

**COVID-19 Vaccine Acceptance among Black, Asian and Minority
Ethnic (BAME) Individuals in the North East and North Cumbria**

Final Report

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Executive Summary

Despite the overall high COVID-19 vaccine uptake in the United Kingdom, there are parts of the population who are either hesitant towards the vaccine or refuse to take it. In particular, uptake among Black, Asian, and Minority Ethnic (BAME) individuals has been lower than in the general population. However, no published research has examined psychological factors contributing to vaccine hesitancy in BAME individuals, nor looked at the role of coronavirus conspiracy beliefs. Successful interventions and campaigns to increase COVID-19 vaccination uptake in BAME communities need to be designed with such factors in mind. The present study aimed to determine psychological predictors of COVID-19 vaccination intention in BAME individuals, using Protection Motivation Theory (PMT) and coronavirus conspiracy beliefs, in addition to established demographic variables. Data were collected using an online survey. In total 1061 participants submitted responses, of whom 67 were BAME individuals (12 males, 52 females, 2 non-binary/third gender, and 1 preferred not to state their gender). They completed the survey assessing PMT constructs, coronavirus conspiracy beliefs, and demographic factors, between May and August 2021. Of the BAME participants, 44 (65.7%) were vaccinated for COVID-19 and 23 (34.3%) were unvaccinated. The mean age was 36.19 ($SD = 9.73$). Hierarchical multiple regression showed that perceived susceptibility to COVID-19 was a significant predictor of vaccination intention, with higher levels of perceived susceptibility being associated with higher levels of vaccination intention. Furthermore, an independent t-test revealed that unvaccinated individuals had significantly higher levels of coronavirus conspiracy beliefs than vaccinated ones. Thematic analysis of free-text responses showed that respondents had both negative and positive attitudes towards and beliefs about the vaccine. Based on these findings, we recommend that campaigns and interventions addressing COVID-19 vaccine uptake in BAME individuals target perceived susceptibility and conspiracy beliefs, using clear, unambiguous messaging. Further work is needed to examine hesitancy towards other vaccines in BAME communities, using social cognitive models of behaviour such as PMT.

Introduction

Efforts to vaccinate the world population against COVID-19 are ongoing. At the end of August 2021, around 4.93 billion doses had been administered worldwide (1). The COVID-19 vaccination programme has been rolled out rapidly across the United Kingdom (UK) (2). While uptake has been encouraging (3), surveys have indicated that there are a significant number of people who are sceptical of the vaccine, and who would either be hesitant to receive it, or refuse it altogether (4–6). In the UK, most of the people who have been hospitalised with COVID-19 are those who have not been fully vaccinated (7). Therefore, to reduce hospitalisations and mortality rates, it is important that as many eligible individuals as possible are fully vaccinated against COVID-19.

Vaccine Hesitancy in Black, Asian and Minority Ethnic (BAME) Individuals

Vaccine hesitancy refers to “delay in acceptance or refusal of vaccination despite availability of vaccination services. Vaccine hesitancy is complex and context specific, varying across time, place and vaccines. It is influenced by factors such as complacency, convenience and confidence” (8, p. 4163). To date, there is little research examining factors underlying COVID-19 vaccine hesitancy or refusal in Black, Asian and Minority Ethnic (BAME) individuals. COVID-19 vaccine hesitancy has been examined in BAME healthcare staff, with higher levels of hesitancy being found in this subgroup than among healthcare staff generally (9). Medical mistrust has been found to play a role in vaccine hesitancy or refusal in BAME individuals (10,11). Furthermore, research commissioned by Healthwatch (12) found that among individuals with African, Bangladeshi, Caribbean, and Pakistani ethnicity, mistrust of the government and pharmaceutical companies was common, and what were

perceived to be mixed messages about the vaccine from a variety of sources left individuals feeling confused. However, there has been little research into which psychological factors drive COVID-19 vaccine acceptance and uptake in BAME individuals.

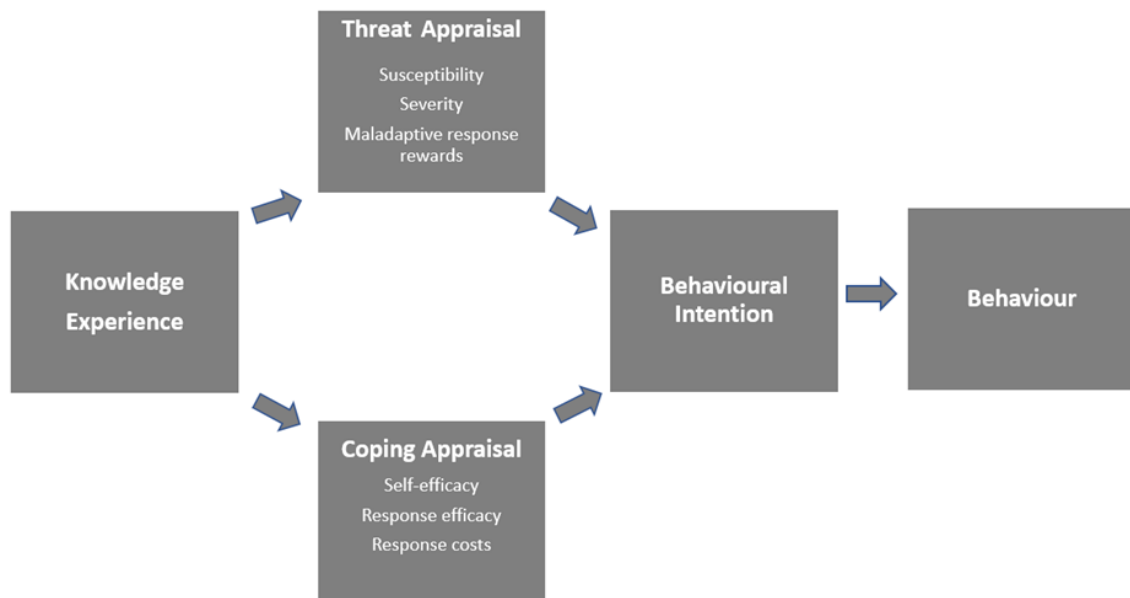
Protection Motivation Theory and Vaccine Acceptance

