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Monitoring the psychological impact of the COVID-19 pandemic in the general population: an overview of the context, design and conduct of the COVID-19 Psychological Research Consortium (C19PRC) Study

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Abstract

The COVID-19 Psychological Research Consortium (C19PRC) Study aims to assess and monitor the psychological and social impact of the coronavirus (COVID-19) pandemic in the general population, using longitudinal surveys and mixed-methods studies in multiple countries. The first strand of the study, an internet-based panel survey, was launched in the UK in March 2020 during the earliest stages of the pandemic in that country (hereafter referred to as C19PRC-UKW1). This paper describes (1) the development, design and content for C19PRC-UKW1, which was informed by the extant evidence base on the psychosocial impact of previous global outbreaks of similar severe acute respiratory syndromes (e.g. SARS, H1N1, MERS); (2) the specific socio-economic and political context of the C19PRC-UKW1; (3) the recruitment of a large sample of UK adults aged 18 years and older (n=2025) via an internet-based panel survey; (4) the representativeness of the C19PRC-UKW1 sample compared to the UK adult population in terms of important sociodemographic characteristics (e.g. age, sex, household income, etc.); and (5) future plans for C19PRC Study including follow-up survey waves in the UK, supplementary non-survey based study strands linking from the C19PRC-UKW1 and the roll-out of the study to other countries.

Monitoring the psychological impact of the COVID-19 pandemic in the general population: an overview of the context, design and conduct of the COVID-19 Psychological Research Consortium (C19PRC) Study

The extant psychological research relating to infectious respiratory diseases (IRDs) has afforded scholars a valuable opportunity to quickly respond to and investigate the psychological impact of the new and rapidly progressing coronavirus disease - severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) - hereafter referred to as COVID-19. This paper begins with an overview of the design of the COVID-19 Psychological Research Consortium (C19PRC) Study, a longitudinal, multi-country, general population study, that was launched in the United Kingdom (UK) 52 days after the nation recorded its first confirmed case of COVID-19. The design of C19PRC Study, including the target population, the timing of the study, and substantive psychosocial focus and associated measurement was directly informed by previous studies that investigated the non-biological consequences of IRD outbreaks in the public over the past two decades (specifically SARS-CoV (SARS), the H1N1 flu pandemic and the Middle East Respiratory Syndrome (MERS)) and on recommendations from researchers and public health representatives in response to these outbreaks. Key literature informing the design of C19PRC Study (i.e. who, when and what to study during the COVID-19 pandemic) and the context of the C19PRC Study in relation to how the epidemic unfolded in the UK are detailed next. The remaining sections of this paper (1) provide a detailed overview of the content and fieldwork procedures for the first wave of C19PRC Study in the UK (C19PRC-UKW1), a nationally representative internet-based panel survey of the UK adult general population, which was conducted between 23 and 28 March 2020; and (2) outline the future of the C19PRC Study, including the launch of ongoing

follow-up survey waves in the UK, plans for non-survey based supplement studies to the main survey spine, and the roll-out of the study in other countries.

COVID-19 pandemic: Who to study?

The majority of studies that investigated the psychological impacts of SARS, the H1N1 flu pandemic and MERS predominantly focussed on health care workers and patients (SARS: (Chong et al., 2004; Maunder et al., 2003; Tam, Pang, Lam, & Chiu, 2004; K. K. Wu, Chan, & Ma, 2005; P. Wu et al., 2009); Lee et al. 2007; H1N1: (Goulia, Mantas, Dimitroula, Mantis, & Hyphantis, 2010; Matsuishi et al., 2012); MERS: (Bukhari et al., 2016; Shin et al., 2019; Um, Kim, Lee, & Lee, 2017). These studies resoundingly showed that those who provisioned or were in receipt of health care during these crises were at significant increased risk for an array of mental health problems including anxiety, depression and traumatic stress. In some countries, for some individuals, the psychological impact of these viruses was suggested to have been greater than the physical health danger posed by the diseases themselves (Cheng & Tang, 2004), and in the case of SARS, multiple studies referred to this particular outbreak in terms of a 'mental health catastrophe' (Gardner & Moallef, 2015; Mak, Law, Woo, Cheung, & Lee, 2009). However, although fewer in number, an array of studies also investigated the psychological impacts of these IRDs among general population samples (SARS: (J. T. Lau et al., 2005; Leung et al., 2003; Mak et al., 2009; Zhu, Wu, Miao, & Li, 2008); H1N1: (Cowling et al., 2010; Jones & Salathe, 2009; Liao, Cowling, Lam, Ng, & Fielding, 2014; Wong & Sam, 2011); MERS: (Batawi et al., 2019) and specific subgroups of the general population (e.g. women in midlife (Yu, Ho, So, & Lo, 2005); pregnant women (Lee et al., 2006; Ng, Sham, Tang, & Fung, 2004); college students (Main, Zhou, Ma, Luecken, & Liu, 2011); mental health patients (Page et al., 2011); elderly and younger people (A. L. Lau et al., 2008); family members of patients (Elizarrarás-Rivas et al., 2010). These studies revealed complex, nuanced and often severe psychological and mental health

consequences of IRDs that extended beyond the 'frontline' impacts of virus detection, treatment and recovery.

Unsurprisingly, the National Advisory Committee on SARS and Public Health (Naylor et al., 2003) proposed that a 'systemic perspective' was needed and should be prioritised by all those engaged in IRD psychosocial research. This recommendation suggested that psychosocial research should not be restricted to health care workers and patients during such crises and that populations such as family members, nonmedical personnel and the general public, that often remained unseen in IRD research, should also be assessed. It was proposed that this approach would enable more comprehensive and balanced planning of efforts to alleviate the psychosocial burden of IRDs in the population at large or mitigate its onset in the future (Sim & Chua, 2004). In light of this evidence base therefore, and in an attempt to comprehensively respond to the COVID-19 outbreak in the UK and beyond, we deemed it necessary to collect data from a large, nationally representative sample in a manner that could identify the widest variety of important and vulnerable subgroups in the general population.

COVID-19 pandemic: When to study?

A second recommendation proposed by the National Advisory Committee on SARS and Public Health (Naylor et al., 2003) related to study duration. According to this recommendation, because the psychological impact of IRDs may persist or evolve over time, prospective research should be prioritised. It was proposed that longitudinal studies would allow an assessment of the important determinants of, and changes in, psychological distress as well as the protective effects of certain coping strategies and behaviours. Several studies that have investigated the psychological impacts of SARS, MERS and the H1N1 flu pandemic have revealed the ongoing, and in some cases, worsening psychological effects over periods of months and years post outbreak.

In a critical review of the literature relating to the psychological impact of SARS, Gardner and Moallef (2015) showed that studies consistently reported high rates of emotional distress among survivors, persisting for years post infection. In twenty original studies pertaining to the psychological experience of patients, these authors revealed the experience of psychotic symptomatology (possibly linked to corticosteroid treatment), fear for survival, and fear of infecting others were common in the acute and early recovery stages of the virus. Stigmatization, reduced quality of life, and psychological distress were observed across all study timeframes, while posttraumatic stress symptoms were prevalent across all stages post-SARS.

Important findings regarding changing health knowledge, attitudes, behaviours, perceptions and practices over the course of IRDs have also been provided. In a study of the long-term impact of the outbreak of MERS in Korea, Shin et al. (2019) showed that 63.5% of survivors suffered from significant psychiatric problems (post-traumatic symptoms (36.5%), sleep problems (36.5%), anxiety (34.9%), and depression (30.2%)) one year after the outbreak. Using random digit dialling, Cowling et al. (2010) sampled 12,965 Hong Kong residents between April and November 2009, covering the entire first wave of the 2009 H1N1 flu pandemic. Respondents in this study reported low anxiety levels throughout the epidemic. Perceived susceptibility to infection and perceived severity of H1N1 were initially high but declined early in the epidemic and remained stable thereafter. As the epidemic grew, knowledge on modes of transmission did not improve, the adoption of hygiene measures and use of face masks did not change, and engagement in social distancing practices declined. Moreover, greater anxiety in this study was associated with lower reported use of hygiene measures but greater social distancing. Knowledge that H1N1 could be spread by indirect contact was also associated with greater use of hygiene measures and social distancing.

To ensure therefore that important changes in mental health, and knowledge, attitudes, behaviours, perceptions and practices relating to COVID-19 could be comprehensively captured in the current study, we adopted a multi-wave study design to specifically record the psychosocial impact of COVID-19 before and after 'the peak'; (i.e. the time when the UK has been projected to reach its maximum daily COVID-19 related death rate) and at 12 months post outbreak.

COVID-19 pandemic: What to study?

Beyond direction relating to assessment of commonly occurring mental health problems (i.e. depression, anxiety and post-traumatic stress), inclusion of often overlooked populations (general population and specific vulnerable subgroups) and sensitivity to critical periods of investigation in IRD research (from outbreak to peak death rate to societal recovery), the extant evidence base also provided valuable direction in relation to a variety of other relevant issues that were important to capture in the current survey. For example, a detailed literature has amassed in relation to the psychological impact of quarantine in the context of IRDs (SARS*:* (Reynolds et al., 2008); H1N1*:* (Wang et al., 2011) MERS*:* (Kim & Kim, 2018)). Such studies have shown that health-care workers have been shown to experience greater psychological distress, including symptoms of PTSD, and that acute treatment of infections in quarantine can have a significant impact on individuals' mental health. Factors influencing the uptake of vaccination, decision making and intentionality regarding vaccine use, and parental consent regarding vaccination of children have also received much attention (Brown et al., 2010; Byrne, Walsh, Kola, & Sarma, 2012; Cole et al., 2015; McNeill, Harris, & Briggs, 2016; Wong & Sam, 2010a). Specific literatures focussing on post-traumatic stress and PTSD outcomes in the context of IRDs (Yoon, Kim, Ko, & Lee, 2016); and, conversely, others emphasising self-efficacy, resilience, and post-traumatic

growth (Bonanno et al., 2008; S. K. Cheng et al., 2006; Mak et al., 2009) also highlighted key constructs for inclusion in the current study.

