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**COVID-19 vaccine hesitancy, medical mistrust, and mattering in ethnically diverse  
communities**

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## Abstract

**Objectives:** Uptake of the COVID-19 vaccine continues to be lower in ethnically diverse communities in the UK even though they are disproportionately affected by the negative effects of the virus. To better understand why uptake is lower, we explored factors that may underpin vaccine hesitancy and intention to vaccinate in these communities with an emphasis on medical mistrust and feelings of mattering.

**Design:** One hundred and sixty-one adults from ethnically diverse backgrounds who had not had a COVID-19 vaccination completed an online questionnaire that contained closed (quantitative) and open (qualitative) questions.

**Results:** Analyses of quantitative questions revealed that medical mistrust, but not feelings of mattering, was related to COVID-19 hesitancy and likelihood of getting a COVID-19 vaccination. Of the three components of medical mistrust, suspicion was the only unique predictor and was related to higher hesitancy towards the COVID-19 vaccine and lower likelihood of getting a COVID-19 vaccine. Analyses of the responses to the qualitative questions were organised into four themes: (1) Beliefs that taking the vaccine is an important social responsibility; (2) Experiences of pressure to take the vaccine and limited choice; (3) General mistrust linked to personal experiences and the health system; (4) Being concerned about social/medical restrictions if not vaccinated.

**Conclusion:** The findings suggest that medical mistrust may partly explain why uptake of the COVID-19 vaccine is lower in ethnically diverse communities in the UK and appears to play a role in how people weigh a sense of responsibility and pressure against health and social concerns in making the decision to be vaccinated.

**Keywords:** Covid-19 Vaccine Hesitancy; Mattering; Ethnicity, Medical-mistrust

## Introduction

Approximately 14% of the UK population - equivalent of 7.85 million people - are from non-white ethnic groups [1]. The COVID-19 pandemic has had a disproportionate impact in the UK with these communities faring far worse in regard to infection, severity of the disease, and mortality [2,3]. Most stark has been the differences between ethnic groups in regards to mortality rates. As reported by Larsen, Bosworth and Nafilyan (2021), in both the first and second waves of the COVID-19 pandemic almost all ethnic minority groups had higher coronavirus related mortality rates compared to White British groups [1,4,5]. In the first wave, for example, the highest mortality rate was in Black Africans, followed by Bangladeshi, Black Caribbean, and Pakistani groups. Additional work in this area has shown that when adjustments are considered for socio-economic factors and geographical location, this only results in a partial explanation for the differences in mortality between groups. Furthermore, even after adjusting for these factors there remains significant elevated risk of COVID-19 related mortality for ethnic minority groups [6].

Despite these and other data on the risks of COVID-19 for ethnic groups, uptake of the COVID-19 vaccine in the UK is lower in ethnically diverse communities [7]. This is particularly evident for Black ethnic groups, in which 1 in 3 report hesitancy towards receiving the vaccine. This trend was noted in the report on coronavirus and vaccine hesitancy by the Office for National Statistics [1] and this is in line with historical trends in vaccine hesitancy and vaccine uptake more generally in ethnic groups [7]. In order to understand current trends, factors underpinning COVID-19 vaccine hesitancy in ethnically diverse communities – their perceptions of complacency, confidence and convenience towards vaccination - need to be better understood [8]. In the current study, we do so by focusing on the possible role of two factors – feelings of mattering and medical mistrust – and soliciting the wider views and experiences of members of these communities.

Medical mistrust pertains to both the absence of trust and sense that someone or something is acting against one's best interests; this can include health care providers, systems, and government [9,10]. Grounded in historical inequities, discrimination, and negative healthcare experiences, evidence suggests medical mistrust is higher in ethnically diverse communities [10]. Medical mistrust is a key factor that underlies general health inequality. In regard to COVID-19 vaccine hesitancy, medical mistrust has recently been suggested to be important to understanding lower uptake in ethnically diverse communities [11]. Research in this area has begun to confirm this assertion with recent research indicating that race-based medical mistrust may explain the relationship between race and COVID-19 vaccine uptake (e.g., [12]).

