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Influences of Nationality and National Identification on Perceived Dangerousness of COVID-19 Variants and Perceived Effectiveness of COVID-19 Vaccines: A Study of UK and Portuguese Samples

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Abstract

During the COVID-19 pandemic, both variants of the virus that causes the disease and vaccines developed to combat it have been identified with nationalities. Both social identity theory and identity process theory would predict that this would initiate intergroup differentiation processes aimed at optimizing ingroup value and personal identity enhancement. Our study examined whether people's nationality and level of national identification influence their perception of dangerousness of variants and effectiveness of vaccines. We compared data collected by online survey in March 2021 from the UK (which was associated with both a variant and a vaccine) and Portugal (which was associated with neither). The Portuguese rated variants overall as more dangerous than did the UK sample. The Chinese variant was rated by both samples as the least dangerous and the UK sample rated the British variant as less dangerous than did the Portuguese. Higher national identification in the UK sample was associated with differentiating more between the British variant and the South African variant and differentiating it less from the Chinese variant. The UK sample rated the effectiveness of the British vaccine higher than did the Portuguese. They also evaluated it as more effective than the American, Chinese and Indian vaccines. In both samples, higher national identification was associated with lower ratings of effectiveness for vaccines originating in China or India. Our study suggests that identity processes associated with national identification do influence perceptions of vaccines and variants. This has significant practice and policy implications. Social representations of variants and vaccines in nationalistic terms can have complex and unexpected consequences.

Keywords

COVID-19 vaccines, COVID-19 variants, perceived dangerousness, nationality, national identification

Resumo

Durante a pandemia de COVID-19, quer as variantes do vírus, quer as vacinas desenvolvidas para combater a doença, foram associadas a diferentes nacionalidades. Segundo as teorias da identidade social e do processo identitário, estas associações produzem diferenciação intergrupal, que visa otimizar o valor do endogrupo e reforçar a identidade individual. Neste estudo analisou-se se a nacionalidade e a identificação nacional influenciam a perceção de perigosidade das variantes do vírus e da eficácia das vacinas. Comparámos dados de amostras do Reino Unido (associada a uma variante e a uma vacina) e de Portugal (não associada a uma variante ou a uma vacina), recolhidos por questionário on-line, em março de 2021. Os portugueses avaliaram todas as variantes como mais perigosas que os britânicos; mas ambos classificaram a variante chinesa como menos perigosa. Os britânicos classificaram a variante britânica como menos perigosa que os portugueses. Nos britânicos, maior identificação nacional associou-se a maior

distância entre a variante britânica e a sul-africana e maior proximidade da variante chinesa. Comparativamente aos portugueses, os britânicos classificaram a eficácia da vacina britânica como mais elevada; e avaliaram-na como mais eficaz que as vacinas americana, chinesa ou indiana. No geral, maior identificação nacional associou-se a piores classificações para a eficácia das vacinas chinesa ou indiana. O estudo sugere que os processos associados à identificação nacional influenciam a perceção das vacinas e das variantes do vírus, o que tem implicações práticas e políticas significativas. As representações sociais nacionalistas de variantes e vacinas podem ter consequências complexas e inesperadas.

Palavras-Chave

Vacinas contra a COVID-19, Variantes da COVID-19, perigo percibido, nacionalidade, identificação nacional

COVID-19 is a global pandemic, and the SARS-CoV-2 virus has developed many variants since its original identification. The most transmissible and virulent were originally associated with specific countries of origin (e.g., the UK, South African, Brazilian, and Indian variants). Variants were identified with a nationality by virtue of their place of origin and probably to provide a non-technical cue offering easier media reportage or memorable labels to differentiate the variants. However, it may have unexpected effects because the labelling may trigger an intergroup response that shapes the way the variants are perceived (Joffe, 2011). For instance, people in Europe may consider the variants originating outside of Europe as more dangerous (less controlled, more virulent). In turn, differences in perception of variant danger may influence international differentials in willingness to accept health policies aimed at containing a variant.

COVID-19 vaccines also acquired national associations. The effort to develop COVID-19 vaccines has been international but individual vaccines have been differentiated by the location of their development, the country (or countries) in which they have been initially manufactured, and, by the countries in which they have been primarily employed. Vaccine development, authorisation, production, distribution and purchase have been subject to considerable inter-national controversy and antagonism. The 'ownership' of the vaccines, both in terms of stockpiling and in claims of discovery, has become a matter of nationalist sentiment (arousing what has been called 'vaccine nationalism', Hassoun, 2021).

The research literature on the international political disputes surrounding COVID-19 vaccines has been growing. Sabahelzain and colleagues (2021) argued that these political struggles could affect vaccine confidence. It has been established that COVID-19 vaccines do differ in efficacy (the capacity to prevent disease or its transmission evidenced in clinical trials) and effectiveness (the capacity to deliver desired outcomes in common usage) (see for example, Mayo Clinic Staff, 2022, though comparisons between vaccines is far from simple, Ledford, 2021). However, nationality and national identification may also affect the public perception of the effectiveness of the vaccines. We have been unable to find empirical studies that directly test this proposition but there is evidence in other domains that national identification and place identity do influence risk perceptions (see Bonaiuto et al., 1996). It seems plausible that individuals regard vaccines linked to their own national or regional grouping as more effective. This bias is likely to be more evident in people who identify more closely with their national grouping (i.e., have higher levels of national identification).

Our study examines the proposition that nationality plays a significant part in determining how people perceive the danger of COVID-19 variants and the effectiveness of COVID-19 vaccines. We argue this occurs because variants and vaccines have been identified with countries and with national interests through the operation of identity and intergroup processes. We also examine whether level of national identification has an effect upon estimates of variant danger and vaccine effectiveness. We define national identification not in terms of political ideology but as the level of personal identification someone feels with the nation of which they are a member. To explore the effects of nationality, our study involved samples from the UK and Portugal. Portugal was chosen because at the time of the study, unlike the UK, it was a country that had no virus variant or vaccine specifically linked to it.

