WORKING DRAFT – NOT PEER-REVIEWED

Preparing for a COVID-19 vaccine: Identifying and psychologically profiling those who are vaccine hesitant or resistant in two general population samples

Jamie Murphy^{1*}, Frédérique Vallières², Richard P. Bentall³, Mark Shevlin¹, Orla McBride¹, Todd K Hartman³, Ryan McKay⁴, Kate Bennett⁵, Liam Mason⁶, Jilly Gibson-Miller³, Liat Levita³, Anton P. Martinez³, Thomas VA Stocks³, Thanos Karatzias⁷, & Philip Hyland⁸.

¹ Ulster University, Northern Ireland

² Trinity College Dublin, Republic of Ireland

³ University of Sheffield, England

⁴ Royal Holloway, University of London, England

⁵ University of Liverpool, England

⁶ University College London, England

⁷ Napier University, Scotland

⁸ Maynooth University, Republic of Ireland

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***Corresponding Author:**

Prof Jamie Murphy
School of Psychology
Ulster University
Coleraine Campus
Northern Ireland
BT52 1SA
Telephone: +44 (0) 28 713 75283
Email: ja.murphy@ulster.ac.uk

Abstract

Successful delivery of a COVID-19 vaccine may be undermined if populations are not receptive to inoculation as a primary public health strategy for combatting the virus. We gathered nationally representative data from the general adult populations of Ireland (N=1,041) and the United Kingdom (UK; N=2,025) to determine rates of hesitancy and resistance to a future COVID-19 vaccine and to identify and psychologically profile vaccine hesitant/resistant individuals in a way that might aid future public health messaging. Vaccine hesitancy was evident for 26% and 25% of Irish and UK samples, respectively, while vaccine resistance was evident for 9% and 6%, respectively. Vaccine hesitant/resistant respondents in Ireland and the UK differed in relation to a number of sociodemographic, political, and health-related variables, but were similar across a broad array of psychological constructs. In both populations, those who were resistant to a COVID-19 vaccine were less likely to obtain information about the pandemic from traditional and authoritative sources and had similar levels of mistrust in these sources. The current findings may help public health officials to more effectively target vaccine hesitant and resistant individuals, develop effective communication strategies that take into account their specific psychological dispositions, and leverage dissemination channels that can successfully reach these individuals.

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the virus that causes COVID-19, reached pandemic status on March 11th, 2020. As of May 27th, the virus had spread to 185 countries, infected over 5.5 million people, and resulted in over 350,000 deaths.¹ The global economic cost of this pandemic over the next two years is projected to lead to a cumulative output loss of nine trillion US dollars (IMF).² In the absence of an effective therapy or vaccine, governments around the world have enacted extreme physical distancing and quarantine measures to slow the spread of the virus, protect the most vulnerable in society, and manage health care service demand and provision.³ The necessity for an approved vaccine to protect populations from this virus, as well as safeguard economies from further disruption and damage, cannot be overstated.

The first human clinical trial of a COVID-19 vaccine commenced on March 3rd, 2020 in the United States with a projected completion date of June 1st, 2020.⁴ Several other human trials have since commenced.⁵ The successful development, production, and distribution of any vaccine is, however, insufficient to guarantee adequate vaccine coverage. Specifically, achieving herd immunity for COVID-19 depends on a host of biological, social, and psychological determinants of health that, together, result in observed rates of vaccine uptake. Identifying, understanding, and addressing hesitance about and resistance to a vaccine for COVID-19 is therefore a critical preparatory step to ensure the rapid and positive uptake of an eventual vaccine. The importance of profiling as a key preparatory step for vaccine development is emphasised by the World Health Organization's (WHO, 2014) Strategic Advisory Group of Experts (SAGE) on Immunization when they state that: *"proactive preparation and nimble response based on social and behavioural insights requires analytical capacity to detect, assess, and address 'hotspot' areas of hesitancy that can quickly become explosive...too often, this sort of outreach is only done in reaction to a problem that has finally grown too big to ignore"*.⁶

Much of the existing literature on vaccine hesitancy and resistance focuses on the explicit reasons individuals provide for their opposition to a specific vaccine or to vaccination programmes more generally.⁷⁻¹¹ Although useful, such information is limited in terms of its ability to explain why these individuals come to their respective epistemological positions. By identifying the key psychological processes that characterise and distinguish vaccine hesitant or resistant individuals from those who are receptive to vaccines, it becomes possible to understand both why they come to hold their specific vaccine hesitance or resistance beliefs, and also develop more effective communication strategies that take into account their specific psychological dispositions. While public health messages that clearly and forcefully dispute myths and falsehoods about vaccine safety and efficacy are essential, challenging false beliefs about vaccination safety and efficacy also risks creating ‘backfire effects’, whereby individuals become more entrenched in their false beliefs.¹² Given that public service campaigns, advocating a variety of health behaviours, have greatly benefitted from such psychologically oriented approaches,¹³⁻¹⁵ it is our position that public health messaging efforts aimed at increasing the uptake of a COVID-19 vaccine can benefit from a comprehensive understanding of the psychology of vaccine hesitant and resistant individuals.

Heeding the recommendations of the WHO’s SAGE Working Group on Immunization, and with the aim of providing public health officials with vital information to increase COVID-19 vaccination uptake, we had four objectives. First, given the absence of information regarding current rates of COVID-19 vaccine acceptance, hesitance, and resistance in the population, we sought to determine *what* proportions of the general adult populations of the Republic of Ireland and the United Kingdom (UK) were receptive, hesitant about, or resistant to a vaccine for COVID-19, should one be developed. In doing this, we offer a current indication of these countries’ respective potential to achieve herd immunity against COVID-19.

Second, we sought to profile individuals who are hesitant about or resistant to a possible vaccine for COVID-19 by identifying the key sociodemographic, political, and health-related factors that distinguish these individuals from those who are accepting of a COVID-19 vaccine. By identifying these distinguishing, objective characteristics, public health officials can better identify *who* in the population is more likely to be hesitant or resistant to a COVID-19 vaccine.

Third, we sought to identify the most salient psychological characteristics that distinguished individuals who are hesitant/resistant to a COVID-19 vaccine from those who are accepting of a COVID-19 vaccine. A better understanding of the psychology of vaccine hesitant and resistant individuals affords public health officials a more complete understanding of *why* these individuals view a COVID-19 vaccine the way that they do.

Finally, we sought to determine from *which* sources vaccine hesitant or resistant individuals gather information about the current pandemic, as well as the level of trust they place in these sources. Taken together, these latter two objectives offer a greater understanding of *how* public health officials can more effectively tailor health behaviour communication messaging to align to the psychological profiles of vaccine hesitant or resistant individuals, while also taking into account their preferences for COVID-19 related information consumption and trust proclivities.