Significant attention has also been paid, by previous investigators, to the role, context and change in public health knowledge, attitudes, behaviours, and practices over the course of IRD outbreaks (Alsahafi & Cheng, 2016; Karademas, Bati, Karkania, Georgiou, & Sofokleous, 2013; J. Lau, Griffiths, Au, & Choi, 2011; J. T. Lau, Griffiths, Choi, & Tsui, 2010; Lin et al., 2011). Some investigators have focussed specifically on risk perceptions during IRD epidemics/pandemics (Cho & Lee, 2015; Ibuka, Chapman, Meyers, Li, & Galvani, 2010; Shi et al., 2003; R. D. Smith, 2006), while others have investigated the occurrence and consequences of phenomena such as paranoia (C. Cheng, 2004), uncertainty (Taha, Matheson, & Anisman, 2014) and rumour and superstitious beliefs (Tai & Sun, 2011). A specific literature (more common to H1N1 and MERS outbreaks) has addressed the role and impact of social media and news broadcasting during IRD outbreaks (H1N1: (McNeill et al., 2016; Taha, Matheson, & Anisman, 2013; Tausczik, Faasse, Pennebaker, & Petrie, 2012; Wong & Sam, 2010b); MERS: (Choi, Yoo, Noh, & Park, 2017; Lim, Lee, Kim, & Chang, 2017; Ludolph, Schulz, & Chen, 2018; Seo, 2019; Yoo, Choi, & Park, 2016). This body of research captures a variety of issues such as the role of trust in the media in determining vaccination intentions, public anxiety associated with information seeking, general health information dissemination, and the effects of mass media exposure on the uptake of preventive measures by the public. Finally, specific literatures relating to the role of social networks in shaping disease transmission (Cauchemez et al., 2011), the dangers and challenges of loneliness and isolation during IRD outbreaks (Jeong et al., 2016; Koller, Nicholas, Goldie, Gearing, & Selkirk, 2006) and residential status (i.e. proximity to infection regions; Lee et al. (2006)) revealed important social contact measures for inclusion in the current study.

The unique UK socio-political context of COVID-19

An important additional factor, absent from the extant IRD literature, further informed the design and content of the C19PRC Study. Unprecedented social controls that were being introduced globally to slow the spread of the virus and to alleviate pressures on health care provision (whilst the C19PRC Study was being designed and developed in March 2020) were unique to the current pandemic and constituted a critical social feature that significantly differentiated COVID-19 from any preceding IRDs in the literature. It was critical therefore to document the response to these social control measures that had been implemented in the UK specifically (during the completion of the C19PRC-UKW1) as the potential for social and psychological disruption in the population was likely to be attributable to these measures as well as to the fear, panic, anxiety and psychological distress that may have been growing in response to the rapid contagion of the virus.

Specifically, describing the changing social, economic and political context during the early stages of the COVID-19 pandemic in the UK (from the first confirmation of infection, to the first public information campaign, to the launch of the current survey), afforded an opportunity to demonstrate (i) what World Health Organisation (WHO) public health information was available, and how it was used to inform the content of the COVID-19 related items in the study; and (ii) what UK government announcements were made and what UK public health measures were introduced and implemented (*a*) before the study was launched, and importantly (*b*) while it was being completed. The following timeline begins on the 31st of December 2019, with the detection of cases of pneumonia in Wuhan, China, which were later attributed to a new strain of coronavirus that had not previously been detected in humans, and ends on the 23rd of March 2020, with the launch of the current study and the UK Prime Minister's announcement to the nation that all citizens were to remain indoors at home except for very limited purposes (e.g. infrequent shopping for basic

necessities, one form of exercise a day, any medical need, travelling for work purposes where necessary). Critical phases in the development, testing and launch of the survey have been italicised and underlined.

UK COVID-19 Timeline

31-12-2019 COVID-19 first detected in Wuhan, China. **30-01-2020** WHO declares that COVID-19 had met the criteria of being a Public Health Emergency of International Concern. **31-01-2020** First UK coronavirus cases confirmed. The UK Chief Medical Officers advised an increase in the UK risk level from low to moderate; however, it was made clear that "this does not mean [they] think the risk to individuals in the UK has changed […] but that the UK should plan for all eventualities". **02-02-2020** UK Government launches a public information campaign to advise on how to slow the spread of COVID-19, emphasising the importance of handwashing. **10-02-2020** The British Health Secretary introduces strengthened powers for public health officials to quarantine people against their will, if necessary. **01-03-2020** COVID-19 cases detected across UK in England, Wales, Scotland and Northern Ireland. **03-03-2020** UK Government publishes coronavirus action plan. This joint action plan between the UK Government and devolved Governments in Wales, Scotland and Northern Ireland sets out a phased response to the virus that includes the 'contain phase', the 'delay phase', a 'research phase' through to the 'mitigate phase'. **04-03-2020 (87 confirmed cases; 0 deaths)**. **05-03-2020** UK records its first COVID-19 related death. **09-03-2020** UK Prime Minister chairs an emergency Cabinet Office Briefing Rooms (COBRA) meeting, attended by the First Ministers of Wales, Scotland and Northern Ireland. The Prime Minister announces that the UK remains in the first 'containment' phase of the outbreak, but that extensive preparations are being made for a move to the 'delay' phase. **09-03-2020** *Lead investigator Richard P. Bentall initiates contact with collaborators and begins planning for a nationally representative survey on the psychological impact of the COVID-19 pandemic in*

the UK. **10-03-2020 (373 confirmed cases; 6 deaths)**. **11-03-2020** The UK Chancellor announces a £12 billion package of measures to support public services, individuals and businesses affected by COVID-19. This includes additional funding for services, statutory sick pay changes, and a temporary increase in the Business Rates retail discount. **11-03-2020** WHO describes COVID-19 as a pandemic but emphasises that this "does not change WHO's assessment of the threat posed by this coronavirus. It doesn't change what WHO is doing, and it doesn't change what countries should do". (The term 'pandemic' refers to the spread of a new, infectious disease across multiple countries, rather than its severity or numbers of cases/deaths). **12-03-2020** The UK moves into the delay phase. The UK Chief Medical Officers raise the risk to the UK from 'moderate' to 'high'. New advice issued instructs UK citizens to self-isolate for 7 days if they develop a high temperature or a new continuous cough. Citizens are also advised not to go to a GP, pharmacy or hospital and to only phone the emergency National Health Service helpline (111) if symptoms do not abate or conditions worsen after 7 days. **13-03-2020** New regulations come into force across Wales, England and Scotland that those who are self-isolating, in line with guidance relating to COVID-19, are deemed to be incapable of working and are entitled to statutory sick pay. **15-03-2020** The British Health Secretary warns that over-70s may be asked to "self-isolate", by not leaving their homes, for an extended period "within weeks". **16-03-2020 (1,543 confirmed cases; 55 deaths)** UK Prime Minister updates advice and informs public that, if anyone in a household has a new continuous cough or high temperature, the whole household should self-isolate for 14 days. The Prime Minister also announces that all non-essential contact and unnecessary travel should cease, and that people should start to work from home where possible. The UK Government also announces that they "will no longer be supporting mass gatherings with emergency workers" and that social distancing is particularly important for those over 70 years old, pregnant women and those with some underlying health conditions. **17-03-2020**

The UK Government publishes details of the proposed measures to be included in the fast-tracked coronavirus legislation. **19-03-2020 (3,269 confirmed cases; 144 deaths)** The Education Minister appears before the Children, Young People and Education Committee to discuss the impact of COVID-19 on education, including the cancellation of this summer's GCSE and A-level exams. **19-03-2020** The Coronavirus Bill 2019-21 is introduced in the House of Commons. **19-03-2020** *First soft-launch (piloting) of the C19PRC-UKW1*. **20-03-2020** The Prime Minister announces that the Government are "telling cafes, pubs, bars, restaurants to close tonight" as well as "nightclubs, theatres, cinemas, gyms and leisure centres". **20-03-2020** The Chancellor announces the creation of a Coronavirus Job Retention Scheme where any UK employers will be able to contact Her Majesty's Revenue and Customs (HMRC) for a grant to cover 80% of the salary of retained workers. The Scheme will cover the costs of wages backdated to 1 March 2020 and is initially set up to cover at least 3 months. **20-03-2020** *Second soft-launch of revisions of the C19PRC-UKW1*. **21-03-2020 (4,000+ cases; 230 deaths)** Regulations requiring the closure of businesses selling food or drink for consumption on the premises come into force in England and Wales. **23-03-2020 (09:00)** Official launch of C19PRC-UKW1 **23-03-2020 (20:30)** The UK Prime Minister addresses the nation – all people are now required to stay at home except for very limited purposes. Non-essential shops and community spaces will close, and gatherings of more than two people in public are prohibited. These measures are enforceable by the police and other relevant authorities. The government also asks ~1.5million vulnerable people who will likely need hospital treatment to "shield" themselves. This involves voluntarily staying at home for 12 weeks to avoid getting the virus.