Psychological research has identified three drivers of vaccine uptake, in addition to possessing the necessary knowledge: an enabling environment, social influences and motivation (13). Protection Motivation Theory (PMT) (14) attempts to explain motivation to respond to health threats such as COVID-19. According to PMT, the likelihood of engaging in a protective behaviour - such as being vaccinated - when faced with a threat is a product of the beliefs that individuals hold about engaging, or not engaging, in this protective behaviour as well as about the threat itself.

In PMT (see Figure 1), intention most closely predicts behaviour. Intention itself is determined by both threat appraisal and coping appraisal. Threat appraisal is the result of one's perceived vulnerability to the negative consequences of the threat (susceptibility), how serious one perceives these negative consequences to be (severity), and perceived benefits of engaging in behaviour that is maladaptive in relation to the threat (maladaptive response rewards). Coping appraisal is the product of confidence in one's perceived ability to successfully engage in the preventative behaviour (self-efficacy), beliefs about how effective the protective behaviour is at preventing the negative consequences of the threat (response efficacy), and any barriers affecting performance of the protective behaviour (response costs). PMT posits that, faced with a threat to their health, people are most likely

to perform a protective behaviour when they believe that not acting poses a threat to themselves (high threat appraisal) and that engaging in the protective behaviour will reduce that threat (high coping appraisal).

Figure 1: Protection Motivation Theory.



PMT has been applied to seasonal influenza vaccine acceptability and uptake (e.g., 15–18), and to predict COVID-19 vaccination intention among Chinese university students (19). However, no published studies have examined the use of PMT to predict COVID-19 vaccination intention in the general UK population, nor in BAME communities. It is important that common theories of health behaviour and health behaviour change, such as PMT, be applied to COVID-19 vaccination acceptance and intention in BAME individuals, as this will allow for theory-based interventions to be designed to increase its uptake.

Conspiracy beliefs have been examined in relation to beliefs about COVID-19. These have been shown to be prevalent in a significant minority and to be associated with less adherence to coronavirus government guidelines and lower willingness to take diagnostic or antibody tests or get vaccinated (4,6). The role of conspiracy beliefs in intention to receive a COVID-19 vaccination has not yet been explored extensively, nor alongside PMT in vaccine acceptance more broadly. As such beliefs are prevalent in a significant minority and may reduce vaccine uptake (4), determining the extent of their influence on intention to get a COVID-19 vaccine in BAME is key to developing interventions for COVID-19 vaccine acceptance and uptake for this group.

In addition to ethnicity, other demographic factors are associated with COVID-19 vaccine acceptance, namely age, gender (4,20,21), and education (20,21). Furthermore, religiosity has been found to correlate with COVID-19 vaccination, with higher religiosity related to higher hesitancy to get the vaccine (22). However, currently nothing is known about psychological and demographic factors predicting COVID-19 vaccination intention in BAME communities generally, and in the North East and North Cumbria specifically.

Aims and Objectives

No published studies have applied PMT to COVID-19 vaccination intention in BAME individuals. Applying health behaviour theory is essential for designing theory-based interventions and public health campaigns addressing COVID-19 vaccine acceptance and uptake in this group, both in the UK overall, as well as in the North East and North Cumbria specifically.

We aimed to explore COVID-19 vaccination intention in BAME individuals. We also sought to establish whether there were differences between those vaccinated for COVID-19 and unvaccinated individuals in relation to coronavirus conspiracy beliefs. To achieve these aims we used PMT and examined coronavirus conspiracy beliefs and demographic factors in this group, in relation to intention to get vaccinated for COVID-19.

Method

Design

As medical mistrust has been found to play a role in some BAME individuals' unwillingness to get vaccinated for COVID-19 (10,11), there was some concern that this mistrust would impact on response rates if the survey were directed at BAME individuals only, particularly as BAME-targeted messaging on COVID-19 vaccination may have the opposite to the intended effect (12). To reduce the potential impact of mistrust on response rates, we aimed the study at the general UK population to avoid perceptions on the part of BAME individuals of being singled out or judged for their decisions in relation to COVID-19 vaccination, thereby increasing the likelihood of their participation. Three papers on the findings for the general population and for younger adults were submitted for publication to journals. one has been published (23) and two are under review (24,25).

The study was correlational and used an online survey. The outcome variable was COVID-19 vaccination intention. Predictors were the PMT constructs (perceived severity of COVID-19, perceived susceptibility to COVID-19, perceived efficacy of the vaccine [response efficacy], confidence in one's ability to obtain a vaccination [self-efficacy], maladaptive response

rewards and perceived response costs) and level of coronavirus conspiracy beliefs. Relevant demographic variables - age, gender, religiosity, and education - were also assessed.

