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Posted Date: 5 March 2025

doi: 10.20944/preprints202503.0346.v1

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Article

Vaccination Beliefs and Conspiracy Theory Mentality Associated with COVID-19 Vaccination Adherence Behaviours in Young Adults

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Abstract: Background/Objectives: Vaccination significantly reduces mortality from COVID-19; however, uptake has declined, with most vaccine hesitancy observed among young adults. Reasons behind low COVID-19 vaccine uptake in this population are poorly understood. The aim of this study was to investigate the role of conspiracy theory mentality and vaccination beliefs as potential predictors of COVID-19 vaccination adherence behaviours (i.e., vaccine hesitancy and uptake). **Methods:** A cross-sectional design was adopted using an online survey, where validated questionnaires adapted for COVID-19 were distributed to one university cohort and on social media platforms targeting young adults in the UK (students aged 18–25-years-old). Quantitative measures included beliefs about vaccinations (Beliefs about Medicines Questionnaire [BMQ] – BMQ-Specific adapted for COVID-19 vaccination and BMQ-General adapted for vaccinations in general), conspiracy theory mentality (Vaccine Conspiracy Beliefs Scale - COVID-19) and vaccine hesitancy (Oxford Vaccine Hesitancy Scale). Vaccine uptake was measured by capturing the number of self-reported doses of COVID-19 vaccination received. Demographic characteristics were also collected and linear regression analysis conducted to identify determinants of vaccination behaviours. **Results:** One hundred and sixty-three valid responses were analyzed. All adapted scales showed acceptable internal consistency (Cronbach's alpha values >0.64). COVID-19 vaccination beliefs (BMQ-Necessity-Concerns Differential), age and conspiracy mentality were significantly associated with vaccine hesitancy ($F=76.6$; Variance = 71.2%, adjusted $R^2=0.703$). Only COVID-19 vaccine beliefs (Necessity-Concerns Differential) was predictive of vaccine uptake ($F=14.866$, Variance = 22.9%, adjusted $R^2=0.214$). Increasing age was also associated with more negative vaccination beliefs (BMQ-Concerns - Beta=0.707, $t=6.824$, $p<0.001$; BMQ-Necessity- Beta =-0.882, $t=-9.558$, $p<0.001$) and vaccine hesitancy (Beta=1.976, $t=2.481$, $p<0.05$), but not vaccine uptake. **Conclusions:** These findings indicate that effective strategies to decrease vaccine hesitancy and promote vaccine uptake among young adults in the UK should aim to modify the underlying psychological factors that drive misconceptions about COVID-19 vaccination and conspiracy beliefs.

Keywords: COVID-19; vaccination; uptake; hesitancy; adherence; behaviours; medication beliefs; conspiracy theory; conspiracy mentality; young adults

1. Introduction

The introduction of COVID-19 vaccines began in December 2020 and played a crucial role in curbing the pandemic [1]. In the United Kingdom (UK), approximately 53 million individuals received at least one vaccine dose, achieving significant herd immunity [2,3]. Vaccination efforts saved over 128,000 lives and prevented more than 262,000 hospitalisations in the UK alone, reducing life-threatening cases by 80% globally [4]. However, vaccine-induced immunity wanes over time, requiring booster doses to sustain protection against evolving SARS-CoV-2 variants [5]. Boosters administered 5–12 months after initial vaccinations have demonstrated a 90% reduction in COVID-19 mortality [5–7]. Despite their efficacy, uptake has declined significantly, particularly among young adults, threatening public health protection against new and evolving variants [5,8,9].

