BMJ Open  Intention to have the seasonal influenza vaccination during the COVID-19 pandemic among eligible adults in the UK: a cross-sectional survey

Susan M Sherman 1, Julius Sim 2, Richard Amlôt 3,4, Megan Cutts 1, Hannah Dasch 5,6, G James Rubin 3,5, Nick Sevdalis 1,6, Louise E Smith 3,5

ABSTRACT

Objective To investigate the likelihood of having the seasonal influenza vaccination during the COVID-19 pandemic in individuals who were eligible to receive it.

Design We conducted a cross-sectional online survey in July 2020. We included predictors informed by previous research, in the following categories: sociodemographic variables; uptake of influenza vaccine last winter and beliefs about vaccination.

Participants 570 participants (median age: 53.07; 56.3% female, 87.0% white) who were eligible for the free seasonal influenza vaccination in the UK.

Results 59.7% of our sample indicated they were likely to have the seasonal influenza vaccination, 22.1% reported being unlikely to have the vaccination and 18.2% were unsure. We used logistic regression to investigate variables associated with intention to receive a seasonal influenza vaccine in the 2020–2021 season. A positive attitude to vaccination in general predicted intention to have the influenza vaccine in 2020–2021 (OR 1.45, 95% CI 1.19 to 1.77, p<0.001) but the strongest predictor of intention was previous influenza vaccination behaviour (OR 278.58, 95% CI 78.04 to 994.46, p<0.001).

Conclusions Previous research suggests that increasing uptake of the influenza vaccination may help contain a COVID-19 outbreak, so steps need to be taken to convert intention into behaviour and to reach those individuals who reported being unlikely or unsure about having the vaccine.

INTRODUCTION

To maximise uptake and help contain subsequent COVID-19 and other infectious disease outbreaks, we need to understand influences on intention to have the influenza vaccination while COVID-19 is circulating. We report findings from a survey conducted in July 2020 in the UK, which explored participants’ likelihood of having the seasonal influenza vaccination in 2020–2021.

The COVID-19 pandemic was declared on 11 March 2020. While the first wave of the pandemic missed most of the influenza season in the Northern hemisphere, a second wave has overlapped with the 2020–2021 season.1 Healthcare systems come under considerable strain during a typical influenza season; this has been compounded by a large number of COVID-19 cases. Recent research has modelled the impact of mass influenza vaccination on the spread of COVID-19, in the event of such an overlap, and suggests that increasing uptake of the influenza vaccination would facilitate efforts to contain COVID-19 outbreaks.2 In addition, there is some evidence to suggest that patients with a recent history of influenza or influenza-like illnesses are at risk of more severe COVID-19.3 However, increasing, or even maintaining, levels of influenza vaccination may be problematic if reduced uptake patterns seen already in other vaccines also hold for the influenza vaccine. For example, the uptake of the measles-mumps-rubella (MMR) vaccine in England became 19.8% lower in the 3 weeks after full physical distancing measures were introduced in March than it was for the same period in 2019.4

The influenza season in the UK runs from December until March each year and the national vaccination programme starts in September. At the time of data collection, eligibility for the free vaccine through the National Health Service (NHS) was the same as in previous years, being available to children aged 2–11, adults over 65, pregnant women, health and social care workers,
individuals aged 6 months to 65 years who are in clinical at-risk groups (many of which coincide with the COVID-19 at-risk groups), those living in a residential or nursing home and anyone who is the main carer of an older or disabled person. In November 2020, the 2020–2021 influenza vaccination programme was extended to all adults aged 50 or older as well as to anyone living with someone who is at high risk from coronavirus. The vaccination is also available privately for a charge through primary care and pharmacies to the rest of the population. Despite the wide availability of a free vaccine for eligible individuals, uptake varies across the different categories of eligibility; for example, in the 2019–2020 season 72.4% of 65+ adults in England were vaccinated compared with 44.9% of individuals aged 6 months to 65 years in clinical at-risk groups.3

In order to protect people ahead of and during the annual influenza season, it might be helpful to understand intention to have a seasonal influenza vaccination during the COVID-19 pandemic. To this end, we explored participants’ likelihood of having the seasonal influenza vaccination as part of a larger cross-sectional study investigating attitudes towards a potential COVID-19 vaccination.6 Previous research exploring factors associated with seasonal influenza vaccination uptake has identified a range of factors that might influence seasonal influenza uptake.7 8 In this study, we focused on sociodemographic factors such as age, ethnicity and gender, general attitude towards vaccination, fear of needles and past behaviour (whether individuals previously had a seasonal influenza vaccination). We explored these factors in participants who were eligible for the free influenza vaccine under pre-COVID criteria (in place at the time of data collection) and conducted a sensitivity analysis in which we included all those who were eligible under the pandemic-motivated broadened criteria.

