

# Explaining COVID-19 Vaccination Intention in Younger Adults using Protection Motivation Theory

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This work was supported by a grant from the National Institute for Health Research Clinical Research Network (CRN) North East and North Cumbria; however all aspects of the work, including the interpretation of the data, the discussion of it and conclusions drawn were all carried out independently of CRN by the authors.

The authors report no conflict of interest.

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**Abstract**

**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 may play a role in this acceptance. The present study assessed the association between COVID-19 vaccination intention in younger adults and PMT, including coronavirus conspiracy beliefs as specific threat beliefs, during the later stages of the vaccination programme, with a correlational design using an online survey.

**Methods:** The survey was completed by 301 individuals (177 vaccinated, 124 unvaccinated) aged 18-34 (67 males, 234 females). Respondents' mean age was 27.13 ( $SD = 4.68$ ). A multiple linear regression was performed on unvaccinated individuals' responses.

**Results:** The model showed that four constructs from PMT - severity, self-efficacy, maladaptive response rewards, and threat beliefs in the form of coronavirus conspiracy beliefs – were associated with intention to get vaccinated for COVID-19. An independent t-test established that unvaccinated individuals had lower levels of education than vaccinated ones.

**Conclusions:** Although further research is needed, interventions and campaigns addressing COVID-19 vaccine acceptance may need to 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.

**Keywords:**

*COVID-19 Vaccination Intention in Younger Adults*

COVID-19; vaccine hesitancy; coronavirus conspiracy beliefs; Protection Motivation Theory;

young adults

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## **Introduction**

Worldwide efforts to vaccinate for COVID-19 are ongoing. Around 3.5 billion doses of the vaccine had been administered globally by July 2021 (Bloomberg, 2021). Progress in the COVID-19 vaccination programme has been rapid in the United Kingdom [UK] (NHS England, 2021). Although vaccine uptake has been encouraging (Public Health England, 2021), COVID-19 vaccine hesitancy or refusal is prevalent in some parts of the UK population (Freeman, Loe, et al., 2020; Freeman, Waite, et al., 2020; Office for National Statistics, 2021a). Vaccine hesitancy refers to a “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” (MacDonald, 2015, p. 4163). As the majority of people who have been hospitalised in the UK with COVID-19 are those who have not been fully vaccinated (Mahase, 2021), understanding COVID-19 vaccine hesitancy is of central importance to developing interventions and campaigns to improve uptake and reduce morbidity and mortality associated with COVID-19, tailoring these interventions to take reasons for vaccine hesitancy into account.

Several studies have found an association between age and COVID-19 vaccine acceptance in the UK, with younger age groups reporting greater hesitancy than older ones. A large-scale UK household survey found that people aged 25-34 were more hesitant than the older age groups (Robertson et al., 2021). Another large UK study involving over 32,000 participants showed that adults over 65 were more likely to be willing to get vaccinated for COVID-19 than younger (aged 30-49 and 50-64) adults (Paul et al., 2021). In an international comparison, the UK emerged as one of four countries where adults aged 50 or over were

more likely to accept the COVID-19 vaccine than those under 50 (Lazarus et al., 2020). A further large-scale UK study involving over 5,000 participants also found COVID-19 vaccine hesitancy to be associated with lower age (Freeman, Loe, et al., 2020). However, all this research was conducted either prior to or in the early stages of the COVID-19 vaccination programme. As the rollout progresses and the vaccine is offered to all adults, reasons for being hesitant to take up this offer may change. Research conducted in the later stages of the vaccine rollout will also offer further insights than those developed early in the vaccination programme.

Apart from knowledge of vaccines, research has identified three drivers of vaccine uptake: an enabling environment, social influences and motivation (World Health Organization, 2020). Protection Motivation Theory (PMT) (Rogers, 1975) is a social cognition theory which attempts to explain motivation to respond to health threats such as COVID-19. According to this theory, the likelihood of engaging in a protective behaviour such as being vaccinated, when faced with a threat, is a product of individuals' beliefs about engaging (or not engaging) in this protective behaviour as well as the threat itself.

In PMT, intention most accurately predicts behaviour. Intention is a function of threat appraisal and coping appraisal. Threat appraisal results from one's perceived vulnerability to the negative consequences of the threat (susceptibility), how serious these negative consequences are perceived to be (severity), and the perceived benefits of performing behaviour that is maladaptive in relation to the threat (maladaptive response rewards). Coping appraisal is a result of confidence in one's perceived ability to successfully engage in the preventative behaviour (self-efficacy), beliefs about the effectiveness of this protective

behaviour at preventing the negative consequences of the threat (response efficacy), and possible barriers affecting performance of the protective behaviour (response costs).