Method

Overview: C19PRC Study design. The C19PRC Study is a longitudinal, multi-country study which aims to assess the psychological impact of the COVID-19 virus in the adult general population, commencing in the UK. C19PRC-UKW1 involved an internet-based survey, which was conducted between 23 and 28 March 2020. The first follow-up study, or wave 2, (C19PRC-UKW2) is planned to commence on 20 April 2020 approximately four weeks after C19PRC-UKW1 began. Other in-depth supplemental studies, including those using qualitative designs, will be conducted with sub-groups of respondents recruited as part of the study 'spine' (i.e. during C19PRC-UKW1) and will be described in detail in subsequent methodological papers in due course.

C19PRC-UKW1: Fieldwork procedures.

Fieldwork organisation overview. C19PRC-UKW1 fieldwork was conducted by the survey company Qualtrics, which has completed more than 15,000 projects across 2,500 universities worldwide. C19PRC-UKW1 survey data were collected between 23 and 28 March 2020, with two 'soft launches', or pilots, conducted on 19 and 20 March 2020 (*n*=50 respondents for each launch to check the survey for any errors and/or omissions prior to the full launch on 23 March 2020). Participants recruited for the 'soft launches' were excluded from the main C19PRC-UKW1 sample.

C19PRC-UKW1 Sampling design. The UK adult population aged 18 years and older was the target population for C19PRC-UKW1. Quota sampling methods to ensure the C19PRC-UKW1 sample was representative of this population in terms of age and sex, were based on 2016 population estimates from Eurostat (2020), the European Commission equivalent of the Office for National Statistics (ONS).

Procedure. As an aggregator of panels, Qualtrics provides the online platform to securely house data and leverages partners to connect with respondents. Qualtrics recruits

study participants from traditional, actively managed, double-opt-in market research panels, which are used for corporate and academic market research only. All of Qualtrics' partners are members of the European Society for Opinion and Marketing Research (ESOMAR), the Council of American Survey Research Organisations (CASRO) and other national organizations. The 'opt-in for market research' process requires respondents to submit an initial registration form requesting to participate in market research studies. Potential respondents build their profile from a standardized list of questions.

Potential respondents could have been alerted to the C19PRC-UKW1 study by Qualtrics in one of two ways: (1) they opted to enter studies they are eligible for themselves by signing up to a panel platform; or (2) they received automatic notification through a partner router which alerts/direct them to studies for which they are eligible (either via email, SMS, in-app notifications). Importantly, to avoid self-selection bias, survey invitations to eligible participants only provide general information and do not include specific details about the contents of the survey. Participants were required to be an adult (18+ years or older), able to read and write in English, and a resident of the UK. No other exclusion criteria were applied. Panel members were not obliged to take part in the study; however, panel members routinely receive an incentive for survey participation based on the length of the survey, their specific panellist profile, and target acquisition difficulty, amongst other factors. The specific type of reward varies and may include cash, air miles, gift cards, redeemable points, charitable donations, sweepstakes entrance, or vouchers.

For the purposes of quota sampling to age, sex and household income for C19PRC-UKW1, Qualtrics proceeded as follows during the six days of fieldwork: (1) respondents in 'hard to reach' quota groups (e.g. young adults in the highest income bands) were prioritised and targeted first; (2) next, the focus shifted to allow the quotas to 'fill up' naturally, without specific targeting; and (3) finally, a switch back to targeting respondents to fill incomplete

quotas ensued. Those who chose to participate followed a link to a secure website and completed all surveys online. The invite link was active for a participant until a quota they would have qualified for was reached but after the quota was filled, previously eligible respondents were prevented from taking part in this study.

Informed consent process. Participants were informed about the purpose of C19PRC-UKW1, that their data would be treated in confidence, that geolocating would be used to determine the area in which they lived (which is used, in conjunction with their postcode stem, to link external data sources to their survey responses – e.g. area-level deprivation, population density, etc.) and of the right to terminate the study at any time without giving a reason. Participants were also informed that some topics may be sensitive or distressing. Information about how their data would be stored and analysed by the research team was also provided. All participants provided informed consent prior to completing the survey and were directed to contact the NHS 111 COVID-19 helpline at the end of the survey if they experienced any distress or had additional concerns about COVID-19.

Compliance with General Data Protection Regulation (GDPR). C19PRC data will be kept confidential in line with GDPR. In accordance with GDPR, contact details were separated from the dataset and personal data is restricted to members of the research team. If the C19PRC Study data is to be shared with other researchers, location data will be removed and replaced with relevant socioeconomic summary data (e.g. area-level deprivation and population density data). All other personal data will also be removed.

Quality control. Prior to recruitment, C19PRC-UKW1 completion time was estimated at 30 minutes and based on the soft launch completion times (median time 22 mins, 22 seconds), a minimum completion time for C19PRC-UKW1 was set at 11 mins, 11 seconds. Qualtrics employed checks to identify and remove any participants who completed

the survey in less than the minimum completion time to ensure responses were trustworthy or potential duplicate respondents.

Ethical approval. Ethical approval for this project was provided by the University of Sheffield (Reference number 033759).

Measures.

Socio-demographic characteristics. In addition to data relating to sex, age, and gross annual household income (which was used for quota sampling), respondents provided data on their ethnicity, religious affiliation, highest level of educational attainment, gross annual household income, current economic activity, urbanicity of residential location, household composition (number of adults and children under 18 years) and whether they were born in the UK and raised there (i.e. lived in the UK before the age of 16 years).

Health characteristics. Participants were asked whether they and members of their immediate family were living with lung disease, diabetes or heart disease; the UK government directed that these chronic health conditions are risk factors for more severe ill-health and increased risk of death upon contracting COVID-19. Information was also gathered as to whether participants had been diagnosed with a chronic health condition prior to the COVID-19 outbreak (i.e. prior to 31st December 2019). Female respondents were also asked whether they were pregnant at the time of the survey and, if so, how many weeks gestation. All respondents were asked whether any members of their immediate family were pregnant at the time of the survey.

COVID-19.

Knowledge, attitudes and beliefs: COVID-19. As this study was devised in mid-March 2020 at the beginning of a global pandemic when COVID-19 was a new virus, no existing measure was available to assess the general population's knowledge, attitudes and behaviours (KAB) of the virus. In order to assess COVID-19 related KAB, measures

developed for use in studies of other global pandemics, for example the 2003 SARS outbreak, the 2009 H1N1 flu pandemic and the 2013-16 Ebola virus pandemic, were consulted and assessed for suitability and adaptation, where possible. Reliable and trusted web sources in the UK (e.g. Public Health England, the National Health Service; NHS) and internationally (e.g. the Centre for Disease Control, the WHO) were also consulted for current, evidence-based knowledge and information relating to the clinical presentation and transmission of COVID-19. Details of the newly devised questions/measures are described below.

Knowledge of COVID-19 symptoms. Respondents were asked to indicate, based on current knowledge, what they believed to be the most commonly reported symptoms of COVID-19 from a list of 12 symptoms (yes/unsure/no response): fever; vomiting; tiredness; muscle pains; coughing; rash; diarrhoea; severe headache; breathing difficulties/shortness of breath; bleeding (internal or external); sore throat; nasal congestion. According to CDC/WHO, the three most common symptoms of COVID-19 (in March 2020) were a cough, fever, shortness of breath; 'yes' responses to all three symptoms would indicate accurate knowledge of COVID-19 symptoms (Centre for Disease Control and Prevention, 2020a; World Health Organisation, 2020a). Symptoms such as bleeding, vomiting, a rash, and diarrhoea were common with other global pandemics (e.g. Ebola), whereas symptoms such as sore throat, headaches and muscle aches are more commonly associated with cold or influenza (Australian Government Department of Health, 2020).

Transmission of COVID-19. Respondents were asked a series of statements relating to possible pathways of transmission of COVID-19 ("Based on current knowledge, how do you think COVID-19 spreads? Can the virus be spread by…?") and were required to indicate whether they believed (yes/no) these to be correct. Eight modes of transmission included: people touching each other; people coughing or sneezing; food contamination; insects (e.g. flies); breathing the air outside; breathing the air in confined spaces; contact with pets; and

touching surfaces. According to the Centre for Disease Control and Prevention (2020c), extant knowledge indicated that the COVID-19 virus transmitted person-to-person via two main modes of transmission: close physical human contact and through respiratory droplets produced when an infected person sneezes or coughs. Accurate knowledge of COVID-19 transmission in this survey, therefore, is indicated by respondents correctly identifying 'no' to modes of transmission involving food contamination, insects, breathing air outside, and contact with pets.

Attitudes relating to risk of contracting COVID-19. To assess level of engagement with, and retention of, information provided in ongoing national and international public health campaigns (Centre for Disease Control and Prevention, 2020b; NHS, 2020a; World Health Organisation, 2020b), respondents were asked the extent to which they agreed with six attitudinal statements relating to general risk of contracting COVID-19 (scored on a 5-point Likert scale ranging from 1 'completely disagree' to '5 completely agree'): (1) antibiotics are effective in preventing and treating COVID-19; (2) washing your hands with soap and water, or using alcohol-based hand-rub regularly, may help reduce risk of infection; (3) healthy people without symptoms should wear a face mask; (4) regularly rinsing your nose with saline will help reduce the risk of COVID-19; (5) cold weather helps to kill the COVID-19 virus; and (6) maintaining at least 1 metre (3 feet) distance between yourself and another person ('social distancing'), may help reduce your risk of infection. Agreement (or strong agreement) with statements 2 and 6 was deemed to be indicative of engagement with current public health messaging.