Participants

A total of 1061 individuals completed the survey (197 males, 854 females, 4 non-binary/third gender, and 6 preferred not to state their gender). The mean age was 41.38 ($SD = 12.91$). Of these, 770 respondents (72.6%) reported having had a COVID-19 vaccination, and 291 (27.4%) reported not having had one. The COVID-19 vaccination programme was being rolled out in the UK by age groups when data collection began (May 2021), with older people being offered the vaccine before younger ones. Accordingly, the mean age of vaccinated individuals was higher ($M = 43.45$, $SD = 13.01$), than that of unvaccinated individuals ($M = 35.91$, $SD = 10.91$). An independent t-test established that this age difference was significant, $t(617.83) = 9.51$, $p < .001$. Sixty-seven respondents (6.3%) were BAME. (See Table 1 for demographic characteristics of the overall sample.)

Table 1: Demographic characteristics of all respondents.

<i>N</i>		Overall (%)
- Vaccinated		1061
- Unvaccinated		770 (72.6)
Age in years <i>M (SD)</i>		291 (24.7)
		41.38 (12.91)
Age category		<i>N (%)</i>
	18 - 29	216 (20.4)
	30 - 39	283 (26.7)
	40 - 49	280 (26.4)
	50 - 59	180 (17.0)
	60 - 69	84 (7.9)
	70 - 79	16 (1.5)
	80+	2 (0.2)
- Mean age of vaccinated (<i>SD</i>)		43.45 (13.01)
- Mean age of unvaccinated (<i>SD</i>)		35.91 (10.91)
Ethnicity (%)	White	994 (93.7)
	Non-White	67 (6.3)
Level of education (%)	No qualifications	16 (1.5)
	General Certificate of Secondary Education	109 (10.3)
	Advanced level qualifications	181 (17.1)
	Higher education (e.g., BA, BSc, or equivalent)	421 (39.7)
	Postgraduate qualifications (e.g., MA, MSc, PhD, DPhil)	334 (31.5)
Religiosity <i>M (SD)</i>	Single item: 'How important is religion in your life?' (Five-point Likert scale; 1 = not important at all, 5 = extremely important)	1.83 (1.18)

Of the 67 BAME respondents (12 males, 52 females, 2 non-binary/third gender, and 1 preferred not to state their gender), 44 (65.7%) were vaccinated for COVID-19 and 23 (34.3%) were unvaccinated. The mean age was 36.19 (*SD* = 9.73). As in the general sample, unvaccinated respondents were on average younger than vaccinated ones. An independent t-test established that the age difference between the vaccinated and the unvaccinated was

significant, $t(55.14) = 2.68, p < .01$. Black Africans made up the largest ethnic group (25.4%), followed by Indian (17.9%) and Pakistani (11.9%). Over half of the sample (50.7%) had postgraduate qualifications. Overall, religion was perceived to be fairly important by BAME respondents ($M = 3.30, SD = 1.54$). See Table 2 for demographic characteristics of the BAME sample.

Table 2: Demographic characteristics of BAME respondents.

<i>N</i>		Overall (%)
- Vaccinated		44 (65.7)
- Unvaccinated		23 (34.3)
Age in years <i>M (SD)</i>		36.19 (9.73)
Age category		<i>N (%)</i>
	18 - 29	18 (26.9)
	30 - 39	22 (32.8)
	40 - 49	22 (32.8)
	50 - 59	5 (7.5)
- Mean age of vaccinated (<i>SD</i>)		38.3 (10.06)
- Mean age of unvaccinated (<i>SD</i>)		32.3 (7.9)
Ethnicity (%)	Black African	17 (25.4)
	Indian	12 (17.9)
	Pakistani	8 (11.9)
	Other	6 (9.0)
	Any other Mixed or Multiple Ethnic background	5 (7.5)
	Mixed - White and Asian	4 (6.0)
	Arab	3 (4.5)
	Bangladeshi	3 (4.5)
	Chinese	3 (4.5)
	Any other Asian background	3 (4.5)
	Mixed - White and Black African	2 (3.0)
	Mixed - White and Black Caribbean	1 (1.5)
Level of education (%)	No qualifications	1 (1.5)
	General Certificate of Secondary Education	2 (3.0)
	Advanced level qualifications	8 (11.9)
	Higher education (e.g., BA, BSc, or equivalent)	22 (32.8)
	Postgraduate qualifications (e.g., MA, MSc, PhD, DPhil)	34 (50.7)
Religiosity <i>M (SD)</i>	Single item: 'How important is religion in your life?' (Five-point Likert scale; 1 = not important at all, 5 = extremely important)	3.30 (1.54)

Measures

An adapted version of the PMT questionnaire (18) was used to measure the PMT constructs. All subscales have previously been shown to have moderate to high internal consistency, ranging from $\alpha = 0.57$ to $\alpha = 0.98$ (18). The original items were worded to assess PMT constructs in relation to the seasonal influenza vaccine. For the present study, these were adapted to assess these constructs in relation to the COVID-19 vaccine. On all subscales, participants indicated their agreement on a five-point Likert scale, ranging from 1 = strongly disagree, to 5 = strongly agree. Scores on each subscale were calculated as the mean of the items on each subscale. Items were reversed where necessary. Higher scores on each subscale indicated higher degrees of the particular construct.

Intention was assessed with three items in relation to COVID-19 vaccination intention.

Susceptibility was measured with two items indicating in how far individuals perceived themselves as being vulnerable to the negative consequences of contracting COVID-19 and one item indicating lack of perceived susceptibility. *Severity* was a composite score calculated by averaging three items indicating that the negative impact of contracting COVID-19 is severe. Higher perceived severity was indicated by higher scores. *Maladaptive response rewards* were measured with three items stating that there were perceived benefits to not getting a COVID-19 vaccination. *Self-efficacy* was assessed with two items indicating that individuals saw themselves as capable of getting a COVID-19 vaccination and one item stating that it would be difficult for them to get a COVID-19 vaccination.