Theoretical Framework for the Hypotheses

Two theories from social psychology are the bases for the hypotheses tested in this study. Social Identity Theory (Tajfel, 1978) argues that people seek to differentiate their own group from others in order to gain greater self-esteem. One way they do this is by assigning greater relative value to actions, products and characteristics (including beliefs or attitudes) of their own grouping. Social Identity Theory would thus suggest that vaccines associated with the nationality that a

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person identifies with would be deemed by that person to be relatively better than other vaccines. It would also suggest that COVID-19 variants linked to their national group would be viewed less negatively by them than by outgroup members.

Identity Process Theory (Breakwell, 2015; Jaspal & Breakwell, 2014) states that, when threatened, one way individuals will seek to protect or bolster their own self-efficacy, positive distinctiveness, sense of continuity, and self-esteem is through enhancing the kudos associated with the groups with which they identify. Identity Process Theory predicts that individuals will achieve a greater sense of self-efficacy and positive distinctiveness by emphasising the perceived effectiveness of the vaccines with which their nation is most associated. It would also suggest that they would minimise the dangers of COVID-19 variants linked to their nationality in the interests of limiting the potential stigma that, by association, could be targeted at themselves.

There is a substantial research literature concerning the perception of health risks that illustrates the influence of identity processes (Barnett & Vasileiou, 2014) and intergroup differentiation processes over responses to threat (Cruwys et al., 2020). The risk perception literature indicates that people in some circumstances are less likely to believe hazards to be serious if they are associated with communities or places with which they identify (Bernardo, 2013; Bonaiuto et al., 1996; Lemée et al., 2019; Lima & Castro, 2005). In fact, the more threatening the hazard is to the individual's own sense of self-efficacy, self-esteem, positive distinctiveness or continuity, the greater the tendency to adopt a coping strategy that denies or downplays its dangerousness (Breakwell, 2001a, 2020a, 2020b; Luís et al., 2016). This phenomenon is more pronounced when the hazard is thought fundamentally irremediable or outside the control of the group or individual members.

The perception of health hazards has also been shown to be heavily influenced by prevailing social representations (e.g., Eicher & Bangerter, 2015). Social Representations Theory (Moscovici, 2001) proposed that social representations are a product of complex social communication processes and emerge to make new phenomena interpretable or explicable. They involve the processes of anchoring and objectification that attribute meaning to novel concepts, experiences or events by either tying them to others that are already familiar or by linking them to known, tangible entities. The evolution of social representations of coronavirus variants and COVID-19 vaccines was inevitable (Roszkowski & Włodarczyk, 2022). However, the social representations that individuals access, accept and promulgate are partly determined by their identity processes and group memberships (Breakwell, 2001b). Social representations that differentiate the individual's own grouping positively or offer the individual reinforcements for their self-esteem, self-efficacy, positive distinctiveness or continuity will be more likely to be influential in driving their perceptions of virus variants or vaccines. Social representations have evolved that link variants and vaccines to nationality and below we suggest why.

The Basis for Variant and Vaccine Links to Nationality

Using the two identity theories to predict public perceptions of COVID-19 vaccines and variants is only sensible if the vaccines and the variants are actually strongly linked to countries and national groupings. The history of the pandemic gives reason to believe that they have been. However, it is also important to acknowledge that the social representations of both vaccines and variants continuously changed as the pandemic evolved and the strategies used to mitigate it morphed (see Páez & Pérez, 2020).

Variants

In the early stages of the pandemic, in many countries, the closure of international borders created both a sense of increased security but also a feeling of being besieged by those beyond those borders. As the coronavirus variants appeared, the issue of keeping out 'foreign' variants became a prime concern. Since the variants were regularly named for the country in which they were first identified, the threat from the virus was repeatedly linked in public discourse with the country of origin, and to what was happening there to victims of the disease. Notably, even when variants successfully spread across many countries (e.g., the South African or British variants) they were still known by their supposed country of origin. National governments came to recognise the stigma (and consequent economic and political challenges) that could accrue to having a variant identified with their countries. For instance, this resulted in

Singapore acting very quickly to deny false statements appearing on Facebook and Twitter in May 2021 of a new variant originating in their city-state (Reuters, 2021).

Our data collection took place in March 2021 when coronavirus variants were still labelled by country. At the end of May 2021, the World Health Organisation (WHO) announced that alternative labels should be used (WHO, 2021). The British variant became Alpha; the South African became Beta; the Brazilian became Gamma; with the Indian variant, newly documented as a variant of concern in May 2021, being labelled Delta. The WHO announcement stated that people had resorted to calling variants by the places where they were detected, "which is stigmatizing and discriminatory" (WHO, 2021), and, to avoid this and to simplify public communications, it encouraged national authorities, media outlets and others to adopt the new Greek alphabet labels. The WHO action illustrates recognition of the significance of the identity and intergroup processes that explicitly linking variants to countries had triggered.

Our data, collected before the WHO action, reflect a particular phase in the pandemic during which variants were closely associated with particular countries. Based on Social Identity Theory and Identity Process Theory, at that time we predicted that variants labelled with a person's nationality would be deemed less dangerous than other new variants by that person. Thus, the British would rate the British variant as less dangerous than other new variants. In contrast, an individual from a country that had no variant named after it would be likely to rate all variants as more dangerous than would a person from a country that had a variant named after it. This may happen because by emphasising the dangers of variants associated with other nations, they imply the superiority of their own national position.

The original virus, identified in China, stands somewhat outside of this process of linking variants to nationality. While it was technically also a variant of some predecessor, nevertheless, because it was first to be identified, it was simply SARS-Cov-2 and, initially, there was no need to append a nationality to the label. People knew where it originated. With the evolution of even more dangerous variants, in retrospect it could be said to have become the 'Chinese' variant. However, by then, it had become the original global variant. By definition, this initial variant can be legitimately considered less dangerous than those that gained national labels later because only new variants that were deemed 'variants of concern' by the WHO were given specific national labels. Moreover, the early vaccines were designed specifically to deal with the Chinese virus. Given these facts, we predicted that the Chinese variant would be deemed less dangerous than other named variants and that nationality or level of national identification would not be a significant influence on the perception of the Chinese variant. This acknowledges that pragmatically efforts towards positive differentiation for one's group (and thereby, for oneself) will be selective and will be less likely to be directed towards targets that are difficult to justify representing in a negative way if easier alternatives are available.