According to PMT, when faced with a threat to their health, people are most likely to engage in a protective behaviour when both threat appraisal and coping appraisal are high, in other words, when they believe that not acting poses a threat to themselves and that engaging in the protective behaviour will reduce that threat.

PMT has been applied to influenza vaccine acceptability and uptake (Crouse Quinn et al., 2017; Freimuth et al., 2017; Lazarus et al., 2020; Ling et al., 2019), and to predict COVID-19 vaccination intention among Chinese university students (Wang et al., 2021). However, no published studies have examined the use of PMT to predict COVID-19 vaccination intention in younger adults in the UK. Using theories of health behaviour and behaviour change, such as PMT, to explain COVID-19 vaccine acceptance, is central to the design of theory-based interventions and campaigns to increase uptake.

Another issue important to COVID-19 vaccine acceptance are conspiracy beliefs relating to COVID-19. Such beliefs have been found to be prevalent in a significant minority and to be associated with both less adherence to coronavirus government guidelines and a lower willingness to take coronavirus tests or get vaccinated (Freeman, Loe, et al., 2020; Freeman, Waite, et al., 2020). The role of conspiracy beliefs in younger adults' intention to receive a COVID-19 vaccination has not yet been explored. As these are prevalent in a significant minority, and negatively affect vaccine uptake (Freeman, Loe, et al., 2020), it is important to examine these in relation to younger adults' intention to get a COVID-19 vaccine to inform interventions for COVID-19 vaccine acceptance and uptake.

Apart from psychological factors and age, demographic factors such as gender (Freeman, Loe, et al., 2020; Lazarus et al., 2020; Paul et al., 2021), ethnicity (Freeman, Loe, et al., 2020; Office for National Statistics, 2021a; Robertson et al., 2021), and education (Lazarus et al., 2020; Paul et al., 2021) have been found to be associated with COVID-19 vaccine acceptance. Additionally, religiosity has been shown to be negatively associated with COVID-19 vaccination uptake (Troiano & Nardi, 2021). However, overall findings on demographic influences on COVID-19 vaccination intention are mixed and thus these relationships are unclear.

The current study focused on intention to get vaccinated as we were interested in why unvaccinated individuals had not yet had the vaccine, despite being eligible. Assessing their intention to get vaccinated, rather than just their vaccination status, was hoped to yield additional insight into the perceived barriers to vaccination of those yet to be vaccinated. We focused on unvaccinated people as their reluctance is unlikely to have been addressed by previous campaigns.

The present study aimed to determine the association between COVID-19 vaccination intention in younger adults in the UK and PMT, including coronavirus conspiracy beliefs as specific threat beliefs. We conducted this work in the later stages of the vaccine rollout, when all the adult population were eligible for vaccination.

We hypothesised that COVID-19 vaccination intention in younger adults would have significant positive associations with:

H1. perceived severity of contracting COVID-19

H2. perceived susceptibility to COVID-19

H3. confidence in ability to obtain a COVID-19 vaccine (perceived self-efficacy) and

H4. perceived efficacy of the COVID-19 vaccine (response efficacy).

We further hypothesised that COVID-19 vaccination intention would have significant negative associations with

H5. maladaptive response rewards

H6. perceived response costs; and

H7. coronavirus conspiracy beliefs.

## **Method**

### ***Design***

The current study was conducted as part of a larger project examining COVID-19 vaccine acceptance in the UK population (Eberhardt & Ling, 2021b). It was correlational and used an online survey. The criterion variable was COVID-19 vaccination intention. Independent variables consisted of 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. Ethnicity, age, gender, religiosity, and education were additionally assessed to be able to control for these factors, and to determine any demographic differences between vaccinated and unvaccinated individuals.

### ***Participants***



## *COVID-19 Vaccination Intention in Younger Adults*

For the purposes of the current study, individuals between the ages of 18 and 34 were categorised as being a younger adult. The lower limit of 18 was set as individuals under 18 were ineligible for COVID-19 vaccination at the time of study; the upper limit of 34 is in line with the limit set by the UK's Office for National Statistics (Office for National Statistics, 2021c). Individuals eligible to participate in the study included anyone aged at least 18 and residing in the UK. Recruitment took place by disseminating the link to the online survey via social media, email, distributing flyers, and interviews on public radio stations. Participants received no monetary or material reward for their participation. Table 1 shows demographic characteristics of vaccinated and unvaccinated individuals.