Results

Objective 1: Prevalence of vaccine hesitancy and resistance in Ireland and the UK

Overall, 65% (95% CI = 62.0, 67.9) of Irish respondents were accepting of a COVID-19 vaccine, 26% (95% CI = 22.9, 28.3) were vaccine hesitant, and 9% (95% CI = 7.7, 11.3) vaccine resistant. Comparatively, 69% (95% CI = 66.8, 70.9) of UK respondents were vaccine accepting, 25% (95% CI = 23.1, 26.9) were vaccine hesitant, and 6% (95% CI = 5.2,

7.3) were vaccine resistant. Figure 1 displays the proportions in these three groups for Ireland and the UK - as well as the UK's nations England, Wales, Scotland, and Northern Ireland. As can be seen, Northern Ireland had the lowest rate of vaccine acceptance at 51.2%.

Figure 1 about here

Objective 2: Sociodemographic, political, and health variables associated with COVID-19 vaccine hesitancy and resistance.

The multinomial logistic regression models exploring indicators of vaccine hesitancy and resistance were statistically significant in the Irish ($\chi^2(64) = 126.875, p < .001$) and UK ($\chi^2(64) = 177.495, p < .001$) samples. The full set of findings from these models in the Irish and UK samples are presented in Tables 1 and 2, respectively.

In the Irish sample, those who were *vaccine hesitant* – compared to those who were vaccine accepting - were more likely to be female (OR = 1.62), aged between 35-44 years (OR = 2.00), and less likely to have received treatment for a mental health problem (OR = 0.63). Those who were *vaccine resistant* – compared to those who were vaccine accepting - were more likely to be aged 35-44 years (OR = 3.33), residing in a city (OR = 1.90), to be of non-Irish ethnicity (OR = 2.89), to have voted for the political party Sinn Féin (OR = 3.22) or an Independent political candidate (OR = 4.15) in the last general election, and to have an underlying health condition (OR = 2.59). Income level was also associated with *vaccine resistance*. Those in lower income brackets were more likely to be vaccine resistant.

Three variables distinguished those who were *vaccine resistant* from those who were *vaccine hesitant*: non-Irish ethnicity (OR = 2.76), having an underlying health condition (OR = 2.68), and having a lower level of income (ORs ranged from 2.82 to 5.44).

Table 1 about here

In the UK sample, those who were *vaccine hesitant* – compared to those who were vaccine accepting – were more likely to be female (OR = 1.43), and to be younger than 65.

Those who were *vaccine resistant* – compared to those who were vaccine accepting – were more likely to be in younger age categories (over ten times more likely to be in the three lowest age categories, and over four times more likely to be aged 45-54 years or 55-64 years, than to be in the 65 and older category). They were also more likely to reside in a suburb (OR = 2.13), to be in the three lowest income brackets, and to be pregnant (OR = 2.36).

The only variable to distinguish *vaccine resistant* respondents from *vaccine hesitant* respondents was age. Those who were vaccine resistant were more likely to be in younger age categories (over seven times more likely to be aged 18-24, and over four times more likely to be aged between 25-34 years and 35-44 years, than to be in the 65 and older age category).

Table 2 about here

Objective 3: Psychological indicators of vaccine acceptance/hesitancy/resistance

The variation in measures of respondent psychology across the vaccine acceptance, hesitance, and resistance groups in the Irish and UK samples is reported in Tables 3 and 4, respectively.

In the Irish sample, the combined vaccine hesitant and resistant group differed most pronouncedly from the vaccine acceptance group on the following psychological variables: lower levels of trust in scientists ($d = .51$), healthcare professionals ($d = .45$), and the state ($d = .31$); more negative attitudes toward migrants (d 's ranged from .27 to .29); lower cognitive reflection ($d = .25$); lower levels of altruism (d 's ranged from .17 to .24); higher levels of social dominance ($d = 0.22$) and authoritarianism ($d = .14$); higher levels of conspiratorial ($d = .21$) and religious ($d = .20$) beliefs; lower levels of the personality trait agreeableness ($d = .15$); and higher levels of internal locus of control ($d = .14$).

When comparing the three groups, the *vaccine resistant* group differed from the *vaccine hesitant* group in terms of higher levels of conspiracy beliefs ($\eta^2 = .02$), and lower

levels of trust in scientists ($\eta^2 = .06$), healthcare professionals ($\eta^2 = .05$), and the state ($\eta^2 = .03$).

Table 3 about here

In the UK sample, the combined vaccine hesitant and resistant group differed most noticeably from the vaccine acceptance group on the following psychological variables: lower levels of trust in healthcare professionals ($d = .39$), scientists ($d = .38$), and the state ($d = .16$); higher levels of paranoia ($d = .27$) and religious beliefs ($d = .21$); lower levels of altruism (d 's ranged from $.17$ to $.22$); higher levels of social dominance ($d = .21$); lower levels of the personality traits agreeableness ($d = .22$) and conscientiousness ($d = .17$), and higher levels of neuroticism ($d = .11$); higher levels of internal locus of control ($d = .16$) and belief in chance ($d = .17$), and lower levels of beliefs about the role of powerful others ($d = .19$); lower cognitive reflection ($d = .14$); and more negative attitudes towards migrants ($d = .11$).

When comparing the three groups, the *vaccine resistant* group differed from the *vaccine hesitant* group in terms of higher levels of conspiracy beliefs ($\eta^2 = .01$), and lower levels of trust in scientists ($\eta^2 = .03$) and healthcare professionals ($\eta^2 = .04$).

Table 4 about here

Objective 4. Consumption of, and trust in, information regarding COVID-19

Figures 2 and 3 show the levels of consumption and trust in sources of information for each of the Irish vaccine response groups. The vaccine resistant respondents consumed significantly ($p < .05$) less information about COVID-19 from newspapers, television, radio, and government agencies, and significantly more information from social media, compared to the vaccine accepting respondents. In relation to trust, the vaccine resistant respondents reported significantly ($p < .05$) lower levels of trust in information that was disseminated via newspapers, television broadcasts, radio broadcasts, their doctor, other health care

professionals, and government agencies compared to the vaccine accepting respondents.

There were no significant differences in levels of consumption and trust between the vaccine accepting and vaccine hesitant groups. Compared to vaccine hesitant responders, vaccine resistant individuals consumed significantly less information about the pandemic from television and radio, and had significantly less trust in information disseminated from newspapers, television broadcasts, radio broadcasts, their doctor, other health care professionals, and government agencies.

Figures 2 & 3 about here

Figures 4 and 5 show the levels of consumption and trust in sources of information for each of the UK vaccine response groups. The vaccine resistant group consumed significantly ($p < .05$) less information about COVID-19 from newspapers and television broadcasts compared to the vaccine accepting group. In relation to trust in the available information, vaccine resistant respondents reported significantly lower levels of trust in information that was disseminated via newspapers, television broadcasts, radio broadcasts, their doctors, other health care professionals, and government agencies. There were no significant differences between the vaccine accepting and vaccine hesitant groups regarding levels of consumption or trust in information. Likewise, there were no significant differences in information consumption between the vaccine hesitant and resistant groups, but the vaccine resistant group did have significantly less trust in information sourced from newspapers, radio broadcasts, their doctor, and other health care professionals.