1.2. Vaccine Hesitancy and Beliefs about Medicines

Vaccine hesitancy, characterised by reluctance or refusal to vaccinate despite availability, affects a significant portion of the population [10]. In the UK, 6% outright reject vaccination, while 34% harbour safety concerns [11,12]. Decisions about vaccination can reflect broader beliefs about the harms and overuse of medicines in general, as well as perceptions of necessity versus concerns [13]. Individuals' beliefs about medication often exhibit hesitancy toward medical interventions and this distrust may extend to preventive measures like vaccinations, where vaccines may be perceived as unnecessary or risky [13–15]. According to the Necessity-Concerns Framework (NCF), individuals balance the perceived necessity of a medication against their concerns about its safety [16]. Applying this framework to vaccination behaviours, when perceived necessity outweighs perceived concerns, adherence is likely to be high. However, where perceived necessity is lower and perceived concerns dominate, hesitancy towards vaccinations is more likely [17]. Perceptions of vaccine safety and efficacy can therefore strongly influence adherence to vaccination programmes. The more an individual of any age is concerned about COVID-19, the more willing they are to have their vaccinations [18,19]. Higher perceived risks of vaccines, especially when coupled with lower perceived risks of COVID-19, drive hesitancy [20–22]. Younger adults, who often believe their natural immunity is sufficient, may therefore be more likely to be hesitant [23,24].

1.3. Conspiracy Mentality

Conspiracy mentality—the tendency to explain major events as the result of powerful, secretive groups—may also influence vaccine hesitancy [25]. During the COVID-19 pandemic, conspiracy theories proliferated, offering simplistic explanations for the pandemic's origins, severity, and treatment [26,27]. COVID-19 conspiracies often involved the spread of false information about science with a focus on vaccines [28]. Moreover, believing in conspiracies was found to diminish an individual's perceived risk of COVID-19 infection, leading to vaccine refusal [28,29]. These results have been observed in various countries as cross-sectional studies often find that a higher conspiracy mentality negatively predicts vaccination intentions [29–31]. As well as determining their own health behaviours, individuals with a high conspiracy mentality also affect the behaviours of those around them by actively discouraging their peers and family members from receiving COVID-19 vaccinations [32].

1.4. Study Rational, Aims and Hypothesis

To date, much research has explored public attitudes toward COVID-19 vaccinations. However, studies specifically targeting young adults remain limited. This age group demonstrates the lowest vaccination rates, driven by safety concerns and beliefs in lower perceived risk of harms from the consequences of contracting the virus. Addressing vaccine hesitancy in young adults is therefore essential as they are more likely to be receptive to new information regarding vaccinations [11]. Understanding the psychological factors driving vaccine hesitancy is critical for designing effective interventions. By addressing concerns about medicines and countering misinformation, healthcare providers can improve vaccination rates among hesitant groups, particularly young adults [33]. The aim of this study was to investigate how beliefs about vaccinations and conspiracy theories influence vaccination adherence behaviours among young adults. It examines general attitudes toward vaccinations, perceived vaccine benefits and risks, and engagement with conspiracy theories. The hypothesis being tested was that negative vaccination beliefs and a strong conspiracy theory mentality will correlate with increased vaccine hesitancy and reduced vaccine uptake in young adults.

2. Materials and Methods

2.1. Overview of Study Design

This study adopted a quantitative cross-sectional design. Structured questionnaires measuring beliefs about medicines, vaccine conspiracy mentality and vaccine hesitancy were adapted for COVID-19 vaccination. The number of vaccination doses received, and demographic characteristics were captured in an online questionnaire distributed to UK-based university students aged 18-25 years in early 2023.

2.2. Participants and Recruitment

Participants were recruited using voluntary sampling [34] in one university cohort based in Southeast Wales, UK through the BSc Psychology (Hons) Student Participant Panel and an advertisement posted on Twitter™ (now 'X'). Participants were asked to share the link with other university students in the UK to facilitate snowball sampling [35] to reach a wider range of young adults eligible for participation. The online survey link was active for six weeks from January to March 2023 for data collection. Individuals were eligible for participation if they were aged between 18-25 years old, studying any university course in a UK institution and living in the UK.

