

Psychological influences on COVID-19 preventive behaviours and vaccination engagement in the United Kingdom and the United States: the significance of ethnicity

Glynis M. Breakwell, Julie Barnett, Rusi Jaspal and Daniel B. Wright

Abstract: Two studies are reported here: a mapping review of literature on the effect of ethnicity on psychological influences upon COVID-19 responses, and a survey simultaneously undertaken in the United Kingdom and United States designed to examine ethnic differences in levels of, and in relationships between, identity resilience, social support, science trust, COVID-19 fear, COVID-19 risk and vaccination likelihood. The review found that very few studies during 2020–2021 examined the effect of ethnicity on the psychological influences on COVID-19 preventive behaviours. The survey study found that science trust, vaccine positivity, perceived risk, COVID-19 fear, identity resilience and social support account for roughly 50 per cent of the variability in COVID-19 vaccination likelihood. Ethnic categories report different levels of these influences but similarity in the way they interact. Taken together, the results indicate that a single model of psychological influences on vaccination decisions is applicable across ethnic categories.

Keywords: ethnic differences, COVID-19 fear, COVID-19 risk, COVID-19 vaccination likelihood, vaccine positivity, identity resilience, social support, science trust

Notes on the authors: see end of the article

Introduction

Part of understanding contextual determinants of COVID-19 reactions requires examining how people from different ethnic backgrounds respond to the threats posed by the pandemic. The research undertaken by the authors of this article as part of the British Academy project was designed to examine the key psychological influences on COVID-19 preventive behaviours and vaccine engagement in the United Kingdom and United States with particular regard to the significance of ethnicity. The first two articles in this special issue, 'Identity resilience, uncertainty, personal risk, fear, mistrust and ingroup power influences upon COVID-19 coping' and 'Methodological considerations and assumptions in social science survey research', described the psychological constructs used in this study and the approaches to their measurement and the theoretical modelling of their relationships. The objective of this article is to describe the relationship between ethnic category identification and these psychological constructs.

There are several reasons why it was important to explore ethnicity effects systematically. First, ethnic minorities form significant parts of UK and US populations. Data from the [UK Census \(2021\)](#) show that 18.3 per cent of the 59.6 million total population of England and Wales were from ethnic minority groups (9.3 per cent were Asian, which included primarily those of Indian, Pakistani, Bangladeshi or Chinese heritage, and 4 per cent were of Black African or Black Caribbean heritage). According to the [US Census \(2020\)](#) the United States was then 57.8 per cent white, 18.7 per cent Hispanic, 12.4 per cent Black and 6 per cent Asian (primarily including those of Chinese, Japanese or Korean heritage). The broad ethnic categories used in such head counts tend to ignore the cultural differences between those groupings that are lodged within them. Blanket labels such as 'Black' and 'Asian', particularly when applied cross-nationally, can result in inaccurate estimates or interpretations of diversity. This may account, in part, for the failure in some international studies to measure the effects of ethnicity on psychological factors that influence COVID-19 responses. However, as long as the limitations of the labelling are recognised and reported, collecting such data is better than ignoring the possibility of ethnic diversity.

Second, in several Western countries, such as the United Kingdom and United States, early in the pandemic individuals from ethnic minority groups were at greater risk of contracting COVID-19 and also exhibited a higher incidence of severe illness and mortality ([Pan et al. 2020](#); [Raharja et al. 2021](#)). Some ethnic groups were at greater risk of poor outcomes than others. In their systematic review and meta-analysis of early studies in the United States and United Kingdom, [Sze et al. \(2021\)](#) found that people of Black and Asian ethnicities had a higher risk of infection and that those of Asian origin appeared to be at higher risk of intensive care unit (ICU) admission

upon diagnosis (see also [Magesh *et al.* 2021](#)). In the United States specifically, a strong relationship was found between Black and Hispanic ethnicity and population-level COVID-19 mortality ([Gross *et al.* 2020](#)).

Initially, there was speculation about the possible epidemiological causes of these ethnic differences, with some researchers highlighting biological causes and others behavioural causes. [Khunti *et al.* \(2020\)](#) noted that socio-economic, cultural and life-style factors, as well as pathophysiological factors (e.g., prevalence of vitamin D deficiency) may all be contributing variables. Subsequent research also revealed a greater risk of other health sequelae, such as poor mental health, in ethnic minority individuals in both the United Kingdom and United States ([Jaspal & Lopes 2021](#); [Proto & Quintana-Domeque 2021](#); [Tiwari & Zhang 2022](#)). Many of the ethnic inequalities observed in pre-pandemic times became accentuated during the pandemic. [Jaspal and Lopes \(2021\)](#) found discrimination to have a direct effect on fear of COVID-19, which in turn was associated with greater depression and generalised anxiety. Cotermiously, linked to stigmatisation, there were negative public statements circulating about the supposed lack of concern for or adherence to COVID-19 preventive behaviours among ethnic minorities ([Lu *et al.* 2021](#)). However, the actual variations by ethnicity in mental health responses during COVID-19 early waves were complex. For instance, [Despard *et al.* \(2022\)](#) found that, compared to White Americans, Black Americans' mental health was less affected by job/income loss associated with the pandemic and, in the United Kingdom, [Routen *et al.* \(2021\)](#) found that the pandemic and the associated lockdown measures did not have a differential impact upon self-reported life satisfaction or quality of social relationships across ethnic groups. These studies suggest that ethnic differences in pandemic responses are likely to be highly context-specific (particularly reflecting differing patterns of historical and current socio-economic inequality).

The third reason for focusing on ethnic variations in the psychological influences on preventive behaviours and vaccination engagement was that we found in a mapping review of extant literature very little empirical data on such differences. Many studies were focusing upon ethnic variations in the mental health effects of COVID-19 and few upon psychological influences on behaviour during COVID-19. The findings of our review are presented here since they shaped our data collection and analysis.

The distinction we are making between the mental health effects of COVID-19 and the psychological influences upon preventive behaviours and vaccination engagement during the pandemic is important. Research on mental health effects (such as depression, psychiatric disorders and post-traumatic stress responses) was concerned with the consequences of the disease for psychological well-being. Research on psychological influences (such as identity resilience, mistrust, ingroup power, perceived personal risk, perception of social support) was concerned with explaining variance

in specific self-protection behaviours. In the first stage of the review, any studies that focused on the consequences of the COVID-19 for mental health were excluded from the analysis. Our interest was in the psychological influences that were associated with COVID-19 preventive behaviours and vaccination engagement.