Other related beliefs may play a similar role. For instance, feelings of mattering may be important in regards to understanding people's views on the COVID-19 vaccine. Mattering refers to feeling like you are depended on, important and valued [13]. This contrasts to feeling like you do not matter, are invisible, insignificant, or uncared for (anti-mattering; [14]. It has recently been argued that feeling like you matter may help people cope with the COVID-19 pandemic by combating stress, loneliness, and isolation [15,16]. Here, we were interested in the possibility that feeling like you don't matter was related to COVID-19 vaccine hesitancy and vaccine intention. That is, when people feel underserved, undervalued, and marginalised, they may also feel that they are more likely to be treated as less important, less significant and, ultimately, with less consideration and care.

### **The Present Study**

The aim of the present study was to explore factors that may underpin hesitancy towards the COVID-19 vaccine and intention to vaccinate in ethnically diverse communities, with a particular focus on medical mistrust and feelings of mattering. Based on previous

research, it was expected that medical mistrust and feelings of not mattering would predict higher COVID-19 vaccine hesitancy and lower intention to vaccinate.

## **Materials and Method**

### **Procedure and Participants**

Ethical approval for the study was granted by the School of Science, Technology, and Health Research Ethics Committee at [York St John University where the authors are based] - Ethics Reference number STHEC0034. An advert for an online questionnaire was distributed to a network of organisations that work with ethnically diverse communities. These organizations were contacted by the *Black Health Initiative (BHI)* a community engagement organisation in the city of Leeds, West Yorkshire, who commissioned the research. As an organization, BHI works towards equality of access to health and social care within Leeds and the surrounding areas for disadvantaged diverse communities. Its partners include the Local authority, statutory health sector [The National Health Service {NHS}], and other local and national community, healthcare organizations and education providers. Through their involvement, community elders, faith leaders and community/health workers who specifically work with and support individuals from diverse communities were engaged in publicising the study.

The questionnaire was open for seven weeks (15<sup>th</sup> March to 7<sup>th</sup> May 2021). In this period, 161 people from various ethnic backgrounds and who had not had a COVID-19 vaccination responded to the questionnaire (mean age = 46.17 years, SD = 15.23; male  $N = 58$  and female  $N = 97$ , preferred not to say  $N = 4$ , other  $N = 2$ ): “Asian or Asian British – Indian” ( $N = 6$ ), “Asian or Asian British – Pakistani” ( $N = 5$ ), “Asian or Asian British – Bangladeshi” ( $N = 1$ ), “Asian or Asian British – any other Asian background” ( $N = 4$ ), “Black or Black British – Caribbean” ( $N = 68$ ), “Black or Black British – African” ( $N = 38$ ), “Black or Black British – other background” ( $N = 19$ ), “Mixed – White and Black

Caribbean” ( $N = 10$ ), “Mixed – White and Black African” ( $N = 3$ ), “Mixed – White and Asian” ( $N = 1$ ), “Mixed – Any other mixed background” ( $N = 4$ ), “Any other ethnic origin group” ( $N = 2$ ).

## Measures

**Medical mistrust.** Medical mistrust was measured using the 12-item Group-based Medical Mistrust Scale (GBMMS) [17]. This scale comprises three subscales of suspicion (e.g., “People of my ethnic group cannot trust doctors and health care workers”), group disparities in healthcare (e.g., “People of my ethnic group are treated the same as people of other groups by doctors and health care workers”; reverse-coded), and lack of support from healthcare providers (e.g., “Doctors and health care workers sometimes hide information from patients who belong to my ethnic group”). Participants responded to the items on a 5-point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Evidence of the reliability and validity of the scale has been provided by a number of studies and includes internal consistency and factor structure (e.g., [17]).