Vaccines

Initially, each COVID-19 vaccine was also identified with a particular country or group of countries. Such identification was based on several factors: where it was developed and given regulatory authorisation for use; where it was manufactured; where it was available and where it was used in countrywide vaccination strategies. The race to create and control vaccines initiated the so-called 'vaccine wars' (BMJ, 2021) and heightened international friction while laying bare international disparities in health care. By May 2021, more than 1.48 billion vaccine doses had been administered worldwide, equal to 19 doses for every 100 people. There was already a stark gap between vaccination programs in different countries with some yet to report a single dose (Holder, 2021). Irrespective of where a country stood in these comparisons, recognition that these disparities existed was likely to stimulate nationalist sentiment. The highly visible and continual processes of international comparison in performance in the mass media made national identity salient.

When our data were collected in March 2021, the international mass distribution of vaccines was in its early stages. Therefore, we expected that the link of vaccine to nationality would be salient in influencing the perception of the effectiveness of a vaccine. By May 2021, there were 12 vaccines whose use was publicly reported, and, by this time, vaccines were being used extensively outside of the countries where they had been developed or were being manufactured. For instance, the Oxford-AstraZeneca vaccine, originating in the UK and manufactured by a British-Swedish multinational pharmaceutical company, was being used in 165 countries. It is evident from this that the actual 'nationality' of a vaccine is not so simple to define. It can be argued that the link of vaccines to nationality has been eroded as the vaccines have been deployed so widely. However, even after the massive expansion of vaccine distribution, certain alignments of vaccines with countries or geographical regions are evident - for instance, the greater

use in Europe of the Oxford-AstraZeneca, Pfizer-BioNTech and Moderna vaccines. We would expect that the effects of nationality and national identification upon perceptions of the vaccines would interact with the effects of availability and use of a vaccine. Vaccines that were available and in use would be perceived by those having access to them as more effective than other vaccines (as suggested as the 'mere exposure effect' by Zajonc, 1968).

Acceptability of vaccines has been a major issue in the COVID-19 pandemic. Many factors have been shown to influence vaccine hesitancy and refusal (Soares et al., 2021; Troiano & Nardi, 2021). Certainly, the perceived effectiveness and safety of the vaccine is a significant determinant of hesitancy. Conflicting social representations (Cordina & Lauri, 2021; Jaspal & Nerlich, 2020) of vaccines during the 'vaccine wars' shaped their perceived effectiveness and safety. Consequently, the national links attributed to a vaccine will be one aspect of the evaluation of its effectiveness. In the case of the Oxford-AstraZeneca vaccine, which was strongly identified as British, this would lead to the prediction that British people would consider it more effective than other vaccines and that higher British national identification would be associated with higher effectiveness ratings.

Hypotheses

The research drew samples from the UK and from Portugal. Unlike the UK, Portugal (PT) is not associated with the national labelling of either a vaccine or a variant.

Regarding coronavirus variants:

1. Given its position in the development of COVID-19, the coronavirus identified in China will be perceived as less dangerous than the later variants and this differential will be unaffected by an individual's nationality or level of national identification.
2. The UK sample will rate the British variant as less dangerous than new variants associated with other countries.
3. The Portuguese sample will rate all variants, other than the Chinese variant, as more dangerous than do the UK sample.
4. National identification will interact with nationality to predict perceived dangerousness of the variants: UK participants with greater national identification as compared to those with lower national identification levels will rate as higher the dangerousness of COVID-19 variants labelled as originating outside the UK and downgrade the perceived dangerousness associated with the British variant. This interaction effect is predicted not to occur for PT participants. In their case, greater national identification will be associated with higher perceived danger for each of the new variants.

Regarding COVID-19 vaccines:

5. The UK sample will rate the effectiveness of the vaccine identified with British development and manufacture (Oxford-AstraZeneca) higher than other vaccines.
6. Vaccines deployed widely in the participants' own countries will be rated as more effective than those not being used there. Thus, in our samples, the Indian and Chinese vaccines will be regarded as less effective than the European and North American vaccines.
7. National identification will interact with nationality and vaccine type in predicting perceived effectiveness of the vaccine: UK participants with higher national identification will differentiate more between the British and other vaccines compared with those with lower national identification levels and this effect will not apply to PT participants.

While we have no strong theoretical basis for predicting age or gender interaction effects with nationality and national identification in explaining variance in the perception of danger of variants and the effectiveness of vaccines, there is evidence that men are more likely to be willing to have a COVID-19 vaccination (see Zintel et al., 2022, for a meta-analysis) and that younger people are less likely to get vaccinated (see Robinson et al., 2021, for a meta-analysis). Consequently, we control for age and gender effects in our analyses.

Method

Participants and Procedure

The survey was conducted over three weeks in February-March 2021. Using Prolific, an online participant recruitment platform, a UK sample of 648 (314 identifying as male; 329 as female, 5 as other) and a Portuguese sample of 486 (179 identifying as male; 306 as female, 1 as other) were recruited. Recruitment inclusion criteria required participants to be at least 18 years old and be nationals of the country where the data were collected (either UK or Portugal). Participants were told they would be participating in a study of their reactions to the COVID-19 pandemic. Each participant was paid a token amount for their time.

There were significantly more males in the UK sample than in the Portuguese sample, $\chi^2(1, 1128) = 15.98$, $p < .001$. This arose primarily because only in the UK were roughly equal numbers of males and females mandated by the sampling process. The samples differed in mean age (UK 32.12 years; $SD = 10.81$; and Portugal 37.74 years; $SD = 14.14$) $t(1,058) = 6.88$, $p < .001$. The age range in the whole sample was skewed to people under the age of 50. Both samples were highly educated, 32% of the Portuguese and 37% of the UK sample had received a university education.

Each sample received the questionnaire online in their own language. The questionnaire was initially compiled in English and translated into Portuguese. Back translation was used to reduce the possibility of any interpretive error.

Measures

National Identification

Level of personal identification with their nation was assessed using a seven-item scale (Cinnirella & Hamilton, 2007). The seven fixed-response Likert-type identity measures (here worded for British national identification) were: - *To what extent do you feel British?; To what extent do you feel strong ties with other British people?; To what extent do you feel pleased to be British?; How similar do you think you are to the average British person?; How important to you is being British?; To what extent do you feel proud to be British?; When you hear someone who is not British criticize the British people, to what extent do you feel personally criticized?* Each measure used a five-point bi-polar response scale (1 = *'not at all'* to 5 = *'extremely'*). The seven items were averaged into a composite measure that had adequate internal reliability in both countries (UK $\alpha = 0.867$; PT $\alpha = 0.867$; an aggregated α of 0.886).