Figures 4 & 5 about here

Discussion

Similar rates of vaccine hesitancy (26% and 25%) and resistance (9% and 6%) were evident in the Irish and UK samples, with only 65% of the Irish population and 69% of the UK population fully willing to accept a COVID-19 vaccine. These findings should be concerning to public health officials given recent estimates suggesting that the rates of vaccine coverage required to achieve herd immunity could be as high as 85%.¹⁶ Rates of resistance to a COVID-19 vaccine parallel those found for other types of vaccines in other countries. For example, in the United States, 9% regarded the MMR vaccine as unsafe in a survey of over 1000 adults¹⁷ while 7% of respondents across the world said they “strongly disagree” or “somewhat disagree” with the statement ‘Vaccines are safe’ (findings from the Wellcome Global Monitor on attitudes to science and major health challenges).¹⁸ Thus, upwards of approximately 10% of countries appear to be opposed to vaccinations in whatever form they take.

Across the Irish and UK samples, similarities and differences emerged regarding those in the population more likely to be hesitant about, or resistant to, a vaccine for COVID-19. Three demographic factors were significantly associated with vaccine hesitancy or resistance in both countries: sex, age, and income level. Compared to respondents accepting of a COVID-19 vaccine, women were more likely to be vaccine *hesitant*, a finding consistent with a number of studies identifying sex and gender-related differences in vaccine uptake and acceptance.^{19,20} Younger age was also related to vaccine *hesitancy* and *resistance*. However, whereas in the UK all age groups under the age of 65 were more likely to be hesitant or resistant than accepting, only those aged between 35-44 were more likely to be vaccine hesitant or resistant in Ireland. Given the low mortality rates of COVID-19 among persons under the age of 65, it may be that lower risk of death accounts for these age effects. Consistent with previous research,²¹ vaccine resistance was associated with lower income

across both the UK and Ireland, with all earning categories below the highest income bracket associated with COVID-19 vaccine resistance.

In Ireland, vaccine resistance was further associated with being of non-Irish ethnicity, city dwelling, voting for anti-establishment or independent candidates in the most recent general election, and having an underlying chronic health problem; while in the UK, vaccine resistance was associated with suburban dwelling and being pregnant. Urban/suburban dwelling may reflect broader socio-economic issues known to underpin vaccine hesitancy,²²⁻²⁴ and is a worrying finding given the greater potential for community transmission within more densely populated areas. Vaccine uptake among minority groups is often lower than the general population,²⁵⁻²⁷ and the reasons for this disparity may include limited access to primary care, failure of clinical staff to communicate the importance of vaccination during health care visits, and/or misconceptions about the costs, adverse effects, risks, and benefits of vaccination.²⁸⁻³⁰ The finding that vaccine resistance in Ireland was associated with having voted for Sinn Féin or an independent candidate in the most recent Irish general election may be reflective of broader societal disaffection and anti-establishment sentiments repeatedly shown to underpin vaccine hesitancy in many populations.^{31,32} Greater resistance to vaccination seen in populations with existing chronic health problems may be further explained by the presence of individuals for whom vaccines are medically contraindicated or by a fear of iatrogenic effects of a vaccine among these individuals.³³ Pregnancy has also been found to be associated with increased resistance to vaccines for other communicable diseases, such as influenza and pertussis.³⁴⁻³⁶

Taken together, our findings show that while there are some similarities in terms of *who* in the Irish and UK populations are more likely to be hesitant or resistant to a potential COVID-19 vaccine, many of these determining factors are likely to be context-dependent. Therefore, and in addition to the importance of identifying vaccine hesitant or reluctant

groups within any given context, there is a need to tailor COVID-vaccine-specific health communication messaging for these various sub-populations (e.g., women, younger adults, ethnic minority groups, those with existing health conditions, pregnant women). A multi-disciplinary approach, engaging social and behavioural change communication experts, social marketers, medical anthropologists, psychologists, and health care practitioners is therefore required.

Interestingly, while vaccine hesitant and resistant individuals in Ireland and the UK varied in relation to their social, economic, cultural, political, and geographical characteristics, both populations shared similar psychological profiles. Specifically, COVID-19 vaccine hesitant or resistant persons were distinguished from their vaccine accepting counterparts by being less trusting of experts (i.e., scientists and health care professionals) and authority figures (i.e., the state), more likely to hold strong religious beliefs (possibly because these kinds of beliefs are associated with distrust of the scientific worldview) and also conspiratorial, and paranoid beliefs (which reflect lack of trust in the intentions of others). They were also more likely to believe that their lives are primarily under their own control, to have a preference for societies that are hierarchically structured and authoritarian, and to be more intolerant of migrants in society (attitudes that have been previously hypothesized to constitute a ‘behavioural immune system’ that has evolved to reduce risk of infection³⁷). They were also less reflective in their thinking style and problem solving, and reported personality characterised by being more disagreeable, more emotionally unstable and less conscientious (traits that might be expected to make it more difficult to appreciate/understand the advantages of herd immunity achieved by mass vaccination).

Responsibility for public health messaging primarily lies with governments, scientists, and medical professionals. However, and consistent with previous findings, our results suggest that health messaging delivered through these channels may not only be ineffective

for vaccine hesitant or resistant individuals, but may also account for the backfire effects observed elsewhere.³⁸ Instead, and given a preference for social dominance and authoritarianism, vaccine hesitant or resistant persons may be more receptive to authoritative health messaging, as delivered by individuals in alternative positions of authority and expertise. Engagement of religious leaders, for example, has been documented as an important approach to improve vaccine acceptance.³⁹ In the specific context of Ireland, results further suggest that independent politicians and politicians from the Sinn Féin party, may represent key figures to convey the importance of vaccination against COVID-19. Key to the preparation of a COVID-19 vaccine is therefore the early and frequent engagement of religious and community-leaders⁴⁰ and for health authorities to do so collaboratively, so as to avoid the feeling that leaders are only acting *on behalf* of government authorities.⁴¹

Moreover, given the difficulties they are likely to have in understanding the benefits of herd immunity, their internal locus of control, and anti-migrant views, messages tailored to vaccine hesitant or resistant individuals should emphasise both personal benefits of a COVID-19 vaccination and also the benefits to those with whom they most closely identify. In addition, messaging may want to emphasise the autonomy of the individual to determine their own path out of the current pandemic. Furthermore, given that vaccine hesitant or resistant individuals are typically less agreeable, less conscientious, less emotionally stable, and less analytically capable, public health messaging targeted at those who are hesitant or resistant should be clear, direct, repeated, and positively orientated.

Aligned to our findings that vaccine resistant individuals were more distrusting of scientific expertise and health and government authorities, vaccine resistant individuals in both countries were less likely to consume, and trust, information from ‘traditional’ sources (i.e., newspapers, television, radio, and government agencies), and were somewhat more likely to obtain information from social media channels. These findings are consistent with

global trends and other studies reporting social media as an instrumental platform for anti-vaccine messaging.^{42,43} This poses further challenges to effective communication for vaccine resistant individuals, and highlights the need for public health officials to disseminate information via other sources of information, in order to increase the chances of accessing vaccine resistant or hesitant individuals. Together, knowledge of the socio-demographical and psychological profiles of vaccine resistant individuals, combined with knowledge of what informational sources they access, and whom they trust most, contribute to important information for public health officials to more effectively design, and deliver, public health messages such that a sufficient proportion of individuals voluntarily accept a vaccine for COVID-19.