Response efficacy was measured with three items indicating that receiving the COVID-19 vaccine would be effective in reducing vulnerability to and severity of the illness.

Response costs were assessed with three items indicating that there were both financial and non-financial costs in relation to receiving a COVID-19 vaccination. (See Table 3 for all PMT items and internal consistency of all subscales in the present study.)

Conspiracy beliefs were assessed with the 7-item OCEANS Coronavirus Conspiracy Scale assessing general coronavirus conspiracy beliefs (6). Items included statements on general beliefs about the coronavirus (e.g., ‘The virus is a hoax’) and participants indicated their agreement on a five-point Likert scale ranging from 1 = strongly disagree, to 5 = strongly agree. In the present study, internal consistency of the scale was high ($\alpha = 0.93$).

Demographic variables were measured using multiple-choice items. Age was measured as a continuous variable; gender, ethnicity, and level of education were assessed using the UK census categories (26). Religiosity was assessed with a single item (‘How important is religion in your life?’), measured using a five-point Likert scale ranging from 1 = not important at all to 5 = extremely important), in line with the Oxford Coronavirus Explanations, Attitudes, and Narratives Survey II (4).

To ensure that participants had the opportunity to mention any additional factors affecting their intention to get vaccinated for COVID-19, two open-response format questions were included at the end of the survey: *‘Is there anything else you can tell us about your reasons for intending or not intending to take the vaccine when it is offered to you?’*; and *‘Are there any practical issues that might affect you getting the COVID-19 vaccine?’*.

Table 3: Protection Motivation Theory items.

Construct and associated internal consistency	Items
Intention ($\alpha = .99$)	I intend to have a COVID-19 vaccination. I plan to have a COVID-19 vaccination. I expect to have a COVID-19 vaccination.
Susceptibility ($\alpha = .80$)	Without being vaccinated for COVID-19, I am vulnerable to contracting COVID-19. Even if I don't get vaccinated for COVID-19, I don't think I'm likely to get COVID-19. If I don't get vaccinated for COVID-19 I am at risk of catching COVID-19.
Severity ($\alpha = .77$)	The negative impact of COVID-19 is very severe. COVID-19 can be a life-threatening illness. COVID-19 is a serious illness for someone like me.
Maladaptive response rewards ($\alpha = .61$)	Not being vaccinated for COVID-19 would have some advantages for me. If I am not vaccinated for COVID-19, then I will not have to worry about the safety of the vaccine. If I am not vaccinated for COVID-19, then I will not have to spend time and money getting vaccinated.
Self-efficacy ($\alpha = .69$)	I'd be able to be vaccinated for COVID-19 when it's offered to me, if I wanted to. Being vaccinated for COVID-19, once it's offered to me, would be difficult for me. Being vaccinated for COVID-19 is easy.
Response efficacy ($\alpha = .82$)	I'm sure that being vaccinated for COVID-19 would be effective in reducing my personal risk of contracting COVID-19. Being vaccinated for COVID-19 would stop me from getting COVID-19. Being vaccinated for COVID-19 would guarantee that I will not get COVID-19.
Response costs ($\alpha = .47$)	Being vaccinated for COVID-19 would have some disadvantages for me. Being vaccinated for COVID-19 is painful. The COVID-19 vaccine is expensive for me.

Procedure

Data collection took place between the beginning of May and the end of August 2021. Ethics approval was granted by the University of Sunderland's Research Ethics Committee. A

website was set up to provide information on the study and a link to the survey on the online survey platform, Qualtrics. The website provided background information on the study and respondents were then invited to complete the anonymous online survey by clicking on the survey link. The survey took an average of five minutes to complete. Upon completion, respondents were presented with a screen thanking them for their time and providing a list of websites that could be accessed for more information on COVID-19 and vaccination. They were also encouraged to contact the National Health Service's 'NHS Direct' website or their general practitioner if they had any coronavirus-related concerns.

Individuals eligible to participate in the study included anyone aged 18 or older and residing in the UK. Recruitment took place by setting up a website specifically for the study (www.vaccineacceptance.com) which provided background information and a link to the online survey. The link to this website was disseminated via social media, emails to BAME-relevant organisations, distributing flyers in person, and engagement with the press through radio interviews and news articles. Teesside University and the University of Sunderland both issued press releases about the project. Participants received no monetary or material rewards for their participation. Appendix 1 shows dissemination activity, which includes regional and national media, in connection with the project.

Analysis

Version 26 of The Statistical Package for the Social Sciences [SPSS] (27) was used to analyse the data. In the analysis of overall sample data, a three-stage hierarchical multiple linear regression was performed on the survey data of respondents who had not had a COVID-19

vaccine to determine significant predictors of intention to receive a COVID-19 vaccination.

(See Appendix 2 for the abstract of the paper reporting the findings of this analysis.)

In order to examine findings more in-depth, a thematic analysis was performed on the free-text responses in the survey (see Appendix 3 for the abstract of the paper reporting the findings of this qualitative analysis). Thirdly, a three-stage hierarchical multiple linear regression was performed for all respondents aged 18-34, as evidence emerged of younger adults being more hesitant to take the COVID-19 vaccine than older ones (28), especially in the Teesside region (29). (See Appendix 4 for the abstract of the paper reporting the findings of this analysis.)

In the analysis of the BAME data, a three-stage hierarchical multiple linear regression was performed on the survey data of respondents who had not had a COVID-19 vaccine ($N = 23$) to determine significant predictors of intention to receive a COVID-19 vaccination, as well as the relative contribution of each significant predictor and nature of its relationship to this outcome variable. In line with previous research indicating the influence of PMT constructs on vaccination intention (18), these were entered at the first stage of the regression. Level of coronavirus conspiracy beliefs was entered at the second stage, and the demographic variables (age, gender, education, and religiosity) were entered at the third stage.