Mapping review

In early 2022, we conducted a mapping review to identify published research that examined the psychological processes accounting for variance in either COVID-19 prevention or vaccination behaviours and to examine the effects of ethnic variations in the United Kingdom and United States. Levels of analysis (ranging from the intra-psychic to the socio-historical) used in the studies reviewed were mapped. The review also aimed to identify the limitations of this body of research, to inform future commissioning, design and organisation of research programmes aimed at improving pandemic preparedness and recovery.

Methods

Data search

Two databases were used in the search: Scopus and Web of Science. Scopus is Elsevier's abstract and citation database, covering nearly 36,377 journals from approximately 11,678 publishers, of which 34,346 are peer-reviewed journals in life sciences, social sciences, physical sciences and health sciences. The Web of Science, owned by Clarivate, provides access to multiple databases, covering science, social science, arts and humanities. The two searches covered the same time period for publications: 1 January 2020–3 December 2021. This spans the two years from the start of the early phases of COVID-19 outbreak (through declaration of the pandemic by the World Health Organization (WHO) in March 2020) to the point just before we started our survey data collection (described in 'Methods and materials' section below).

Both databases were searched using a search string that: (1) focused on psychology as a subject area; (2) did not attempt to define, and thus limit, possible outcome variables (such as refusal, acceptance, protest etc.); (3) broadened the search by not specifying ethnicity terms; and (4) sought to operationalise the preventive behaviours of interest. The search focused on the psychology subject area since the objective was to retrieve papers studying at least one psychological variable. The search string used was:

TITLE-ABS-KEY((coronavirus OR "covid-19") AND (((prevent* OR protect* OR mitigat*) W/2 behav*) OR "face mask*" OR "face covering*" OR "social* distanc*" OR "physical distancing" OR (hand* w/2 (wash* OR saniti*)) OR testing OR "contact tracing" OR "self-isolation" OR vaccin*)) AND (LIMIT-TO (DOCTYPE,"ar")) AND (LIMIT-TO (SUBJAREA,"PSYC")) AND (LIMIT-TO (PUBYEAR,2022) OR LIMIT-TO (PUBYEAR,2021) OR LIMIT-TO (PUBYEAR,2020))

The Web of Science search yielded 1660 hits. Scopus yielded 1411. Duplicates across the two searches were eliminated, resulting in 2198 unique results.

Only peer-reviewed papers were considered. Pre-prints were excluded. Had they been included we may have uncovered a broader range of attempts to assess ethnicity effects. However, given the variability in quality of pre-prints, we decided to omit them. We regard searching only two databases as reasonable since they are comprehensive in catchment and include a broad range of psychological publications.

Inclusion and exclusion criteria

The initial searches were broadly defined to avoid premature exclusion of relevant papers. In a series of stages, the search was refined (after [Page et al. 2021](#)). As shown in [Figure 1](#), the number of studies retained for detailed analysis decreases at each stage.

Stage 1: To be included, papers must have as a dependent variable a COVID-19 prevention behaviour and/or vaccine hesitancy/vaccination choice. Additionally, their independent variables had to include some indicator of psychological influences. Initial search outputs were hand-searched to remove any papers irrelevant because they:

- dealt with psychological or social consequences of COVID-19 (illness or prevention restrictions) upon physical or mental health rather than actual or intended prevention or vaccination actions;
- were opinion pieces without data;
- were evaluations/descriptions of COVID-19-induced changes to healthcare practices (e.g., mode of therapy delivery);
- examined impacts of COVID-19 on specific at-risk groups (e.g., cancer or HIV/AIDS patients) but not the prevention or vaccination intentions or actions of those groups;
- examined the impact of COVID-19 preventive restrictions upon other behaviour (e.g., violence in families, suicide).

Stage 1 refinement of the search in itself led to a useful finding. The majority of studies that were captured in the initial searches but then excluded examined the

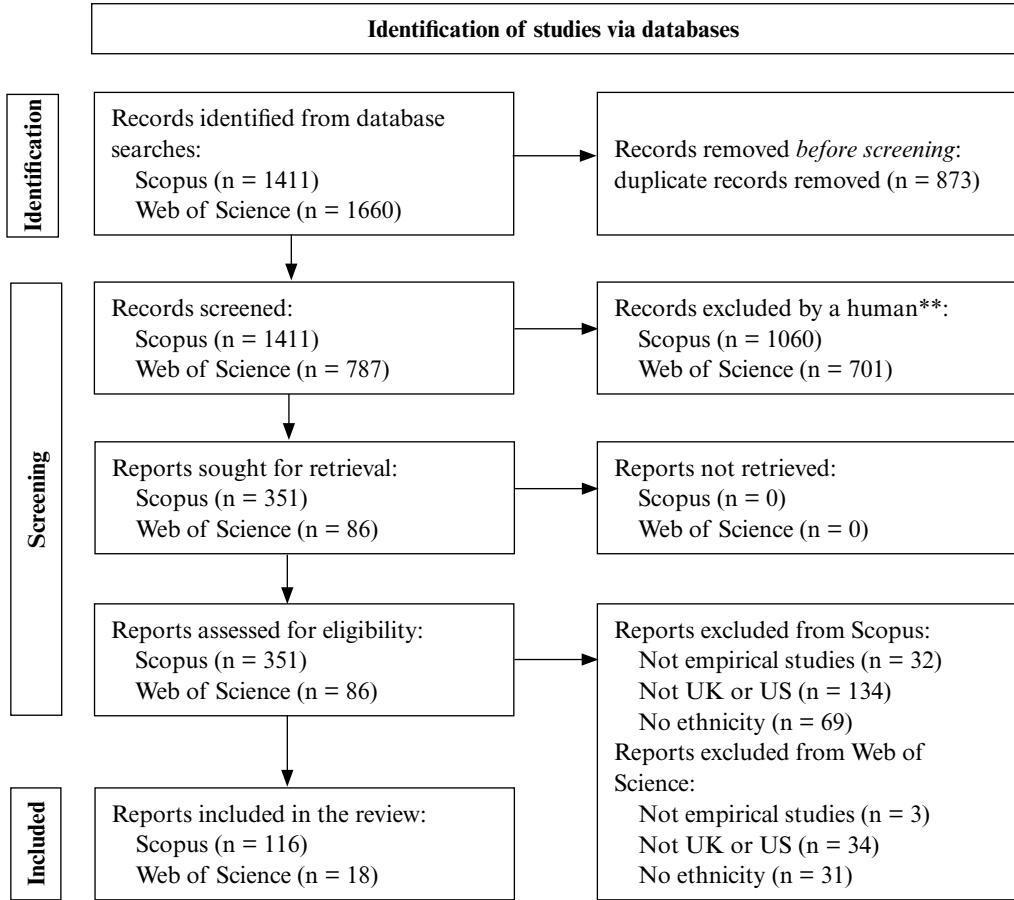


Figure 1. Identification of studies for mapping review.

psychological consequences of the disease itself or the psychological effects of the governmental strategies used to curtail COVID-19's spread. They treated psychological constructs as dependent, not independent, variables.