Perceived Dangerousness of the Virus Variants

Respondents rated the dangerousness of four variants of the virus: the original Chinese variant, the British variant, the South African variant and the Brazilian variant. Responses were given on an 11-point scale, ranging from 0 = *'not dangerous at all'* to 10 = *'extremely dangerous'*. It should be noted, the 'Indian' variant had not been named as a variant of concern at the time the study was conducted, and consequently it was not included. This is a measure of the general dangerousness of the variant and is non-specific about whom the variant might endanger.

Perceived Effectiveness of the Vaccines

Respondents rated how effective they considered each of the following vaccines, described together with their national origin: 'the Moderna (American) vaccine', 'the BioNTech/Pfizer (German and American) vaccine', 'the Oxford-AstraZeneca Vaccine (British and Swedish)', 'the Sinovac Vaccine (Chinese)', and 'the COVAXIN vaccine (Indian)'. The 11-point response scale ranged from 0 = *'not effective at all'* to 10 = *'extremely effective'*.

Results

All analyses were performed on data from 1134 respondents, 648 UK and 486 Portuguese, missing data points being excluded analysis by analysis. Portuguese and UK respondents differed significantly in level of reported national identification, based on total scale score $M_{PT} = 26.05$, SD_{PT} 4.89; $M_{UK} = 21.45$, SD_{UK} 5.30; $t(1,085) = 15.14$, $p < .001$ with the

Portuguese scoring higher. In order to differentiate those with high and lower national identification, the whole sample was divided into two groups: those scoring higher than one standard deviation from the mean score (M = 24.42, SD = 5.61, SE = 0.16) were labelled 'high' and all others 'lower'. There were 185 respondents classified as high and 874 as lower. Given the initial difference between the UK and Portuguese samples, this resulted in a lower number from the UK (n = 66) appearing in the 'high' group. Descriptive statistics for the studied variables are displayed in Table 1 (relating to variant dangerousness) and in Table 2 (vaccine effectiveness).

Table 1

Variant Dangerousness

Samples	Chinese		British		South African		Brazilian	
	M	SD	M	SD	M	SD	M	SD
UK								
High national identification n = 66	7.79	2.14	7.63	2.36	8.16	2.10	7.89	2.42
Lower national identification n = 582	6.55	2.09	7.04	2.02	7.45	2.13	7.09	2.16
UK total sample n = 648	6.68	2.13	7.11	2.07	7.52	2.14	7.17	2.19
Portuguese								
High national identification n = 119	7.54	1.75	8.30	1.81	8.48	1.72	8.62	1.72
Lower national identification n = 292	6.93	2.11	7.61	1.95	7.77	2.03	7.95	2.06
PT total sample n = 411	7.11	2.03	7.81	1.93	7.97	1.97	8.15	1.99
Whole sample								
High national identification n = 185	7.63	1.89	8.06	2.04	8.37	1.87	8.36	2.02
Lower national identification n = 874	6.68	2.11	7.23	2.01	7.56	2.10	7.38	2.16
Sample total N = 1059	6.85	2.10	7.38	2.04	7.69	2.09	7.55	2.17

In order to test Hypotheses 1-4 a Repeated Measures ANOVA with nationality (UK/ PT) and national identification (High/Lower) as between-subjects factors and the dangerousness ratings of the four variants as the within-subjects factor was conducted, and age and gender were entered as covariates. These covariates had a significant effect upon perceived dangerousness of variants. Perceived dangerousness increased with age, $F(1, 1,053)$ = 28.48, $p < .001$, η_p^2 = 0.03 (observed power = 0.99) and women perceived it to be greater than did men, $F(1, 1,053)$ = 6.98, p = .008, η_p^2 = 0.01 (observed power = 0.78). There were significant main effects for variant, $F(3, 1,053)$ = 2.934, p = .03, η_p^2 = 0.003, observed power = 0.7, nationality, $F(1, 1,053)$ = 4.15, p = .04, η_p^2 = 0.004, observed power = 0.75, and national identification, $F(1, 1,053)$ = 22.6, $p < .001$, η_p^2 = 0.02, observed power = 0.99. The three-way interaction of variant by nationality by national identification was not statistically significant, $F(1, 1,053)$ = 0.094, p = .76, η_p^2 = 0.000.

As predicted in H1, the Chinese variant was perceived as significantly less dangerous than each of the other three. Pairwise comparisons, with Bonferroni adjustment for multiple comparisons, revealed the Chinese variant to be rated less dangerous than each of the other three (Mdn with British = -0.443, SD = 0.068; Mdn with South African = -0.753, SD = 0.076; Mdn with Brazilian = -0.677, SD = 0.078; $p < .001$ in each case). The British variant was rated significantly less dangerous than the South African (Mdn = -0.310, SD = 0.061; $p < .001$) and the Brazilian (Mdn = -0.234, SD = 0.064; p = .002). Rating of the dangerousness of the South African and Brazilian variants did not differ significantly (Mdn = -0.077, SD = 0.047; p = .60).

The Portuguese rated the variants overall as more dangerous than the UK sample. However, there was an interaction effect between variant type and nationality, $F(1, 1,053)$ = 11.48, $p < .001$, η_p^2 = 0.042, observed power = 0.92. This emerged from the effects of nationality on the difference between the Chinese and the British variant ratings, $F(1, 1,053)$ = 16.02, $p < .001$, η_p^2 = 0.004, observed power = 0.55, and on the Chinese and the Brazilian variants, $F(1, 1,053)$ = 19.9, $p < .001$, η_p^2 = 0.019, observed power = 0.99. Figure 1 illustrates the relationships between the variants by nationality. The extent of the difference between the PT and UK samples' dangerousness ratings is greater for the British, $F(1, 1,132)$ = 37.71, $p < .001$, and the Brazilian, $F(1, 1,132)$ = 62.09, $p < .001$, variants than for the other two variants (Chinese $F(1, 1,132)$ = 11.51, $p <$

.001; South African $F(1, 1,132) = 14.16$, $p < .001$). Both nationalities differentiate the Chinese significantly from the South African and Brazilian variants, but the UK respondents do not report the difference between the Chinese and the British variants to be as great as the Portuguese do. Nevertheless, H2 is not supported because, while the UK sample rate the British variant as significantly less dangerous than the South African ($p < .001$ Bonferroni corrected), they do not rate the British lower than the Brazilian variant ($p = 1$).