### **Materials**

An adapted version of the PMT questionnaire (Ling et al., 2019) was used to measure the PMT constructs. All subscales have previously been shown to have moderate to high internal consistency (Ling et al., 2019); in the present study Cronbach's  $\alpha$  values ranged from 0.61 to 0.98. 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 (e.g., "*I intend to have a COVID-19 vaccination*") ( $\alpha = 0.98$  in the present study).

*Susceptibility* was measured with two items indicating in how far individuals perceived themselves as being vulnerable to the negative consequences of contracting COVID-19 (e.g., “Without being vaccinated for COVID-19, I am vulnerable to contracting COVID-19”) and one item indicating lack of perceived susceptibility (“Even if I don't get vaccinated for COVID-19, I don't think I'm likely to get COVID-19”) ( $\alpha = 0.76$ ).

*Severity* was a composite score calculated by averaging three items indicating that the negative impact of contracting COVID-19 is severe (e.g., “COVID-19 can be a life-threatening illness”) ( $\alpha = 0.75$ ). 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 (e.g., “Not being vaccinated for COVID-19 would have some advantages for me”) ( $\alpha = 0.72$ ).

*Self-efficacy* was assessed with two items indicating that individuals saw themselves as capable of getting a COVID-19 vaccination (e.g., “I'm sure that being vaccinated for COVID-19 would be effective in reducing my personal risk of contracting COVID-19”), and one item stating that it would be difficult for them to get a COVID-19 vaccination (“Being vaccinated for COVID-19, once it's offered to me, would be difficult for me”) ( $\alpha = 0.81$ ).

*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 (e.g., “I'm sure that being vaccinated for COVID-19 would be effective in reducing my personal risk of contracting COVID-19”) ( $\alpha = 0.78$ ).

*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 (e.g., “*Being vaccinated for COVID-19 is painful*”) ( $\alpha = 0.61$ ).

Conspiracy beliefs were assessed with the 7-item OCEANS Coronavirus Conspiracy Scale assessing general coronavirus conspiracy beliefs (Freeman, Waite, et al., 2020). 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 ( $\alpha = 0.94$ ).

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 (Office for National Statistics, 2021b). 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 (Freeman, Loe, et al., 2020).

### ***Procedure***

Ethics approval was granted by the institution of the last author. 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. Data were collected from May to July 2021. 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.

### **Analysis**

Version 26 of The Statistical Package for the Social Sciences (SPSS) (IBM Corp., 2019) was used to analyse the data.

A prospective power analysis conducted using the G\*Power software, version 3.1.9.7 (Faul et al., 2009) established that for a power of .80 and with 7 independent variables, a sample size of 103 would be needed to detect a medium effect size in a multiple linear regression analysis. A total of 301 individuals from nine regions in England, as well as from Scotland and Wales, aged 18-34 completed the survey (67 males, 234 females). The mean age was 27.13 ( $SD = 4.68$ ). Of these, 177 respondents (58.8%) reported having had a COVID-19 vaccination, and 124 (41.2%) reported not having had one. A multiple linear regression was performed on the survey data of respondents who had not had a COVID-19 vaccine ( $N = 124$ ) to determine significant relationships between the independent variables and intention to receive a COVID-19 vaccination, as well as the relative contribution of each significant independent variable and the nature of its relationship to this outcome variable.

Additionally, independent t-tests and chi-square tests were performed to compare individuals who had had a COVID-19 vaccine with those who had not had one in relation to demographic factors (age, gender, ethnicity, level of education, and religiosity).

## **Results**

Unvaccinated individuals' mean intention to get vaccinated for COVID-19, assessed on a five-point Likert scale ranging from 1 = strongly disagree, to 5 = strongly agree, was 3.48 (*SD* = 1.64). To assess relationships between the PMT constructs, Pearson's product-moment correlations were performed for parametric variables (see Table 2). As would be expected (Ling et al., 2019), nearly all constructs correlated with each other. There were significant positive correlations between intention and susceptibility, severity, self-efficacy, and response efficacy. Intention was negatively correlated with maladaptive response rewards, and with response costs. Positive correlations were also observed for susceptibility and severity, self-efficacy, and response efficacy. Susceptibility correlated positively with severity, self-efficacy, and response efficacy, and negatively with maladaptive response rewards and response costs. Severity correlated positively with self-efficacy and with response efficacy, and negatively with maladaptive response rewards and response costs. Self-efficacy correlated positively with response efficacy but had an inverse relationship with response costs; response efficacy correlated negatively with response costs.