MATERIALS AND METHODS
A nationally representative quota sample of 1500 UK adults (quotas set on age, gender and ethnicity) was recruited through Prolific’s online research panel to complete a cross-sectional survey between 14 and 17 July 2020. Participants were included in this study if they were eligible to receive the free influenza vaccine through the NHS at the time of data collection (aged 65 years or older, pregnant, working in health or social care or in a clinical risk group). We did not collect data on whether participants were living in a care home or whether they were a main carer, and so these eligibility criteria are not explicitly represented in our analysis. After providing consent, participants were asked to complete the survey, which included: sociodemographic questions (eg, age, gender, ethnicity, employment status, highest educational or professional qualification); clinical questions (eg, whether they or someone else in their household (if applicable) had a chronic illness that made them clinically vulnerable to serious illness from COVID-19); questions about COVID-19 (eg, whether they were worried about catching coronavirus) and questions about a possible COVID-19 vaccination (eg, whether they thought most people would get a coronavirus vaccination). We also asked participants to what extent they agreed that ‘in general, vaccination is a good thing’ and to what degree they were ‘afraid of needles’ (both on an 11-point scale from ‘strongly disagree’ to ‘strongly agree’), and if they had been vaccinated for seasonal influenza last winter (yes/no). The outcome measure for this study, influenza vaccination intention, was measured by asking participants how likely they would be to have the seasonal influenza vaccine ‘this winter’ (11-point scale, from ‘extremely unlikely’ to ‘extremely likely’). Full details of the wider study, including survey methodology, are reported elsewhere.6 The survey is available in online supplemental file 1.

Since eligibility for the free influenza vaccine in the 2020–2021 season was widened after data collection, as a sensitivity analysis, we re-ran analyses using these broader criteria.

Statistical analysis
In order to identify factors associated with intention to receive the seasonal influenza vaccine in the 2020–2021 season, we used a multivariable logistic regression model, based on those respondents expressing a clear intention either to have or not to have the vaccine. The predictors in the model were specified a priori, based on previous research7 8: sociodemographic variables; uptake of influenza vaccine last winter and beliefs about vaccination (value of vaccination in general; afraid of needles); see table 1. Odds ratios (ORs) with 95% CIs are reported, adjusted for all of the other predictors in the model; in addition, the corresponding crude (bivariate) ORs are given for the purpose of comparison. We used the Nagelkerke pseudo-$R^2$ statistic to express the goodness-of-fit of the model. Statistical significance was set at $p\leq0.05$.

Patient and public involvement
Patients or the public were not involved in the design, or conduct, or reporting or dissemination plans of this research.

RESULTS
At the time of data collection, 570 individuals in our sample were eligible for the free influenza vaccine. The distribution of influenza vaccination intention was bimodal, with the majority of responses clustering at both ends of the scale. We therefore dichotomised this variable as 0–2 = ‘no’ (n=126; 22.1%) and 8–10 = ‘yes’ (n=340; 59.7%) on the 0–10 scale. The 466 respondents who expressed a clear intention either to have or not to have the seasonal influenza vaccine were included in the analysis, and the 104 (18.2%) indeterminate cases were not analysed further. The results of the regression analysis are shown in table 2.
A positive attitude to vaccination and previous vaccination behaviour were significant predictors of intention to have the influenza vaccine in the 2020–2021 season. As indicated by the large OR, previous influenza vaccination behaviour was a markedly stronger predictor.

Sensitivity analysis
We conducted the above analyses based on participants who were eligible for the free influenza vaccine at the time of data collection. In the intervening time, these criteria were broadened. Using the broadened eligibility criteria, 1003 respondents were eligible in 2020–2021. Of these, 491 (49.0%) respondents expressed a clear intention to have the vaccine, 291 (29.0%) had a clear intention not to have the vaccine and there were 221 (22.0%) indeterminate cases. As before, the indeterminate cases were not analysed. The results of the sensitivity analysis are shown in table 3.

Compared with the main analysis, a somewhat smaller percentage of respondents indicated a clear intention to be vaccinated (49.0% vs 59.7%), and correspondingly a larger percentage not to be vaccinated (29.0% vs 22.1%). However, the ORs were of a similar magnitude to those in the main analysis and with similar associated p values (though with the larger sample size, the OR for age became significant), suggesting that while the broader eligibility criteria may influence the percentage of individuals intending to be vaccinated against influenza, they have little effect on the predictors of such vaccination behaviour.