These findings should be interpreted in light of several limitations. These data were collected during the first week of the strictest lockdown measures being enacted in Ireland and the UK, respectively. Thus, rates of vaccine acceptance, hesitance, and resistance will have been affected by these social circumstances. Second, questions were answered with regards to a hypothetical vaccine, whose effectiveness, risk of adverse side-effects, and contraindications are currently unknown. Continued monitoring, conducted throughout the pandemic and throughout the development of a vaccine, will help us better understand changing levels of hesitance and resistance to vaccination, and our group are engaging in this work. Additionally, while the use of nationally representative samples from two countries is a key strength, these samples are representative of general adult populations and do not include members of the public that are institutionalised (e.g., hospital care, prisons, refugee centres). The inability to survey these members of society is a threat to the generalisability of our results. Relatedly, the extent to which these results will generalise to other high-income nations is not known. It is essential that many other countries, both low/middle income and high-income countries, obtain estimates of hesitancy/resistance to COVID-19 vaccination.

Despite these limitations, our findings provide important initial evidence regarding the level of hesitance and resistance toward a potential COVID-19 vaccine in two general population samples. The development of a vaccine for COVID-19 represents an enormous ongoing global scientific and political effort; however, these findings suggest that if this global effort is successful and a vaccine is found, governments and health workers in many countries are likely to face another battle: how to persuade a sufficient proportion of their populations to accept the vaccine in order to effectively suppress the virus. We offer these findings in the hope that they highlight the importance of understanding the various social, economic, political, and psychological factors that are related to COVID-19 vaccine hesitance and resistance, so as to better inform public health messaging. Convincing members of the public who are hesitant or resistant to a COVID-19 vaccine will require the concerted efforts of multiple stakeholders in society, many of whom are often excluded from politics and health policy.⁴⁴ The engagement and participation of these key and trusted community actors are required to effectively reach and convince individuals of the necessity of COVID-19 immunisation.

Methods

Participants and procedure

Nationally representative samples of the general adult populations of Ireland ($N = 1,041$) and the UK ($N = 2,025$) were collected by the survey company Qualtrics. Stratified quota sampling was used to ensure that the sample characteristics of sex, age, and geographical distribution matched known population parameters for the Irish population while age, sex and income matched known population parameters for the UK population. The UK data collection took place between March 23rd and 28th, 2020. Data collection began 52 days after the first confirmed case of COVID-19 in the UK, and the same day the UK Prime

Minister announced that people were required to stay at home except for very limited purposes. The Irish data collection took place between March 31st and April 5th, 2020. This was 31 days after the first confirmed case of COVID-19 in Ireland, 19 days after the first physical distancing measures were enacted (i.e., closure of all childcare and educational facilities), and two days after the Taoiseach (Irish Prime Minister) announced that people were not to leave their homes except for very limited purposes. Therefore, these data were collected within the first week of the strictest physical distancing measures being enacted in both countries.

Inclusion criteria for both samples were that participants be aged 18 years or older at the time of the survey and be able to complete the survey in English. Participants were contacted by the survey company via email and requested to participate. If consenting, participants completed the survey online (median time of completion = 37.52 minutes and 28.91 for the Irish and UK surveys respectively) and were reimbursed by the survey company for their time. Ethical approval was granted by the University of Sheffield and Ulster University. The sociodemographic characteristics for both samples are reported in Table 5.

Table 5 about here

Measures

Given the distinct socio-political contexts of Ireland and the UK, some variation existed in the measurement of the sociodemographic and political variables used in this study. All other variables were measured in an identical manner across the two samples.

COVID-19 vaccination status

Participants were asked, ‘If a new vaccine were to be developed that could prevent COVID-19, would you accept it for yourself?’ and were classified as ‘vaccine accepting’ if they responded ‘Yes’, ‘vaccine hesitant’ if they responded ‘Maybe’, and ‘vaccine resistant’ if they responded ‘No’.

Sociodemographic, political and religious indicators

The sociodemographic variables used in this study are outlined in Table 5. Additionally, the Irish and UK samples were asked about their voting behaviours in recent political elections. In the Irish sample, people were asked if they voted in the February 2020 General Election (0 = No, 1 = Yes), and to which political party they gave their first preference vote (Fine Gael, Fianna Fáil, Sinn Féin, Other party, Independents; 0 = No, 1 = Yes). In the UK sample, people were asked if they voted in the most recent general election (0 = No, 1 = Yes), and how they voted in the 2016 European Union membership referendum (0 = Remain, 1 = Leave). In both samples, respondents were asked “What is your religious conviction (how you would classify your religious belief now)?”, with response options including: Christian, Muslim, Jewish, Hindu, Buddhist, Sikh, Atheist, Agnostic, Other. A binary variable was generated to represent ‘Religion’ where 1= No religion (combining atheist/agnostic?) and 0= ‘Other’ (combining all other categories).

Health related indicators

Participants were asked if they have diabetes, lung disease, or heart disease (0 = No, 1 = Yes), if any immediate family members have diabetes, lung disease, or heart disease (0 = No, 1 = Yes), if they are pregnant (0 = No, 1 = Yes), if they have, or have had, a confirmed/suspected case of COVID-19 infection (0 = No, 1 = Yes), and if a close relative or friend has, or has had, a confirmed/suspected case of COVID-19 infection (0 = No, 1 = Yes). Additionally, participants were asked if they are currently, or have in the past, received mental health treatment (i.e., medication or psychotherapy) for a mental health problem (0 = No, 1 = Yes).

Psychological indicators

Personality traits: The Big-Five Inventory (BFI-10)⁴⁵ measures the traits of openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism. Each trait is

measured by two items using a five-point Likert scale that ranges from ‘strongly disagree’ (1) to ‘strongly agree’ (5). Higher scores reflect higher levels of each personality trait, and Rammstedt and John⁴⁴ reported good reliability and validity for the BFI-10 scale scores.

Locus of control: The Locus of Control Scale (LoC)⁴⁶ measures internal (e.g., ‘My life is determined by my own actions’) and external locus of control. The latter has two components, ‘Chance’ (e.g., ‘To a great extent, my life is controlled by accidental happenings’) and ‘Powerful Others’ (e.g., ‘Getting what I want requires pleasing those people above me’). Each subscale was measured using three questions and a seven-point Likert scale that ranges from ‘strongly disagree’ (1) to ‘strongly agree’ (7). Higher scores reflect higher levels of each construct.