**Mattering and anti-mattering.** Feelings of mattering were measured using the 5-item Rosenberg General Mattering Scale (GMS; [18]) and the 5-item Anti-Mattering Scale (AMS) [19]. These provide separate scores for mattering (“How important do you feel you are to other people”) and anti-mattering (“How much do you feel like you don’t matter”). Participants were asked to indicate how they had felt over the past last month by responding on a scale from 0 (*not at all*) to 3 (*a lot*). The scales have demonstrated reliability and validity in previous studies (e.g., [15]).

**COVID-19 vaccine hesitancy.** Vaccine hesitancy was measured using the Oxford COVID-19 Vaccine Hesitancy Scale [8]. The instructions were amended as since the publication of the original scale, a COVID-19 vaccine was approved for the NHS (“The following questions ask how you would respond if a COVID-19 vaccine is offered to you”).

This scale included seven items that each had a specific five-point response format (e.g., “I would describe my attitude towards receiving a COVID-19 vaccine as: ‘*very keen*,’ ‘*pretty positive*,’ ‘*neutral*’ ‘*quite uneasy*,’ or ‘*against it*’). As with the original use of the instrument, item-specific response options were coded from 1 to 5, and a ‘*Don’t Know*’ option for each item was provided and excluded from scoring. Freeman et al. (2020) provided evidence to support the validity and reliability of the scale including factor structure [8].

**COVID-19 vaccine intention.** Intention to vaccinate was measured using a single item. This item was based on one created by [20] and used in the UCL COVID-Social Study. The item “How likely do you think you are to get a COVID-19 vaccine when one is approved?” was amended to “How likely do you think you are to get a COVID-19 vaccine if offered to you?” to reflect the existence of approved COVID-19 vaccines. Like with the original item, participants responded to the item using a scale from 1 (*very unlikely*) to 6 (*very likely*). To allow comparison to Paul et al. (2021), we also report the percentage of participants for three groups: intend to vaccinate (responses 5 to 6), unsure about whether to vaccinate (responses 3 to 4) and unwilling to vaccinate (responses 1 to 2) [20].

**Open-questions:** We also asked two open-questions. (1) “If you have answered that you are likely to have the COVID-19 vaccination, is there anything else you want to add/say?” and (2) “If you have answered that you are NOT likely to have the COVID-19 vaccination, is there anything else you want to add/say?” We also invited respondents to elaborate on their general thoughts or feelings in an open response format (“Is there anything else you want to say about your thoughts or feelings around the COVID-19 pandemic, lockdown or vaccination?”).

### **Analytical strategy**

Preliminary analyses of quantitative data focused on missing values, detecting univariate and multivariate outliers and reliability of the instruments. Primary analyses of



quantitative data were descriptive statistics, bivariate correlations, and a series of multiple regressions to examine the degree to which medical mistrust and mattering predicted COVID-19 vaccine hesitancy and COVID-19 vaccine intention. Analyses were conducted using SPSS 26.0 (IBM) and Mplus 8.1 [21]. For qualitative data (responses to open questions), thematic analysis was conducted in line with Braun and Clarke (2006) [22]. Each theme was derived so as to capture something important about the data and to represent a level of patterned response or meaning in the responses [22].

## Results

### Preliminary analyses

We inspected the quantitative data for missing values. Participants with more than 5% missing data for the measures were removed ( $n = 8$ ). Thereafter, there were very few item responses missing ( $i = 17$  or 1 item for 17 participants). In deriving scale scores, missing responses were replaced with the mean of the item responses of the corresponding scale [23]. One participant did not report a response to the single item measure. No imputation was used for this item. Following recommendations by Tabachnick and Fidell, [24] we screened for univariate ( $z$ -score  $> 3.29$ ) and multivariate outliers (Mahalanobis distance  $> 26.13$ ,  $df = 8$ ,  $p < .001$ ). One univariate outlier and two multivariate outliers were removed.