Stage 2: Papers remaining after Stage 1 were classified in relation to the countries in which the data were collected, and which, if any, demographic and ethnicity variables were included. Only papers including data on UK or US respondents and with data on ethnicity were retained for analysis. Studies varied in their definitions or labelling of ethnicity. We included, amongst others: 'ethnic minority', 'racial minority', 'Black, Asian and Minority Ethnic (BAME)', 'Black and Minority Ethnic (BME)', 'Black', 'Asian', 'Latino/Latinx', 'African', 'Native American'.

Stage 3: Papers that included US/UK samples and ethnicity data were cross-tabulated and examined. Some did not present data relevant to the review topic and were excluded.

Stage 4: Remaining papers were examined to determine whether they reported analyses of ethnicity effects on the relationship between the independent and dependent variables that they examined. Those papers that did were the focus of the review.

Identification of systematic review articles

A further search, using both Scopus and Web of Science, was conducted on 22 February 2022 to identify all systematic review articles relevant to the topic of our own review and published to that date. This search identified 1391 review papers (once duplicates across the two databases were removed). Forty-eight of those reviews were to some degree relevant to COVID-19 preventive behaviours. However, only three of these examine ethnicity differences and only one of those considered psychological influences upon COVID-19 behaviours.

Results

Characteristics of the relevant studies

Our overall analysis of the papers identified in the search revealed that no single shared systematic (theoretical or purposive) framework guides this corpus of research activity. Mostly, the studies reviewed involved small-scale, unrepresentative, convenience samples from a single country. However, there are exceptions, for instance, the University College London (UCL) large-scale, UK, longitudinal study ([Wright et al. 2021](#)). Small studies typically used self-report questionnaire survey methods, usually administered online via commercial platforms employing respondent panels or in person to people within an organisation or institution (e.g., a college/workplace). Studies were sometimes incorporated into ongoing research programmes, so samples established for other purposes were used for COVID-19 work. This is not inappropriate; while outputs need to be examined carefully for unanticipated side effects arising from the main purpose of the initial project or from repeated cycles of data collection, the advantage of this approach was that data could be collected quickly and, often, could be examined in relation to a broad range of previously collated information about respondents.

Psychology researchers, early in the COVID-19 pandemic, were responding quickly to a rapidly escalating and unmapped crisis. They adapted methods and analytic models from previous health crises (particularly from HIV/AIDS), but COVID-19 was a unique problem. The effects were evident in the studies conducted. Initially, there was little consistency across studies in the measurement instruments used, and sometimes their psychometric properties were uncertain. However, by mid-2021, for

some variables (e.g., vaccine hesitancy, COVID-19 fear, perceived personal risk of COVID-19 and trust in science/scientists) scales had been developed or repurposed that began to be used across research teams. The emergence, across the research community, of some consensus on the measurement instruments to be used reflects the growing recognition that the constructs these scales measured were important in predicting COVID-19 preventive behaviours and vaccination acceptance.

The most important finding from the mapping review relates to the marked absence of reported analyses of ethnic differences in psychological variables associated with COVID-19 preventive behaviours (including vaccination decisions or vaccine hesitancy). Most of the papers relevant in other respects did not collect ethnicity data from respondents. However, when they did, the disparity (evident in [Figure 1](#)) between having collected ethnicity information and actually analysing data in relation to ethnicity is notable. Data on the ethnic mix of the sample were normally provided. However, the relationship of ethnicity to the target variables studied was not provided. Decisions to leave ethnicity effects unanalysed may have been taken for various reasons. For instance, small sample sizes may have made it statistically inappropriate. It would be valuable in future, when ethnicity data are collected, to archive the data and make them available for subsequent cross-study collation and analysis. It is disappointing that some of the larger, multinational studies do not include ethnicity as a core variable. However, the absence of ethnicity data in cross-national studies is possibly unsurprising since, as suggested earlier, it is hard to establish internationally comparable definitions of ethnicity categories. Also, currently in some countries (e.g., Portugal) policy restrictions exist on collecting ethnicity data purely for research purposes.

In fact, across the two database searches there were 130 papers that recorded ethnicity information but only 59 papers stated they had analysed ethnicity effects. Thirty-six of these actually reported what ethnicity effects they found; all but four of these were based on US samples. In some of the other twenty-three papers, ethnicity was used alongside other socio-demographic variables (e.g., age and gender), but its independent impact was not reported. The absence of reports on ethnicity effects may occur for many reasons. For instance, effects that are not statistically significant will often go unpublished. Also, weak effects that cannot be adequately interpreted using established theory may not be described. Further, where public health is concerned, there may be a particular caution against reporting results that can be misapplied.