In both the main analysis and the sensitivity analysis, the adjusted and crude ORs were similar, with the exception of those for ethnicity. For this variable, the ORs changed noticeably (and went from being significant to non-significant) after adjustment for the other predictors in the multivariable model, suggesting that some of the explanatory effect of ethnicity was redistributed to other predictors in the full model.

**DISCUSSION**

These findings strongly suggest that individuals who had the influenza vaccine in the last influenza season were likely to intend to have it again in the 2020–2021 season. This is consistent with findings from the H1N1 influenza pandemic as well as with findings from studies exploring influenza vaccination intentions during the COVID-19 pandemic in other countries and regions such as Italy and Catalonia. It also aligns with the finding that across six countries (USA, Canada, Israel, Japan, Spain, Switzerland) parents’ intention to vaccinate their child against seasonal influenza was influenced by their and their child’s previous influenza vaccination status. However, there are still key issues to address. Vaccination intention across all those individuals in our sample who were eligible for the vaccine (59.7%) at the time of data collection was slightly lower than the reported uptake from the last influenza season (64.3%). Furthermore, it is likely that actual uptake will be lower than intention as a result of the intention-behaviour gap, making it important that efforts are made to convert positive intentions into uptake. This might be achieved through appropriate messaging and special arrangements for vaccine delivery, particularly for those who might be shielding or at higher risk from COVID-19 and reluctant to attend their general practitioner’s surgery. Both approaches are also likely to be needed to motivate those individuals who have not previously had the influenza vaccine and those individuals who are eligible for free vaccination but who were among respondents in our sample who indicated they definitely did not intend to be vaccinated (22.1%) or were unsure (18.2%).

Limitations of the current study include that participants were reporting intention to be vaccinated rather...
than actual vaccination status and that they were collected before a COVID-19 vaccination was a reality. However, since public health systems globally are likely to be managing seasonal influenza against a backdrop of COVID-19 for the foreseeable future, we believe these data provide useful information to assist with understanding the evolving response to national vaccination programmes.

The NHS is often overwhelmed during the influenza season, needing, for example, to cancel routine operations. The extension of the influenza vaccination programme in 2020–2021 to people aged 50 years and over and to those living with someone who is at high risk from coronavirus may also help decrease the burden of the influenza season. Potential carry-over effects into the next influenza season (2021–2022 in the UK), in light of the current availability of COVID-19 vaccination, and ongoing public health and media discussions regarding the need for seasonal vaccination programmes for both corona and influenza viruses suggest that the current dataset can be used as a baseline for future evaluation of the uptake of the influenza vaccination within an ever-changing context. Increasing uptake of the seasonal influenza vaccine in a timely fashion will relieve pressure on health services. If this is to be successful, strategies to achieve this increase need to be designed now.

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#### Table 2

<table>
<thead>
<tr>
<th>Variable</th>
<th>Adjusted (crude) OR</th>
<th>95% CI</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>1.02 (1.03)</td>
<td>0.99 to 1.04</td>
<td>0.190</td>
</tr>
<tr>
<td>Gender (reference: female)</td>
<td>1.24 (1.37)</td>
<td>0.60 to 2.59</td>
<td>0.565</td>
</tr>
<tr>
<td>Ethnicity—white (reference: black and minority ethnic)</td>
<td>0.60 (1.99)</td>
<td>0.23 to 1.53</td>
<td>0.281</td>
</tr>
<tr>
<td>Qualifications—degree equivalent or higher (reference: other)</td>
<td>1.52 (0.94)</td>
<td>0.72 to 3.22</td>
<td>0.278</td>
</tr>
<tr>
<td>Working (reference: not working/other)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Part-time</td>
<td>1.12 (0.75)</td>
<td>0.39 to 3.21</td>
<td>0.830</td>
</tr>
<tr>
<td>Full-time</td>
<td>1.51 (0.81)</td>
<td>0.64 to 3.56</td>
<td>0.342</td>
</tr>
<tr>
<td>Key worker (reference: not key worker)</td>
<td>0.59 (0.62)</td>
<td>0.27 to 1.31</td>
<td>0.197</td>
</tr>
<tr>
<td>Influenza vaccination last winter (reference: no vaccination)</td>
<td>278.58 (273.58)</td>
<td>78.04 to 994.46</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>In general, vaccination is a good thing (0–10 scale)</td>
<td>1.45 (1.57)</td>
<td>1.19 to 1.77</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>I am afraid of needles (0–10 scale)</td>
<td>0.98 (.091)</td>
<td>0.89 to 1.09</td>
<td>0.757</td>
</tr>
</tbody>
</table>

Reference categories for the ORs are shown where appropriate. CIs and p values relate to the adjusted ORs. n=460 (six cases with missing data on one or more variables were not analyzed). Nagelkerke $R^2=0.760$.

