or withheld.

Participants were told that the vaccine was developed and manufactured in one of four countries: the UK, Germany, China, or Chile. We selected the UK and Germany due to their associations with the Oxford-AstraZeneca and the Pfizer-BioNTech vaccines, respectively. We selected China due to its association with the initial outbreak of COVID-19. We arbitrarily selected Chile as a country we did not expect our participants to strongly associate with COVID-19 or vaccines in any specific way. Participants were also either given information that the vaccine was 83% effective, or this information was withheld.

Participants in the condition where they were given a UK vaccine were shown an image of a vaccine vial with a UK flag on it, alongside text confirming that the vaccine was developed and manufactured in the UK and information about its development time, effectiveness (for participants in the condition where effectiveness was given), the number of doses necessary, required storage temperature, and its approval for use in the UK by the Medicines and Healthcare products Regulatory Agency (MHRA). With this information visible on screen, participants were given an attention check in the form of identifying true statements from a list (see SI Section 1.1 for details).

For participants given a Germany, China, or Chile vaccine, the image and text were adapted appropriately. Regardless of country of origin, all vaccines had the same text regarding the vaccine's MHRA approval for use in the UK.

We collected five dependent variables. First, we collected three measures relating to the participant's perceptions about the vaccine they were shown: (i) competence and trust, (ii) safety, and (iii) perceived effectiveness. We then collected the participant's intentions: the extent to which they would (a) choose to have the vaccine and (b) prefer to wait for a different COVID-19 vaccine. We additionally collected how strongly they felt they would never take any COVID-19 vaccine. See SI Section 1.2 for details.

We also then collected participants' perceptions of COVID-19 risk, their self-identification as British (see SI Section 1.2), and, as another proxy measure of British identity, we asked participants how they voted in the 2016 EU (Brexit) Referendum (Hobolt et al., 2021). Finally, we recorded their age, gender, and the country within the UK that they lived in.

### 2.1.1 | Participants

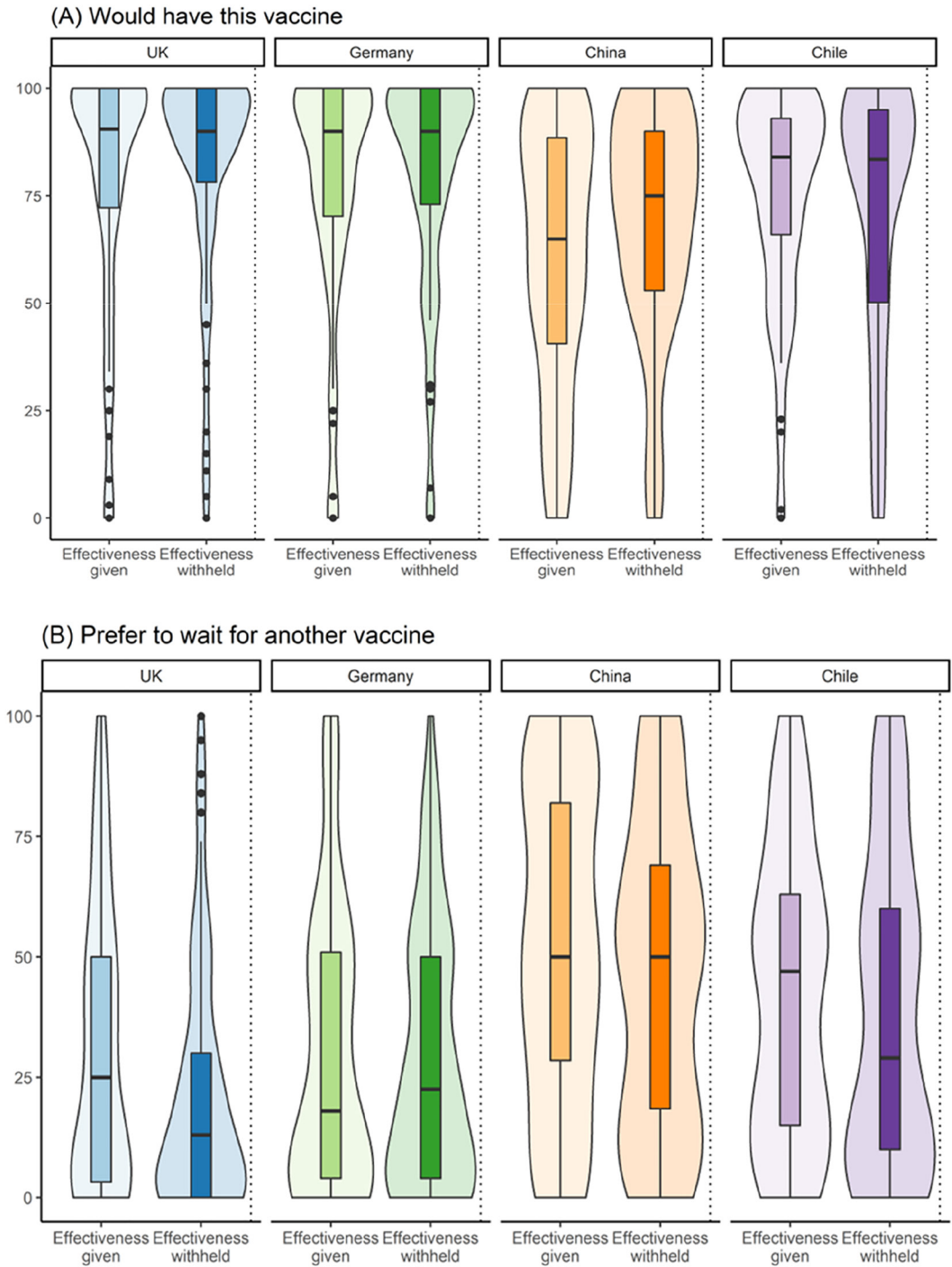
Data from 800 participants --- 100 in each vaccine origin/effectiveness data condition --- was collected using Prolific on 28-27 January 2021. Participants were prescreened to only recruit British people currently living in the UK. Each was paid £1.