Analysis plan for the relevant papers that report ethnic effects

The analysis of the thirty-six papers that reported ethnicity effects in relation to the modelling framework we used is summarised in [Figure 2](#). Diversity of conceptual

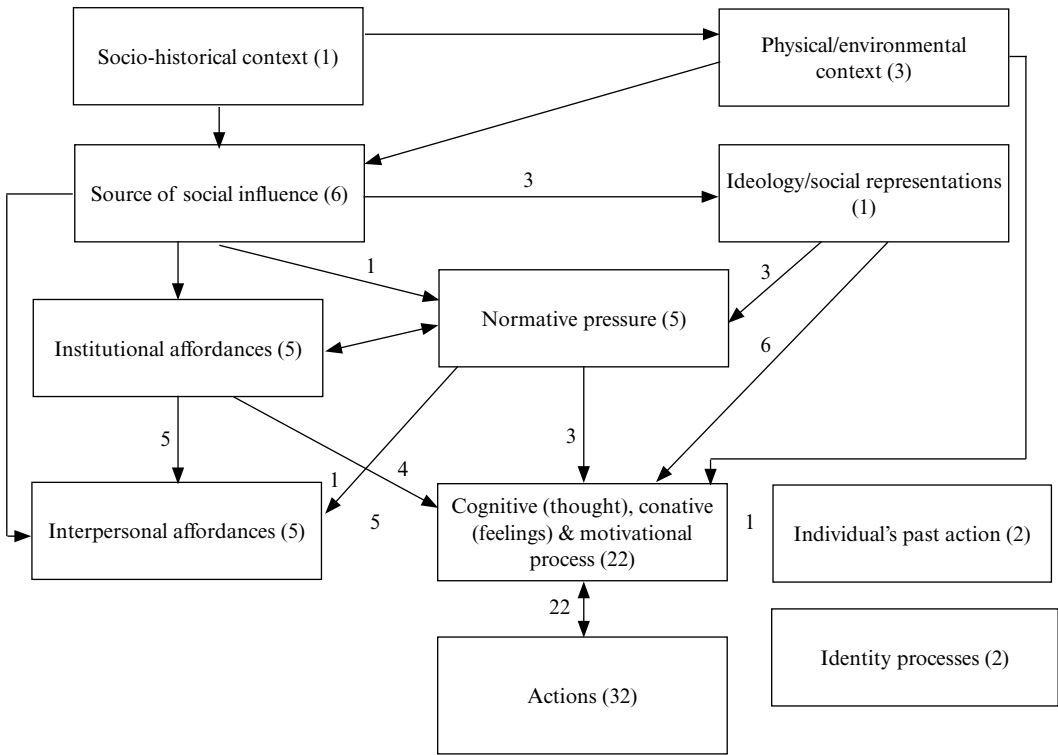


Figure 2. Levels of analysis used in studies reviewed.

models, methods, measurement tools and sampling strategies makes statistical synthesis across these studies inappropriate. Given this, we adopted an innovative approach, approximating more to a mapping review than a standard systematic review (Grant & Booth 2009). A mapping review differs from conceptual or integrative reviews in that typically it examines a broad topic area, where diversity of theory or measurement tools exist, with a view to identifying evidence gaps.

Our mapping analysis is based upon a generic framework for action analysis presented by Breakwell (2014). This suggests that explanations of action cut across levels of analysis. The elements in the framework are shown in Table 1, together with exemplars relevant to the review. The direction of influence between these elements will differ depending on the types of action under examination and, in all likelihood, over time. This levels-of-analysis framework (LOAF) was originally developed specifically to assist in the modelling of decision-making and behaviour in response to risks or hazards and it was first used in mapping behaviour change responses to HIV/AIDS (see Breakwell 1994). It seemed appropriate to use it to systematise what might be learned from studies of psychological influences upon the public’s COVID-19 prevention responses.

Table 1. Levels of Analysis Framework for the Mapping Review

The framework requires the analysis used in a study to be examined in terms of:

- **Socio-historical context:** what has happened in the past that is relevant to object of analysis? e.g., collective memories of ways major health crises developed in the past & the public responses to them (including attitudes to vaccination)
 - **Physical/environmental context:** what is happening in the material universe? e.g., availability of vaccines or prevalence and proximity of the disease
 - **Sources of social influence:** what social agents, deliberately or unintentionally influence the subject researched? e.g., leaders in local communities & cultural groups, politicians, scientists, & employers information & advice on vaccination.
 - **Ideology/social representations:** systems of widespread or shared belief and values that might affect the subject researched? e.g., societally prevailing trust in science or medicine, anti-vaccination and conspiracy theories, political and religious beliefs.
 - **Normative pressure:** the processes and acts of communication that operate as the channels of influence? e.g., from peers or authority figures, overt or covert efforts to sway action, thought or feelings about the value of vaccination.
 - **Institutional affordances:** the constraints and provisions offered by institutions relevant to the object of analysis. These include economic, legal, fiscal, and religious facilitation and barriers? e.g., legal measures changing vaccination mandates, vaccination passports, & penalties for failure to vaccinate.
 - **Interpersonal affordances:** how other people (including other group members) limit or support action relevant to the object of analysis? e.g., how the action of others (such as family or friends) directs or constrains decisions about vaccination.
 - **Cognitive, conative, and motivational processes:** the intra-psyche processes that result in the thoughts, feelings, and intentions of the individual relevant to the object of analysis? e.g., Uncertainty; vaccine beliefs; COVID-19 fear/risk; desire to protect oneself.
 - **Past Action:** the past actions of the individual that are relevant to the object of analysis? The individual's action is not deemed to be necessarily the outcome that the model seeks to explain, it can feed back into other elements in the framework. e.g., history of following medical advice, vaccination history, habits when at risk (e.g., compliance or dissent).
 - **Identity processes:** any assessment of identity structure or processes relevant to the object of analysis? e.g., self-esteem, self-efficacy, distinctiveness, continuity, resilience.
 - **Action:** current behaviours relevant to the object of analysis? e.g., seek to resolve uncertainty; refuse, or accept vaccination; indecision on vaccination (temporary or long term); pro- or anti-vaccination activity.
-

Figure 2 includes proposed connections and directions of influence between the elements. LOAF parallels the ‘socio-ecological’ model developed under the auspices of WHO ([SAGE Working Group 2014](#)) for determinants of vaccine hesitancy in response to parental rejection of the Measles, Mumps, Rubella (MMR) vaccination for their offspring (see [Rodrigues et al. 2022](#)). LOAF is more generically applicable and has been used in developing a social psychological model of COVID-19 coping strategies ([Jaspal et al. 2023](#)).

LOAF was used because it was initially developed to model the factors influencing action in reaction to hazards. It is valuable in highlighting the elements that are not being examined in existing studies and in determining which relationships between

elements in the framework are not being explored. Our analysis of the reviewed articles indicates substantial lacunae at some levels of analysis and particularly in attempts to establish the relationships between elements. In Figure 2, the numbers in parentheses inside each box indicate how many studies reviewed addressed that level of analysis. The numbers near arrows indicate how many studies were, in both boxes, connected by the arrow. Arrows without a number connect boxes with no studies in common.