Analytical/reflective reasoning: The Cognitive Reflection Task (CRT)⁴⁷ is a three-item measure of analytical reasoning where respondents are asked to solve logical problems designed to hint at intuitively appealing but incorrect responses. The response format was multiple choice with three foil answers (including the hinted incorrect answer), as recommended by Sirota and Juanchich.⁴⁸

Altruism: The Identification with all Humanity scale (IWAH)⁴⁹ is a nine-item scale adapted for use in this study (reference to ‘America’ in the original study was substituted with ‘Ireland’ or ‘the UK’ for this study). Respondents are asked to respond to three statements with reference to three groups – people in my community, people from Ireland/the UK, and all humans everywhere. The three statements were presented to respondents separately for each of the three groups, as follows: (1) How much do you identify with (feel a part of, feel love toward, have concern for) ...? (2) How much would you say you care (feel upset, want to help) when bad things happen to ...? And, (3) When they are in need, how much do you want to help...? Response scale ranged from 1 ‘not at all’ to 5 ‘very much’.

Higher scores reflect greater identification with others, care for others, and a desire to help others.

Conspiracy beliefs: The Conspiracy Mentality Scale (CMS)⁵⁰ measures conspiracy mindedness using five items with each scored on an 11-point scale (1 = ‘Certainly not 0%’ to 11 = ‘Certainly 100%’). Items include, ‘I think that many very important things happen in the world, which the public is never informed about’, and ‘I think that there are secret organizations that greatly influence political decisions’. The internal reliability of the CMS in both the Irish and UK samples was excellent ($\alpha = .84$ & $.85$ respectively).

Paranoia: The five-item persecution subscale from the Persecution and Deservedness Scale (PaDS)⁵¹ was used. Participants rate their agreement with statements such as “I’m often suspicious of other people’s intentions towards me” and “You should only trust yourself.” Response options ranged from ‘strongly disagree’ (1) to ‘strongly agree’ (5) with higher scores reflecting higher levels of paranoia. The psychometric properties of the scale scores have been previously supported,⁵² and the internal reliability in both the Irish and UK samples was excellent ($\alpha = .83$ & $.86$ respectively).

Religious and atheist beliefs: Participants indicated their agreement to 8 statements from the Monotheist and Atheist Beliefs Scale.⁵³ Statements included: “God has revealed his plans for us in holy books” and “Moral judgments should be based on respect for humanity rather than religious doctrine”. Response options ranged from ‘strongly disagree’ (1) to ‘strongly agree’ (5). Atheism oriented statements were reverse scored and summed with monotheist items to produce a summed score, with higher scores reflecting religious belief orientation. The psychometric properties of the scale scores have been previously supported,⁵³ and the internal reliability in both the Irish and UK samples was excellent ($\alpha = .81$ & $.83$ respectively).

Trust in institutions: Respondents were asked to indicate the level of trust they have in political parties, the parliament, the government, the police, the legal system, scientists, and doctors and other health professionals. Responses were scored on a five-point Likert scale ranging from ‘do not trust at all’ (1) to ‘completely trust’ (5). For this study, responses to the first five institutions were summed to generate a total score for ‘trust in the state’. Trust in scientists, and trust in doctors and other health professionals were treated individually.

Authoritarianism: The Very Short Authoritarianism Scale (VSA)⁵⁴ includes six items assessing agreement with statements such as: ‘It’s great that many young people today are prepared to defy authority’ and ‘What our country needs most is discipline, with everyone following our leaders in unity’. All items were scored on a five-point Likert scale ranging from ‘strongly disagree’ (1) to ‘strongly agree’ (5), with higher scores reflecting higher levels of authoritarianism. The internal reliability of the scale scores in the Irish sample was lower than desirable ($\alpha = .58$) but somewhat stronger for the UK sample ($\alpha = .65$).

Attitude towards migrants: Two items assessing respondents’ attitudes towards migrants were taken from the British Social Attitudes Survey 2015.⁵⁵ These were, (1) ‘Would you say it is generally bad or good for the UK’s economy that migrants come to the UK from other countries?’ (scored on a 10-point scale ranging from 1 ‘extremely bad’ to 10 ‘extremely good’), and, (2) ‘Would you say that the UK’s cultural life is generally undermined or enriched by migrants coming to live here from other countries?’ (scored on a 10-point scale ranging from 1 ‘undermined’ to 10 ‘enriched’). These items were phrased appropriately for use with the Irish sample.

COVID-19 information consumption and trust

Participants were asked, ‘How much information about COVID-19 have you obtained from each of these sources?’, and were presented with nine options: Newspapers, Television, Radio, Internet websites, Social media, Your doctor, Other health professionals, Government

agencies, and Family or friends. Responses were recorded on a four-point Likert scale (1 = None, 2 = A little, 3 = Some, 4 = A lot). Participants were also asked, ‘How much do you trust the information from each of these sources?’, and responses were recorded on a four-point Likert scale (1 = Not at all, 2 = A little, 3 = Some, 4 = A lot).

Data analysis

The analytical strategy involved four linked elements. First, the proportion of people in the Irish and UK samples classified as ‘vaccine accepting’, ‘vaccine hesitant’, and ‘vaccine resistant’ were calculated.

Second, multinomial logistic regression analyses were performed to identify the key sociodemographic, political, and health-related indicators associated with vaccine hesitancy and resistance. Analyses were performed separately for the Irish and UK samples. For these analyses, the vaccine acceptance group was set as the reference category to identify factors associated with vaccine hesitancy and vaccine resistance, respectively. Subsequently, the models were re-estimated with the *vaccine hesitant* group set as the reference category to identify which factors distinguished vaccine resistant respondents from vaccine hesitant respondents. All associations between the predictor and criterion variables are represented as adjusted odds ratios (AOR) with 95% confidence intervals.

Third, a series of one-way between-groups analysis of variance (ANOVA) tests with Bonferroni post-hoc tests were performed to determine on what psychological characteristics vaccine hesitant and resistant people differ from vaccine accepting people. Statistically significant differences are reported at the standard alpha level ($p < .05$) and at a stricter level ($p < .001$) to account for the potential for increased Type 1 errors due to multiple testing. These analyses were performed for the Irish and UK samples separately. The magnitude of the effect between the three means was quantified in terms of eta-squared (η^2) where values $\leq .05$ reflect a small effect size, values from .06-.13 reflect a medium effect size, and values $\geq$

.14 reflect a large effect size.⁵⁶ Additionally, the vaccine hesitant and resistant groups were combined to represent a single group, and this group was compared to the vaccine accepting group on all psychological variables. The magnitude of the effect between the two means was quantified in terms of Cohen's *d* where values < 0.30 reflect a small effect size, values from 0.30-0.80 reflect a medium effect size, and values > 0.80 reflect a large effect size.⁵⁷ Finally, the vaccine accepting, hesitant, and resistant groups were compared with respect to where they source their information about COVID-19, and the level of trust they have in these information sources. These comparisons were made using one-way between-groups ANOVA tests with Bonferroni post-hoc tests.