122 (15%) of participants made at least one mistake in the attention check and their data was removed from the analysis.<sup>3</sup> Our final sample was 678 British UK residents (438 female, 229 male, 11 other/undisclosed gender; age 18-75, mean 34.2).

### 2.1.2 | Results

Competence and trust, safety, and perceived effectiveness for vaccine origin and whether effectiveness information was provided are illustrated in SI Section 1.3. Preparedness to have the offered vaccine and preferring to wait for another are illustrated in Figure 1.

Our analyses involved linear mixed effects modelling. Model outputs for preparedness to have the vaccine and preferring to wait for another vaccine are given in Tables 1 and 2, respectively. For succinctness, we highlight the main findings below. Full details of all our analysis, including additional model outputs, are given in SI Section 1.4.



**FIGURE 1** (a) Preparedness to have vaccine (top panel) and (b) Preferring to wait for another vaccine (bottom) by vaccine origin and whether effectiveness information was given (left of each pair) or withheld (right). The boxplots indicate the data's median, interquartile range, limits, and outliers. The violin plots illustrate the data's distribution, with the width at a given value approximately representing the frequency of the data at that value.

TABLE 1 The linear mixed model output for preparedness to have vaccine in Study 1.

	<i>b</i>	<i>SE</i>	95% <i>CI</i>	<i>t</i>	<i>p</i>
(Intercept)	80.073	2.226	[75.736, 84.411]	35.97	<0.001***
Germany	-1.156	3.03	[-7.076, 4.750]	-0.382	0.703
China	-15.211	3.028	[-21.112, -9.286]	-5.023	0.001***
Chile	-6.812	3.056	[-12.767, -0.813]	-2.229	0.026*
Effectiveness info.	-1.933	2.143	[-6.113, 2.251]	-0.902	0.367
Germany: Effectiveness info.	0.626	3.028	[-5.278, 6.541]	0.207	0.836
China: Effectiveness info.	-1.607	3.025	[-7.506, 4.299]	-0.531	0.595
Chile: Effectiveness info.	3.28	3.049	[-2.673, 9.227]	1.076	0.283

Note: Vaccine origin (with UK as baseline) and effectiveness information (sum coded with information given as 1 and information withheld as -1), and their interaction were included as fixed effects. Age and gender were included as random intercepts. See SI Section 1.4.1 for full details and outputs for pairwise comparisons of vaccine origin.