**INSERT TABLE 1 HERE**

**INSERT TABLE 2 HERE**

### *COVID-19 Vaccination Intention in Younger Adults*

Results of the linear multiple regression (see Table 3) showed that severity, maladaptive response rewards, self-efficacy, and coronavirus conspiracy beliefs all contributed significantly to the regression model, with 74.3% of the variance in COVID-19 vaccination intention being accounted for.

The model showed that the lower the perceived rewards of not getting vaccinated for COVID-19 (maladaptive response rewards), and the higher the perceived severity of COVID-19 and confidence in one's ability to obtain a vaccination (self-efficacy), the higher the intention was to get vaccinated. Furthermore, the lower a respondent's level of conspiracy beliefs about COVID-19, the higher their intention was to get vaccinated.

To control for demographic factors, we also conducted a multiple regression analysis with these (age, gender, level of education, ethnicity, and religiosity). This did not affect the overall significance of the model nor the pattern of results for the PMT variables, and none of the demographic variables had a significant association with COVID-19 vaccination intention ( $R^2 = .76$ , 95%  $F(12, 110) = 25.49$ ,  $p < .001$ ).

Results of the independent t-test comparing COVID-19 vaccinated and unvaccinated individuals on demographic variables showed that unvaccinated individuals ( $M = 3.76$ ,  $SD = .88$ ) reported significantly lower levels of education than those who had been vaccinated ( $M = 4.08$ ,  $SD = .78$ ),  $t(299) = 3.41$ ,  $p < 0.001$ . There were no significant differences between vaccinated and unvaccinated respondents in relation to the other demographic variables (age, gender, ethnicity, and religiosity).

**INSERT TABLE 3 HERE**

## **Discussion**

The present study aimed to assess the association between COVID-19 vaccination intention in younger adults in the UK and PMT, including threat beliefs in the form of coronavirus conspiracy beliefs. Furthermore, we examined if there were significant differences between those vaccinated and unvaccinated for COVID-19 in relation to demographic factors.

We found that four constructs from PMT were significantly associated with individuals' intention to receive the COVID-19 vaccine: maladaptive response rewards, severity, self-efficacy, and threat beliefs in the form of coronavirus conspiracy beliefs. The lower individuals' perceived rewards of not getting vaccinated for COVID-19, and the higher perceived severity and confidence in one's ability to obtain a vaccination, the higher their intention was to get vaccinated for COVID-19. Our findings are in line with prior work on intention to receive a seasonal influenza vaccine (Crouse Quinn et al., 2017; Ling et al., 2019; Weinstein et al., 2007). By contrast, only one PMT construct - perceived severity –predicted COVID-19 vaccination intention in Chinese students (Wang et al., 2021). This may be a result of cultural differences, with the present study being conducted in a Western, UK setting. Further work should consider cross-cultural comparisons of PMT in relation to COVID-19 vaccination intention.

Coronavirus conspiracy beliefs were found to be a negatively associated with COVID-19 vaccination intention in younger adults. This is in in line with previous UK research on the general population (Eberhardt & Ling, 2021b; Freeman, Loe, et al., 2020; Freeman, Waite, et al., 2020); our finding links to many inequalities shown in the area of health provision

uptake and has been consistently highlighted in the Marmot Review on health inequalities in the UK (Marmot, 2013).

Unlike most previous studies, however, our study was conducted at a time when the COVID-19 vaccination programme was well underway. Therefore, in contrast to most previous research, respondents in the present study did not have to indicate their beliefs in relation to a future scenario, as the COVID-19 vaccine was already available to them. This may have led to more accurate responses, as respondents did not have to imagine a hypothetical situation – no vaccines had been approved at the time most earlier studies were conducted. The finding that COVID-19 vaccination intention is negatively associated with coronavirus conspiracy beliefs in young people is potentially important for interventions and campaigns addressing COVID-19 vaccination uptake. Negative attitudes towards the vaccine may be a result of misinformation on COVID-19 and the vaccine (Lockyer et al., 2021) which is often disseminated through social media (Broniatowski et al., 2021). Combating such misinformation and providing accurate information is of central importance – particularly if this too is delivered through social media, and from a trusted source.