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Author Contributions

Conception/design of the work (JM, PH, FV); acquisition of data (all authors); analysis of data (JM, PH); interpretation of findings (JM, PH, FV, RB, MS, OMB, TH, RMK); drafted the work (JM, PH, FV); substantively revised the work (RPB, MS, OMB, TH, RMK, KB, LM, JGM, LL, AM, TS, TK).

Competing Interests statement

The authors declare no competing interests

Figure 1. Rates of vaccine acceptance, hesitancy, and resistance in Ireland and the UK (including devolved nations of the UK)

Figure 2. Sources of COVID-19 information for vaccine accepting, hesitant, and resistant groups in the Irish sample.

Figure 3. Trust in COVID-19 information sources for vaccine accepting, hesitant, and resistant groups in the Irish sample.

58. Figure 4. Sources of COVID-19 information for vaccine accepting, hesitant, and resistant groups in the UK sample.

Figure 5. Trust in COVID-19 information sources for vaccine accepting, hesitant, and resistant groups in the UK sample

Table 1. Sociodemographic, political, and health indicators associations with vaccine hesitancy and resistance in the Irish sample (N = 1041).

	Would you accept a COVID-19 vaccine for yourself?								
	(Reference = Vaccine acceptance)						(Reference = Vaccine hesitant)		
	Vaccine hesitant (Maybe)			Vaccine Resistant (No)			Vaccine Resistant (No)		
	AOR	95% CIs		AOR	95% CIs		AOR	95% CIs	
Sex (Female)	1.62	1.18	2.22	1.24	0.77	2.00	0.77	0.46	1.29
Age 18-24	1.74	0.84	3.60	2.49	0.78	7.88	1.43	0.41	4.96
25-34	1.42	0.74	2.72	2.79	0.99	7.82	1.96	0.64	6.02
35-44	2.00	1.06	3.75	3.33	1.17	9.47	1.67	0.54	5.15
45-54	1.35	0.71	2.57	2.49	0.87	7.16	1.84	0.59	5.79
55-64	1.47	0.82	2.62	1.01	0.35	2.87	0.69	0.23	2.11
Birthplace (Ireland)	0.82	0.47	1.43	1.44	0.57	3.63	1.76	0.66	4.67
Ethnicity (non-Irish)	1.05	0.59	1.89	2.89	1.17	7.09	2.76	1.05	7.19
Resident in City	1.01	0.66	1.57	1.90	1.02	3.54	1.88	0.96	3.67
Resident in Suburb	0.65	0.41	1.04	0.57	0.26	1.26	0.87	0.37	2.05
Resident in Town	0.94	0.63	1.38	0.72	0.38	1.35	0.77	0.39	1.51
No Education	1.14	0.81	1.61	1.25	0.75	2.10	1.10	0.63	1.92
Unemployed	0.97	0.65	1.44	0.79	0.45	1.39	0.82	0.44	1.51
Income €0 – €1999	1.05	0.63	1.75	5.73	2.19	14.96	5.44	1.98	14.93
€20000 – €29999	1.23	0.77	1.97	3.46	1.33	9.00	2.82	1.04	7.66
€30000 – €39999	0.95	0.58	1.54	3.16	1.23	8.13	3.34	1.23	9.04
€40000 – €49999	0.92	0.53	1.58	4.79	1.82	12.64	5.24	1.86	14.73
Only adult in Household	0.71	0.47	1.05	0.61	0.34	1.08	0.86	0.46	1.60
No children in Household	1.13	0.80	1.59	1.22	0.73	2.02	1.08	0.62	1.87
Voted Fine Gael	1.31	0.59	2.90	2.31	0.71	7.50	1.77	0.49	6.39
Voted Fine Fail	1.71	0.75	3.90	2.89	0.85	9.84	1.69	0.45	6.40
Voted Sinn Féin	1.91	0.92	3.97	3.22	1.14	9.08	1.69	0.54	5.23
Voted Other	1.23	0.55	2.75	1.64	0.51	5.23	1.33	0.37	4.74
Voted Independent	2.16	0.91	5.14	4.15	1.19	14.49	1.93	0.49	7.44

Religiosity (No)	0.82	0.56	1.20	1.14	0.67	1.93	1.39	0.77	2.49
Voter (Yes)	0.53	0.27	1.04	0.48	0.19	1.21	0.90	0.33	2.49
Mental health history (Yes)	0.63	0.45	0.88	0.77	0.46	1.28	1.22	0.70	2.14
Underlying health condition (Present)	0.97	0.61	1.54	2.59	1.38	4.85	2.68	1.33	5.38
Underlying health condition - Relative	1.11	0.79	1.57	1.72	0.99	2.99	1.55	0.86	2.80
Pregnant	0.78	0.36	1.68	0.92	0.33	2.62	1.19	0.39	3.66
C-19 infection	0.61	0.30	1.25	1.92	0.40	9.18	3.16	0.65	15.42
C-19 infection - relative	1.03	0.56	1.89	1.64	0.54	5.02	1.59	0.49	5.16

Note: AOR = adjusted odds ratios; 95% CIs = 95% confidence intervals for the adjusted odds ratios; statistically significant associations ($p < .05$) are highlighted in bold.

Table 2. Sociodemographic, political, and health indicators associations with vaccine hesitancy and resistance in the UK sample (N = 2025).

	Would you accept a COVID-19 vaccine for yourself?								
	(Reference = Vaccine acceptance)						(Reference = Vaccine hesitant)		
	Vaccine hesitant (Maybe)			Vaccine Resistant (No)			Vaccine Resistant (No)		
	AOR	95% CIs		AOR	95% CIs		AOR	95% CIs	
Sex (Female)	1.43	1.14	1.80	1.05	0.69	1.60	0.73	0.47	1.15
Age 18-24	1.90	1.11	3.26	13.90	3.82	50.53	7.30	1.89	28.18
25-34	2.33	1.46	3.72	10.11	2.89	35.34	4.34	1.18	15.91
35-44	2.53	1.59	4.03	11.83	3.36	41.60	4.67	1.27	17.25
45-54	2.27	1.47	3.52	4.91	1.37	17.65	2.16	0.58	8.12
55-64	2.48	1.60	3.85	4.36	1.19	16.00	1.76	0.46	6.74
White British/Irish	0.83	0.35	1.93	0.94	0.26	3.39	1.14	0.28	4.62
White Other	0.87	0.32	2.38	0.84	0.19	3.79	0.96	0.19	4.99
African/Afro-Caribbean	0.50	0.16	1.56	0.62	0.12	3.17	1.24	0.21	7.29
Chinese/Asian	0.66	0.20	2.12	2.16	0.20	23.83	3.30	0.27	40.33
Indian/Pakistani/Bangladeshi	0.43	0.16	1.16	1.04	0.21	5.12	2.41	0.44	13.22
Resident in City	1.09	0.76	1.57	2.07	0.97	4.45	1.90	0.86	4.21
Resident in Suburb	1.04	0.74	1.46	2.13	1.01	4.49	2.05	0.94	4.45
Resident in Town	0.88	0.62	1.23	1.35	0.63	2.89	1.55	0.70	3.41
No Education	0.53	0.29	0.98	0.63	0.20	1.98	1.19	0.37	3.80
Unemployed	0.72	0.51	1.00	1.06	0.56	1.98	1.48	0.77	2.84
Income 0-£15,490	1.20	0.81	1.80	2.48	1.11	5.54	2.07	0.89	4.80
£15,491-£25,340	1.31	0.90	1.90	2.68	1.28	5.63	2.05	0.94	4.49
£25,341-£38,740	1.31	0.91	1.88	2.31	1.10	4.84	1.76	0.81	3.84
£38,741-£57,930	1.10	0.77	1.56	1.17	0.52	2.62	1.06	0.46	2.47
Only adult in household	0.81	0.61	1.09	1.05	0.62	1.77	1.29	0.74	2.23
No children in the household	1.15	0.88	1.49	0.97	0.61	1.53	0.84	0.52	1.37
Voter (No)	0.62	0.42	0.90	0.73	0.39	1.38	1.19	0.61	2.31
Brexit (Leave)	1.08	0.85	1.38	1.57	0.99	2.47	1.45	0.89	2.34
Religiosity (No)	0.92	0.73	1.16	0.78	0.50	1.21	0.85	0.54	1.36