Figure 1

Variant Dangerousness – Nationality and National Identification
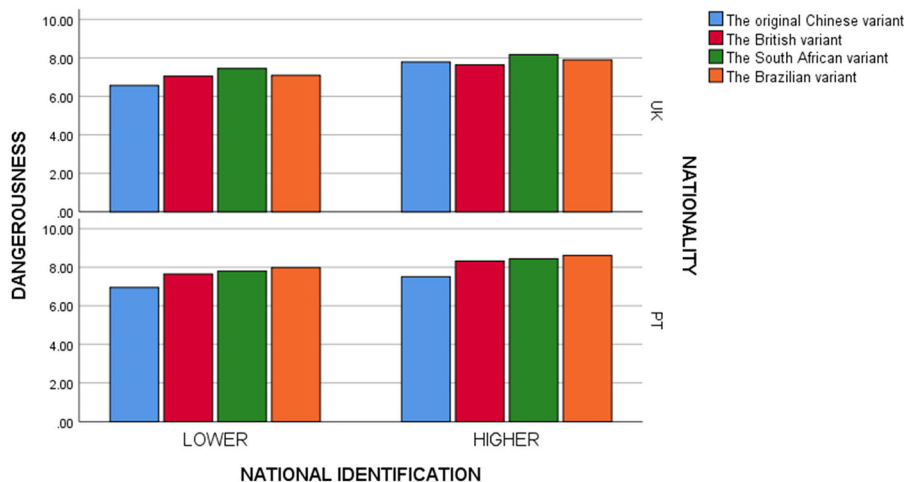
H3 is also only partially supported. The Portuguese sample actually rate all the variants more dangerous than do the UK sample (Chinese $t(1,132) = 3.4$, $p = .001$; British $t(1,132) = 6.14$, $p < .001$; South African $t(1,092) = 3.76$, $p < .001$; Brazilian $t(1,099) = 8.01$, $p < .001$). H3 proposed that the two national samples would not differ significantly in ratings of the Chinese variant but they do.

The main effect for national identification is noteworthy, $F(4, 1,050) = 22.60$, $p < .001$, $\eta_p^2 = 0.026$, observed power $= 0.99$. Respondents in the high national identification category rated all the variants as significantly more dangerous: Chinese, $F(1, 1,053) = 26.69$, $p < .001$, $\eta_p^2 = 0.025$, observed power $= 0.99$); British, $F(1, 1,053) = 13.27$, $p < .001$, $\eta_p^2 = 0.012$, observed power $= 0.95$; South African, $F(1, 1,053) = 15.64$, $p < .001$, $\eta_p^2 = 0.015$, observed power $= 0.97$; and Brazilian, $F(1, 1,053) = 15.96$, $p < .001$, $\eta_p^2 = 0.015$, observed power $= 0.97$.

H4 predicted that national identification would interact with nationality in affecting perception of dangerousness by the UK sample. UK participants with greater national identification as compared to those with lower national identification levels were predicted to emphasise the dangerousness of COVID-19 variants labelled as originating outside the UK and downgrade the perceived dangerousness associated with the British variant. This interaction effect was predicted not to occur for PT participants. In their case, greater national identification was predicted to be associated with higher perceived danger for each of the new variants. In fact, we found no significant three-way interaction on perceived dangerousness. In both samples, the effect of higher national identification is to raise perceived dangerousness for all variants considered in this study, $F(1, 1,053) = 0.094$. $p = .76$, $\eta_p^2 = 0.000$.

In order to test Hypotheses 5-7 a GLM Repeated Measures ANOVA with nationality (UK/ PT) and national identification (High/Lower) as between-subjects factors and the effectiveness ratings of the five vaccines as the within-subjects factor was conducted, and age and gender were entered as covariates. Table 2 presents the means and standard deviations on ratings for each of the vaccines by sub-category within the sample and for the total sample.

Table 2

Vaccine Effectiveness

Samples	Oxford-Astra Zeneca		BioNTech/Pfizer		Moderna		Sinovac		Covaxin	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
UK										
High national identification *n* = 66	7.36	1.95	7.56	1.99	6.86	2.16	5.13	2.84	5.19	2.71
Lower national identification *n* = 582	6.70	2.13	6.89	2.23	6.10	2.33	5.42	2.31	5.14	2.27
UK total sample *n* = 648	6.68	2.13	6.96	2.21	6.17	2.32	5.39	2.37	5.14	2.32
Portuguese										
High national identification *n* = 119	7.54	1.75	7.57	1.83	7.00	1.75	5.89	2.34	5.67	2.27
Lower national identification *n* = 292	6.93	2.11	7.02	1.87	6.58	2.00	5.66	2.29	5.16	2.15
PT total sample *n* = 411	7.11	2.03	7.18	1.87	6.70	1.94	5.72	2.33	5.30	2.20
Whole sample										
High national identification *n* = 185	7.21	1.82	7.57	1.88	6.95	1.90	5.62	2.60	5.50	2.44
Lower national identification *n* = 874	6.63	2.09	6.93	2.11	6.26	2.23	5.50	2.31	5.14	2.23
Total *N* = 1059	6.73	2.06	7.04	2.09	6.38	2.19	5.52	2.36	5.21	2.27

There was a main effect for vaccine type, $F(4, 1,053) = 19.967$, $p < .001$, $\eta_p^2 = 0.019$, observed power = 1). Pairwise comparisons between vaccines were analysed using a Bonferroni adjustment for multiple comparisons. BioNTECH/Pfizer was rated as significantly more effective than any of the others (cf Oxford-AstraZeneca *Mdn* = 0.335, *SD* = 0.059, $p < .001$; Moderna *Mdn* = 0.624, *SD* = 0.060, $p < .001$; Sinovac *Mdn* = 1.735, *SD* = 0.097, $p < .001$; Covaxin *Mdn* = 1.969, *SD* = 0.096, $p < .001$). Oxford-AstraZeneca was rated as significantly more effective than Moderna (*Mdn* = 0.289, *SD* = 0.068, $p < .001$); Sinovac (*Mdn* = 1.399, *SD* = 0.092, $p < .001$); and Covaxin (*Mdn* = 1.634, *SD* = 0.090, $p < .001$). Moderna was rated more effective than Sinovac (*Mdn* = 1.110, *SD* = 0.092, $p < .001$) and Covaxin (*Mdn* = 1.345, *SD* = 0.086, $p < .001$). Sinovac was rated significantly higher than Covaxin (*Mdn* = 0.234, *SD* = 0.065, $p = .003$). The hierarchy of perceived effectiveness is evident in Figure 2. These findings support H6.