Since we searched for papers researching psychological influences on COVID-19 behaviours, it is not surprising that twenty-two of the papers found appear in the 'cognitive, conative and motivational processes box' (i.e., intra-psychic processes). Yet fourteen do not; these, in the main, focus on societal and ideological influences upon action. Some papers appear in several boxes. One paper (Freeman *et al.* 2022 – e-version 2021) appears in five, and examines relationships between ideology/social representations, social influence, normative pressure, past action and intra-psychic processes and actions. Another (Rogers *et al.* 2021) appears in four, examining the relationships between institutional affordances, normative pressure, interpersonal affordances, intra-psychic processes and actions. Presence in multiple boxes occurs if researchers were building models operating across levels of analysis. By tracking the occurrence of papers across the boxes, it is possible to build a picture of the range of conceptual models that underlie their data collection.

Influences associated with COVID-19 prevention choices

The studies analysed show the importance of certain key types of influence associated with whether people choose to engage in COVID-19 prevention behaviours. However, each type of behaviour is likely to be associated with these influences to varying degrees. For instance, in relation to vaccination decisions, uncertainty (as an intra-psychic state) appears to be a key influence. Such uncertainties focus primarily upon the efficacy or potentially undesirable side effects of the novel vaccines produced to manage SARS-CoV-2 and its variants. In turn, this uncertainty is associated with being subject to conflicting information and with the degree of trust placed in the sources of that information. Individuals differ in the information that they access, largely as a function of both their prior knowledge (often related to educational level and cultural context) and of the social norms they accept based on interpersonal and group contacts or support. Their degree of trust in any source of information will be similarly influenced by their knowledge and norms. Trust in government agencies responsible for managing the pandemic and trust in science or scientists are two key influences upon vaccination decisions. Habit (i.e., past behaviours), past experience (e.g., having evidence of falsehoods or errors from a source) and wider beliefs (e.g., political orientation, social representations of COVID-19) will determine where an

individual is situated in relation to receiving conflicting information (including conspiracy theories) and how far they will invest their trust in any source. The papers we reviewed illustrate how different influences at different levels of analysis each have a place in this complex causal system that explains vaccination decisions. Also, some papers showed how perceived personal risk of COVID-19 infection and fear of infection are associated with both the likelihood of choosing to be vaccinated and of willingness to adopt protective or preventive behaviours. Others showed that an individual's personality traits, identity evaluation (e.g., self-efficacy or self-esteem levels) and problem-solving competence are significant influences. Consequently, this review clearly indicates that a comprehensive model explaining COVID-19 choices must encompass factors at different levels of analysis that range from the intra-psychic to the intergroup or societal.

Nevertheless, even a multi-level model will only predict actual action if the opportunity to act is present. For instance, wanting to get vaccinated is one thing, getting vaccinated is another and depends, crucially, upon having access to the vaccine. Similarly, self-isolation may be the intention but might not be possible in some forms of accommodation. The emphasis on interpersonal and institutional affordances in LOAF reflects the need to explore such obstacles.

The review finds nothing in those few papers reporting ethnicity effects to suggest that the structure of the network of factors associated with COVID-19 decisions differs between ethnic groups. There is no suggestion or evidence that differing explanatory models are needed or, indeed, are being developed for different ethnic groups. No study tested directly whether any particular explanatory model was differentially appropriate across ethnic groups. As a result, we decided to conduct such a test in our survey study.

There is some evidence that ethnic groups do vary on the key factors associated with COVID-19 choices (e.g., levels of trust, who is trusted, perceived personal risk, levels of uncertainty). Importantly, there is no evidence from the studies reviewed that, once those factors are present, they have differential effects related to ethnicity. In fact, some apparent relationships between ethnicity and health behaviours are actually mediated by other variables (e.g., political orientation). What we do not find in this sparse literature are clear signs of moderation effects via ethnicity. It is important to stress that the literature is sparse, so lack of evidence of differential effects is not evidence of no differential effects. Therefore, the study we describe next is an important attempt to look for differential effects.

LOAF illustrated that an additional objective for research in this area should be to examine in more detail what ethnicity effects occur, not only in relation to discrete elements within any model, but also in relation to interactions between elements within a model as a whole. For instance, will the impact of interventions to reduce uncertainty

about vaccination have differential effects across varied ethnic groups? Will the ripple effects of any change in uncertainty have differential impacts upon other factors associated with COVID-19 choices for different ethnic groups?

In the period reviewed, few papers originating in the United States or United Kingdom examined ethnic differences in the predictors of COVID-19 preventive behaviour or vaccination likelihood or hesitancy, even though there were many epidemiological studies that show there are ethnic differences in actual behaviour. Indeed, of 1391 systematic review articles that were targeted on factors associated with COVID-19 preventive behaviours we found only one (Khanijahani *et al.* 2021) that focused on ethnicity effects.

Furthermore, closer consideration of those studies that report ethnicity effects is needed. What appear to be ethnicity-based differences in COVID-19 preventive behaviours and vaccination likelihood often disappear when other variables are built into the modelling of the particular behaviour. For instance, in multiple regression models where, in the second step of the analysis, additional variables (such as political orientation, mistrust of physicians, trust in science, health beliefs or past behaviour) are added, the statistical significance of ethnicity may disappear. This may mean that for ethnic minority groups it is particularly important to assess the significance of those other variables. For example, in the United States, enhancing Hispanic and Latino levels of trust in physicians might be key to improvement in vaccination acceptance. Bhanu *et al.* (2021), in their systematic review, noted the higher levels of vaccine hesitancy in ethnic minorities. Kamal *et al.* (2021), in another systematic review, have shown that vaccination hesitancy is strongly associated with vaccination refusal. It is necessary to look beyond ethnicity *per se* to understand the basis for ethnicity effects on COVID-19 preventive behaviours. It is important to understand how ethnicity operates as part of a broader system of factors. This conclusion led us to the design of our survey study.