In line with prior research on the seasonal influenza vaccine (Ling et al., 2019), our findings persisted after controlling for demographic factors, suggesting that demographic surveys, such as household surveys, are insufficient to facilitate an understanding of COVID-19 vaccine acceptance and vaccination intention. Assessing psychological factors in the form of a model of health behaviour, as the present study has done, is essential to understanding the factors driving vaccine acceptance and intention to get vaccinated. However, vaccinated individuals had significantly higher levels of education than unvaccinated ones in our study. Prior findings on this are mixed, reporting either higher levels of education being correlated



with lower levels of COVID-19 vaccine acceptance in the UK (Lazarus et al., 2020), a positive relationship between educational level and vaccine acceptance (Paul et al., 2021), or finding no relationship (Eberhardt & Ling, 2021b; Freeman, Loe, et al., 2020). Thus, further clarity is needed on the role of level of education in COVID-19 vaccine acceptance.

The present study was observational, based on a cross-sectional survey. Our findings need to be replicated on a larger scale before definitive conclusions can be drawn. However, if our findings are replicated in subsequent research this would suggest that campaigns and interventions addressing COVID-19 vaccine acceptance and uptake need to take a targeted approach (Razai et al., 2021), focusing on the factors shown to predict COVID-19 vaccine acceptance in younger adults. Campaigns should focus on emphasising that COVID-19 can be severe for younger age groups too, seeking to increase perceived severity in those unaware. Additionally, perceived barriers for younger adults to obtaining a vaccination should be reduced, thereby targeting perceived self-efficacy. Moreover, campaigns and interventions should attempt to decrease the perceived rewards of *not* getting vaccinated, reducing maladaptive response rewards. Research has shown that such rewards for younger adults may include avoiding perceived negative health effects of the vaccine, such as adverse effects on fertility (Eberhardt & Ling, 2021a). Effective strategies to convey the safety of the vaccine are therefore important. As part of reducing maladaptive response rewards, the perception that not getting vaccinated will save time and money also needs to be addressed. A systematic review showed that public health messages to increase vaccine uptake tend to focus on addressing concerns about vaccine safety and correcting misunderstandings, and informing the public about the benefits of vaccination, but little attention has been paid to messaging around opportunity to receive the vaccine (Lawes-Wickwar et al., 2021). Barriers to vaccination which create costs for individuals also need to

be tackled. This could take the form of improving access to the vaccine through flexible delivery models in the community, such as outreach programmes in accessible locations (Razai et al., 2021), and/or mobile vaccination units.

### ***Strengths, Limitations, and Future Research***

Our study offers important insights into possible directions for future research and provides first steps towards elucidating issues to consider when devising campaigns and interventions addressing COVID-19 vaccine acceptance in younger adults. Some limitations to the present study need to be acknowledged. The sample in the present study was biased towards more highly educated respondents, and vaccinated respondents were more highly educated than unvaccinated ones. As discussed above, although this could have conceivably affected the results, it would be beneficial to establish if the present findings are replicated using a sample with a more even distribution of education level. More representative numbers of BAME individuals, as well as religious individuals, should also be included in such research.

In the present study we did not assess PMT constructs in vaccinated individuals. The items of the PMT scale are worded to address unvaccinated individuals, framing vaccination as an event which has not yet occurred. However, future work to determine differences between vaccinated and unvaccinated individuals in relation to PMT constructs may help elucidate reasons for COVID-19 vaccine hesitancy. One of the PMT subscales (response costs) had a Cronbach's  $\alpha$  of below .70. Closer examination showed that internal consistency of the response costs sub-scale could not be improved by the deletion of any of the three items. Prior research has yielded similarly low internal consistency for this subscale (Eberhardt &

Ling, 2021b; Ling et al., 2019). Future work should consider revalidation of this particular subscale. All other subscales had good to excellent internal consistency.

While our findings make clear that three of the six PMT constructs, including threat beliefs in the form of coronavirus conspiracy beliefs, play a role in COVID-19 vaccination intention in younger adults, we currently know little about how these beliefs develop, or about any other barriers towards vaccination which may be relevant in this context. Qualitative or mixed methods could be employed to examine these beliefs and their origins more closely in younger adults. This would help devise interventions and campaigns targeting COVID-19 vaccine acceptance and uptake, ensuring that their effectiveness is maximised.