2.3. Measures

An online survey consisting of demographic questions regarding their age, sex, ethnicity and 38 closed questions was hosted on Qualtrics. The survey included the Beliefs about Medicine Questionnaires (BMQ) – BMQ-Specific and BMQ-General [17] – adapted for COVID-19 vaccination and vaccines in general the Vaccine Conspiracy Beliefs Scale-COVID-19 [36], the Oxford Vaccine Hesitancy Scale [32] - adapted for COVID-19, and self-report measures of the number of COVID-19 vaccine doses received.

2.3.1. Beliefs about Medicines

The Beliefs about Medicines Questionnaire (BMQ) Specific – was adapted for COVID-19 vaccination [17] measuring beliefs about the Concerns (5-items) and Necessity (5-items) about COVID-19 vaccination. The BMQ-General was adapted for vaccinations in general, measuring beliefs about Harm (5-items) and Overuse (3-items) of vaccinations. For example, Specific-Concerns (i.e., beliefs about possible negative effects of COVID-19 vaccination) – *“Having to receive the COVID-19 vaccination worries me”*; Specific-Necessity (i.e., beliefs that receiving the COVID-19 vaccination is necessary to preserve health) - *“My health, at present, depends on being vaccinated against COVID-19”*; General-Overuse (i.e., beliefs that vaccinations are prescribed too often by doctors) – *“Doctors use too many vaccinations”* and General-Harm (i.e., beliefs that vaccinations can harm health) - *“All vaccinations are poisons”*. A five-point Likert Scale (Strongly Agree, Agree, Neither Agree nor Disagree, Disagree, Strongly Disagree) was used to rate each statement with a lower score indicating stronger belief in that concept. The internal consistency (Cronbach’s alpha) of the original BMQ scales are as follows: BMQ-Specific-Necessity (0.85), BMQ-Specific-Concern (0.65), BMQ-General-Overuse (0.60) and BMQ-General-Harm (0.51) [17].

2.3.2. Vaccine Conspiracy Beliefs

The 7-item Vaccine Conspiracy Beliefs Scale-COVID-19 [36] assessed conspiracy mentality surrounding COVID-19 vaccines. For example, *“COVID-19 vaccine safety is often fabricated”* using a 5-point Likert scale with higher scores indicating increased conspiracy mentality regarding vaccines. The internal consistency of the scale was 0.92 [36].

2.3.3. Vaccination Adherence Behaviours -Vaccine Hesitancy and Uptake

The 7-item Oxford Vaccine Hesitancy Scale [32] was adapted for measuring COVID-19 vaccine hesitancy. For example, *“If you were invited for a Covid-19 booster, would you take it?”* with six response options - definitely/ probably/ I may or may not/ probably not/ definitely not/ I don’t know. Higher scale scores indicated greater vaccine hesitancy. The internal consistency of the original scale was 0.97 [32]. COVID-19 vaccine uptake was captured using a self-report measure where respondents selected how many COVID-19 vaccination doses they had received with possible response options ranging from 0-10. At the time of the study, UK guidelines for booster vaccinations stated that adults 18 to 64 years old were eligible for a dose every 12-months in addition to the two initial doses needed for immunity. Recommendations for those who were immunocompromised extended to a booster dose every 6-months [8].