Furthermore, a t-test was performed to determine whether there were significant differences in coronavirus conspiracy beliefs between vaccinated and unvaccinated respondents. T-tests were also performed for all psychological factors expected to play a role in COVID-19 vaccine acceptance, comparing BAME to non-BAME respondents. Finally,

an inductive thematic analysis (30) was performed on the responses to the two open-response format questions.

Results

Descriptive Statistics

Overall, levels of perceived susceptibility, severity, response efficacy, and intention to get vaccinated were rather high among BAME respondents. Maladaptive response rewards (i.e., perceived rewards of not getting vaccinated), response costs, and conspiracy beliefs were rather low. Examining the mean levels of the PMT constructs and conspiracy beliefs, three significant differences emerged between BAME and non-BAME individuals: BAME respondents had significantly higher levels of self-efficacy, conspiracy beliefs, and intention to get vaccinated for COVID-19.

Table 4: Comparison of psychological factors between BAME and non-BAME respondents.

Psychological Factor	BAME M (SD)	Non-BAME M (SD)	t(df)	p
Susceptibility	3.46 (1.26)	3.14 (1.15)	-1.22 (259)	.223
Severity	3.71 (1.13)	3.33 (1.04)	-1.62 (259)	.106
Maladaptive response rewards	2.59 (.98)	2.94 (1.05)	1.47 (259)	.142
Self-efficacy	2.83 (1.20)	2.29 (1.10)	-2.13 (259)	.034*
Response efficacy	3.95 (.94)	3.90 (1.04)	-.24 (259)	.814
Response costs	2.29 (.92)	2.45 (.80)	.91 (259)	.363
Conspiracy beliefs	2.12 (1.09)	1.83 (.97)	-2.07 (72.39)	.042*
Intention	3.97 (1.34)	2.78 (1.68)	-3.81 (25.87)	.001***

Note: * $p < .05$; *** $p < .001$

Inferential Statistics

Results of the hierarchical multiple regression (see Table 5) showed that at stage 1, susceptibility contributed significantly to the regression model, with 63% of the variance in COVID-19 vaccination intention being accounted for. Adding coronavirus conspiracy beliefs at stage 2 resulted in an additional 7% of the variance being explained, with susceptibility remaining significant. Adding the demographic variables (age, gender, religiosity, and education) at stage 3 led to an additional 3% (73% in total) of the variance in COVID-19 vaccination intention being explained. Susceptibility was no longer a significant predictor of COVID-19 vaccination intention.

Table 5: Results of hierarchical multiple linear regression predicting COVID-19 vaccination
intention.

Predictor	β	95% CI	<i>t</i>	R^2	R^2 change	<i>p</i>
Stage 1				.63		
Intercept		[-1.59, 8.57]	1.47			.163
Severity	-.13	[-.92, .62]	-.42			.681
Susceptibility	.55	[.03, 1.15]	2.26			.041*
Maladaptive response rewards	-.32	[-1.22, .34]	-1.22			.243
Self-efficacy	.37	[-.14, .97]	1.60			.132
Response efficacy	-.23	[-1.05, .41]	-.95			.360
Response costs	.07	[-.59, .80]	.33			.748
Stage 2				.70	.07	
Intercept		[-2.14, 7.67]	1.22			.245
Severity	.02	[-.91, .55]	-.53			.606
Susceptibility	.51	[.01, 1.07]	2.19			.047*
Maladaptive response rewards	-.07	[-.96, .77]	-.24			.815
Self-efficacy	.43	[-.06, 1.01]	1.93			.076
Response efficacy	-.11	[-.88, .57]	-.46			.652
Response costs	.25	[-.37, 1.11]	1.07			.303
Conspiracy beliefs	-.48	[-1.19, .15]	-1.68			.117
Stage 3				.73	.03	
Intercept		[-11.06, 10.91]	-.02			.988
Severity	.02	[-1.19, 1.25]	.05			.962
Susceptibility	.51	[-.24, 1.31]	1.56			.153
Maladaptive response rewards	.10	[-1.53, 1.80]	.18			.858
Self-efficacy	.32	[-.40, 1.11]	1.06			.316
Response efficacy	-.09	[-1.13, .88]	-.28			.785
Response costs	.16	[-1.13, 1.60]	.39			.706
Conspiracy beliefs	-.54	[-1.59, .41]	-1.34			.214
Age	.11	[-.11, .15]	.33			.752
Gender	.18	[-1.20, 2.28]	.70			.499
Religiosity	.10	[-.72, .88]	.24			.816
Level of education	.04	[-1.02, 1.16]	.15			.888

 Note: * $p < .05$

Results of the t-test comparing COVID-19 vaccinated and unvaccinated BAME individuals on their coronavirus conspiracy beliefs showed that unvaccinated individuals ($M = 2.55$, $SD = 1.23$) reported significantly higher levels of conspiracy beliefs than those who had been vaccinated ($M = 1.91$, $SD = .96$), $t(64) = -2.29$, $p < 0.05$.

Table 6: Themes from free-text responses.