#### Table 3

<table>
<thead>
<tr>
<th>Variable</th>
<th>Adjusted (crude) OR</th>
<th>95% CI</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>1.02 (1.02)</td>
<td>1.00 to 1.04</td>
<td>0.046</td>
</tr>
<tr>
<td>Gender (reference: female)</td>
<td>1.24 (1.12)</td>
<td>0.76 to 2.01</td>
<td>0.388</td>
</tr>
<tr>
<td>Ethnicity—white (reference: black and minority ethnic)</td>
<td>0.75 (1.73)</td>
<td>0.36 to 1.56</td>
<td>0.443</td>
</tr>
<tr>
<td>Qualifications—degree equivalent or higher (reference: other)</td>
<td>1.00 (1.02)</td>
<td>0.62 to 1.59</td>
<td>0.983</td>
</tr>
<tr>
<td>Working (reference: not working/other)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Part-time</td>
<td>0.80 (0.68)</td>
<td>0.40 to 1.58</td>
<td>0.519</td>
</tr>
<tr>
<td>Full-time</td>
<td>1.03 (0.71)</td>
<td>0.58 to 1.81</td>
<td>0.929</td>
</tr>
<tr>
<td>Key worker (reference: not key worker)</td>
<td>0.93 (0.83)</td>
<td>0.55 to 1.57</td>
<td>0.776</td>
</tr>
<tr>
<td>Influenza vaccination last winter (reference: no vaccination)</td>
<td>281.78 (262.85)</td>
<td>95.35 to 832.72</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>In general, vaccination is a good thing (0–10 scale)</td>
<td>1.54 (1.57)</td>
<td>1.31 to 1.81</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>I am afraid of needles (0–10 scale)</td>
<td>0.98 (0.92)</td>
<td>0.91 to 1.05</td>
<td>0.529</td>
</tr>
</tbody>
</table>

Reference categories for the ORs are shown where appropriate. CIs and p values relate to the adjusted ORs. n=774 (eight cases with missing data on one or more variables were not analyzed). Nagelkerke $R^2=0.716$.
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Contributors Conceptualisation, LES; Methodology, RA, MC, HD, GJR, NS, SMS, JS, LES; Software, SMS; Formal analysis, JS; Writing—original draft preparation, SMS; Writing—review and editing, RA, MC, HD, GJR, NS, SMS, JS, LES; Funding acquisition, RA, GJR, NS, SMS, JS, LES.

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Disclaimer The views expressed are those of the authors and not necessarily those of the NIHR, the charities, Public Health England or the Department of Health and Social Care.

Competing interests NS is the director of the London Safety and Training Solutions Ltd, which offers training in patient safety, implementation solutions and human factors to healthcare organisations and the pharmaceutical industry.

Patient consent for publication Not required.

Ethics approval Ethical approval for this study was granted by Keele University’s Research Ethics Committee (reference: PS-200129).

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data are available in a public, open access repository. Survey items and dataset are available from: DOI 10.17605/OSF.IO/94856.

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REFERENCES
CoVAccS Survey 1 - Final

Start of Block: Information about the research

Q1.2 Covid-19 Vaccination Acceptability Study – CoVAccS
Survey exploring public attitudes towards a possible coronavirus (Covid-19) vaccination
Participant Information