2.4. Data Analysis

Data were extracted from Qualtrics to IBM Statistical Software for Social Sciences (SPSS) (Version 29) for statistical analysis. Cronbach's alpha analyses were conducted to measure the internal consistency of each scale which were found to be acceptable (i.e., >0.60) [37]. Summed scores were therefore calculated for each scale of the BMQ (Concerns, Necessity, Harm and Overuse), Vaccine Conspiracy Beliefs scales and Oxford Vaccine Hesitancy. A Necessity-Concerns Differential score was calculated by deducting the BMQ-Concerns score from the BMQ-Necessity score. A higher Necessity score was shown by a positive differential, and a higher Concerns score was a negative differential. A score of 0 indicated no difference between Necessity and Concerns scores. Descriptive statistics were undertaken to calculate the distribution for each scale. Mann-Whitney tests were conducted to evaluate differences in scale scores for sex, age (median split) and Kruskal-Wallis test was undertaken to investigate differences in scale scores for ethnicity. Spearman correlation was conducted to examine the relationships between age, vaccination beliefs, conspiracy mentality and vaccination adherence behaviours (vaccine hesitancy and uptake). Linear regression analyses (Enter method) were performed to assess the predictive power of age, BMQ-Necessity-Concerns Differential, BMQ-Harm, BMQ-Overuse and Vaccine Conspiracy Mentality scores on Vaccine Hesitancy scores, and the predictive power of BMQ-Necessity-Concerns Differential, Vaccine Conspiracy Mentality and Vaccine Hesitancy scores on Vaccine Uptake.

3. Results

3.1. Sample and Demographic Characteristics

A total of 163 eligible participants out of 171 respondents (95.3%) were included in the analysis (six were removed as they did not meet the inclusion criteria and two did not complete the demographic questions at the end of the survey to be able to check eligibility). Age ranged from 18-25 years (median=21; mean = 21.3, S.D. = 1.99). The most frequently reported age was 19 (30.1%, n = 49), followed by 20 (21.5%, n=35) and 18 (14.6%, n=24) years old. The majority of participants self-reported as female (79.8%, n=130), with 19.6% (n=32) reporting as male and 0.6% (n=1) as other. The most frequently reported ethnicity was White British (81%, n=131), other (11.7%, n=19; not reported x10; Latino x2, Middle East x3, White American x1, Filipino x1, and Bengal x1), White European (4.3%, n=7) and Mixed (3.75%, n=6).

3.2. Internal Reliability of Scales and Scale Scores

Descriptive statistics and Cronbach's alpha scores of the scales (adapted for vaccinations or COVID-10 vaccination) are shown in Table 1. Appendix 1 (Figures A1 to A7) shows graphical representation of the spread of data.

Table 1. Descriptive Statistics and Internal Reliability (Cronbach's Alpha Scores) of the Scales.

Scale / Variable (n= number of items; Mid-point of scale)	Cronbach's alpha (alpha value of original scale)	Min. (Min. possible score)	Max. (Max possible score)	Mean (SD)	Percentage above the mid-point of the scale
BMQ Specific – Necessity (n=5; MP=15)	0.81 (0.85)	5.0 (5.0)	23.0 (25.0)	12.6 (4.04)	25.2%
BMQ Specific – Concern (n=5; MP=15))	0.76 (0.65)	5.0 (5.0)	23.0 (25.0)	11.5 (3.93)	17.3%
Necessity-Concerns Differential (NCD) (MP=0)	N/A	-16.0 (-25.0)	13.0 (0)	1.1 (6.04)	52.5%
BMQ General -Harm (n=5 ; MP =15)	0.71 (0.51)	5.0 (5.0)	21.0 (25.0)	12.3 (2.95)	8.4%
BMQ General -Overuse (n=3 ; MP = 9)	0.64 (0.60)	3.0 (3.0)	11.0 (15)	7.1 (1.99)	11%
Vaccine Conspiracy Mentality	0.89 (0.92)	9.0 (7.0)	35.0 (35.0)	20.1 (5.19)	40.1%

(n=7; MP=21)					
COVID-19 Vaccine Hesitancy (n=7; MP=19.5)	0.92 (0.97)	7.0 (7.0)	35.0 (42.0)	23.6 (6.66)	41.1%
Vaccine Uptake (N/A)	N/A	1.0 (1.0)	5.0 (5.0)	2.6 (0.80) Median=3	N/A

3.3. Demographic Characteristics and COVID-19 Vaccination Adherence Behaviours

A significant difference was found in vaccine hesitancy but not uptake for age ($Z = -2.83$, $n = 163$, $p = 0.005$), with participants aged 22 years and above reporting higher hesitancy scores. No significant differences in vaccination attitudes or adherence behaviour (hesitancy or uptake) were found for participant gender or ethnicity.