We computed MacDonal's omega to assess internal reliability of the measures, which were all satisfactory with the exception of one of the subscales (see Table 1). We also assessed the factor structure of all multi-item instruments using both confirmatory factor analysis (CFA) and exploratory structural equation modelling (ESEM). In both cases we used robust maximum likelihood estimation with the addition of oblique target rotation in the ESEM. Fit was evaluated using chi-square ( $\chi^2/df$ ), comparative fit index (CFI), Tucker-Lewis's index (TLI), standard root mean square residual (SRMR), root mean square error of

approximation (RMSEA). Standard recommendations for adequate fit were used;  $\chi^2/df < 3$ , CFI  $>.90$ , TLI  $>.90$ , SRMR  $<.10$ , RMSEA  $<.10$  [25]. Instruments displayed adequate fit with items loading on intended factors ( $>.32$ ) and minimal cross-loadings ( $<.32$ ). There was one noteworthy exception. In the ESEM for mattering and anti-mattering, three anti-mattering items loaded meaningfully on the mattering latent variable, but these were negative so were not unexpected or considered problematic.

### **Descriptive statistics and bivariate correlations**

Descriptive statistics indicated moderate levels of medical mistrust, higher levels of mattering, lower levels of anti-mattering, and moderate levels of COVID-19 vaccine hesitancy and COVID-19 vaccine intention (as indicated by mean levels and response format). Of the respondents, 53 were classified as intending to vaccinate (35.3%), 44 were classified as unsure about whether to vaccinate (29.3%), and 52 were classified as unwilling to vaccinate (34.7%). Medical mistrust and its sub-dimensions were all positively correlated to COVID-19 hesitancy and intention whereas mattering and anti-mattering were not correlated with either. All statistics and analyses are reported in Table 1 and Table 2.

### **Regression analyses**

*COVID-19 vaccine hesitancy:* Suspicion ( $\beta = .42$ ,  $B = 0.55$ ,  $p = .001$ ) positively predicted COVID-19 vaccine hesitancy ( $\beta = .15$ ,  $B = .35$ ,  $p = .040$ ). There were no other statistically significant unique predictors. The model explained 38% of variance in COVID-19 vaccine hesitancy ( $R^2 = .38$ ,  $p < .001$ ; adjusted  $R^2 = .37$ ). In a separate model, neither mattering or anti-mattering significantly predicted COVID-19 vaccine hesitancy ( $R^2 = .01$ ,  $p = .404$ ; adjusted  $R^2 = .001$ ).

*COVID-19 vaccine intention:* Suspicion ( $\beta = -.35$ ,  $B = -0.66$ ,  $p < .001$ ) and lack of support ( $\beta = -.25$ ,  $B = -0.54$ ,  $p = .010$ ) negatively predicted COVID-19 vaccine intention. Disparity was not a statistically significant unique predictor. The model explained 33% of

variance in COVID-19 vaccine intention ( $R^2 = .33, p < .001$ ; adjusted  $R^2 = .32$ ). In a separate model, neither mattering or anti-mattering significantly predicted COVID-19 vaccine intention ( $R^2 = .01, p = .455$ ; adjusted  $R^2 = .003$ ).

### **Thematic analyses**

Four themes emerged from the participant responses: (1) Participants' beliefs that it is important to take the vaccine and seeing it as a social responsibility, (2) Experiencing pressure / feelings of being forced to take the vaccine and thus positioned into having limited/no choice, (3) General mistrust linked to personal experiences, and relating to the health system rather than an anti-vax position, and (4) Being hesitant and concerned about being socially or medically restricted if not vaccinated.

Theme 1: Participants' beliefs that it's important to take the vaccine and seeing it as a social responsibility. A small number of participants, despite being hesitant, voiced in their qualitative responses that they felt it was important to take the vaccine for a number of reasons. Some indicated that they felt a sense of wider responsibility to society. Others saw getting the vaccine as a rule or dictate that had to be followed. These perspectives are relayed by the following quotes:

*"I think it's important to follow the rules"*

*"Everyone should take the vaccine to protect all of the population"*

*"Ethnic minorities have a role to play in the management and spread of Covid-19 and should take this responsibility seriously"*

This theme included motives and reasons to get vaccinated. Notably, subsequent themes differed in that they capture reasons for vaccination hesitancy and participants concerns regarding vaccination.