Mental health history (Yes)	0.90	0.71	1.15	0.83	0.54	1.27	0.92	0.59	1.44
Underlying health condition (Present)	1.32	0.94	1.85	0.91	0.50	1.65	0.69	0.36	1.30
Underlying health condition - Relative	1.07	0.81	1.40	1.30	0.77	2.20	1.22	0.70	2.11
Pregnant	1.26	0.69	2.27	2.36	1.03	5.40	1.88	0.78	4.57
C-19 infection	1.17	0.67	2.04	0.69	0.30	1.60	0.59	0.24	1.47
C-19 infection - relative	0.81	0.51	1.29	1.68	0.62	4.54	2.07	0.74	5.78

Note: AOR = adjusted odds ratios; 95% CIs = 95% confidence intervals for the adjusted odds ratios; statistically significant associations ($p < .05$) are highlighted in bold.

Table 3. Psychological indicators of vaccine acceptance/hesitancy/resistance in the Irish sample.

	Vaccine acceptance ^a n = 665 (65%)			Vaccine hesitance ^b n = 262 (26%)			Vaccine resistance ^c n = 97 (9%)				Hesitance & Resistance ^d n = 359 (35%)			
	Mean	SD	SE	Mean	SD	SE	Mean	SD	SE	η^2	Mean	SD	SE	d
Personality														
Extraversion	6.05	1.90	.07	6.20	1.84	.11	6.25	2.04	.21	.002	6.21	1.89	.10	0.08
Agreeableness	7.08 ^d	1.57	.06	6.84	1.64	.10	6.87	1.61	.16	.005	6.84 ^a	1.63	.09	0.15
Conscientiousness	7.48	1.72	.07	7.52	1.72	.11	7.57	1.66	.17	.000	7.53	1.70	.09	0.03
Neuroticism	5.55	2.11	.08	5.52	1.94	.12	5.66	2.15	.22	.000	5.56	1.99	.11	0.01
Openness	6.62	1.65	.06	6.59	1.62	.10	6.90	1.61	.16	.002	6.67	1.62	.09	0.03
LOC														
Chance	11.19	3.76	.15	11.15	3.10	.19	10.77	4.09	.42	.001	11.04	3.39	.18	0.04
Powerful Others	11.97	2.02	.08	11.87	1.87	.12	12.14	1.97	.20	.001	11.94	1.90	.10	0.02
Internal	8.77 ^d	3.21	.12	9.20	2.88	.18	9.24	3.42	.35	.004	9.21 ^a	3.03	.16	0.14
CRT														
Tests 1-3	0.88 ^d	1.09	.04	0.76	0.97	.06	0.70	0.99	.10	.004	0.74 ^a	0.97	.05	0.25
Altruism														
Identify with others	11.07 ^{bd}	2.43	.09	10.52 ^a	2.38	.15	10.44	2.59	.26	.012	10.50 ^a	2.43	.13	0.24
Care about others	11.59 ^{bd}	2.53	.10	10.92 ^a	2.69	.17	11.22	2.73	.28	.013	11.00 ^a	2.70	.14	0.23
Help others	11.40 ^{bd}	2.50	.10	10.93 ^a	2.62	.16	11.03	2.84	.29	.007	10.96 ^a	2.68	.14	0.17
Beliefs														
Religious	25.23 ^{bd}	6.43	.25	24.08 ^a	5.70	.36	23.78	6.39	.66	.009	23.99 ^a	5.89	.32	0.20
Conspiracy	35.59 ^{cd}	9.12	.35	36.60 ^c	9.24	.57	40.20 ^{ab}	9.50	.96	.021	37.57 ^a	9.44	.50	0.21
Paranoia	12.05	5.02	.20	12.32	4.37	.27	13.18	5.04	.51	.005	12.55	4.57	.24	0.10
Trust														
State	14.33 ^{bcd}	4.44	.17	13.29 ^a	4.07	.25	12.16 ^a	4.70	.48	.025	12.98 ^a	4.27	.23	0.31
Scientists	3.76 ^{bcd}	.91	.04	3.30 ^a	1.02	.06	3.21 ^a	1.15	.12	.056	3.27 ^a	1.05	.06	0.51
Health Care Profs	3.95 ^{bcd}	.93	.04	3.57 ^a	.99	.06	3.36 ^a	1.20	.12	.047	3.51 ^a	1.05	.06	0.45
Socio-political views														
Authoritarianism	17.80 ^d	3.99	.16	18.42	3.45	.21	18.09	4.06	.41	.005	18.33 ^a	3.62	.19	0.14

Social Dominance	17.94 <i>bd</i>	5.34	.21	19.15 ^a	4.83	.30	18.87	5.25	.16	.011	19.08 ^a	5.05	.27	0.22
Migrant views 1	6.52 <i>bd</i>	2.37	.09	5.86 ^a	2.19	.14	5.92	2.44	.25	.017	5.88 ^a	2.26	.12	0.27
Migrant views 2	6.57 <i>bcd</i>	2.49	.10	5.85 ^a	2.24	.14	5.90 ^a	2.50	.25	.019	5.86 ^a	2.31	.12	0.29

Note: *abcd* = mean difference between denoted categories is significant at the <0.001 level. *abcd* = mean difference between denoted categories is significant at 0.05 to 0.001 level. Statistically significant comparisons in bold.

Table 4. Psychological indicators of vaccine acceptance/hesitancy/resistance in the UK sample.