3.4. Relationships between Vaccination Adherence Behaviours, Beliefs about Vaccination and Conspiracy Mentality

The correlation matrix showing relationships between variables related to vaccine hesitancy, vaccine uptake, beliefs about vaccinations and conspiracy mentality is presented in Appendix 1 (Table A1).

3.4.1. Outcome Variables – Vaccination Adherence Behaviours

Vaccine Hesitancy scores and self-reported COVID-19 Vaccine Uptake were significantly negatively correlated ($\rho = -0.426$, $n = 156$, $p < 0.001$).

3.4.2. Linear Regression Analysis

The summary statistics for the linear regression model are presented in Table 2 where the variables entered explained 71.2% of the variance in Vaccine Hesitancy ($F = 76.571$, $\text{adj}R^2 = 0.703$, $p < 0.01$) with statistically significant findings for BMQ-Necessity-Concerns Differential scores, age and Vaccine Conspiracy Mentality.

Table 2. Coefficients for variables included in the Vaccine Hesitancy Linear Regression Model.

	Unstandardised Coefficients		95% Confidence Intervals	t	Sig.
	B	S.E.	Lower to Upper		
Necessity-Concerns Differential	-0.808	0.074	-0.96 to -0.66	-10.879	<0.001
Age	1.910	0.800	0.30 to 3.49	2.388	<0.05
BMQ-Overuse	-0.316	0.221	-0.75 to 0.12	-1.430	0.155
BMQ-Harm	0.211	0.137	-0.06 to 0.48	1.536	0.127
Conspiracy Mentality	0.281	0.091	0.10 to 0.46	3.089	<0.05

3.5.2. COVID-19 Vaccine Uptake

Table 4 shows the Beta values for variables entered into the COVID-19 Vaccine Uptake multi-variable linear regression models. The model was statistically significant and explained 22.9% of the variance in Vaccine Uptake ($F = 14.866$, $\text{adj}R^2 = 0.214$, $p < 0.001$).

Table 3. Coefficients for variables included in the Vaccine Uptake Linear Regression Model.

	Unstandardised Coefficients		95% Confidence Intervals	t	Sig.
	B	S.E.	Lower to Upper		
BMQ-Necessity-Concerns Differential	0.057	0.018	0.002 to 0.02	3.2241	0.002
Conspiracy Mentality	0.001	0.016	-0.30 to 0.03	0.075	0.940
Vaccine Hesitancy	-0.012	0.014	-0.39 to 0.02	-0.816	0.416

4. Discussion

This is the first study to investigate the relationships between vaccination beliefs, conspiracy theory mentality and COVID-19 vaccination adherence behaviours in young adults. The hypotheses being tested were upheld since negative beliefs about COVID-19 vaccination (high concerns and low necessity beliefs) were independently associated with COVID-19 vaccination adherence behaviours (both vaccine hesitancy and uptake). These findings are consistent with earlier research concluding that a higher perceived risk of COVID-19 is associated with greater vaccine acceptance [24,25,38], whereas a greater concern regarding COVID-19 vaccines is strongly correlated with low vaccine intention [21]. These increased concerns about COVID-19 vaccines, along with a perceived lack of necessity for vaccination, have been noted to be more prevalent among younger adults as this age group often views vaccines as unnecessary risks, believing that their immune systems can naturally fight off COVID-19 without the need for vaccination [20,23]. This may explain why most participants in this study had only received three COVID-19 vaccine doses and scored relatively low on the Necessity Scale. The fact that only a small percentage of participants received above three COVID-19 vaccine doses may also be due to the fact that young adults perceive the COVID-19 vaccines to be unnecessary for their age group. However, the majority of the sample also scored low on the Concerns scale which indicated that worries about the vaccine were uncommon, suggesting that other factors may be influencing uptake in this population. For example, issues with access to routine COVID-19 vaccine boosters may be a problem among young adults where difficulties in scheduling vaccination appointments and determining their eligibility for booster shots have been reported [23]. Access barriers could help explain the relatively low uptake of COVID-19 vaccines observed in the student sample, despite the lack of concerns about the vaccines.