Health Behaviours relating to preventing COVID-19 transmission. Seventeen questions based on the COM-B (Capability, Opportunity, Motivation-Behaviour) model of behaviour change (Michie, Van Stralen, & West, 2011) assessed respondents' ability to engage in two key public health-protective behaviours recommended to help prevent

COVID-19 and reduce or slow the spread of the disease, namely, *maintaining hygienic practices* and *social distancing*. Questions focused on respondents' perception of the extent to which they experienced sufficient motivation, capability and opportunity to enact the recommended behaviours.

Items were adapted from a preliminary version of the COM-B self-evaluation questionnaire (COM-B-Qv1) (Michie, Atkins, & West, 2014). In relation to each of the two health-protective behaviours, participants were asked to indicate the extent to which seventeen statements were true for them during the COVID-19 pandemic on a 5-point Likert scale ranging from 1 'strongly agree' to 5 'strongly disagree'. Definitions of each behaviour were given within the questions. *Maintaining hygienic practices* was defined as 'for example hand washing frequently, cleansing surfaces' and *social distancing* was defined as 'for example avoiding crowds, maintaining personal distance, avoiding non-essential meetings, less socialising in public'. Capability was measured by three items: "I knew about why it was important and had a clear idea about how the virus was transmitted", "I knew about how and when to do it" and "I was able to overcome the physical and/or mental barriers that might have stopped me from doing it". Opportunity was measured by six items, split into physical opportunity: "I had the necessary time to do it", "It was easy for me to do it", "People were doing it around me", "I had reminders that prompted me" and social opportunity: "I had support from others" and "I felt like doing it was normal and expected". Motivation was measured by eight items, split into five items measuring reflective motivation: "I intended to do it", "I felt that I wanted to do it", "I believe that it was a good thing to do", "I developed a specific plan for doing it", "I developed a habit of it in my everyday routine" and three items measuring automatic motivation: "It made me feel anxious", "It made me feel disgusted" and "I felt like I could control my emotional reactions so I could do it". Measurements of

behaviour in relation to maintaining hygiene practices and social distancing were also assessed as follows.

Personal behaviour change to reduce individual risk of contracting COVID-19. Respondents were asked to report on whether and how they have changed behaviours relating to their personal care and health recently to reduce their personal risk of being infected by COVID-19 during the pandemic. Statements were posed as follows: "To reduce your risk of being infected by COVID-19 have you recently…": (1) Worn a face mask; (2) Washed your hands with soap and water more often; (3) Used hand sanitising gel if soap and water were not available; (4) Used disinfectants to wash surfaces in your home more frequently; (5) Covered your nose and mouth with a tissue or sleeve when coughing or sneezing; (6) Taken a herbal supplement; and (7) Ensured you have enough sleep. Response categories were no, occasionally, or whenever possible. In addition, respondents were asked whether they had, more generally, changed their behaviours following best practice advice from the earliest messages in public health campaigns: "To protect yourself from COVID-19, to what degree have you changed your plans and behaviour to avoid the following?": (1) Travelling to infected areas (e.g. China, Italy); (2) Travelling via airplane; (3) Travelling in taxis; (4) Travelling on public transport (e.g. trains, underground, buses); (5) Close contact greetings with other people (e.g., shaking hands, hugging); (6) Eating in restaurants; (7) Attending large gatherings of people (e.g. cinema, theatre, concerts); (8) Touching your eyes or mouth; (9) Being close to people who are ill; (10) Going to school, college or work; and (11) Taking children to school. Responses ranged from 1 'Not at all' to 4 'Avoided completely'.

Experiences of COVID-19 symptoms, testing and diagnosis. Respondents were asked whether they had, by the time of the survey (March 2020), experienced symptoms of COVID-19, whether they had been tested for the virus and the outcome (positive/negative) of that test. Respondents were also asked whether someone close to them (e.g. a family member

or friend) had experienced symptoms of COVID-19 and the outcome (positive or negative) following being tested for COVID-19. All respondents were asked whether they were currently (or had in the recent past) self-isolated.

Anxiety relating to COVID-19. Respondents' degree of specific anxiety about the COVID-19 pandemic was assessed using a single visual slider scale, ranging from 0 'not at all anxious' on the left-hand side to 100 'extremely anxious' on the right-hand side.

Perceived risk of contracting COVID-19. Respondents estimated on a visual slider (ranging from 0% on the left-hand side to 100% on the right-hand side) their perceived percentage risk of contracting COVID0-19 within one-month, within three months, and within six months of the survey. They were also asked to estimate the perceived risk of different vulnerable groups – the elderly, children, pregnant women, and those with underlying chronic health conditions – experienced serious illness and (separately) death following a diagnosis of COVID-19 – using the same 'percentage risk' visual slider.

Knowledge of appropriate action to take following COVID-19 diagnosis. Respondents were asked what members of the public had been advised to do if they suspected that they had been infected by COVID-19: (1) go to their nearest hospital immediately; attend their GP to get tested for the virus; stay at home and keep away from other people; or call the NHS COVID-19 helpline. At the time of the survey, government advice was for people to stay at home and self-isolate and call the NHS helpline if symptoms deteriorated (NHS, 2020b). Respondents were asked if they were aware of the NHS helpline number (i.e. 111) and asked to report it.

Attitudes relating to accepting any potential COVID-19 vaccine. At the time of the survey, there was no approved vaccine available for COVID-19. In anticipation of a vaccine being developed in the future, respondents were asked their views on the acceptability of a

newly-developed COVID-19 vaccine for themselves, their children, their relatives' children and their elderly relatives (yes/no/maybe response categories).

Consumer purchasing during COVID-19 pandemic. A series of questions were developed to measure respondents' purchasing behaviours during the early phases of the UK epidemic. Respondents were asked to report the extent to which they increased their purchasing of the following items in the weeks before the survey: (1) Tinned food; (2) Water; (3) Sanitary products (e.g. hand sanitiser); (4) Toilet roll; (5) Dried foods (e.g. pasta. rice); (6) Bread; (7) Pharmacy products (e.g. painkillers, cold/flu products); (8) Batteries; and (9) Fuel (heating or car fuel). Responses were recorded on a five-point Likert scale ranging from (1) 'not at all' to 5 'very considerably'.

Perceived household income changes during the COVID-19 pandemic. Respondents were asked to report their experiences of changes in income during the Coronavirus pandemic, including: (1) a loss of income due to not being able to work as much or because business contracts had been cancelled or delayed; and (2) any financial savings made due to changes in leisure activities (e.g. not eating out in restaurants; attending the cinema or sports events). Response scales for both items were 'my household has/has not lost/saved income because of the COVID-19 pandemic' (with the additional option of 'unsure whether my household has/has not lost/saved income because of the COVID-19 pandemic). Finally, respondents were asked to report, on balance, how much they had worried about the way their household finances had been affected by the pandemic, with response options ranging from 1 'not at all worried' to 10 'extremely worried'.

Mental health.

Patient Health Questionnaire-9 (PHQ-9) (Kroenke, Spitzer, & Williams, 2001). Depression was assessed with the PHQ-9, a nine-item measure which corresponds to the DSM-IV Diagnostic Criterion A symptoms for major depressive disorder (American

Psychiatric Association, 2000). Participants were asked how often, over the last two weeks, they had been bothered by each of the depressive symptoms. Response options were "not at all", "several days", "more than half the days", and "nearly every day", scored as 0, 1, 2 and 3, respectively. PHQ-9 scores range from 0 to 27, with scores of ≥5, ≥10, ≥15, representing mild, moderate and severe levels of depression severity (Kroenke et al., 2001). A threshold of ≥10 was used in this study. Psychometric properties of the PHQ-9 are well documented (see Kroenke, Spitzer, Williams, and Löwe (2010) for an overview). A threshold of

Generalized Anxiety Disorder Scale (GAD-7) (Spitzer, Kroenke, Williams, & Löwe, 2006). Experiences of generalized anxiety were assessed using the GAD-7. Respondents were asked to report, on a 4-point Likert scale ranging from 1 (not at all) to 4 (nearly every day), how often in the past 7 days they were bothered by seven anxiety symptoms (e.g. trouble relaxing, becoming easily annoyed or irritable). The GAD-7 was originally validated in a primary care sample and a cut-off score of 10 had a sensitivity value of 0.89 and a specificity value of 0.82 for identifying generalised anxiety disorder (Spitzer et al., 2006), and a threshold of 10 was used in this study. The GAD-7 has demonstrated good reliability and construct validity, as evidenced by strong associations with other established measures of anxiety as well as diagnoses of GAD and its associations with depression, self-esteem, life satisfaction, and resilience (Löwe et al., 2008).

Persecution and Deservedness Scale (PaDS) (Melo, Corcoran, Shryane, & Bentall, 2009). Paranoia was assessed with five items taken from the persecution subscale of the persecution and deservedness scale (PaDS), a measure designed for use with both clinical and population samples and which has been validated against both questionnaire and clinical measures of paranoia (Elahi, Algorta, Varese, McIntyre, & Bentall, 2017; Melo et al., 2009). Participants rated their agreement on a 5-point scale 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 1 = strongly disagree to 5 = strongly agree. Scale reliability

for the five items was very good ($\alpha = 0.84$) in a previous epidemiological study of UK

citizens (McIntyre, Wickham, Barr, & Bentall, 2018).