We are interested in understanding how people feel about a possible coronavirus (Covid-19) vaccination and whether you would be likely to have the vaccine if one becomes available to you. We would be very grateful if you would complete this 3-part survey. The first part contains some questions about you, the second part contains questions about the coronavirus illness, the third part contains questions about a possible coronavirus vaccination, whether you would have such a vaccination and some general questions about your thoughts regarding vaccination and healthcare. To assist us with this, we would be grateful if you would complete this survey. It should take no more than 20 minutes. Please note that all responses will be anonymous. What will I need to do? If you decide to take part, you should tick the consent box at the bottom of this page and then complete the questionnaire. Please ensure that you have answered all questions on a page before moving on to the next one. Please note that once you have completed the final page you will be unable to withdraw your data as it is anonymous. Will my taking part in the study be kept confidential? Yes. The survey is anonymous (we don’t ask for your name or any identifying information). What will happen to the results of the research study? We intend to publish the results of this study in scientific journals. We will also present it at scientific conferences and we may also pass the results of the research to relevant policy makers. This will contribute to the debate around vaccination policy. You will not be identified in any research presentation or publication as the study is completed anonymously. The data you have provided will be stored on a password protected computer and laptop. On completion of the project the data will be stored indefinitely in an online repository such as the Open Science Framework to which access will be open. You will not be identifiable from the data since your participation is entirely anonymous. Who is conducting the research? The research is being conducted by a team from Keele University, King’s College London, and Public Health England. Who has reviewed the study? All research conducted by Keele University is looked at by an independent group of people, called a Research Ethics Committee, to protect your interests. This study has been reviewed and approved by Keele’s Research Ethics Committee. What if there is a problem? If you have a concern about any aspect of this study, you may wish to speak to the principal investigator, Dr Sue Sherman, at Keele University at s.m.sherman@keele.ac.uk. Alternatively, you may wish to contact Dr Joseph Brooks (j.l.brooks@keele.ac.uk) who is the Director of Research in the School of Psychology at Keele University.
Q1.3

**Consent agreement** If you are happy to take part in this survey, please read the following statements:

- I confirm that I have read and understand the information above for this study.
- I understand that my data will be anonymous and that my participation is voluntary.
- I understand that I have the right to withdraw from the study at any time by closing the survey.
- I agree to allow the data collected to be used for research projects related to this project.

Now please click on one of the options below:

- ○ I agree with the statements above and I am happy to take part in this study (1)
- ○ I do not wish to take part in this study (2)

End of Block: Information about the research

Start of Block: Does not consent

Q2.1

As you do not wish to participate in this study, please return your submission on Prolific by selecting the ‘Stop without completing’ button.

End of Block: Does not consent

Start of Block: Prolific ID

Q3.2

Before you start, please:

- maximize your browser window;
- switch off phone/e-mail/music and anything else distracting
- and please enter your Prolific ID in the box below [it can be found at the top of this webpage or when going to your account info]:

________________________________________________________________

End of Block: Prolific ID

Start of Block: Age check
Q4.2 How old are you?

- 17 or younger (1)
- 18 (2)
- Then options through to
- 100 (84)
- Older than 100 (104)

End of Block: Age check

Start of Block: Not eligible

Q5.1 Unfortunately you are not eligible to take part in this survey as you are under 18, please return your submission on Prolific by selecting the ‘Stop without completing’ button.

End of Block: Not eligible

Start of Block: Demographics

Q6.2 PART 1: INFORMATION ABOUT YOU

Q6.3 How would you describe your gender?

- Female (0)
- Male (1)
- Non-binary (2)
- Prefer to self-describe (please specify) (3)

- Prefer not to say (-7)
Q6.4 Please choose one of the options below which best describes your ethnic group or background. These categories reflect the categories used in the Census 2011.

- English/ Welsh/ Scottish/ Northern Irish/ British (1)
- Irish (2)
- Gypsy or Irish traveller (3)
- Any other white background, please specify (4)
- White & Black Caribbean (5)
- White and Black African (6)
- White and Asian (7)
- Any Other Mixed background, please specify (8)
- Indian (9)
- Pakistani (10)
- Bangladeshi (11)
- Chinese (12)
- Any other Asian background, please specify (13)
- African (14)
- Caribbean (15)
- Any other Black background, please specify (16)
- Arab (17)
Q6.6 What is your religion?

- Any other ethnic group, please specify (18)
- Prefer not to say (-7)

Q6.6 What is your religion?

- No religion (1)
- Christian (2)
- Buddhist (3)
- Hindu (4)
- Jewish (5)
- Muslim (6)
- Sikh (7)

- Any other religion, please describe (8)

- Prefer not to say (-7)
Q6.7 What is the highest level of educational or professional qualification you have received?

- No formal qualifications (1)
- Youth training certificate/skillseekers (2)
- Recognised trade apprenticeship (3)
- Clerical and commercial (4)
- City & Guilds certificate (5)
- City & Guilds certificate – advanced (6)
- ONC (7)
- CSE grades 2–5 (8)
- CSE grade 1, GCE O level, GCSE, School Certificate (9)
- Scottish Ordinary/ Lower Certificate (10)
- GCE A level or Higher Certificate (11)
- Scottish Higher Certificate (12)
- Nursing or midwifery qualification (e.g. SEN, SRN, SCM, RGN) (13)
- Teaching qualification (not degree) (14)
- University diploma (15)
- University or CNAA first degree (e.g. BA, BSc, BEd) (16)
- University or CNAA higher degree (e.g. MSc, PhD) (17)
- Other technical, professional or higher qualification (18)
- Don't know (19)
Q6.8 Which ONE of the following best describes your current working situation?