Age and conspiracy theory mentality were also significant determinants of COVID-19 vaccination hesitancy. These findings are consistent with previous UK research that found that general vaccine hesitancy increases in younger populations [39] who report most hesitancy towards COVID-19 vaccination [40,41]. However, it is interesting to note that significant differences were found even within this younger age group (i.e., 18-21 and 22-25-years old) where increasing age was associated with more negative beliefs about vaccinations, stronger conspiracy theory mentality and more vaccine hesitancy. Previous studies indicated that higher levels of conspiracy mentality are more likely to express COVID-19 vaccine hesitancy due to strong beliefs about false information being spread about vaccines [28,42]. Similar relationships have been observed where vaccine conspiracy mentality reduces vaccination intentions [30,31,43,44]. This may be explained by conspiracy beliefs being linked to a lower perception of COVID-19 risk [45] reinforcing the idea that misleading beliefs can contribute to reduced adherence to measures aimed at reducing infection [46].

In this study, a strong relationship was observed between vaccine conspiracy mentality and both vaccination adherence behaviours, i.e., vaccine hesitancy and uptake. These findings are consistent with other studies which have shown that individuals who are inclined towards conspiratorial thinking were significantly less likely to receive COVID-19 vaccines [47,48]. However, conspiracy mentality and vaccine hesitancy were not predictive of self-reported COVID-19 vaccine uptake in this study population. As one might expect, this study found a significant correlation between COVID-19 vaccine hesitancy and COVID-19 vaccine uptake which is a finding supported by past research which demonstrated that individuals expressing higher levels of COVID-19 vaccine hesitancy were significantly less likely to receive their vaccinations [49]. This relationship holds across diverse national and demographic contexts [20]. However, the strength of the correlation between vaccine hesitancy scores and number of doses of COVID-19 received ($\rho = -0.426$) is relatively low when considering that these two concepts are intended to measure the same behaviour. This correlation may be moderated by factors such as access, mandates, and social influences, as some hesitant individuals may ultimately get vaccinated despite their underlying hesitancy [20,50–52]. This discrepancy in intentions (49%) and actual uptake (63%) of COVID-19 vaccination has been reported elsewhere with nurses [53]. Other factors not considered in this research may have increased vaccine uptake in this student population despite a higher vaccine conspiracy mentality such as employment requirements (if working part-time) or other COVID-19 vaccine mandates [20,50,54]. Furthermore, the COVID-19 pandemic led to many restrictions on behaviours in the UK and as such the perceived severity and perceived threat of COVID-19 may have influenced vaccine uptake in a way that was unprecedented.

All scales adapted for vaccinations in general or COVID-19 vaccination showed acceptable reliability compared to their original Cronbach's alpha values, with some scale displaying improved

internal consistency compared to the original values. For example, in this population the BMQ-Harm (alpha value = 0.71 v 0.51) [17] and BMQ-Overuse (alpha=0.64 v 0.60) scales displayed much better internal reliability when measuring beliefs about vaccinations than they did for medicines in general [17]. This is probably explained by the fact that vaccinations are a more homogenous concept than the expansive range of all medications that exist, where beliefs about these is a much more heterogeneous concept. In line with previous research, our study also demonstrated that beliefs about vaccinations being harmful and overused in society were related to COVID-19 vaccine hesitancy [15,55,56]. However, harm and overuse beliefs were not related to COVID-19 vaccination uptake. Reasons for this may involve the social pressure often cited by those who were late adopters of the COVID-19 vaccine as they were noted to feel “bullied” into receiving it by their social circle despite their negative underlying beliefs regarding medicine [20,51]. Additionally, social norms among certain groups may be at play as, in some communities, there are shared expectations about responsible behaviour, especially in the context of public health. If receiving vaccinations is seen as socially responsible, young adults may feel a stronger pressure to get vaccinated to align with these norms, even if they have personal reservations [20]. This social responsibility has been noted in students in higher education and young adults with their primary reason for vaccination often being to help the community [52,57,58].