TABLE 2 The linear mixed model output for preferring to wait for another vaccine in Study 1.

	<i>b</i>	<i>SE</i>	95% <i>CI</i>	<i>t</i>	<i>p</i>
(Intercept)	25.950	2.309	[21.416, 30.485]	11.238	<0.001***
Germany	2.753	3.260	[-3.649, 9.155]	0.844	0.399
China	22.952	3.261	[16.549, 29.355]	7.038	<0.001***
Chile	13.777	3.269	[7.357, 20.197]	4.214	<0.001***
Effectiveness info.	4.585	2.309	[0.050, 9.119]	1.985	0.048*
Germany: Effectiveness info.	-3.393	3.260	[-9.795, 3.009]	-1.041	0.298
China: Effectiveness info.	-1.280	3.261	[-7.683, 5.124]	-0.392	0.695
Chile: Effectiveness info.	-2.934	3.269	[-9.354, 3.485]	-0.897	0.370

Note: Vaccine origin (with UK as baseline) and effectiveness information (sum coded with information given as 1 and information withheld as -1), and their interaction were included as fixed effects. Age and gender were included as random intercepts. See SI Section 1.4.1 for full details and outputs for pairwise comparisons of vaccine origin.

First, vaccine perceptions and intentions (both in terms of receiving the vaccine or preferring to wait for an alternative option) were affected by the vaccine's country of origin. The vaccine from China was perceived more negatively, rated lower than the other vaccines on competence and trust (SI Tables S1 and S2), lower than the UK and Germany vaccines on safety (SI Tables S3 and S4), and lower than the UK vaccine on effectiveness (SI Tables S5 and S6). Participants were also more prepared to have the UK vaccine than either the China or Chile vaccine (Table 1) and were more prepared to have either the Germany or Chile vaccine than the China vaccine (SI Table S8). Compared to the UK or Germany vaccines, participants also showed a greater preference for waiting for an alternative vaccine when offered the China or Chile vaccine (Table 2). Compared to the Chile vaccine, they also showed a greater preference for waiting when offered the China vaccine (SI Table S10).

Second, perceptions and intentions were affected by whether effectiveness information was given. Preference for waiting for an alternative vaccine was greater when the effectiveness figure of 83% was given (Table 2). Compared to the UK vaccine, the lower perceptions of safety and effectiveness of the China vaccine described above were not as pronounced when the effectiveness figure was withheld (SI Tables S3 and S5).<sup>4</sup>

Third, there was evidence of some effects of vaccine origin and effectiveness information being moderated by strength of British identity. Participants with the strongest British identity had an even greater preference for waiting for an alternative vaccine when offered the China vaccine and effectiveness information was withheld (SI Table S15). Comparing the China vaccine to the UK vaccine, many of the effects of vaccine origin above were magnified (i.e.,

reduced trust and safety, and preference to wait for an alternative vaccine) for participants who voted to leave, compared to remain, in the EU (SI Tables S16 and S17 Tables S19 and S20).

### 3 | STUDY 2

In Study 2, we aimed to see if priming British participants to focus on a British identity or on a global identity at the start of the study affected the results of Study 1. We also included a measure of British superiority alongside our previous measure of British identification in general to investigate whether particular social identity characteristics lead to identity-related effects. Finally, we included some additional measures to assess estimates of protection given by the vaccine, along with post-vaccination intentions to adhere to COVID-19 public health guidelines.

#### 3.1 | Methodology

The methodology of Study 2 followed that of Study 1, but with two conditions designed to manipulate participant identity. Participants were either placed in a Global Identity condition or a British identity condition (a between-subjects manipulation). They began the study with a short text to read and a writing task, designed to make either their identity as a person of the world, or specifically as a British person, more salient to them throughout the study. See SI Section 2.1 for full details of this manipulation.

The study otherwise followed the procedure of Study 1, though with the following changes. For streamlining purposes, we did not include Chile as a country of origin and we also removed the manipulation where participants were presented with vaccine effectiveness information. We collected an additional dependent variable: a measure of participant post-vaccination intentions to adhere to COVID-19 preventative behaviours. We also collected a measure of British superiority alongside British identification. See SI Section 2.2.