- Working full time (30 hours per week or more) (1)
- Usually working full time (30 hours per week or more), but currently furloughed (2)
- Working part time (8–29 hours per week) (3)
- Usually working part time (8–29 hours per week), but currently furloughed (4)
- Stay-at-home parent (5)
- Unemployed (6)
- Retired (7)
- Student (8)
- Other (9)
- Don’t know (10)
- Prefer not to say (-7)
Q6.9 In which of the following categories would you place your total household income from all sources before tax and any other deductions?

- Under £10,000 (1)
- £10,000–£19,999 (2)
- £20,000–£29,999 (3)
- £30,000–£39,999 (4)
- £40,000–£49,999 (5)
- £50,000–£74,999 (6)
- £75,000 or over (7)
- Don't know (8)
- Prefer not to say (-7)
Q6.11 Where in the UK do you live?

- East Midlands (1)
- East of England (2)
- London (3)
- North East (4)
- North West (5)
- Northern Ireland (6)
- Scotland (7)
- South East (8)
- South West (9)
- Wales (10)
- West Midlands (11)
- Yorkshire and the Humber (12)
- Prefer not to say (-7)
Q6.12 How many people live in your household including yourself?

- 1 (1)
- 2 (2)
- 3–4 (3)
- 5–6 (4)
- 7 or more (5)
- Prefer not to say (-7)

Q6.13 The colour test is simple, when asked for your favourite colour you must enter the word purple in the text box below.

Based on the text you read above, what colour have you been asked to enter?

________________________________________________________________

Q6.14 Do any of the following apply to you or someone else in your household?

<table>
<thead>
<tr>
<th></th>
<th>You</th>
<th></th>
<th>Someone else in your household</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes (1)</td>
<td>No (0)</td>
<td>Prefer not to say (-7)</td>
</tr>
</tbody>
</table>
Received a letter from the NHS recommending that extra precautions against coronavirus are taken (this is called 'shielding')
(Q6.11_1)

<table>
<thead>
<tr>
<th>Condition</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>A lung condition (such as asthma, COPD, emphysema or bronchitis)</td>
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<tr>
<td>Heart disease (such as heart failure)</td>
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<tr>
<td>Chronic kidney disease</td>
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<td>Liver disease (such as hepatitis)</td>
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<tr>
<td>A condition affecting the brain or nerves (such as Parkinson's disease,</td>
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<td>motor neurone disease, multiple sclerosis or cerebral palsy)</td>
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<tr>
<td>Diabetes</td>
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BMJ Open, et al. Sherman SM
doi: 10.1136/bmjopen-2021-049369
A condition that means there is a high risk of getting infections (Q6.11_8)
Taking medicine that can affect the immune system (such as steroids) (Q6.11_9)
Classified as very obese (a body mass index (BMI) of 40 or above) (Q6.11_10)
Pregnant (Q6.11_11)

Q6.15 Do any of the following apply to you?

<table>
<thead>
<tr>
<th>You</th>
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<tbody>
<tr>
<td>Yes (1)</td>
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</tbody>
</table>
Received a letter from the NHS recommending that extra precautions against coronavirus are taken (this is called 'shielding') (Q6.12_1)

- A lung condition (such as asthma, COPD, emphysema or bronchitis) (Q6.12_2)
- Heart disease (such as heart failure) (Q6.12_3)
- Chronic kidney disease (Q6.12_4)
- Liver disease (such as hepatitis) (Q6.12_5)
- A condition affecting the brain or nerves (such as Parkinson's disease, motor neurone disease, multiple sclerosis or cerebral palsy) (Q6.12_6)
- Diabetes (Q6.12_7)
- A condition that means there is a high risk of getting infections (Q6.12_8)
- Taking medicine that can affect the immune system (such as steroids) (Q6.12_9)
- Classified as very obese (a body mass index (BMI) of 40 or above) (Q6.12_10)
Q6.17 Please could you indicate if you work in any of the following sectors or roles? Please include any voluntary work. Please tick all that apply.