4.1. Limitations

The sampled population for this study were university students and as such the findings are not representative of all young adults in the UK. Some studies have reported that young adults are more likely to intend to receive COVID-19 vaccinations [23,39,59]. These contrasting results may be due to differences in education levels between the samples as individuals with lower levels of formal education were noted to be significantly more likely to express hesitancy towards getting vaccinated against COVID-19 compared to those with higher educational attainment [39,40]. This may be because health literacy and the ability to critically assess scientific data are typically more developed among those with higher educational attainment [60]. Young adults with higher levels of education may be better able to comprehend the significance of vaccinations, their scientific basis, and their function in public health whereas, those with less knowledge may have trouble finding or correctly comprehending health information, potentially leaving them more susceptible to misinformation. This could explain why most participants in this study scored relatively low in vaccine hesitancy despite being a part of the age group reporting most vaccine hesitancy. One part of the recruitment strategy for the study was drawn from students studying for a BSc Psychology degree at one university. Whilst attempts were made to widen the recruitment approach through snowball sampling and use of social media, vaccine hesitancy has been found to be lower in those pursuing degrees with a strong scientific background who are more likely to accept vaccinations [61]. This suggests that the educational context and the academic discipline of the participants may have played a role in shaping their attitudes towards COVID-19 vaccines. This information was not collected from participants, which limits the level of analysis that can be undertaken to explain this. Other factors may be driving COVID-19 vaccination adherence behaviours which were not captured in this study and could explain the low variance in the model for vaccination uptake compared to vaccine hesitancy. As seen in this study, vaccine hesitancy may not be the best measure of actual vaccination uptake behaviour when applied in a global pandemic, where other psychological, social and economic determinants are at play.

4.2. Future Research

Further research is needed to address some of the limitations of this study. For example, repeating the study with a sample of non-university students would allow further investigation of the extent to which these beliefs relate to vaccination adherence behaviours in a less educated population and to explore the role of level of education in influencing conspiracy theory mentality and beliefs about vaccinations. This study found strong relationships between vaccination beliefs and behaviours in a sample of young adults. Further research is needed to determine the extent to which these factors determine vaccine adherence behaviours in other age groups. In addition, longitudinal studies are needed to address the causal direction of relationships between beliefs and behaviours [62]. Longitudinal studies can determine changes in vaccination beliefs as young adults grow older and to

establish what factors predict vaccination adherence behaviours with age, and what strategies are most effective for specific age groups [63,64].

5. Conclusions

The findings of this study support the need for effective strategies to decrease vaccine hesitancy and promote vaccine uptake among young adults in the UK. These interventions should aim to modify the underlying psychological factors that drive misconceptions about vaccinations which include beliefs about vaccinations in general and as well as specific COVID-19 vaccination beliefs, where the necessity of vaccination may be related to conspiracy theory mentality beliefs.

Author Contributions: Conceptualization, L.C.S. and D.J.; methodology, L.C.S. and D.J.; validation, D.J.; formal analysis, L.C.S. and D.J.; investigation, L.C.S.; data curation, L.C.S. and D.J. writing—original draft preparation, L.C.S. and D.J.; writing—review and editing, S.B., R.P. H.S. and D.J.; supervision, D.J.; project administration L.C.S.; All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki and approved by the Institutional Ethics Committee of Cardiff Metropolitan University (Reference: UG-6897, December 2022).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Conflicts of Interest: The authors declare no conflicts of interest.

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