	Vaccine acceptance ^a n = 1383 (69%)			Vaccine hesitance ^b n = 501 (25%)			Vaccine resistance ^c n = 124 (6%)				Hesitance & Resistance ^d n = 625 (31%)			
	Mean	SD	SE	Mean	SD	SE	Mean	SD	SE	η^2	Mean	SD	SE	d
Personality														
Extraversion	5.55	1.80	.05	5.39	1.61	.07	5.47	1.77	.16	.002	5.41 ^a	1.64	.07	.08
Agreeableness	6.85^{bcd}	1.61	.04	6.58^a	1.53	.07	6.23^a	1.76	.16	.012	6.50^a	1.58	.06	.22
Conscientiousness	7.55^{bcd}	1.73	.05	7.31^a	1.72	.08	7.03^a	1.87	.17	.007	7.25^a	1.75	.07	.17
Neuroticism	5.63^d	2.15	.06	5.83	2.01	.09	5.98	2.08	.19	.003	5.86^a	2.03	.08	.11
Openness	6.52	1.69	.05	6.48	1.64	.07	6.52	1.44	.13	.000	6.45	1.60	.06	.04
LOC														
Chance	11.25^{bc}	3.81	.10	11.83^a	3.35	.15	12.12^a	3.89	.35	.007	11.89^a	3.46	.14	.17
Powerful Others	13.47^{bcd}	2.46	.07	13.12^{ac}	2.45	.11	12.51^{ab}	2.42	.22	.011	13.00^a	2.45	.10	.19
Internal	11.10^{bd}	1.96	.05	11.43^a	1.98	.09	11.38	2.30	.21	.006	11.42^a	2.04	.08	.16
CRT														
Tests 1-3	.96^d	1.09	.03	.84	1.02	.05	.73	.99	.09	.004	.81^a	1.01	.04	.14
Altruism														
Identify with others	10.06^{bcd}	2.55	.07	9.68^a	2.50	.11	9.43^a	3.03	.27	.006	9.63^a	2.62	.10	.17
Care about others	10.54^{bcd}	2.73	.07	10.14^a	2.70	.12	9.63^a	3.17	.28	.009	10.04^a	2.81	.11	.18
Help others	10.30^{bcd}	2.77	.07	9.80^a	2.62	.12	9.27^a	3.11	.28	.012	9.69^a	2.73	.11	.22
Beliefs														
Religious	27.84^{bcd}	6.37	.17	26.75^a	5.65	.25	25.73^a	5.83	.53	.011	26.55^a	5.70	.23	.21
Conspiracy	35.07^c	9.07	.24	34.47^c	9.00	.40	38.73^{ab}	10.02	.90	.011	35.31	9.36	.37	.03
Paranoia	12.04^{bc}	5.02	.14	13.13^a	4.73	.21	14.27^a	4.81	.43	.018	13.36^a	4.77	.19	.27
Trust														
State	13.86^{cd}	4.12	.11	13.36	3.91	.18	12.68^a	4.92	.44	.006	13.22^a	4.13	.17	.16
Scientists	3.77^{bcd}	.96	.03	3.45^{ac}	.98	.04	3.20^{ab}	1.08	.10	.033	3.40^a	1.00	.04	.38
Health Care Profs	4.01^{bcd}	.95	.03	3.71^{ac}	.97	.04	3.32^{ab}	1.11	.10	.039	3.63^a	1.01	.04	.39
Socio-political views														
Authoritarianism	29.62	6.76	.18	29.46	6.18	.28	29.60	6.54	.59	.000	29.48	6.25	.25	.02

Social Dominance	23.45^{bd}	8.83	.24	25.03^a	8.65	.39	26.50^a	8.99	.81	.011	25.32^a	8.73	.35	.21
Migrant views 1	6.34	2.31	.06	6.21	2.25	.10	6.16	2.41	.22	.001	6.20	2.28	.09	.06
Migrant views 2	6.16^d	2.53	.07	5.92	2.45	.11	5.71	2.54	.23	.003	5.88^a	2.47	.10	.11

Note: ^{abcd} = mean difference between denoted categories is significant at the 0.001 level. ^{abcd} = mean difference between denoted categories is significant at the 0.05 to 0.001 level. Statistically significant comparisons in bold

Table 5. Sociodemographic characteristics of the Irish and UK samples.

Ireland (N = 1041)	%	UK (N = 2025)	%
Sex		Sex	
Female	51.5	Female	51.7
Male	48.2	Male	48.3
Age		Age	
18-24	11.1	18-24	12.1
25-34	19.2	25-34	18.8
35-44	20.6	35-44	17.4
45-54	15.9	45-54	20.2
55-64	21.0	55-64	17.2
65+	12.2	65+	14.2
Birthplace		Birthplace	
Ireland	70.7	UK	90.6
Region of Ireland		Region of UK	
Leinster	55.3	England	86.9
Munster	27.3	Scotland	7.8
Connaught	12.0	Wales	3.1
Ulster	5.4	Northern Ireland	2.3
Ethnicity		Ethnicity	
Irish	74.8	White British/Irish	85.5
Irish Traveller	0.3	White non-British/Irish	5.7
Other White background	17.3	Indian	2.0
African	1.9	Pakistani	1.3
Other Black background	0.3	Chinese	0.9
Chinese	0.4	Afro-Caribbean	0.6
Other Asian	3.2	African	1.3
Mixed Background	1.8	Arab	0.1
		Bangladeshi	0.3
		Other Asian	0.5
Living location		Living location	
City	24.5	City	24.6
Suburb	18.1	Suburb	28.2
Town	26.8	Town	30.6
Rural	28.8	Rural	16.5
Highest Education		Highest Education	
No qualification	1.2	No qualifications	2.9
Finished mandatory schooling	6.4	O-level/GCSE or similar	19.0
Finished secondary school	22.4	A-level or similar	18.1
Undergraduate degree	22.5	Diploma	5.6
Postgraduate degree	19.8	Undergraduate degree	28.2
Other technical qualification	27.9	Postgraduate degree	15.6
		Technical qualification	9.3

COVID-19 VACCINE HESITANCY IN THE UK AND IRELAND

		Other	1.3
2019 income		2019 income	
0-€19,999	24.6	£0-£15490	20.2
€20,000-€29,999	21.3	£15,491-£25,340	20.2
€30,000-€39,999	19.5	£25,341-£38,740	19.0
€40,000-€49,999	12.7	£38,741-£57,930	20.2
€50,000+	21.9	£57,931+	20.2
Employment status		Employment status	
Full-time (self)/employed	43.3	Full-time (self)/employed	48.8
Part-time (self)/employed	15.7	Part-time (self)/employed	15.0
Retired	15.0	Retired	16.5
Unemployed	8.4	Unemployed	11.7
Student	6.3	Student	4.7
Unemployed (disability or illness)	5.6	Unemployed (disability or illness)	3.4
Unemployed due to COVID-19	5.7		
Religion		Religion	
Christian	69.8	Christian	50.4
Muslim	1.6	Muslim	3.0
Jewish	0.2	Jewish	0.8
Hindu	1.1	Hindu	0.6
Buddhist	0.6	Buddhist	0.8
Sikh	0.1	Sikh	0.5
Other religion	3.8	Other	6.0
Atheist	15.3	Atheist	25.4
Agnostic	7.5	Agnostic	12.5
Lone adult in household		Lone adult in household	
Yes	18.4	Yes	22.4
Children in the household		Children in the household	
Yes	39.7	Yes	29.2