Theme 2: Experiencing pressure and feelings of being forced to take the vaccine with limited/no choice. A number of participants noted that they were hesitant to get the vaccine because they felt not enough was known about it. And, despite uncertainty, they were still experiencing pressure to take the vaccine or felt they had limited choice. In response, they were choosing to err on the side of caution and not take it. Some of the quotes were:

*“Too many unanswered questions”*

*“...the data does not add up as no long-term research has been done”*

*“.... I would get it, but it is still in the trial stage. I'll wait awhile”*

Others felt the same kind of pressure and uncertainty but were more inclined to get the vaccine as a consequence. Some stated:

*“I'm only doing it because the government seem to be saying that they won't let me travel without it”*

*“...feeling pressured to take it”*

*“...I have I've been forced into taking because of my profession”.*

The current theme included general and specific pressures that participants felt and were responding to in making their decisions regarding vaccination. The next theme focused on how their own experiences and sense of mistrust was also important.

Theme 3: General mistrust linked to personal and historic experiences of the health system rather than an anti-vax position. There were a large number of responses which relayed participants' feelings of hesitancy for reasons which include not trusting medical professionals and not trusting the government. Some of the statements mirror the quantitative results on mistrust.

*“Do not trust these medical professionals”*

*“Will not be forced by legislation or coercion”*

*“do not trust this government as they do not have our best interest at heart”*

Importantly, for many respondents, this mistrust centred on past experiences of the healthcare system in dealing with them as members of diverse communities.

*“..... I can understand the distrust about medical care from an ethnicity distrust perspective but NOT from an overall anti-vax perspective”.*

*“I would like more information about the COVID vaccine trials on my ethnic group”*

*“....Unethical medical experimentation that has occurred for over a century may be the cause of the fear and mistrust of doctors and medicines. For example...the drug [name of drug given] was illegally tested in a clinical trial in Nigeria, which resulted in people's death, others suffered blindness, deafness, and brain damage... it is difficult to trust medical professionals and their practices peradventure history repeats itself on Ethnic Groups”.*

Other participants listed reasons for their mistrust. An example is of the quote below which noted a range of historic studies that they relayed was a cause of medical mistrust within those from minority ethnic groups in the UK.

*“Unethical medical experimentation that has occurred for over a century may be the cause of the fear and mistrust of doctors and medicines for example... it is difficult to trust medical professionals and their practices peradventure history repeats itself on Ethnic Groups”*

Theme 4: Being hesitant, reluctant and concerned about being socially or medically restricted if not vaccinated. This theme relays hesitancy to get vaccinated but also concern that to not be vaccinated would impact social activities, civil liberties, and health and care now or in the future.

*“Especially because of the impact on my civil liberties if I don’t have the vaccine”*

*“I need to travel so it’s not really about my health”*

*“I am doing it for convenience’s sake with fear that if I refuse it might affect my future care and treatment”*

We consider this theme and the other themes to capture the deliberations and decision making of those within diverse communities as they encounter medical and health systems, derive health beliefs, and enact health behaviours centred on COVID-19 vaccination.

### **Discussion**

The aim of the present study was to explore factors related to hesitancy towards the COVID-19 vaccine and intention to vaccinate in ethnically diverse communities with an

emphasis on medical mistrust and feelings of mattering. Analyses of quantitative questions revealed that feelings of mattering were unrelated to vaccine hesitancy and intention to vaccinate. However, as expected, medical mistrust predicted higher COVID-19 vaccine hesitancy and lower intention to vaccinate, with suspicion being the main source of this relationship. Analyses of qualitative responses provided a complementary account of the experiences of the respondents that included mistrust as part of weighing a sense of responsibility and pressure to get the vaccine against health and social concerns about negative consequences of doing so.