International Trauma Questionnaire (ITQ) (Cloitre et al., 2018). Post-traumatic stress

disorder was assessed using the ITQ, a self-report measure of ICD-11 PTSD based on a total

of six symptoms across the three symptom clusters of Re-experiencing, Avoidance, and

Sense of Threat; each symptom cluster is comprised of 2 symptoms. Participants were asked

to complete the ITQ as follows: "…in relation to your experience of the COVID-19

pandemic, please read each item carefully, then select one of the answers to indicate how

much you have been bothered by that problem in the past month". The PTSD symptoms are

accompanied by three items measuring functional impairment caused by these symptoms. All

items are answered on a 5-point Likert scale, ranging from 0 (Not at all) to 4 (Extremely)

with possible PTSD scores ranging from 0 to 24. A score of ≥ 2 (Moderately) is considered

'endorsement' of that symptom. A PTSD diagnosis requires traumatic exposure, and at least

one symptom to be endorsed from each PTSD symptom cluster (Re-experiencing,

Avoidance, and Sense of Threat), and endorsement of at least one indicator of functional

impairment. The psychometric properties of the ITQ scores have been demonstrated in

multiple general population (Ben-Ezra et al., 2018; Cloitre et al., 2019) and clinical and high-

risk samples (Hyland et al., 2017; Karatzias et al., 2016; Vallières et al., 2018) samples.

Patient Health Questionnaire-15 (PHQ-15) (Kroenke, Spitzer, & Williams, 2002).

The PHQ-15 is a brief, self-administered questionnaire which assesses for the presence and

severity of the most prevalent DSM-IV somatization disorder somatic symptoms (American

Psychiatric Association, 2000). Respondents rated the severity of symptoms, such as stomach

pain, headaches, dizziness, they experienced over the last seven days as 0 ('not bothered at

all'), 1 ('bothered a little') or 2 ('bothered a lot'). PHQ-15 score ranges from 0 to 30 and

scores of ≥5, ≥10, ≥15 represent mild, moderate and severe levels of somatization (Kroenke et al., 2002). The reliability and validity of the PHQ-15 are high in clinical and occupational health care settings (de Vroege, Hoedeman, Nuyen, Sijtsma, & van der Feltz-Cornelis, 2012; Kroenke et al., 2002; Kroenke et al., 2010).

Treatment seeking behaviour for mental health difficulties. All respondents were asked about their history of mental health difficulties (never received treatment for mental health problems; received treatment for mental health problems in the past; and currently receiving treatment for mental health problems).

Psychological variables.

Locus of control (LoC) scale (Sapp & Harrod, 1993). The short 9-item version of Levenson's LoC scale (Levenson, 1973), which measures internal LoC (items such as 'My life is determined by my own actions') and external LoC, which has two components - change (items such as 'To a great extent, my life is controlled by accidental happenings') and powerful others (items such as 'Getting what I want requires pleasing those people above me'). The internal, chance, and powerful others subscales were each measured by three questions using a 7-point Likert scale ranging from 1' strongly disagree' to 7 'strongly agree'.

Death Anxiety Inventory (DAI) (Tomás-Sábado, Gómez-Benito, & Limonero, 2005). Respondents' attitudes towards death were assessed using the 17-item DAI, which measures four death-related anxiety factors (labelled as death acceptance, externally generated death anxiety, death finality, and thoughts about death) with items such as 'I get upset when I am in a cemetery', 'The sight of a corpse deeply shocks me', 'I find it difficult to accept the idea that it all finishes with death' and 'I find it really difficult to accept that I have to die'. Responses were scored on a 5-point Likert scale ranging from 1 'totally disagree' to 5 'totally agree' (Tomás-Sábado et al., 2005).

Big-Five Inventory (BFI-10) (Rammstedt & John, 2007). The five personality traits of openness to experience, conscientiousness, extroversion, agreeableness and neuroticism were assessed using the BFI-10, which contains items two items per personality construct such as 'I see myself as someone who is reserved', ' I see myself as someone who tends to be lazy', and 'I see myself as someone who has few artistic tendencies'. Rammstedt and John (2007) reported good reliability and validity for the 10-item scale.

Intolerance of uncertainty (Buhr & Dugas, 2002). Respondents' intolerance of uncertainty, which is thought to play a key role in the aetiology and maintenance of worry, was assessed using the 12-item Intolerance of Uncertainty Scale (IUS) (Buhr & Dugas, 2002). The IUS has a good construct validity (Birrell, Meares, Wilkinson, & Freeston, 2011), with two factors '*unexpected events are negative and should be avoided*' measured by items such as 'I always want to know what the future has in store for me', and '*uncertainty leads to the inability to act*' measured by items such as 'the smallest doubt can stop me from acting'. All 12 items are scored on a 5-point Likert scale ranging from 1 'not at all characteristics of me' to 5 'entirely characteristic of me'. The IUS has excellent internal consistency, good test–retest reliability over a five-week period, and convergent and divergent validity when assessed with symptom measures of worry, depression, and anxiety (Buhr & Dugas, 2002).

Loneliness Scale (Hughes, Waite, Hawkley, & Cacioppo, 2004). Social connectedness was measured using the three-item Loneliness Scale, which was specifically designed for use in large-scaled population surveys (Hughes et al., 2004). Respondents were asked how often they felt: (1) that they lacked companionship; (2) left out; and (3) isolated from others. Responses were scored on a 3-point scale (hardly ever, sometimes, or often).

Single-Item *Self-esteem Scale* (SISES) (Robins, Hendin, & Trzesniewski, 2001). Respondents' reported the extent to which they agreed with a single statement ('I have high self-esteem') on a 7-point Likert scale ranging from 1 'not very true of me' to 7 'very true of

me'. The SISES has been shown to have good convergent validity against other self-esteem measures (Robins et al., 2001).

Brief Resilience Scale (BRS) (B. W. Smith et al., 2008). Respondents' level of resilience was assessed using the 6-item BRS, which included the items such as: 'I tend to bounce back quickly after hard times'; ' I have a hard time making it through stressful events'; and ' I tend to take a long time to get over set-backs in my life'. Items were scored on a 5-point Likert scale ranging from 1 'strongly disagree' to 5 'strongly agree', with items 2,4 and 6 reverse coded. The BRS has demonstrated construct, convergent, and discriminant validity in the general population (Kyriazos et al., 2018; Rodríguez-Rey, Alonso-Tapia, & Hernansaiz-Garrido, 2016).

Facial detection of trust (Martinez, Agostini, Alsuhibani, & Bentall, in submission). This task used stimuli obtained from the trustworthiness dataset of the Princeton Social Perception Lab database[1] (Oosterhof and Todorov (2008). This dataset contains computer-generated faces created using FaceGen 3.1 and includes identities manipulated on different traits as rated by a normative sample (attractiveness, competence, dominance, extroversion, likeability, threat, and trustworthiness). From the data set, 10 bald Caucasian male computer-generated faces (5 prior rated as trustworthy and 5 prior rated as untrustworthy) were randomly selected by using the website www.Random.org. Participants were presented with each face followed by a fixation cross and were asked: "*How much would you trust this person*". Answers were given on a 7-point Likert scale (1 = *"I would not trust this person at all"* to 7 = *"I would trust this person completely"*) .

Cognitive Reflection Task of Analytical Reasoning (CRT)was devised by (Frederick, 2005) as a measure of analytical reasoning. Respondents' level of ability was assessed using an adapted version which included two additional items as well as the three in the original scale CRT. Respondents were asked to solve the following five problems, each of which is

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[1] http://tlab.princeton.edu/databases/secretdatabaseportal/

designed to stimulate intuitively appealing but incorrect responses: (1) A bat and a ball cost £1.10 in total. The bat costs £1.00 more than the ball. How much does the ball cost? (2) If it takes 5 machines 5 minutes to make 5 widgets, how long would it take 100 machines to make 100 widgets? (3) In a lake, there is a patch of lily pads. Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half of the lake? (4) If you're running a race and you pass the person in second place, what place are you in? (5) A farmer had 15 sheep and all but 8 died. How many are left? Each problem hints at an incorrect answer and analytic reasoning (or 'slow thinking'; (Kahneman, 2012) reflects correct responses obtained by ignoring or discounting the hinted answer. The response format was multiple choice with three foil answers (including the hinted incorrect answer) as recommended by Sirota and Juanchich (2018).

Social and political attitudes and behaviours.

Very Short Authoritarianism Scale (VSA) (Bizumic & Duckitt, 2018). Under the Dual-Process Motivational Model (Duckitt, 2001, 2009), right-wing authoritarianism (RWA) and social dominance orientation (SDO) are conceptualised as value-attitude-belief dimensions which emerge from two different motivational schemas: threat-control (RWA) and competition-dominance (SDO). Both are robust predictors of a range of right-wing political beliefs, including prejudice. Past research also demonstrates that RWA can interact with the perception of threat to produce support for anti-democratic policies (Cohrs, Maes, Moschner, & Kielmann, 2007; Kossowska et al., 2011). The six-item VSA was used to assess respondents' levels of RWA, and includes items such as: 'It's great that many young people today are prepared to defy authority'; 'What our country needs most is discipline, with everyone following our leaders in unity'; and 'Our society does NOT need tougher government and stricter laws'. All items were scored on a 5-point Likert scale ranging from 1 'strongly disagree' to 5 'strongly agree', with three items reverse coded.

Social Dominance Scale (SDO$_7$) (Ho et al., 2015). Respondents' levels of social dominance orientation were assessed using the eight-item SDO$_7$. Respondents were asked the extent to which they opposed/favoured statements such as : 'An ideal society requires some groups to be on top and others to be on the bottom'; 'Some groups of people are simply inferior to other groups'; and 'We should do what we can to equalize conditions for different groups'. Response were scored using a 5-point Likert scale ranging from 1 'Strongly oppose' to 5 'Strongly Favour'. Ho et al. (2015) demonstrated the SDO$_7$ had good criterion and construct validity.