- ☐ Health or social care (e.g. doctors, nurses, midwives, paramedics, social workers, care workers; or work as part of the health and social care supply chain, including producers and distributors of medicines and medical equipment) (1)

- ☐ Education and childcare (e.g. teaching and support staff, childminders, social workers, specialist education professionals) (2)

- ☐ Key public services (e.g. the justice system, religious staff, charities delivering frontline services, journalists, broadcasters, undertakers) (3)

- ☐ Local and national government in a role essential to continuous provision of essential services (e.g. the payment of benefits, or processing of new benefit applications) (4)

- ☐ Food and essential goods (e.g. food production, processing, distribution, sale and delivery, as well as those essential to the provision of other key goods such as hygienic or veterinary medicine) (5)

- ☐ Public safety and national security (e.g. police and support staff, Ministry of Defence civilians, contractor and armed forces, fire and rescue service employees, National Crime Agency staff, border security staff, prison and probation staff and other national security roles) (6)

- ☐ Transport (e.g. air, water, road and rail passenger and freight transport modes) (7)

- ☐ Utilities, communication and financial services (e.g. banks, building societies and financial market infrastructure; the oil, gas, electricity and water sectors; information technology and data infrastructure sector; civil nuclear, chemicals, telecommunications, network operations, field engineering, call centre staff, IT and data infrastructure, 999 and...
111 critical services, postal services and delivery, payments providers and waste disposal) (8)

☐ None of the above (9)

☐ Prefer not to say (-7)

Q6.18 Last winter, did you have a vaccination for seasonal flu?

☐ Yes (1)

☐ No (0)

☐ Don't know (2)

☐ Prefer not to say (-7)

End of Block: Demographics

Start of Block: Pre-survey statement

Q7.2 Over the next few pages we will ask you a series of questions about the coronavirus illness and a possible vaccination. We are interested to know your personal opinion about these topics.

Please click on 'NEXT' when you are ready to continue.

End of Block: Pre-survey statement

Start of Block: Questions about Covid-19 the illness 1

Q8.2 PART 2: YOUR THOUGHTS ABOUT THE CORONAVIRUS (COVID-19) ILLNESS

Q8.3 To what extent do you think coronavirus poses a risk to people in the UK?
Q8.4
To what extent do you think coronavirus poses a risk to you personally?

○ Major risk (5)
○ Significant risk (4)
○ Moderate risk (3)
○ Minor risk (2)
○ No risk at all (1)
○ Don't know (0)
Q8.5 Do you believe you have had, or currently have, coronavirus? (Please select the one option that BEST applies to you)

○ I have definitely had it or definitely have it now (4)
○ I have probably had it or probably have it now (3)
○ I have probably not had it and probably don’t have it now (2)
○ I have definitely not had it and definitely don’t have it now (1)
○ Don’t know (0)
○ Prefer not to say (-7)

Q8.6 Do you personally know anyone (excluding yourself) who has had coronavirus?

○ Yes (1)
○ No (0)
○ Don’t know (0)
○ Prefer not to say (-7)

End of Block: Questions about Covid-19 the illness 1
Start of Block: Questions about Covid-19 the illness 2

Q9.2 PART 2: YOUR THOUGHTS ABOUT THE CORONAVIRUS (COVID-19) ILLNESS

Q9.3 Please indicate the extent to which you agree or disagree with the following statements by ticking a number between 0 and 10, where 0 means ‘strongly disagree’ and 10 means ‘strongly agree’:
Q9.4 I am worried about catching coronavirus
Q9.5 I believe that coronavirus would be a mild illness for me
Q9.6 Too much fuss is being made about the risk of coronavirus
Q9.7 We are all responsible for reducing the spread of the coronavirus
Q9.8 It's important that you pay attention to this study, so please select 0 (‘strongly disagree’) for this item
Q9.9 I believe I am immune to coronavirus
Q9.10 The coronavirus pandemic has had a big impact on my life
Q9.11 I trust the NHS to manage the coronavirus pandemic in the UK
Q9.12 I trust the Government to manage the coronavirus pandemic in the UK

End of Block: Questions about Covid-19 the illness 2

Start of Block: Questions about the Covid-19 vaccination 1

Q10.2 PART 3: YOUR THOUGHTS ABOUT A CORONAVIRUS (COVID-19) VACCINATION

For the following questions, please imagine that a coronavirus vaccine is widely available.

Q10.3 When a coronavirus vaccination becomes available to you, how likely is it that you will have one? Please select a number between 0 and 10, where 0 means ‘extremely unlikely’ and 10 means ‘extremely likely’:

End of Block: Questions about the Covid-19 vaccination 1

Start of Block: Questions about the Covid-19 vaccination 2

Q11.2 PART 3: YOUR THOUGHTS ABOUT A CORONAVIRUS (COVID-19) VACCINATION

For the following questions, please imagine that a coronavirus vaccine is widely available.