Figure 2

Vaccine Effectiveness – Nationality and National Identification
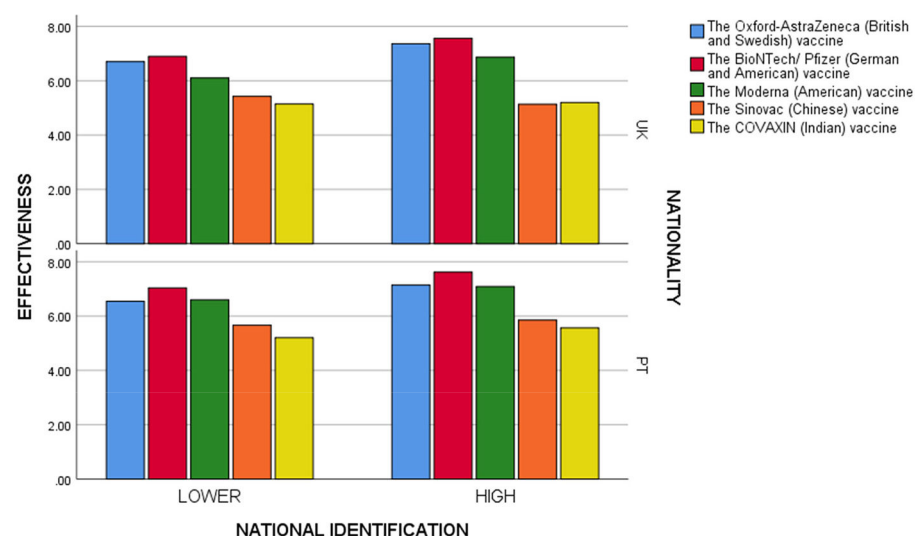
Of the two covariates, age had a significant effect upon vaccine ratings, $F(1, 1,053) = 6.94$, $p < .009$, $\eta_p^2 = 0.007$, observed power = 0.75. Gender did not have a significant effect, $F(1, 1,053) = 3.432$, $p = .064$, $\eta_p^2 = 0.003$, observed power = 0.45. There was no significant main effect for nationality, $F(1, 1,053) = 0.964$, $p = .326$, $\eta_p^2 = 0.001$, observed power = 0.16, but there was for national identification, $F(1, 1,053) = 7.246$, $p = .007$, $\eta_p^2 = 0.007$, observed power = 0.76. Those with high national identification rated vaccines overall as more effective. This effect is primarily a product of them rating the BioNTECH/Pfizer, $t(1,132) = 4.1$, $p < .001$, Moderna, $t(351) = 4.86$, $p < .001$, and Oxford-AstraZeneca, $t(347) = 4.01$, $p < .001$, more highly than did the lower national identification group. The high and lower groups did not differ significantly in assessment of Sinovac, $t(1,132) = 0.62$, $p = .53$, and Covaxin, $t(1,132) = 1.62$, $p = .11$. The three-way interaction of vaccine by nationality by national identification was not statistically significant, $F(1, 1,053) = 0.249$, $p = .62$.

Consequently, the findings do not support H5. Additionally, the results do not support H7. National identification is significantly related to perception of the vaccines' effectiveness, but this effect is not related to nationality. Moreover, the three-way interaction of nationality, national identification and vaccine type is not statistically significant.

Discussion

This study has explored some important identity influences that affect perception of key aspects of the global pandemic that threatens people indiscriminately. It has shown that people are significantly affected by their nationality and level of national identification in coming to an understanding of the threat posed by coronavirus variants and the protection offered by vaccines. The study illustrates how perception, in times of great stress and heightened risk, are motivated by identity processes serving intergroup differentiation and self-enhancement that are predicted by both Identity Process Theory and Social Identity Theory. However, the study also indicates that these identity effects are complex.

Variant Dangerousness

Our data indicate that sociodemographic characteristics influence perceptions of the dangerousness of variants. Perceived dangerousness increased with age and women perceived it to be greater than men (Ahrenfeldt et al., 2021). It may be unsurprising that older people rate the danger higher, given that they were found during the early part of the pandemic to have higher rates of COVID-19 morbidity and mortality. However, while clinical incidence rates indicate that susceptibility to COVID-19 infection is equally likely between males and females, clinical outcomes show that men experience both a higher severity and fatality for COVID-19 infection than women (Mukherjee & Pahan, 2021). Perception of the dangerousness of the variants is informed by factors other than the epidemiological evidence. It is affected by access to other social representations. For instance, we found that there was agreement, irrespective of nationality or national identification, that the Chinese variant was least dangerous. This assessment may simply be based on dominant social representations of the Chinese virus as the 'source' variant and the one against which vaccines were first targeted, while other variants were only named subsequently if they were designated as 'of concern' by the WHO and could, thus, be assumed to be more dangerous.

Our data suggest that nationality and national identification are aspects of identity that are significant in shaping perception of the variants. The Portuguese sample rated the variants overall as more dangerous than did the UK sample (specifically rating both the British and Brazilian variants more dangerous than did the UK sample). We had predicted this difference between the UK and Portuguese samples on the basis that the Portuguese had no reason in terms of identity or intergroup processes to minimise the dangerousness of any particular variant or indeed of variants as a whole. Our data do not actually allow us to explain the difference we have found. In fact, the effect we found could be explained by the UK sample seeking actively to downgrade the dangerousness of the variants. Actually, the UK sample did rate the British variant as less dangerous than both of the other two new variants, though this effect was statistically significant only in relation to the South African variant. In developing this research further, it would be valuable to have data from more countries that have varied experience of the variants. Obviously, it is impossible to replicate the circumstances under which our data were collected, since the reality of the pandemic has changed.