Ethnicity effects in models of psychological influences upon COVID-19 vaccination likelihood: a survey study in the United Kingdom and United States

Data presented here from our study will focus specifically on the effect of ethnicity upon psychological issues that influence the reported likelihood of COVID-19 vaccination uptake. We particularly wish to examine whether there are ethnic differences in the way these psychological influences are related. We focus on a small set of psychological constructs previously found to be influential for vaccination likelihood or vaccine hesitancy (Jaspal & Breakwell 2021; Breakwell & Jaspal 2023; Breakwell

et al. 2023). In surveys conducted simultaneously in the United Kingdom, we sampled participants who identified themselves as Asian, Black or White, and in the United States participants identifying as Asian, Black, Hispanic or White. These categories reflect the largest ethnic groupings reported in the UK and US censuses. As noted earlier, these category labels encompass substantial internal heterogeneity. On the basis of the literature reviewed earlier in this paper we tested three hypotheses:

- Hypothesis 1: the psychological constructs measured (i.e., identity resilience, social support, science trust, COVID-19 fear, COVID-19 risk and vaccine positivity), taken together, will predict substantial amounts of variability in vaccination likelihood.
- Hypothesis 2: there will be some significant ethnic differences in mean scores on the psychological constructs and on vaccination likelihood.
- Hypothesis 3: there will be limited ethnic variation in the way in which the psychological influences are correlated with each other or with vaccination likelihood. Essentially, we hypothesise that the model of psychological influences upon vaccination likelihood will apply well across ethnic categories.

Methods and materials

Ethical approval

The study received ethical approval from the University of Brighton's Cross-School Research Ethics Committee C (Ref: 2022-9564-Jaspal). All participants provided electronic consent before completing the survey.

Participants

Data were collected from 1109 people in the United Kingdom and 754 in the United States. Participants were recruited using Prolific, an online, international, participant recruitment platform, applying two eligibility criteria: being aged 18 or over and being resident in either the United Kingdom or United States. Sampling criteria ensured approximately equal numbers of male and females and included proportionally similar target sample numbers for three broad ethnic categories (Asian, Black and White) in both countries, plus Hispanic in the United States. Forty-one participants did not fall into any of these categories and their data are not examined here. The breakdown of the sample into seven ethnic categories was: Asian UK = 390; Asian US = 111;

Black UK = 388; Black US = 207; Hispanic US = 180; White UK = 316; and White US = 247.

Data were collected in January 2022. In the sample, 49.5 per cent of respondents identified as male. Age range was 18–81 (two gave values less than 10 and three values above 190; these were treated as missing). Mean age was 34.49, standard derivation (SD) 12.33. In the sample, 45 per cent of respondents were 30 years or younger and 13 per cent were 50 years or older. There were no significant differences between the US and UK samples in their age or gender profiles.

Procedure

Participants completed an online survey that included measures of identity resilience, social support, COVID-19 fear, COVID-19 risk, science trust, vaccine positivity and vaccine likelihood. Other information they provided included their chronological age, gender and country of residence. They provided electronic consent, were debriefed and were paid a token amount for participating in the study. The survey took approximately twenty minutes to complete. Respondents were only included in the analyses if they satisfied the two embedded attention checks in the questionnaire. All respondents satisfied the attention checks.

Measures

Identity resilience

The Identity Resilience Index (IRI) (Breakwell *et al.* 2022), comprising sixteen items with responses on a five-point scale (1 = strongly disagree to 5 = strongly agree), was used. The IRI comprises four subscales: self-esteem, self-efficacy, continuity and positive distinctiveness. Items included ‘On the whole, I am satisfied with myself’ (self-esteem), ‘I am confident that I could deal efficiently with unexpected events’ (self-efficacy), ‘I think I am different from other people in a good way’ (positive distinctiveness) and ‘There is continuity between my past and present’ (continuity). A higher score indicates higher identity resilience (whole sample, and all sixteen items, $\alpha = .87$).

Social support

Social support was measured using the twelve-item version of the Interpersonal Support Evaluation List (Cohen *et al.*, 1985). Respondents were asked to say whether statements were true for them. Measurement was on a four-point scale (1 = definitely

false, 2 = probably false, 3 = probably true and 4 = definitely true). Items included ‘There is someone I can turn to for advice about handling problems in my family’ and ‘If I were sick, I could easily find someone to help me with my daily chores.’ Higher scores indicate greater social support (whole sample $\alpha = .90$).

Fear of COVID-19

An abbreviated six-item version of the Fear of COVID-19 Scale (Ahorsu *et al.*, 2020) was used, measurement was on a five-point scale (1 = strongly disagree to 5 = strongly agree). Items included ‘I am afraid of losing my life because of COVID-19’ and ‘I cannot sleep because I am worrying about COVID-19.’ Higher scores indicate greater fear of COVID-19 (whole sample $\alpha = .87$).

Risk of COVID-19

The COVID-19 Own Risk Appraisal Scale (CORAS) (Jaspal *et al.*, 2022), comprising six items using a five-point scale (1 = strongly disagree to 5 = strongly agree), was used to measure own perceived risk of COVID-19. Items included: ‘I am sure I will NOT get infected with COVID-19’ and ‘I feel vulnerable to COVID-19 infection.’ Higher scores indicate higher COVID-19 perceived risk (whole sample $\alpha = .87$).

Science trust

Twelve items (rated on a five-point scale: 1 = strongly disagree to 5 = strongly agree) from ‘The Trust in Science and Scientists Inventory’ (Nadelson *et al.* 2014) were used. Exploratory and confirmatory factor analysis of the original twenty-one items indicated the scale was multidimensional. We used the items that loaded highest on the first factor, allowed the positive- and negative-worded items to be balanced and ensured items that did not manifestly relate to trust in science were excluded (e.g., ‘Scientists do not care if lay people understand their work’). The twelve-item version has been used before (see Breakwell *et al.*, 2022) and included ‘We can trust science to find the answers that explain the natural world’ and ‘We cannot trust science because it moves too slowly.’ Higher scores indicated greater science trust (whole sample $\alpha = .90$).

Vaccine positivity

An adaptation of the Attitudes toward PrEP Scale (Jaspal *et al.*, 2019) was used to measure positivity of attitudes towards COVID-19 vaccines. This comprised eight items using a five-point scale (1 = strongly disagree to 5 = strongly agree). Items included

‘COVID-19 vaccines are likely to work’ and ‘COVID-19 vaccines will probably have some serious side effects.’ A higher score indicated greater COVID-19 vaccine positivity (whole sample $\alpha = .89$). The scale is specific to attitudes towards COVID-19 vaccine but it is referred to simply as ‘vaccine positivity’ in this article.