Theme	Example Quotes
COVID-19 vaccine as ineffective, unnecessary, unnatural, and experimental	<p><i>"In my personal opinion, the risks outweigh the benefits. I have not died during the so-called pandemic and know many people who had the virus and had barely any symptoms. The vaccine had been given emergency approval only. I refuse to be part of a medical trial which is what it is. The effects will not be known for decades."</i></p> <p><i>"We need longitudinal studies, without these we are at risk of anything until studies have been carried out and improvements are made."</i></p> <p><i>"I [...] do not intend to add synthetic protein spikes to my blood cells, this is unnecessary and a health risk in itself!"</i></p> <p><i>"I don't want to put myself at unnecessary risk whilst I'm still healthy and experience issues with vaccines that aren't clinically proven long term. I have had a family member die from COVID and I have had family members who contracted the virus more than once and are still healthy. It depends on the individuals current state of health and their body it does not affect everyone the same so my risk is equal to contracting it without the vaccine and being okay to having the vaccine and experiencing side effects."</i></p>
Fear of side-effects	<p><i>"I am concerned about potential long term side effects on myself and any children I have in the future. Both my parents have suffered serious side effects after the vaccine and I believe it may also happen to me."</i></p> <p><i>"I do intend to have the vaccine, my only worry is that I'm breastfeeding and there's not much research out there on the side effects for baby."</i></p> <p><i>"I have been told that I can and then cannot have either of the main vaccines due to possible allergic reaction. This has left me unsure and apprehensive about which of the vaccines to have. I want to be vaccinated, but am now worried about side-effects."</i></p> <p><i>"Trial periods are not finished, not enough evidence to prove the safety and effectiveness long term. I am a young woman who had fertility issues, the vaccine's effect on fertility has not yet been clinically proven to have no complete effect long term for women, nor has any evidence yet proved it does affect fertility so I am waiting."</i></p>
Getting vaccinated to protect oneself and others, and 'get back to normal'	<p><i>"I intend to take the vaccine because I don't want to suffer from the severe symptoms of covid."</i></p> <p><i>"If I get vaccinated, I could visit family members who are high-risk."</i></p> <p><i>"If I have the vaccine I can travel internationally. This is why I have taken the vaccine."</i></p> <p><i>"It's about protecting me, my family, friends and community."</i></p>

Three themes emerged from the free-text responses (see Table 6). Fear of perceived serious side-effects of the vaccine was described as a barrier to getting vaccinated for COVID-19. Some respondents ascribed unfavourable properties to the COVID-19 vaccine, perceiving it as unnecessary and unnatural. In these participants' views, the vaccine had not been sufficiently tested to make it safe to administer. On the other hand, positive attitudes were voiced as well. Among those who had high intentions of getting vaccinated, many felt a duty to do so, to protect both themselves and the public's health. Additionally, those with positive views felt that getting vaccinated would enable things to return to a similar state to before the pandemic, for example, making visits to high-risk individuals and international travel.

Discussion

We aimed to explore COVID-19 vaccination intention in BAME individuals, and to establish whether there were differences between those vaccinated for COVID-19 and unvaccinated individuals in relation to their coronavirus conspiracy beliefs.

The high levels of perceived susceptibility, severity, response efficacy, and intention to get vaccinated, and low levels of maladaptive response rewards (i.e., perceived rewards of not getting vaccinated), response costs, and conspiracy beliefs, are encouraging. Furthermore, in light of the reported higher levels of COVID-19 vaccine hesitancy in BAME individuals, it is interesting to note that BAME respondents in our study were significantly higher in self-efficacy and in COVID-19 vaccination intention than non-BAME respondents. However, they also had higher levels of conspiracy beliefs, which is in line with previous research on

medical mistrust in BAME individuals (10–12). Furthermore, unvaccinated BAME had higher levels of conspiracy beliefs than vaccinated ones. This finding is similar to findings for the general population (23).

Applying PMT to COVID-19 vaccination intention in BAME respondents yielded only one significant predictor, perceived susceptibility. Thus, the more vulnerable individuals felt themselves to be to contracting COVID-19, the higher their intention was to get vaccinated. None of the other PMT constructs, conspiracy beliefs, nor demographic variables predicted vaccination intention. This is most likely the result of our BAME sample being very small and the study therefore being underpowered, making the detection of significant effects less likely. Nonetheless, the lack of influence of demographic variables on vaccination intention is in line with previous findings (18,23,24). It thus seems important to focus efforts to establish predictors of COVID-19 vaccination uptake in BAME individuals on psychological factors, rather than on demographic ones.

Analysis of free-text responses revealed some negative attitudes towards the COVID-19 vaccine, with several participants perceiving it to be unnatural and unnecessary. Others voiced their fears over side-effects. However, positive views were also expressed, with a primary motivation for wanting to receive the vaccine, once eligible, being the protection of oneself and others, and wanting things to go back to 'normal'. These findings are congruent with findings for the general population (23), particularly concerns over the vaccine being unnatural and unnecessary which may be a product of misinformation (31) obtained from social media (32). Therefore, providing people with accurate information is of central

importance, and particularly if this is delivered through social media. Clear, unambiguous messaging and avoiding conflicting information is central to gaining BAME individuals' trust (12), increasing the effectiveness of information campaigns.

Strengths and Limitations

To our knowledge, the present study is the first to assess the influence of PMT, coronavirus conspiracy beliefs and demographic factors on COVID-19 vaccination intention in BAME individuals. It offers important insights into potential directions for future research, and highlights issues to consider when devising interventions and campaigns addressing COVID-19 vaccine uptake in BAME communities.

Still, some limitations to the present study need to be acknowledged. Despite the principal investigator being a member of the BAME community and having made extensive recruitment efforts (see Appendix 1), we experienced substantial difficulties recruiting BAME participants. The focus of the work was in particular on the BAME experience in North East England and North Cumbria, however these are both parts of the UK which have relatively few BAME individuals compared to the rest of the country. A further potential factor limiting accessibility of the survey was that it was only produced in English, although funding did not enable the translation of the survey into different languages.