However, in preparing for future outbreaks, early data collection from a wide range of countries on perceptions of variant dangerousness would be beneficial.

Irrespective of nationality, those in the high national identification group compared with the lower national identification group rated all the variants as significantly more dangerous. The relationship between national identification and risk perception in the COVID-19 context has been recognised to be of growing importance. Some see the possibility of harnessing shared identifications to motivate preventive behaviour or accelerate pro-active responses (Bonetto et al., 2021; Vignoles et al., 2021). Our findings suggest that national identification accentuates awareness of danger of new viral infections.

We did not find a significant three-way interaction between variant, nationality and national identification. We had predicted that UK participants with greater national identification as compared to those with lower national identification levels would emphasise the dangerousness of COVID-19 variants labelled as originating outside the UK and downgrade the perceived dangerousness associated with the British variant. In fact, those in the UK sample who were higher in national identification differentiated their national variant least from the least dangerous variant and most from the variant that they regarded as most dangerous. This process of selective differentiation to achieve an evaluative advantage for an aspect of identity which is important to an individual is predicted by Identity Process Theory (Breakwell, 2010). It is a process also predicted in Social Identity Theory which suggests that ingroup advantages can be achieved either through enhancing the perceived value of an ingroup product or by devaluing the outgroup's product (Brewer, 1979; Mummendey et al., 2000). In relation to our data, rating of variant dangerousness by the UK high national identification group was positioning the British variant closer to a more positive object (the Chinese) and away from a more negative object (the South African).

Vaccine Effectiveness

Ratings of the effectiveness of the five vaccines differed significantly. Each was clearly differentiated from all the others. The pattern emerging supported our hypothesis that the Indian (Covaxin) and Chinese (Sinovac) vaccines would be regarded as less effective than those developed or being used in Europe. The UK sample rated the Oxford-AstraZeneca vaccine significantly better than the rest, with the exception of the BioNTech/Pfizer vaccine. The high rating for the BioNTech/Pfizer vaccine may be a result of the unique position it had, having been chosen early to be used alongside Oxford-AstraZeneca as part of the national vaccination programme, thereby acquiring a strong association with the UK.

There was agreement between the two samples on the relative effectiveness of the vaccines. Furthermore, we found no significant interaction between nationality and national identification affecting perceived effectiveness. Contrary to our hypothesis, the high national identification UK respondents did not differentiate more than their Portuguese counterparts in favour of the British vaccine. National identification operated for both samples in a similar way: higher national identification compared with lower national identification was associated with rating the Oxford-AstraZeneca, BioNTECH/Pfizer and Moderna vaccines as significantly more effective than Sinovac or Covacin vaccines. Higher national identification accentuates the underlying tendency to emphasise the effectiveness of vaccines that have some link, either through development and manufacture or through access and use, with the national group. It will be important to map in future research whether this group discrimination in favour of a vaccine is resistant to modification as more empirical evidence becomes available about its effectiveness over time or for different populations.

Significance of National Identification

The findings can be briefly summarised as offering evidence that discrimination in favour of the vaccines developed or used in one's country is manifested in the relative devaluing of the effectiveness of the vaccines of other countries. This strategy for raising national or social category esteem and thereby gaining personal self-esteem has been regularly described (Breakwell & Lyons, 1996; Tajfel & Turner, 1979). National identification intensifies the tendencies both to discriminate against the products made or used by other nations (in this case, vaccines) and to minimise the weaknesses or failings (in this case, virus variants) of one's own nation. An aspect of this process is sometimes called 'parochial national identification' (i.e., reflected in greater cooperation among members of the same nation) and has been described by Romano et al. (2021) as ubiquitous. We compared Portuguese and UK samples expecting that the Portuguese would

have less tendency to discount the dangers of any variant given that they had no variant attached to their national identity. This proved to be so.

The findings not only support the argument that intergroup processes affect the perception of COVID-19 virus variants and vaccines; they also point to the significance of individual levels of national identification. This illustrates how intergroup processes of discrimination can be magnified by the level of the individual's attachment to the group.

The influence of national identification on these perceptions also suggests that the perceived differences between variants and between vaccines is not simply explained by the fact that some may be more familiar to the respondents than others. There is no reason to believe that familiarity will differ between those in the high or lower national identification groups. Of course, familiarity with locally developed and manufactured vaccines could be greater. However, there is no clear reason to believe that familiarity per se would lead to attribution of greater effectiveness. In fact, familiarity could alternatively lead to greater knowledge of the limitations and side effects of the vaccine. With regard to virus variants, familiarity is less likely to explain our findings. Virus variants, while labelled by country of origin, do not stay in that country. By the time of this study, the non-British variants were known to have a significant presence in both the UK and in Portugal. However, this study did not assess respondents' levels of familiarity with either the variants or vaccines. The effects of familiarity upon perceptions of effectiveness and dangerousness merit subsequent research.

Country and National Identification

The UK sample reported significantly less national identification than the Portuguese sample. There is evidence that national identification is higher in Portugal than in the UK (Hadler, Chin, & Tsutsui, 2021). There are many reasons why this might be so, particularly the effects of the existence within the UK of four countries: England, Scotland, Wales and Northern Ireland. National identification within the UK can be with any one of these or with the whole, or, indeed, some blend of the specific and the general. The label British formally encompasses nationals of England, Scotland and Wales but those with United Kingdom citizenship in Northern Ireland. For some of our sample, if they identified more readily with one of the constituent nations, identifying as "British" may have been difficult, even though technically they were all UK citizens. Nevertheless, we did find that national identification within our UK sample was a significant factor in perception of variants and vaccines.

Objective Danger and Effectiveness – Missing Parameters?