### **COVID-19 vaccine hesitancy and intention**

Ethnic minority groups continue to report lower COVID-19 vaccine uptake in the UK and other countries. As a result, COVID-19 morbidity and mortality rates are higher in these groups and continue to climb [20,26]. Here, we found additional evidence of COVID-19 vaccine hesitancy in ethnic minority groups with notable differences to previous research in this area. By way of example, in the current sample, the number of respondents who reported they were unwilling to get the COVID-19 vaccine was more than double that reported in a study that included the same measurement tool but a much smaller proportion of people from diverse ethnic backgrounds in the UK (e.g., 14.0% versus 34.7%; UCL COVID-19 Social Study [20]). As such, our findings suggest that the degree of vaccine hesitancy in ethnically diverse communities may currently be underestimated.

In regard to factors underlying vaccine hesitancy, our findings support the idea that medical mistrust may play a role in the decisions of members of ethnically diverse communities. Similar emerging research in this area suggests this is also the case. Key, here, is a recent study that found group-based medical mistrust partially explained the relationship between ethnicity and COVID-19 vaccine uptake in the US [27]. This recent study used the same suspicion aspect of medical mistrust that we found to be the most important as the

explanatory or mediating factor. This aspect of mistrust is a key predictor of beliefs regarding other health behaviours, too (e.g., benefits and disadvantages of cancer screening [17]). As such, suspicion of the COVID-19 vaccine and of the quality of medical care more generally appears especially important to understanding current trends in vaccine uptake.

Greater insight into the experiences and influences that were the basis for medical mistrust were afforded to us by the qualitative element of the study. While a sense of pressure and coercion featured as part of increasing likelihood of vaccine uptake for some participants, more generally a sense of pressure contributed to perceptions of there being another agenda by medical professionals, public health bodies or the government. Some participants drew upon personal experiences or knowledge of instances of medical harm against black populations (e.g., US Tuskegee syphilis study) in sharing their concern that information was being withheld from diverse communities about the COVID-19 vaccine. The accounts of the participants here echo those in other research, notably those who have described an erosion of confidence and amplification of fear that minority groups have experienced regarding the COVID-19 vaccine [2].

With this in mind, it is useful to reiterate the position of those who have highlighted that vaccine hesitancy pertains to uncertainty and ambivalence about vaccination [11]. Given the fears communicated by members of ethnically diverse communities, vaccine hesitancy is an understandable viewpoint. In addition, higher vaccine hesitancy is not necessarily indictive of an “anti-vax” position. This was something that was evident in some of the qualitative responses. In order to lower hesitancy and increase vaccine uptake, then, meaningful engagement with these communities is needed that includes health professionals collaborating with community allies, champions, faith leaders, and other trusted members of diverse communities [11]. The most successful interventions are likely to be those that include this type of “trust-based” engagement, are culturally competent, include non-



stigmatising messages, and that target issues underlying medical mistrust that shape perceptions of the benefits and risks associated with the COVID-19 vaccination.

### **Limitations and Future Research**

The present study has several limitations. First, the study adopted a cross-sectional design. Although this approach allowed us to assess and quantify relationships between variables, it did not permit us to examine changes or infer causal relationships. Longitudinal research is required in order to help take steps to do so. Second, we assessed vaccine hesitancy and intention, not actual vaccine uptake. We assume a reasonable correlation between these factors and vaccine behaviour. However, it is possible that people still get vaccinated despite their hesitancy and lower intentions (and, conversely, others do not despite the absence of hesitancy or higher intentions). Additional research that includes actual vaccination behaviour will help better understand its links to hesitancy and intentions. Third, the current sample is small in comparison to other surveys of this kind, notably national surveys, and was recruited via non-random convenience sampling. These are key considerations regarding representativeness and generalisability of the findings. Asian ethnic groups are under-represented in the current sample, for example. Similarly, we recruited only from a particular region in the North of England. With these issues in mind, larger scale attempts to capture the views of ethnically diverse communities are warranted. Much larger samples would also permit comparisons across different ethnic groups in regard to hesitancy and likelihood, and therefore help tailor support and information.