Vaccination likelihood

Two items were used: ‘How likely is it that you will have the recommended doses of the COVID-19 vaccine?’ and ‘How likely is it that you will have the recommended “booster” vaccinations?’ (rated on a five-point scale: 1 = extremely unlikely to 5 = extremely likely). The items are highly correlated (whole sample $\alpha = .95$).

Data analysis

Scale scores were constructed for all seven of the scales described. It is important to highlight two of these. There were only two questions for the vaccine likelihood construct. Typically, when constructing a scale more items would be included. However, the two items used here were highly correlated $r = .90$. Adding more items would have introduced repetition and redundancy. Second, the IRI ([Breakwell et al. 2022](#)) has four subcomponents. It is not unidimensional. The factor structure of this scale is discussed in more detail in [Wright \(2023\)](#). Here the single scale represents an amalgamation of the four components.

Our interest is in comparing values on these constructs, and the associations among them, for the different ethnic categories. Because all seven constructs were estimated using factor analysis, the overall mean in the sample for each is near zero. [Figure 3](#) shows the means and the 95 per cent confidence intervals for each ethnic group in relation to each construct. The focus is on differences between groups for each construct. There are three broad analytic approaches that we considered using. The first approach would be to run an analysis of variance (ANOVA) to show that the ethnic groups differ for these constructs. This was not done for two reasons. First, with large samples even very small differences can be statistically significant. Second, and more important, this would only tell us that some group or groups differ from others. The second approach would be comparing each group with the mean for the remaining groups. This could be done by including a dummy variable for the ethnic category and conducting t -tests. This would provide similar information to comparing the intervals in [Figure 3](#) with the $y = 0$ line. This would tell us that a group is different than the others, combined, but not tell us which groups it differs from. The third approach, which we used, compares all the categories, pairwise, with each other. This allows us to identify where differences lie. It is important to note, however, that this approach

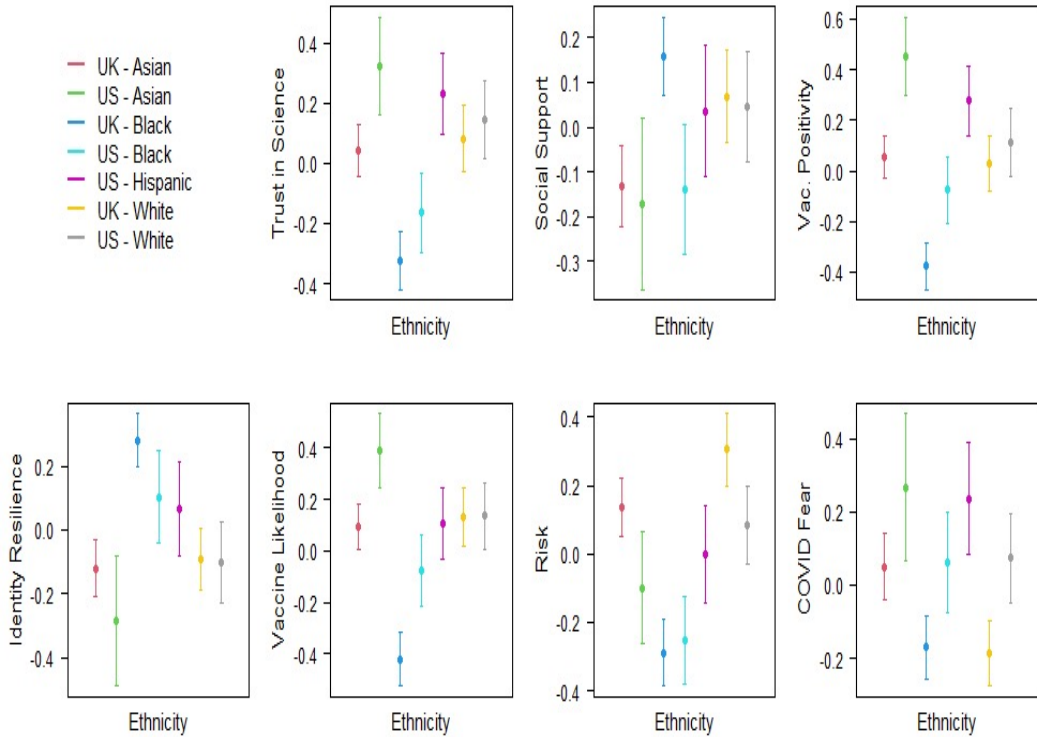


Figure 3. The means and 95 per cent confidence intervals for the seven ethnic categories of the seven constructs.

is only feasible because we have a relatively large sample and used a quota sampling method to ensure that there were over a hundred respondents in each category.

There are twenty-one different pairwise comparisons that we can make between the different ethnic groups for each construct. We calculated whether each of these was different using a series of *t*-tests. Because there are twenty-one tests for each construct, even if none of the groups are different in the population, it is likely some would be significantly different in our sample. To account for this we adjusted the critical *p*-value using Holm's method within each construct (Holm 1979). Since there are seven constructs, in total there are: $21 \times 7 = 147$ tests comparing means.

The main finding is that the means for the different constructs vary considerably for the different ethnic groups (supporting Hypothesis 2). We found a large number of statistically significant differences between ethnic groups on the seven constructs. There are fifty-five (i.e., 37 per cent) that remain statistically significant even after adjusting for the large number of tests conducted. These are:

- Science trust – nine differences: Black UK participants reported lower trust in science than all the other ethnic categories except Black US. Black US

participants reported lower trust than the White UK, White US, Hispanic US and Asian US.

- Social support – three differences: Black UK participants reported higher social support than Asian UK, Asian US and Black US.
- Identity resilience – six differences: Asian UK participants reported lower identity resilience than Black UK. Asian US participants reported lower identity resilience than Black UK, Black US and Hispanic US. Black UK reported higher identity resilience than White UK and White US.
- COVID-19 risk – nine differences: Black UK participants reported perceiving lower COVID-19 risk than Asian UK, Hispanic US, White UK and White US. Black US reported lower levels than Asian UK, White UK and White US. Asian US and Hispanic US both reported lower levels than White UK.
- COVID-19 fear – ten differences: Black UK report lower levels than Asian UK, Asian US, Black US, Hispanic US and White US. White UK report lower levels than Asian UK, Asian US, Black US, Hispanic US and White US. It is notable that the Black UK and White UK participants do not differ from each other but do differ from the other ethnic categories.
- Vaccine positivity – eleven differences: Black UK report lower vaccine positivity than Asian UK, Asian US, Black US, White UK and White US. Asian UK report lower vaccine positivity than Asian US. Black US report lower levels than Asian US and Hispanic US. Hispanic US report lower levels than Black UK and White UK and White US report lower levels than Asian US.
- Vaccination likelihood – seven differences: Black UK report lower vaccination likelihood than Asian UK, Asian US, Black US, Hispanic US, White UK and White US. Black US report lower levels than Asian US.