It also needs to be acknowledged that there were high levels of education in our BAME sample, with just over half holding postgraduate qualifications. This may, at least in part, explain the high levels of COVID-19 vaccination intention (20,21). Furthermore, highly

educated individuals are less likely to have high levels of conspiracy beliefs (33). People high in conspiracy beliefs may have been less likely to have completed our survey; as mentioned previously, medical mistrust has been found to be high among BAME individuals, which may have played a role in their low levels of participation.

Recommendations for addressing COVID-19 vaccine hesitancy in BAME individuals

From our findings, we make the following recommendations for campaigns and interventions to improve COVID-19 vaccine uptake:

1. **Campaigns and interventions should focus on emphasising susceptibility to COVID-19.** This seems to be a significant predictor of vaccination intention in BAME individuals. Thus, it needs to be made clear that anyone can contract COVID-19, regardless of ethnicity. However, this should be done in a sensitive manner, as there is some evidence that campaigns drawing on disease severity (which would be inevitable when emphasising susceptibility) can backfire, particularly with hesitant individuals (34,35).
2. **Campaigns and interventions need to address coronavirus conspiracy beliefs.** These appear to be significantly associated with COVID-19 vaccination intention, not just in BAME individuals, but also in the general population (23). It may be advisable to use people who are not authority figures, and therefore less likely to be perceived as being part of a conspiracy, as part of such campaigns.
3. **Clear, unambiguous messaging and avoiding conflicting information is central to gaining BAME individuals' trust.** Effective campaigns need to employ clear messaging, and as misinformation on the COVID-19 vaccine is frequently

disseminated via social media, campaigns to correct false perceptions of the vaccine should consider using the same media.

Future Directions

The findings of the current study are important and offer insights relevant to improving COVID-19 vaccination uptake in BAME communities, further work is however necessary to establish psychological predictors of vaccination intention for this group and the wider population. Such work should include a recruitment strategy which maximises reach, employing material translated into different languages, and engaging BAME communities through a variety of methods, including community leaders (36). Furthermore, qualitative work is necessary to explore psychological predictors in more depth.

In the long term, expanding the focus to include hesitancy among BAME individuals in relation to vaccines other than the COVID-19 vaccine is needed. Previous research has shown that BAME are more likely than the general population to be hesitant towards a variety of vaccines (37–41). Therefore, future research should establish predictors of hesitancy using a psychological model such as PMT, to inform interventions and campaigns increasing the uptake of these vaccines in BAME communities. Factors underlying hesitancy may differ between ethnic groups. As there is some evidence to indicate that attitudes towards vaccination may be at least in part be rooted in cultural factors (42), such research needs to be conducted on a large scale, to enable an understanding of culture-specific influences on vaccine uptake.

Next Steps

Our work found that perceived susceptibility to COVID-19 was associated with vaccination intention in BAME, and that conspiracy beliefs also play a role. The present study has evidenced the challenges in successfully engaging BAME groups in research. These findings are relevant to healthcare professionals and policymakers in devising public health campaigns targeting BAME - an important step towards maximising their protection from COVID-19, contributing to the general population's protection, and improving understanding of the factors influencing vaccine hesitancy in BAME communities more generally.

We recommend public health teams and local authorities emphasise susceptibility to COVID-19 in campaigns directed at BAME communities, but that this is done in a sensitive way as it may otherwise backfire. Furthermore, coronavirus conspiracy beliefs need to be addressed, preferably using people who are not authority figures in order to build trust and promote engagement with the presented information. Additionally, campaign messaging needs to be clear and unambiguous, avoiding conflicting information.

These findings will feed into further larger-scale work to develop our understanding of vaccine acceptance in general among BAME individuals, which has been shown to be low for many types of vaccinations, not only for COVID-19. With this understanding, we aim to develop an intervention addressing low vaccination acceptance and uptake among BAME individuals. We will seek funding for this work from the NIHR and the Wellcome Trust to conduct mixed-methods research combining survey methodology with focus groups and

interviews. We will draw on the insights gained in planning the future work and use a variety of strategies, including working with community leaders, to facilitate recruitment and engagement of BAME individuals. These proposed next steps are important for reducing health inequalities in the BAME community regionally and nationally.

Conclusions

Our study presents an effort to understand and predict COVID-19 vaccination intention in BAME individuals in the North East and North Cumbria. Although further work is needed to fully understand which psychological factors drive vaccine hesitancy in this group, the present study's findings will help the design of interventions and campaigns addressing COVID-19 vaccine uptake in BAME individuals, and within the wider population. No single intervention is likely to be effective (36), and it may take a combination of approaches, tailored to the needs of individuals, to achieve a reduction in COVID-19 vaccine hesitancy.

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Appendix 1. Dissemination activity in connection with the project

Activity	Date(s)	Medium or Platform
Dissemination of link to survey	April 2021 – August 2021	Website ¹ set up for the study
Social media posts about project	April 2021 – August 2021	Twitter
Social media posts about project	April 2021 – August 2021	LinkedIn
Radio interview	18/05/21	BBC Radio Tees
Radio interview	29/06/21	BBC Radio Tees
Radio interview	01/07/21	BBC Radio Oxford
Radio interview	13/08/21	BBC Radio Tees
News article	24/06/21	Northern Echo
News article	29/06/21	BBC News
News article	11/08/21	Teesside Live
News article	13/08/21	Northern Echo
News article	17/08/21	Teesside Live
Press Release	24/06/21	Teesside University website
Press Release	24/06/21	University of Sunderland website
Emails sent to BAME-relevant organisations	April 2021 – August 2021	Email