### **Conclusion**

We explored whether medical mistrust and feelings of mattering predicted COVID-19 vaccine hesitancy and intention to vaccinate in ethnically diverse communities. Medical mistrust predicted higher COVID-19 vaccine hesitancy and lower likelihood of getting the COVID-19 vaccine. Respondents also provided accounts of their views that included a sense

of responsibility and pressure weighed against health and social concerns when making decisions regarding whether to get vaccinated.

Table 1

*Descriptive Statistics, Omega, and Pearson's Correlations*

Variable	1	2	3	4	5	6	7	8
1. Medical mistrust								
2. Suspicion	.92**							
3. Disparity	.68**	.40**						
4. Lack of support	.83**	.65**	.52**					
5. Mattering	.09	.15	-.09	.42**				
6. Anti-mattering	.00	-.10	.15	.07	-.50**			
7. COVID-19 vaccine hesitancy	.61**	.58**	.39**	.50**	.09	-.10		
8. COVID-19 vaccine intention	-.57**	-.54**	-.32**	-.51**	-.10	.08	-.91**	
Response format	1-5	1-5	1-5	1-5	0-3	0-3	1-5	1-6
<i>M</i>	3.24	3.17	3.38	3.23	2.47	0.96	3.05	3.47
<i>SD</i>	0.81	1.01	0.93	0.89	0.49	0.81	1.32	1.91
Omega	.89	.92	.77	.63	.75	.88	.97	-

Note. \*\*  $p < .001$ , two-tailed.

Table 2

*Multiple Regression Analyses*

Model	$R^2$	$\beta$	$B$	BCa 95% CI
<b>COVID-19 vaccine hesitancy</b>				
$F(3, 146) = 29.60, p < .001.$	.38			
Suspicion		.42	0.55**	[0.30, 0.81]
Disparity		.13	-0.19	[-0.03, 0.41]
Lack of support		.16	-0.24	[-0.01, 0.48]
<b>COVID-19 vaccine hesitancy</b>				
$F(2, 147) = 0.91, p = .404$	.01			
Mattering		.06	0.16	[-0.41, 0.71]
Anti-mattering		-.07	-0.11	[-0.46, 0.24]
<b>COVID-19 vaccine intention</b>				
$F(3, 146) = 23.97, p < .001.$	.33			
Suspicion		-.35	-0.66**	[-0.98, 0.33]
Disparity		-.05	-0.10	[-0.42, 0.24]
Lack of support		-.25	-0.54	[-0.84, -0.20]
<b>COVID-19 vaccine intention</b>				
$F(2, 146) = 0.79, p = .455.$	.01			
Mattering		-.07	-0.29	[-1.07, 0.48]
Anti-mattering		.05	0.11	[-0.38, 0.57]

Note. \* $p < .01$ , \*\* $p < .001$ , two-tailed. BCa = Bias Corrected accelerated [1000 resamples].

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### **Declarations**

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### **Conflicts of interest/Competing interests**

Apart from the already declared funding for the research, by the Black Health Initiative, Leeds UK, which was paid directly to York St John University, where the authors [Divine Charura, Andrew P. Hill, & Marianne Etherson] are based, the authors have no relevant financial or non-financial interests to disclose.

### **Availability of data, code, and material**

Data and code are publicly available here: <https://doi.org/10.25421/yorks.j.19551709.v1>

### **Author contributions**

All authors contributed to the study conception and design. Material preparation, data collection and analysis were performed jointly by the authors [Divine Charura], [Andrew P. Hill] and [Marianne E. Etherson], The first draft of the manuscript was jointly written by all the authors [Divine Charura, Andrew P. Hill and Marianne E. Etherson] and all authors

edited and commented on previous versions of the manuscript. All authors read and approved the final manuscript.

### **Ethics approval**

Approval was obtained from the ethics committee of York St John University (12<sup>th</sup> March 2021 STHEC0034) The procedures used in this study adhere to the tenets of the Declaration of Helsinki.

### **Consent to participate**

Informed consent was obtained from all individual participants included in the study.

### **Consent for publication**

The manuscript does not include individual identifiable data of participants. Informed consent was obtained from all individual participants included in the study for publication.

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