Q11.3 Please indicate the extent to which you agree or disagree with the following statements by ticking a number between 0 and 10, where 0 means ‘strongly disagree’ and 10 means ‘strongly agree’:
Q11.4 A coronavirus vaccination should be mandatory for everyone who is able to have it
Q11.5 Without a coronavirus vaccine, I am likely to catch coronavirus
Q11.6 If I get a coronavirus vaccination, I will be protected against coronavirus
Q11.7 If I don't get a coronavirus vaccination and end up getting coronavirus, I would regret not getting the vaccination
Q11.8 It would be very easy for me to have a coronavirus vaccination
Q11.9 A coronavirus vaccination could give me coronavirus
Q11.10 It's important that you pay attention to this study, so please select 10 ('strongly agree') for this item
Q11.11 I would be worried about experiencing side effects from a coronavirus vaccination

End of Block: Questions about the Covid-19 vaccination 2

Start of Block: Questions about the Covid-19 vaccination 3

Q12.2 PART 3: YOUR THOUGHTS ABOUT A CORONAVIRUS (COVID-19) VACCINATION

For the following questions, please imagine that a coronavirus vaccine is widely available.

Q12.3 Please indicate the extent to which you agree or disagree with the following statements by ticking a number between 0 and 10, where 0 means 'strongly disagree' and 10 means 'strongly agree':

Q12.4 I might regret getting a coronavirus vaccination if I later experienced side effects from the vaccination
Q12.5 A coronavirus vaccination will be too new for me to be confident about getting vaccinated
Q12.6 Most people will get a coronavirus vaccination
Q12.7 Other people like me will get a coronavirus vaccination
Q12.8 In general, vaccination is a good thing
Q12.9 I am afraid of needles
Q12.10 If I were vaccinated, I think I would not need to follow social distancing and other restrictions for coronavirus
Q12.11 I know enough about the coronavirus illness to make an informed decision about whether or not to get vaccinated
Q12.12 I know enough about the coronavirus vaccine to make an informed decision about whether or not to get vaccinated

End of Block: Questions about the Covid-19 vaccination 3
Q13.2 PART 3: YOUR THOUGHTS ABOUT A CORONAVIRUS (COVID-19) VACCINATION

For the following questions, please imagine that a coronavirus vaccine is widely available.

Q13.3 Please indicate the extent to which you agree or disagree with the following statements by ticking a number between 0 and 10, where 0 means ‘strongly disagree’ and 10 means ‘strongly agree’:

Q13.4 Only people who are at risk of serious illness from coronavirus need to be vaccinated
Q13.5 My family would approve of my having a coronavirus vaccination
Q13.6 My friends would approve of my having a coronavirus vaccination
Q13.7 If a coronavirus vaccination were recommended by the Government, I would get vaccinated
Q13.8 If a coronavirus vaccination were recommended by a health care professional (e.g. GP or nurse), I would get vaccinated
Q13.9 Widespread coronavirus vaccination is just a way to make money for vaccine manufacturers
Q13.10 A coronavirus vaccine will allow us to get back to ‘normal’
Q13.11 There would be no point in having the coronavirus vaccination unless I could go back to my normal life

End of Block: Questions about the Covid-19 vaccination 4

Start of Block: Questions about the Covid-19 vaccination 5

Q14.2 PART 3: YOUR THOUGHTS ABOUT A CORONAVIRUS (COVID-19) VACCINATION

For the following questions, please imagine that a coronavirus vaccine is widely available.

Q14.3 As far as you know, would your employer want you to have the coronavirus vaccination?

- Yes (0)
- No (1)
- Don’t know (2)
- Not applicable (11)
Q14.4 As far as you know, is there currently a widely-available vaccination to protect against coronavirus?

- Yes (1)
- No (0)
- Don't know (2)
- Prefer not to say (-7)

Q14.5
This winter, how likely is it that you will have the seasonal flu vaccination? Please select a number between 0 and 10, where 0 means ‘extremely unlikely’ and 10 means ‘extremely likely’:

End of Block: Questions about the Covid-19 vaccination

Start of Block: Thank you

Q15.2 Thank you for taking part in this survey.

If you have any questions about the survey, please contact Dr Sue Sherman (s.m.sherman@keele.ac.uk).

If you have questions about coronavirus (Covid-19), please visit the NHS website: https://www.nhs.uk/conditions/coronavirus-covid-19/ or the government website: https://www.gov.uk/coronavirus.

End of Block: Thank you