Furthermore, it may help influence thinking about future vaccine campaigns targeting young people, such as for the human papillomavirus (HPV) vaccine.

## **Conclusions**

The current study shows that PMT including threat beliefs in the form of coronavirus conspiracy beliefs play an important role in younger adults' intention to receive the COVID-19 vaccine, while demographic factors do not appear to have any significant influence on intention. Effective campaigns and interventions for increasing COVID-19 vaccine uptake need to use techniques to increase younger adults' perceived severity of COVID-19 and their perceived ability to get vaccinated, while decreasing perceived rewards of not getting vaccinated. Additionally, conspiracy beliefs should be addressed, as for some these may play an important role in their COVID-19 vaccine hesitancy. No single intervention on its own is likely to be effective (Razai et al., 2021). It may take a combination of approaches to achieve an increase in COVID-19 vaccine acceptance and uptake in younger adults.

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**Table 1: Demographic characteristics of respondents**

	Vaccinated	Unvaccinated	Overall
<i>N</i>	177	124	301
Gender	42 males, 135 females	25 males, 99 females	67 males, 234 females
Age in years <i>M (SD)</i>	27.01 (4.74)	27.31 (4.61)	27.13 (4.68)
Ethnicity % ( <i>N</i> )			
White	93.2 (165)	91.1 (113)	92.4 (278)
Non-White	6.8 (12)	8.9 (11)	7.6 (23)
Level of education % ( <i>N</i> )			
No qualifications	0 (0)	0.8 (1)	0.3 (1)
General Certificate of Secondary Education (equivalent to school leavers' certificate)	1.7 (3)	8.1 (10)	4.3 (13)
Advanced level qualifications (equivalent to high school diploma)	20.9 (37)	24.2 (30)	22.3 (67)
Higher education (e.g., BA, BSc, or equivalent)	44.6 (79)	48.4 (60)	46.2 (139)
Postgraduate qualifications (e.g., MA, MSc, PhD, DPhil)	32.8 (58)	18.5 (23)	26.9 (81)
Religiosity <i>M (SD)</i>	1.58 (1.03)	1.63 (1.06)	1.6 (1.04)

Response Scales. Gender: Male – female - other/prefer not to say; Ethnicity: white – non-white; Level of education: No qualifications - General Certificate of - Secondary Education (equivalent to school leavers' certificate) - Advanced level qualifications (equivalent to high school diploma) - Higher education (e.g., BA, BSc, or equivalent) - Postgraduate qualifications (e.g., MA, MSc, PhD, DPhil) Religiosity: 'How important is religion in your life?' (Five-point Likert scale; 1 = not important at all, 5 = extremely important)

**Table 2: Pearson's correlations between variables measuring PMT constructs for unvaccinated respondents**

Construct	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7
1. Intention	3.48	1.64							
2. Susceptibility	3.43	1.13	.65**						
3. Severity	3.54	1.04	.71**	.61**					
4. Maladaptive response rewards	2.73	1.12	-.70**	-.55**	-.47**				
5. Self-efficacy	2.73	1.12	.72**	.60**	.63**	-.53**			
6. Response efficacy	4.08	1.00	.38**	.39**	.18	-.49**	.31**		
7. Response costs	2.33	0.88	-.59**	-.48**	-.33**	.68**	-.45**	-.60**	
8. Conspiracy beliefs			-.60**	-.52**	-.45**	.59**	-.36**	-.34**	.51**

\* $p < .05$ , \*\* $p < .01$

**Table 3: Results of multiple linear regression assessing the relationship between COVID-19 vaccination intention and PMT constructs for unvaccinated individuals**

Predictor	$\beta$	95% CI	<i>t</i>	$R^2$	<i>p</i>
Intercept		[.83, 4.17]	2.97	.743	.004**
Severity	.28	[-.22, .68]	3.91		.001***
Susceptibility	.03	[-.17, .25]	.40		.692
Maladaptive response rewards	-.23	[-.56, -.11]	-2.91		.004**
Self-efficacy	.29	[-.21, .63]	3.99		.001***
Response efficacy	.00	[-.21, .20]	-.05		.964
Response costs	-.11	[-.49, .09]	-1.39		.167
Conspiracy beliefs	-.16	[-.42, -.04]	-2.39		.019*

\**p* < .05; \*\**p* < .01; \*\*\**p* < .001