It is worth noting that collecting measures of British identification and superiority at the same time here will mean that the identity measure in Study 2 is likely different to that of Study 1. A participant who identifies as British yet would not ascribe to a notion of British superiority, for example, may give a higher score for British identity (alongside a comparatively low score for British superiority) in Study 2 than they would for Study 1.

##### 3.1.1 | Participants

Data from 601 participants --- 100 in each identity/vaccine origin condition (plus 1 additional participant we inadvertently over-collected in the British identity/China vaccine condition) --- was collected using Prolific on 10 February 2021. Participants were again pre-screened to only recruit British people currently living in the UK who had not taken part in Study 1. Each was paid £1.

103 (17%) of participants made at least one mistake in the attention check and their data was removed from the analysis. Our final sample was 498 British UK residents (319 female, 178 male, 1 other/undisclosed gender; age 18–83, mean 33.8).<sup>5</sup>

##### 3.1.2 | Results

Each dependent variable is illustrated by vaccine origin and identity manipulation in SI Section 2.3. Full details of all our analysis given in SI Section 2.4. For succinctness, here we focus on the main findings.

As in Study 1, there was evidence of vaccine perceptions and intentions being affected by the vaccine's country of origin. The China vaccine was perceived more negatively and intentions to have it were lower, while here

participants also expressed a greater preference for waiting for an alternative vaccine when offered the Germany vaccine compared to the UK one (SI Tables S21–S24 and Tables S27–S30).

Strength of British identity was once again associated with lower perceptions of vaccine safety in general (SI Table S36), and interacted with vaccine origin, leading to higher post-vaccination adherence intentions following a UK vaccine but lower following a China vaccine (SI Table S41).

Strength of British superiority, however, affected the results more markedly, and better replicated the identity-related results of Study 1 than Study 2's measure of British identity: comparing the China vaccine to the UK vaccine, many of the effects above (i.e., reduced competence and trust, reduced safety, effectiveness and preparedness to have the vaccine, and higher preference to wait for an alternative vaccine), were magnified for participants with higher British superiority (SI Tables S42–S46).

Our identity manipulation appeared to have only limited effects on the results. There were no main effects of the manipulation, or two-way interactions between the identity manipulation and vaccine origin, apart from a suggestion that participants in the Global identity condition were slightly more likely to engage in post-vaccination preventative behaviours (SI Table S33).<sup>6</sup> However, participants in the Global identity condition did not perceive the China vaccine as quite as unsafe compared to the UK vaccine as those in the British identity condition did (SI Table S36).

## 4 | DISCUSSION

Previous research has shown that among others, vaccine hesitancy can be driven by vaccine-related information and by different social and political identities (Fridman et al., 2021; Pires, 2022; Soares et al., 2021). Our studies complement this literature by showing that a vaccine's country of origin can affect vaccine perceptions, uptake willingness, and intentions to wait for alternative options. Our sample of British participants perceived the Chinese vaccine less favourably compared to other vaccines and was less willing to receive it. When offered the Chinese (and to a lesser extent a Chilean or a German vaccine) they were willing to wait until a different option was available. At the same time, and despite being beyond the focus of this set of studies, we recognize that xenophobia, racism, and strong anti-Chinese sentiments in some parts of the population might have also driven negative attitudes towards the Chinese vaccine (e.g., Carr et al., 2022).

Vaccination intentions are also affected by belief in conspiracy theories, political conservatism, and rates of vaccine efficacy (Hursh et al., 2020). In our case, inclusion of effectiveness information increased participants' preference to wait for a different vaccine. Thus, it is possible that some of our participants perceived an effectiveness rate of 83% to be low, despite vaccines often being officially approved when their efficacy is over 50% (WHO, 2021). However, a vaccine's country of origin interacted with the inclusion of the effectiveness information. Including effectiveness information led to the China vaccine as being perceived as less safe and less effective. This suggests that how positive the effectiveness figure is interpreted may vary with the vaccine it is related to.