We have acknowledged that the virus variants we studied do differ objectively in their transmissibility and pathogenicity. Vaccines differ in their effectiveness against infection and severity of illness, besides their side effects. We did not examine the relationship between the objective indices of danger and effectiveness and the perceptions captured in this study. It is likely that the estimates that our respondents gave of the danger of variants and the effectiveness of vaccines are influenced by the public evidence that has been made available by the scientific and medical communities. However, we were concerned with differences between individuals and between two discrete samples in their perceptions. The fact that we find differences within and between our samples indicates that we are seeing both the effect of the objective evidence that discriminates between variants or between vaccines and the effects of social and identity processes upon perception. That the 'Chinese' variant is seen as less dangerous certainly suggests that people are using available evidence. It would be valuable in future studies to use objective indices of danger or effectiveness (acknowledging that such indices tend to be contested) as covariates in the analysis. Certainly, the empirical evidence concerning effects of vaccines and variants continues to evolve rapidly.

Social Representations of Danger and Effectiveness

In addition to the influence of objective evidence concerning danger and effectiveness, processes of social representation (Moscovici, 2001) are important. Perceptions of COVID-19 virus variants and of vaccines evolved in the midst of contending representations of every aspect of the disease. They have been surrounded by conspiracy theories (Douglas, 2021) on the one hand and by political and scientific/medical establishment information campaigns on the other. International negotiations and conflicts about the manufacture, stockpiling and distribution of vaccines and about the

existence or control of variants have thrown into the public sphere images that might make people confused and anxious. Stories circulated about vaccines causing infertility or abnormally high incidence of blood clotting. Our analyses do not assess the impact of such social representation processes. They probably play a role in creating the platform of images and narratives informing inter-nation differences in the perception of dangerousness and effectiveness. It would be valuable if future studies explored the interaction between social representation exposure and inter-nation processes of differentiation in shaping vaccine and variant perceptions.

Other Identity Status Effects

This study was designed to explore the effects of two aspects of identity: nationality and national identification. Other aspects of an individual's identity are known to influence perception of vaccines and variants. Research has focused on vaccine hesitancy or refusal (e.g., Robertson et al., 2021). Differences have been found over time and across countries (Kerr et al, 2020) but also across ethnic groups, gender, age, occupation and educational background (Aboelsaad et al., 2021). Psychological factors, such as perceived personal risk of infection, fear of the disease and social support, play a role (Breakwell & Jaspal, 2021; Jaspal & Breakwell, 2022). The factors influencing the perception of variants are less researched. However, the effects of nation and national identification probably will interact with other aspects of the individual's identity to influence responses to the vaccines and the virus variants. Research on these interactions is needed.

Methodological Limitations of the Study

This study has a number of methodological limitations that are worth noting. Measurement of dangerousness of variants and effectiveness of vaccines used single-item responses, which may raise reliability issues. Developing reliable and validated measures might have been preferable. However, in the absence of pre-existent scales, we chose to use the simplest measures. Also, it is possible that asking the same question in relation to each variant/vaccine could have induced demand effects on responses (e.g., a pressure to enhance differentiation between responses). It may have been possible to control for this by systematically varying the presentation position of each variant and vaccine within the questionnaire. Since we had nine objects (vaccines plus variants) that each had to be rated, many possible sequences are required. To ensure presentation parity for each object would have made it necessary to divide our samples into many subgroups and each of these would have had to be balanced in terms of age, gender, and nationality. We considered this impractical. Further, the study is limited to only two national samples. As indicated earlier, it would have been ideal to include more. As it is, the effects attributed to nationality will need to be treated with caution, since many contextual factors may confound the assumption that those effects are due to country. Moreover, it is worth noting that many of the inferential tests that we have reported have small effect sizes, but highly significant p values and higher degrees of freedom due to the large sample size. Consequently, where appropriate we have reported the observed power of effects. While recognising these limitations of the study, we believe that the results are useful both to those interested in identity processes and those concerned with preparedness for health crises.

Conclusion

Nationality and national identification influence perceptions of both COVID-19 vaccines and new virus variants in ways partially predicted by Social Identity Theory and Identity Process Theory. The findings reported support the proposition that such perceptions are influenced by individuals' motivations to positively differentiate their own national group from others and thereby satisfy their personal desire for identity affirmation.

These findings have significant practice and policy implications. Perceived dangerousness and fear of viruses is a significant predictor of compliance with health guidance on infection prevention (Breakwell et al., 2021; Breakwell & Jaspal, 2021). Despite being complex, there are evident effects of nationality and national identification upon the perceived dangerousness of COVID-19 variants. Given that a co-ordinated international effort is required to deal with the pandemic, these effects deserve careful consideration. Our study also illustrates the impact of nationality and

national identification on belief in vaccine effectiveness. Implications for vaccine acceptance internationally must be expected. This should be considered when manufacturers, governments and the mass media introduce vaccines to each new public. In the case of new virus variants, our study supports the decision of the WHO to replace national labelling with names of the letters of an alphabet. The influences of identity processes upon personal and societal decisions about health protection and care should not be ignored. In fact, it is vital that we understand them better. Only then will it be possible to use them systematically to leverage both attitudinal and behavioural change.

Author Contributions: *CRediT Authorship Contribution Statement*

Glynis M. Breakwell: Conceptualisation, Data analysis, Writing – original draft, Writing – reviewing & editing.

Cristina Camilo: Conceptualisation, Data analysis, Writing – original draft, Writing – reviewing & editing.

Rusi Jaspal: Conceptualisation, Data analysis, Writing – original draft, Writing – reviewing & editing.

Maria Luisa Lima: Conceptualisation, Data analysis, Writing – original draft, Writing – reviewing & editing.

Ethics Statement: Nottingham Trent University's Schools of Business, Law and Social Sciences Ethics Committee provided ethics clearance for this study (REF: 2021/30). Participants provided electronic consent before completing the study.

Data Availability: The data set for this study is available open access (Breakwell et al., 2022).

Supplementary Materials

The Supplementary Materials contain the research data for this study. For access see Index of Supplementary Materials below.

Index of Supplementary Materials

Breakwell, G. M., Camilo, C., Jaspal, R., & Lima, M. L. (2022). *Supplementary materials to "Influences of nationality and national identification on perceived dangerousness of COVID-19 variants and perceived effectiveness of COVID-19 vaccines: A study of UK and Portuguese samples"* [Research data]. University of Brighton. https://doi.org/10.17033/DATA.00000279

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