Identification with all humanity scale (IWAH) (McFarland, Webb, & Brown, 2012). The original nine-item IWAH was adapted for use in this study (reference to 'Americans' in the original study was substituted with 'the UK'). Respondents were asked to report on three statements with reference to three groups – people in my community; people from 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'.

Patriotism/Nationalism. Patriotism (sometimes referred to as 'constructive nationalism' has been conceptualised as love for one's country, whereas nationalism has been conceptualised as the belief that one's country is superior to others. Items to measure patriotism and nationalism were adapted from Davidov (2011). Patriotism was assessed by pride in Britain's democracy, its National Health Service (NHS) and its fair and equal treatment of all groups in society. Nationalism was assessed by two items: 'The world would be a better place if people from other countries were more like the British' and 'Generally

speaking, Britain is a better country than most other countries'. Responses were scored on 5-point Likert scales from 1 'strongly disagree' to 5 'strongly agree'.

Attitude towards migrants. Three items from the British Social Attitudes Survey 2015 (British Social Attitudes Survey 2015, 2015) were used to assess respondents' attitudes towards migrants, as follows: (1) would you say it is generally bad or good for Britain's economy that migrants come to Britain from other countries? (scored on a 10-point scale ranging from 1 'extremely bad' to 10 'extremely good') (2) would you say that Britain'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'); and (3) Some migrants make use of Britain's schools, increasing the demand on them. However, many migrants also pay taxes which support schools and some also work in schools. Do you think that, on balance, migration to Britain reduces or increases pressure on the schools across the whole of Britain (scored on a 5-point scale ranging from 1 'reduces pressure a lot' to 5 'increases pressure a lot')?

Voting behaviour and political party affiliation. Three questions were used to assess respondents' voting behaviour in the last general election (December 2019) and in the European Referendum (May 2016). All respondents were asked if they had voted (responses voted; did not vote; ineligible to vote, too young; ineligible to vote, not a UK citizen or resident). For those respondents who did vote, in relation to the General Election, they were asked to report which political party they voted for (all main political parties and an 'other' option were presented); in relation to the European Referendum, they were asked whether they had voted to 'Leave' or 'Remain in' the EU. Three additional questions, adapted from the British Election Study 2017 (2017), asked respondents how they would describe their (1) political affiliation (on a 10-point scale ranging from 1 'left-wing' to 10 'right-wing'); (2) views on social issues such as abortion and same-sex marriage (on a 10-point scale from 1

'very liberal' to 10 'very conservative'); and (3)views on economic issues such as taxes and government spending (on a 10-point scale from 1 'very liberal' to 10 'very conservative').

Conspiracy mentality scale (CMS) (Imhoff & Bruder, 2014). Conspiracy mentality is a generalized political attitude, distinct from established generalized political attitudes like right-wing authoritarianism (RWA) and social dominance orientation (SDO) (Imhoff & Bruder, 2014). Respondents completed five items of the CMS (scored on a 5-point scale from 1 'Certainly not 0%' to 11 'Certainly 100%'), including: 'I think that many very important things happen in the world, which the public is never informed about'; 'I think that politicians usually do not tell us the true motives for their decisions'; and ' I think that there are secret organizations that greatly influence political decisions'.

Trust in institutions. Respondents were asked the extent to which they have trust in the following institutions/groups: (1) political parties; (2) parliament; (3) the government; (4) the police; (5) the legal system; (6) scientists; and (7) doctors and other health professionals. Responses were scored on a 5-point Likert scale ranging from 1 'completely trust' to 5 'do not trust at all'.

Belongingness in neighbourhood. Three questions taken from the UK Community Liver Survey (Cabinet Office, 2015) were asked of respondents to assess their level of belongingness and connectedness to their neighbourhood generally and neighbours specifically, as follows: (1) How strongly do you feel you belong to your immediate neighbourhood? (scored on a 4-point scale from 1 'not at all' to 4 'very strongly'; (2) How comfortable would you be with asking a neighbour to keep a set of keys to your home for emergencies (scored on a 4-point scale ranging from 1 'very uncomfortable' to 4 'very comfortable'); and (3) How comfortable would you be asking a neighbour to collect a few shopping essentials for you, if you were ill and at home on your own (scored on a 4-point scale ranging from 1 'very uncomfortable' to 4 'very comfortable').

Religious identity and belief. Participants were asked to select their religious identity from a drop down menu of religious belief systems (including 'atheist', 'agnostic' and 'other'; in the latter case a text entry box requested identity to stated). In addition, an 8-item Monotheist and Atheist Beliefs Scale derived from a longer scale developed by the present authors (Alsuhibani, Shevlin, & Bentall, (in submission)) was included. This had four items measuring religiosity, for example 'The soul is immortal' and four measuring atheism, for example, "It is wrong to indoctrinate children into religion'. Factor analysis of the longer scale indicated that religiosity and atheism are separate albeit negatively correlated constructs.

Analytic plan. Three sets of analyses are presented to (1) assess the success of the quota sampling methodology employed by Qualtrics to rapidly recruit a nationally representative sample of the UK adult population; (2) determine the representativeness of the recruited sample for a selection of socio-demographic characteristics not used for quota sampling (i.e. country of residence, ethnicity, economic activity, having been born in the UK, and household composition), using most recently available UK population estimates; and (3) describe in full the sample composition using the wide range of socio-demographic data respondents provided for C19PRC-UKW1.

Results

Quality control checks and representativeness of C19PRC-UKW1 sample as per quota sampling methods. The target sample size for C19PRC-UKW1 was 2000 adults. Given the dual processes used by Qualtrics and partners to recruit respondents to quotas, it is not possible determine the number of survey invites that were distributed to panel members, or indeed the number of panellists who were alerted to the survey and who did/did not complete the survey (i.e. a response rate). Qualtrics did provide some metrics for the C19PRC-UKW1,

as follows: (1) having original commenced the survey, 159 respondents did not provide full informed consent and were screened out; 35 respondents who completed the survey from outside the UK or were aged under 18 years (n=6) were also screened out; to ensure responses were trustworthy, 77 participants who completed the survey in less than the minimum completion time were removed, as were 64 potential duplicate respondents. This resulted in a C19PRC-UKW1 sample of 2025 participants who completed the survey over six days of fieldwork as follows: 23 March 2020 (n=461; 22.8%); 24 March 2020 (n=118; 5.8%); 25 March 2020 (n=778; 38.4%); 26 March 2020 (n=500; 24.7%); 27 March 2020 (n=161; 8.0%) and 28 March 2020n=7; 0.3%). **Table 1** compares the pre-recruitment quotas to those achieved during the fieldwork period. The sex quotas were obtained to within 1% (slightly more women than men were recruited), the age quotas were obtained to within 0.1%-0.6% (fewer respondents aged 25-44 years were recruited), and the household income band quotas were obtained to within 0.25%-1% (fewer respondents in the middle income band £25,341-£38,740 were recruited).

Insert **Table 1** about here

Representativeness of the C19PRC-UKW1 sample - UK population estimates. The composition of the C19PRC-UKW1 sample was compared to the UK adult population aged 18 years and over (where possible), stratified by country, in terms of a selection of socio-demographic characteristic. Although reliable estimates for some population estimates (e.g. age, sex) can be obtained annually from non-Census sources (e.g. ONS mid-year population estimates) (Office for National Statistics, 2019b) and there are on-going efforts to develop methods to produce similar reliable mid-Census population estimates for characteristics such as ethnicity using the Annual Population Survey (APS) (Office for National Statistics,

2019c), the 2011 Census remains the most reliable source of population data for many socio-demographic characteristics (e.g. ethnicity, country of birth) (Office for National Statistics, 2020), despite the recognition that the population structure has changed since 2011 (e.g. in recent years, international migration has been a bigger driver of population change than births and deaths).

Table 2 presents the percentage difference between the proportion of respondents obtained for each socio-demographic characteristic compared to the population for each country of the UK. In total, 1951 respondents (95.1% of the sample) provided the stem of their residential postcode. Participants living in England and Wales were combined for analytic purposes to facilitate comparison to the 2011 Census for England and Wales. The proportion of respondents recruited in Scotland and Northern Ireland was within 0.7% of the 2011 Census estimates; fewer participants in England and Wales (5%) were recruited when compared to population estimates, which may indicate that the majority of people who did not provide postcode data may be residing in these countries.

The ethnic profile of respondents was diverse and closely mirrored that of the UK population. Specifically, for England/Wales, the proportion of White British/Irish was higher than expected (2.8%) and the proportion of White Other was lower (0.8%); in Scotland and Northern Ireland, the proportion of respondents in the two White categories combined was within 0.5% of population estimates, although in Scotland the proportion of White British/Irish was lower than expected (3.6%) but White Other was higher (3.3%), suggesting some variation in the self-categorisation as White among Scottish respondents in the survey. In England/Wales and Scotland, non-White ethnic groups were well-represented and the proportions were achieved to within 1% of population estimates; in Northern Ireland, population estimates are only provided at a higher level for minority ethnic groups (1.8% of

population), but the ethnic profile of the sample suggested these respondents were largely of Asian ethnicity.