Finally, strength of British identity can influence vaccine perceptions and intentions. Studies have shown that stronger endorsement of national identities is associated with increased public health-related behaviour (van Bavel et al., 2022). In our case, participants with stronger British identification preferred to wait for an alternative vaccine to a greater extent when effectiveness information was provided and when they were offered the China vaccine. Whereas strength of national identification had limited effects in Study 1, Study 2 showed that it was not British national identity in general, but a sense of British superiority attached to that identity that influenced vaccine perceptions and intentions. Stronger British superiority was associated with vaccines being perceived as less safe, whereas post-vaccination behaviours were higher following a British vaccine compared to a China vaccine. Stronger endorsement of British superiority also enhanced negative perceptions of the China vaccine and was associated with being less prepared to accept a China vaccine and being more prepared to wait for an alternative. Moreover, Brexit Leave voters rated the China vaccine lower for competence, trust, and safety, were less prepared to receive it, and were even more prepared to wait for an alternative vaccine.

## 4.1 | Limitations and future research

We did not see the expected main effects of identity condition on most outcome measures in Study 2, although participants in the Global identity condition did not consider the China vaccine as unsafe as the UK vaccine compared to participants in the British identity condition. It seems likely that the relative lack of main effects was a consequence of an ineffective identity manipulation rather than identity being unimportant for vaccine perception given that identification was related to many of the outcome measures. Indeed, given the ubiquity of identity information regarding COVID-19 vaccines, it is perhaps not surprising that our experimental manipulation was impotent relative to this competing information. Future research should explore ways to strengthen this manipulation.

Also, our studies used hypothetical scenarios and there might be discrepancies with how people's perceptions regarding real vaccines might operate. Also, our hypothetical scenarios might be affected by perceptions regarding real-world vaccines. The Chilean vaccine is the only one that does not correspond to a real-life vaccine, but participants unavoidably carry into the study their perceptions of German, British and Chinese vaccines, which might affect the results. On the other hand, despite not naming the vaccines, attaching real perceptions to an experimental study with fictional variables might increase the ecological validity of our studies. Our study also focuses on people's intentions to get vaccinated and might not correspond to actual behaviour. Another limitation concerns the moderate alpha value of the perceived effectiveness scale, with future studies needing to use scales that have been validated across large samples. Finally, our sample is not representative of the British public. In our studies our sample is skewed towards participants who voted for Remain on Brexit (over both studies, of those who declared how they voted, those who voted Remain outnumbered those who voted Leave by 3.5:1) so more representative samples are needed, including the examination of non-UK samples. Additional theoretically-informed research (i.e., Atkinson et al., 2023) is also needed to examine how different types of identities (e.g., national identity, community identity) and particular aspects of identity content and framing can affect health-related behaviours (e.g., social distancing, self-isolation, mask-wearing).

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### CONFLICT OF INTEREST STATEMENT

The authors declare that there are no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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### ENDNOTES

- <sup>1</sup> See, for example, coverage by the BBC (<https://www.bbc.co.uk/news/uk-england-tees-55579004>), all publishing on 7 January 2021 [accessed 1 April 2022]).
- <sup>2</sup> Reflecting on this period a year later, Prof Adrian Hill, director of the Jenner Institute in Oxford, where the vaccine was developed, said 'There was too much nationalism. It was encouraging competition between vaccine types, between countries. That's the last thing you want in trying to control the pandemic and provide vaccines for the world.' (Reported by the BBC on 7 February 2022: <https://www.bbc.co.uk/news/health-60259302> [accessed: 29 August 2022]).
- <sup>3</sup> Inspection of the attention check errors, however, did not suggest that the participants were selecting the true statements at random. The most common error was failing to select one of the true statements, typically the 'It can be stored at 3°C' statement.
- <sup>4</sup> Note that we get a slightly different result if we include the data from participants who made one or more mistakes in the attention check. In that case there is no significant interaction between vaccine origin and whether effectiveness information is given or withheld for the measures of safety and perceived effectiveness.



- <sup>5</sup> As for Study 1, inspection of the attention check errors did not suggest that the participants were selecting the true statements at random. The most common error was again failing to select one of the true statements, typically the 'It can be stored at 3°C' statement.
- <sup>6</sup> Note that we get a slightly different result again if we include the data from participants who made one or more mistakes in the attention check. In this case there is no significant effect of identity condition on post-vaccination preventative behaviours.

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## SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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