¹ www.vaccineacceptance.com

Appendix 2. Abstract of paper reporting quantitative results of analysis of general-population data (published in *Vaccine*)

Predicting COVID-19 Vaccination Intention Using Protection Motivation Theory and Conspiracy Beliefs

Judith Eberhardt and Jonathan Ling

Background: While COVID-19 vaccine uptake has been encouraging overall, some individuals are either hesitant towards, or refuse, the vaccine. Protection Motivation Theory (PMT) has been applied to influenza vaccine acceptance, but there is a lack of research applying PMT to COVID-19 vaccine acceptance. Additionally, prior research has suggested that coronavirus conspiracy beliefs and demographic factors may play a role in attitudes towards the vaccine. This study aimed to predict COVID-19 vaccination intention using PMT, coronavirus conspiracy beliefs, and demographic factors. Furthermore, vaccinated and unvaccinated individuals were compared in relation to their coronavirus conspiracy beliefs.

Methods: An online survey was administered to 382 (278 vaccinated, and 104 unvaccinated) individuals in the United Kingdom (77 males, 301 females, one non-binary/third gender, and three unstated). Respondents' mean age was 43.78 ($SD = 12.58$).

Results: A hierarchical multiple linear regression was performed in three stages. Initially, four PMT constructs - severity, susceptibility, maladaptive response costs, and self-efficacy - emerged as significant predictors of COVID-19 vaccination intention. The final model accounted for 75% of the variance and retained two significant predictors from PMT - maladaptive response rewards and self-efficacy - alongside coronavirus conspiracy beliefs

and age. An independent t-test established that unvaccinated individuals held greater coronavirus conspiracy beliefs than vaccinated ones.

Conclusions: Interventions and campaigns addressing COVID-19 vaccine acceptance should employ strategies increasing individuals' perceived severity of COVID-19, perceived susceptibility, and perceived ability to get vaccinated, while decreasing perceived rewards of not getting vaccinated. Additionally, coronavirus conspiracy beliefs should be addressed, as these appear to play a role for some vaccine-hesitant individuals.

Appendix 3. Abstract of paper reporting the findings of the thematic analysis of free-text responses (under review)

A Qualitative Exploration of Factors affecting COVID-19 Vaccine Acceptance in the United Kingdom

Judith Eberhardt and Jonathan Ling

Objectives: Although COVID-19 vaccine uptake in the United Kingdom (UK) has been encouraging, many individuals are either hesitant to get vaccinated for COVID-19 or refuse to do so. Research has uncovered associated demographic and psychological factors, but there is a lack of qualitative work involving individuals across the UK to explore reasons for this hesitancy. We aimed to qualitatively explore attitudes and beliefs in relation to the COVID-19 vaccine in individuals across the UK during the later stages of the vaccine rollout.

Design: Free-text responses within an online survey.

Methods: Free-text responses were collected to assess factors associated with COVID-19 vaccine acceptance. 874 individuals took part (156 males, 698 females, 1 non-binary, 6 preferred not to say); 217 provided free-text responses. The mean age was 41.99 ($SD = 13.23$). 631 respondents (73.3%) had been vaccinated and 230 (26.7%) had not.

Results: Inductive thematic analysis yielded five themes, describing fear as a vaccination barrier; perceptions of the COVID-19 vaccine being ineffective, unnecessary, unnatural, and experimental; perceived pressure to get vaccinated; practical barriers to getting vaccinated; and getting vaccinated to protect others and 'get back to normal'.

Conclusions: Measures to increase COVID-19 vaccine uptake should target misinformation, fear, and practical factors as deterrents. Interventions such as motivational interviewing should be considered for guiding individuals towards considering COVID-19 vaccination.

Appendix 4. Abstract of paper reporting the results of the quantitative analysis of data from respondents aged 18-34 (under review)

COVID-19 Vaccination Intention in Younger Adults, Protection Motivation Theory, and Conspiracy Beliefs

Judith Eberhardt and Jonathan Ling

Objectives: While COVID-19 vaccine uptake has been encouraging in the United Kingdom, younger adults are more likely to be hesitant towards the vaccine. Protection Motivation Theory (PMT) has been applied to influenza vaccine acceptance, but there is a lack of research applying models of health behaviour, such as PMT, to COVID-19 vaccine acceptance in younger adults. Additionally, prior research has suggested that coronavirus conspiracy beliefs and demographic factors may play a role in this acceptance. The present study aimed to predict COVID-19 vaccination intention in younger adults using PMT, coronavirus conspiracy beliefs, and demographic factors, during the later stages of the vaccination programme, with a correlational design using an online survey.

Methods: The survey was administered to 301 individuals (177 vaccinated, and 124 unvaccinated) aged 18-34 (67 males, 234 females). Respondents' mean age was 27.13 ($SD = 4.68$). A hierarchical multiple linear regression was performed in three stages.

Results: The final model contained three significant predictors from PMT - severity, self-efficacy, and maladaptive response rewards - alongside coronavirus conspiracy beliefs. Demographic factors did not significantly predict COVID-19 vaccination intention, suggesting that demographic surveys are not enough to understand COVID-19 vaccine hesitancy. An

independent t-test established that unvaccinated individuals held greater coronavirus conspiracy beliefs than vaccinated ones.

Conclusions: Interventions and campaigns addressing COVID-19 vaccine acceptance should employ strategies increasing young adults' perceived severity of COVID-19 and their perceived ability to get vaccinated, while decreasing perceived rewards of not getting vaccinated. Additionally, coronavirus conspiracy beliefs should be addressed in vaccine-hesitant individuals.