The economic activity profile of the C19PRC-UKW1 sample was comparable to population estimates (aged 20+ years, see Table 2 footnote); the most notable differences between the sample and population occurred in relation to full-time employment (i.e., higher proportions of respondents from England/Wales and Scotland were in full-time employment (49.3% and 46.7%, respectively) compared to the 2011 Census (43.5% and 43.3%, respectively), part-time employment in England/Wales (14.3% achieved, 16.8% expected), and retirement (i.e., lower proportions of respondents living in England/Wales (5.7%) and Scotland (5.9%) reported that they were retired than reported in the 2011 Census). More students (2.2%) were recruited in England/Wales than would have been expected when compared to the 2011 Census, but all other economic activity categories were obtained to within 1% of population estimates. For Northern Ireland, the comparability of the sample to population estimates was more varied (and likely related to the population estimates including citizens aged 16-74 years), but there was generally good representation of all economic activity groups, albeit there were higher proportions of adults who were unemployed or employed part-time, but fewer retirees or students than expected.

A higher proportion of respondents (90.5%) than expected (84.5%) in England/Wales were born in the UK, although the sample proportion obtained for Scotland was identical to the 2011 Scottish Census. In Northern Ireland, a lower proportion of respondents reported having been born in the UK compared to the population estimates (90.9% compared to 92.6%, respectively). Finally, with respect to household composition, the proportion of respondents living in 'adult only' households in both England/Wales and Scotland was lower than expected (similar comparison for Northern Ireland were not feasible – see Table 2).

Insert **Table 2** about here

Socio-demographic characteristics of the Wave 1 sample (n=2025). **Table 3** presents

the socio-demographic characteristics of the C19PRC-UKW1 sample. In addition to the

description of the sample above, the findings demonstrate that the sample was diverse in

relation to (% majority): religion (Christian; 50.4%), urbanicity (living in a town; 30.6%),

education (having an undergraduate degree; 28.2%), having been raised in the UK (92.4%),

housing tenure (being a homeowner; 30.2%), and household composition (not living in a

household with dependent children aged <18 years; 70.8%).

Insert **Table 3** about here

Discussion

This paper detailed the planning, design and conduct of C19PRC, a longitudinal, multi-strand

study which, upon its launch, 52 days after the first registered case of COVID-19 in the UK

on 23 March 2020, was one of the first studies to begin to investigate the psychological and

social impacts of the COVID-19 pandemic in the UK adult general population. In the short

period since this launch, there has been a notable and rapidly-growing interest in the study of

the mental health impact of the COVID-19 pandemic in the UK. This is evidenced by the

release of specific funding calls to support this research topic (UK Research and Innovation,

2020; UK Research and Innovation Medical Research Council, 2020), the development of a

dedicated hub to support collaboration across established and emerging COVID-19 mental

health-focused studies (Thomas, 2020), and the hosting of a webinar series on the mental

health-related impact of COVID-19 (United for Global Mental Health, 2020). Although the

need to study the non-biological aspects of the COVID-19 pandemic is very important,

particularly given the considerable disruption that government-imposed social restrictions have had on personal, social, political and economic life in the UK over a short period of time, it has been emphasized recently that now, more than ever, mental health studies in the context of the COVID-19 pandemic must be of high quality, and that this can only be achieved through the use of focused questions, the employment of robust methodologies and the securement of necessary ethical approval(s) from relevant institutions (The Lancet Psychiatry, 2020).

　　　　Study strengths. Given that the C19PRC Study was carefully designed using the evidence-base generated by studies that have responded to and investigated the psychosocial impact of similar IRD outbreaks in the past (e.g. SARS, MERS, and H1N), it is pioneering in terms of its **broad and deep coverage of a wide range of important psychosocial risk/protective factors and outcomes that warrant long-term investigation during the pandemic** (*see Measures section*). In addition to our **prospective, longitudinal design** and the level and scope of measurement, the **multidisciplinary composition of C19PRC** also presents an opportunity to study the psychosocial impact of COVID-19 from an ecological perspective, considering the influences of social, political, media, economic and demographic factors on the psychological health and wellbeing of the population. It is anticipated that the C19PRC Study data will be used to facilitate and stimulate interdisciplinary research on important public health questions such as: (1) *What role does the public's knowledge, attitudes, beliefs and practices have in determining health outcomes during the COVID-19 pandemic?* (2) *From which sources do the public source important information in relation to the pandemic*? (3) *What level of trust does the public have in public/political institutions and how is this associated with compliance with COVID-19 related health/protective/preventative behaviours or practices?* (4) *What is the psychological impact and sequalae of COVID-19 and its associated socio-economic effects in the UK?* (5) *Who is*

most at risk of psychological distress during COVID-19? (6) *What does resilience look like in the context of COVID-19 and what factors contribute to it*? and (7) *How do the public feel about future vaccination for COVID-19?* Importantly, the on-going efforts to expand the C19PRC beyond the UK, including a roll-out of the Wave 1 survey in the Republic of Ireland (C19PRC-ROIW1 was completed 7th April 2020), and planned 'sister' studies in India, Spain (commenced on 10th April 2020), Italy and Saudi Arabia will ensure that **potentially important international differences in the psychosocial impact of the COVID-19 pandemic can be identified**.

Another major strength of the C19PRC relates to the **timing of C19PRC-UKW1**. Critically, we were able to secure baseline data before the projected UK 'peak'. This, coupled with our longitudinal 8-wave design, ensured that we could emulate some of the more sophisticated survey designs that had delivered some of the most valuable evidence from the earliest stages of previous IRD outbreaks (e.g. (Karademas et al., 2013; Tausczik et al., 2012; Wong & Sam, 2010b)). Somewhat more fortuitously we were able to secure baseline data after the UK government announced the creation of a Coronavirus Job Retention Scheme (where UK employers were notified about the availability of a grant to cover 80% of their employees' salaries). Large swathes of the UK population will likely have had elevated levels of stress and anxiety due to the economic impact of the pandemic and associated uncertainties regarding job security and income prior to the launch of the survey. Launching the survey after this government intervention likely ensured that much economically derived distress in the population was ameliorated prior to data collection, thus eliminating/reducing some of the 'noise' relating to more direct COVID-19 derived distress in the population. Notably however, those who were self-employed in the UK remained without similar government reassurance and protection until the last day of the survey (Day 6, 28-03-2020), therefore not everyone in the population will have had their economic anxieties allayed in the same way or

at the same time. Also, fortuitously, we launched the survey on the day that the UK 'lockdown' was announced (Day 1 of the survey, 23-03-2020 - when The UK Prime Minister instructed UK citizens to stay at home except for very limited purposes). This meant that the most stringent of UK social control measures had been implemented before 77% of the C19PRC-UKW1 sample completed the survey. We also secured, however, a sizable subsample on Day 1 (n=471) to facilitate valuable pre-post lockdown comparison analyses. Another significant strength of the study was the decision taken at the design stage to ensure that **the C19PRC-UKW1 sample was recruited to be nationally representative of the UK adult population aged 18 years and over in relation to age, sex, and household income**; subsequent post-data collection analyses presented in this paper revealed that the survey sample recruited was very closely representative of the characteristics of the UK adult population in relation to country population size, ethnicity, economic activity, country of birth and household composition.

Study limitations. As is common with all studies, the C19PRC-UKW1 is not without limitations and chief among these is the use of quota sampling to rapidly recruit the non-probability based sample via the internet. This opt-in mode of recruitment employed by Qualtrics, albeit being a cost-effective method for gaining fast access to a large and diverse sample, inevitably meant that it was not possible to generate a response rate for the survey (due to the lack of a known denominator or sampling frame). Indeed, given the nature of the pandemic, an internet-based survey was the only feasible method of recruitment (i.e. sampling within households to conduct face-to-face surveys would not have been possible). Nevertheless, whilst more research is required to fully investigate the strengths and disadvantages associated with internet-based panel surveying (Bergeson, Gray, Ehrmantraut, Laibson, & Hays, 2013), it has been suggested that the composition of non-probability internet-based survey panels differs from that of the underlying population (Hays, Liu, &

Kapteyn, 2015). Specifically, although internet access rates have grown steadily over time, internet use is still not universal in the UK (the Office for National Statistics (2019a) estimated that 87% of the UK adult population used the internet daily or almost daily in 2019), and a so-called 'digital divide' persists between those individuals living with and without internet access (e.g. ~17% of adults aged 55 years and over reported not using the internet in the past 3 months) (Office for National Statistics, 2019a). The American Association for Public Opinion Research (APPOR) asserts that when non-probability sampling (as opposed to probability sampling) methods are used, there is a higher burden of responsibility on investigators to describe the methods used to draw the sample and collect the data, so that users can make an informed decision about the usefulness of the resulting survey estimates (Baker et al., 2013). Indeed, we support the APPOR's position that it is useful to think of different non-probability sample approaches as falling on a continuum of expected accuracy of the survey estimates; at one end are uncontrolled convenience samples that produce risky survey estimates by assuming that respondents are a random sample of the population, whereas at the other end, there are surveys that recruit respondents based on criteria related to the survey subject matter and then the survey results are adjusted using variables that are correlated with the key study outcome variables (Baker et al., 2013). The design of C19PRC ensures that it falls towards the latter end of the continuum.

Other study limitations relate to the development of the new COVID-19 measures for the survey based on information available at the earliest stages of the pandemic, which have changed rapidly in the interim period. For example, the official guidance on '*social distancing*' parameters was changing from 1 metre to 2 metres towards the end of the design phase; the term '*self-isolation*' was originally intended to refer to the process by which individuals infected with the COVID-19 virus avoid contact with all other individuals (including members of their own household) for a period of 7 days (subsequently, extended

to 14 days due to the incubation period of the virus) but, ultimately, use of this term has expanded even further to align to the government advice that during the 'lockdown' all members of the public should 'stay at home' and isolate from members outside of their own family, regardless of whether they were symptomatic of COVID-19, to prevent the spread of the infection. Finally, several important social and public health issues have arisen during the 'lockdown' period that were not fully anticipated by the C19PRC. For example, there has been increased awareness of the negative impact that the restrictions on social movement have had in relation to issues such as domestic violence within the family home (BBC, 2020), which were not assessed at C19PRC-UKW1. In subsequent waves, the C19PRC consortium are aware that specific definitions of COVID-19-related terminology, in addition to new and emerging difficulties faced by the public during the 'lockdown' period, will need to be carefully considered during the planning phases for subsequent study waves to ensure that the C19PRC Study can collect and produce high-quality data in relation to important public health behaviours and social issues that emerge over the course of the pandemic.

In conclusion, on balance, we believe that the C19PRC Study is well placed to make a significant contribution to the knowledge base surrounding the COVID-19 pandemic among both research and public health communities in both the UK and beyond, in both the short and long term.

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Table 1 Outcome of quota sampling recruitment, COVID-19 Psychological Research Consortium (C19PRC) Study UK Wave 1 (C19PRC-UKW1), March 2020 (*N*=2025)

Socio-demographic characteristics used for quota sampling		Sampling Quota[1] (Target sample *N*=2000)	Sample Achieved *(N=2025)*		Percentage difference between sampling quota target and quota obtained
		%	n	%	
Sex[1]	Men	49	972	48.0	-1%
	Women	51	1047	51.8	+0.8%
	Other		6	0.2	NA
Age group (years) [1]	18-24	12	246	12.1	+0.1%
	25-34	19	380	18.8	-0.2%
	35-44	18	353	17.4	-0.6%
	45-54	20	410	20.2	+0.2%
	55-64	17	349	17.2	+0.2%
	65+	14	287	14.2	+0.2%
Gross annual household income[2]	£0-£15490	20	410	20.2	+0.25%
	£15,491-£25,340	20	410	20.2	+0.25%
	£25,341-£38,740	20	385	19.0	-1.0%
	£38,741-£57,930	20	410	20.2	+0.25%
	£57,931+	20	410	20.2	+0.25%

[1]Quotas for age and sex were derived from EUROSTAT 2016 population estimates (Eurostat, 2020)

[2]Quotas for gross household income bands were on 2016 Office for National Statistics data (Office for National Statistics, 2017)

Table 2 Comparison of representativeness of the COVID-19 Psychological Research Consortium (C19PRC) Study UK Wave 1 (C19PRC-UKW1) sample to UK adult population for key socio-demographic characteristics, by country, March 2020 (*N*=1951)

		Sample (%)			Comparison to UK adult population (+/- % difference between survey sample and population)		
		England/Wales	Scotland	Northern Ireland	England/Wales (N=42,645,389)	Scotland (N=4,109,000)	Northern Ireland (N=1,329,919)
Country of residence[1]*		83.7%	7.8%	2.3%	88.7% (-5.0%)	8.5% (+0.7%)	2.8% (-0.5%)
Ethnicity[1]	White British/Irish	85.8%	89.5%	90.9%	83.0% (+2.8%)	93.1% (-3.6%)	98.2% (-0.5%)
	White Other	5.5%	6.6%	6.8%	4.7% (-0.8%)	3.3% (+3.3%)	
	Indian	2.2%	0%	0%	2.5% (-0.3%)	0.6% (-0.6%)	-
	Pakistani	1.1%	2.0%	0%	1.6% (-0.5%)	0.8% (+1.2%)	-
	Chinese	1.0%	0.7%	0%	0.8% (+0.2%)	0.7% (0.0%)	-
	Black/African/Afro-Caribbean	2.1%	0.7%	0%	2.9% (-0.8%)	0.5% (-0.2%)	-
	Arab	0.2%	0%	0%	0.4% (-0.2%)	0.2% (+0.2%)	-
	Bangladeshi	0.3%	0%	0%	0.6% (-0.3%)	0.1% (-0.1%)	-
	Other Asian	0.4%	0%	2.3%	1.4% (-1.0%)	0.4% (-0.4%)	-
	Other	1.5%	0.7%	0%	2.1% (-0.6%)	0.3% (+0.4%)	1.8% (+1.8%)
Economic activity[2]	Full-time (including self-employed)	49.1%	46.7%	43.2%	43.5% (+5.6%)	43.3% (+3.4%)	42.5% (+0.7%)
	Part-time (including self-employed)	14.3%	16.4%	22.7%	16.8% (-2.5%)	15.8% (+0.6%)	15.1% (+7.6%)
	Unemployed (looking for work)	5.0%	5.3%	11.4%	4.1% (+0.9%)	4.3% (+1.0%)	7.4% (+4.0%)
	Unemployed (not looking for work)	6.7%	5.3%	6.8%	6.3% (-0.4%)	5.2% (+0.1%)	5.0% (+1.8%)
	Retired	17.1%	17.8%	6.8%	22.8% (-5.7%)	23.7% (-5.9%)	12.9% (-6.1%)
	Student	4.6%	2.6%	4.5%	2.4% (+2.2%)	2.6% (0.0%)	9.8% (-5.3%)
	Not looking for work	3.2%	5.9%	4.5%	4.1% (0.9%)		7.3% (-2.8%)

		Sample (%)			Comparison to UK adult population (+/- % difference between survey sample and population)		
		England/Wales	Scotland	Northern Ireland	England/Wales (N=42,645,389)	Scotland (N=4,109,000)	Northern Ireland (N=1,329,919)
	(e.g. due to disability)					5.1% (+0.8%)	
Born in the UK[3]	Yes	90.5%	92.8%	90.9%	84.5% (+6.0%)	92.8% (0.0%)	92.6% (-1.7%)
	No	9.5%	7.2%	9.1%	15.5% (-6.0%)	7.2% (0.0%)	7.4% (+1.7%)
Household composition[4]	Adult only household	22.1%	27.6%	18.2%	25.6% (-3.5%)	33.1% (-5.5%)	66.1%
	Other	77.9%	72.4%	81.8%	74.4% (+3.5%)	66.9% (+5.5%)	33.9%

[*] 3.7% of the survey sample did not provide data relating to postcode stem and therefore country of origin could not be established.

[1] Source. 2011 Census population estimates for adults aged 18+ years for England/Wales and Scotland; adults aged and Northern Ireland.

[2] Source. 2011 Census population estimates for adults aged 20+ years for England/Wales and Scotland; Northern Ireland age 16-74 years (no other breakdown of age publicly available).

[3] Source. 2011 Census population estimates for adults aged 25+ years for England/Wales and Scotland; adults aged 18+ years for Northern Ireland.

[4] Source. 2011 Census population estimates for adults aged 25+ years for England/Wales and Scotland; Northern Ireland provides publicly available data on household composition for the household reference person only (N=703,275), not for all adults aged 18+ years, and therefore a comparison to survey for household composition is not feasible.

Table 3 Sociodemographic characteristics of respondents, COVID-19 Psychological Research Consortium (C19PRC) Study UK Wave 1 (C19PRC-UKW1), March 2020 (*N*=2025)

Sociodemographic characteristics		*N*	*%*
Sex	Men	972	48.0
	Women	1047	51.8
	Other	6	0.2
Age group (years)	18-24	246	12.1
	25-34	380	18.8
	35-44	353	17.4
	45-54	410	20.2
	55-64	349	17.2
	65+	287	14.2
Gross household income	£0-£15490	410	20.2
	£15,491-£25,340	410	20.2
	£25,341-£38,740	385	19.0
	£38,741-£57,930	410	20.2
	£57,931+	410	20.2
Ethnicity	White British/Irish	1732	85.5
	White non-British/Irish	116	5.7
	Indian	41	2.0
	Pakistani	27	1.3
	Chinese	19	0.9
	Afro-Caribbean	13	0.6
	African	27	1.3
	Arab	3	0.1
	Bangladeshi	6	0.3
	Other Asian	11	0.5
	Other	30	1.5
Religion	Christian	1020	50.4
	Muslim	61	3.0
	Jewish	16	0.8
	Hindu	13	0.6
	Buddhist	16	0.8
	Sikh	10	0.5
	Atheist	514	25.4
	Agnostic	254	12.5
	Other	121	6.0
Urbanicity	City	498	24.6
	Suburb	572	28.2
	Town	620	30.6
	Rural area	335	16.5
Born in UK	Yes	1834	90.6
	No	191	9.4
Raised in the UK (lived here	Yes	1872	92.4

Sociodemographic characteristics		*N*	*%*
before age 16 years)	No	153	7.6
Highest level of educational attainment	No qualifications	58	2.9
	O-level/GCSE or similar	385	19.0
	A-level or similar	366	18.1
	Diploma	114	5.6
	Undergraduate degree	572	28.2
	Postgraduate degree	316	15.6
	Technical qualification	188	9.3
	Other	26	1.3
Employment	Full-time (including self-employed)	988	48.8
	Part-time (including self-employed)	303	15.0
	Unemployed (looking for work)	103	5.1
	Unemployed (not looking for work)	133	6.6
	Not in employment (due to disability)	69	3.4
	Retired	334	16.5
	Student	95	4.7
Housing tenure	Own outright	733	36.2
	Own (with a mortgage)	560	27.7
	Shared ownership	20	1.0
	Renting	541	26.7
	Living rent free	149	7.4
	Other	22	1.0
Number of adults in household	1	454	22.4
	2	1132	55.9
	3	270	13.3
	4	130	6.4
	5+	39	1.9
Number of children (under 18 years in household)	0	1433	70.8
	1	293	14.5
	2	238	11.8
	3	44	2.2
	4+	17	0.8