A large number of the pairwise differences involved the Black UK sample. The Black UK participants have a different composite profile across the constructs compared to the other ethnic groups, characterised by high identity resilience and low COVID-19 risk, COVID-19 fear, science trust, vaccine positivity and vaccination likelihood. In fact, the Black UK sample is included in thirty-two of the fifty-five comparisons where significant differences are found. The White UK sample was included in fourteen of the comparisons where differences were found (including six that also involved the Black UK sample). The Black and White UK samples differed significantly on all the constructs except social support. The Asian UK sample was included in ten comparisons involving significant differences (seven of these were differences from the Black UK and one from White UK). The Asian UK scored higher on COVID-19 fear than the White UK.

The Black US sample is included in sixteen of the fifty-five comparisons where significant differences were found. However, the Black US sample was not differentiated from the other ethnic categories on as many constructs as the Black UK sample. The comparable figure for the White US sample was ten (two of these were comparisons with the Black US sample on science trust and on COVID-19 risk, on both of which White US scored higher), for the Asian US sample fifteen (eleven of these with either Black UK or Black US) and for the Hispanic US sample ten (five of these with Black UK and one with White UK).

Figure 3 shows the similarities between the Hispanic US, White UK and White US samples on identity resilience, social support, science trust, vaccine positivity and vaccination likelihood, although they also show that White UK and Hispanic US differ on both COVID-19 risk and fear, while White UK and White US differ only on fear. Asian UK and Asian US samples differ only on vaccine positivity.

Table 2 shows the Pearson correlations between the seven constructs. Most notable are the large associations between trust in science, vaccine positivity and vaccination likelihood, and between social support and identity resilience. To test Hypothesis 1, which stated that the psychological constructs measured would predict substantial variability in vaccination likelihood, we analysed how much variance these constructs actually accounted for in vaccination likelihood. The bivariate comparisons show that vaccination likelihood is highly correlated with both vaccine positivity and trust in science. Together they account for $R^2 = .488$ of the variance of vaccination likelihood ($F[2,1836] = 876.0, p < .001$). Including the other four constructs raised the amount of variation accounted to $R^2 = .517$ ($F[6,1832] = 327.3, p < .001$), which, although slight, is a statistically significant increase: $F(4,1832) = 27.54, p < .001$. The coefficients for each of the variables were:

Trust in Science	$\beta = 0.21$	$t(1832) = 9.04, p < .001$
Social Support	$\beta = 0.06$	$t(1832) = 3.02, p = .003$
Vaccine Positivity	$\beta = 0.53$	$t(1832) = 22.91, p < .001$
Identity Resilience	$\beta = -0.32$	$t(1832) = -1.54, p = .124$
Risk	$\beta = 0.09$	$t(1832) = 5.00, p < .001$
COVID Fear	$\beta = 0.13$	$t(1832) = 7.04, p < .001$

These are all coefficients from a multiple regression. This means that they are each associations with vaccine likelihood after taking into account all the other variables. This differs from the correlations between each of these measures and vaccine likelihood shown in Table 2, which, presents bivariate associations, without taking into account other variables.

As a partial test of Hypothesis 3, which said that the model of six psychological influences upon vaccination likelihood would apply across ethnic groups, we examined

Table 2. The Pearson correlations for all groups.

	Trust in science	Social support	Vaccine positivity	Identity resilience	Vaccination likelihood	Risk
Social support	.140					
Vaccine positivity	.683	.096				
Identity resilience	.083	.557	.052			
Vaccination likelihood	.584	.114	.679	.017		
Risk	.203	.020	.151	-.112	.238	
COVID fear	.073	-.061	.103	-.159	.209	.244

how this multiple regression model varies by ethnic group. First, we include the main effects of ethnic group, which raised the R^2 to .523, a statistically significant increase, $F(6,1826) = 3.84$, $p < .001$. Next, we added, individually, the interaction between the ethnic category variable and each construct. Here are the resulting R^2 values and test statistics for these increases:

Interaction with Trust in Science	$R^2 = .525$	$F(6,1820) = 1.03$, $p = .403$
Interaction with Social Support	$R^2 = .529$	$F(6,1820) = 3.84$, $p < .001$
Interaction with Vaccine Positivity	$R^2 = .527$	$F(6,1820) = 2.56$, $p = .018$
Interaction with Identity Resilience	$R^2 = .529$	$F(6,1820) = 3.54$, $p = .002$
Interaction with Risk	$R^2 = .524$	$F(6,1820) = 0.30$, $p = .935$
Interaction with COVID Fear	$R^2 = .526$	$F(6,1820) = 1.43$, $p = .201$

Even the largest effect only accounts for about half a per cent more variation. The three that were significant were for the interaction with social support, with vaccine positivity and with identity resilience. The largest differences in coefficients for each of these were: a larger association between social support and vaccination likelihood for Black UK participants; a larger association between vaccine positivity and vaccination likelihood for Black US participants; and a larger association between identity resilience and vaccination likelihood for Black UK participants. It is important when trying to interpret these to recognise that they are each associations conditional on all the other effects of the other six constructs. In general, the pattern of results supports Hypothesis 3.

In order to further test Hypothesis 3 we compared the size of each correlation between each of the twenty-one possible ethnic group pairings. Given that there are 21 correlations in [Table 2](#), this requires 441 comparisons in total. When we adjusted for the number of ethnic groups, only 8 of the 441 (about 2 per cent) were statistically significant using this method. The eight comparisons yielding significant effects are shown in [Table 3](#). Six of the eight show the White UK participants reporting higher associations between a pair of constructs – generally trust in science and

Table 3. Variables and groups with significant differences in their Pearson correlations.

Construct 1	Construct 2	Larger r	r	Smaller r	r	adj. p
Identity resilience	Social support	US – Asian	.717	UK – White	.501	.036
Vaccination likelihood	Trust in science	US – White	.664	UK – Black	.488	.022
Vaccination likelihood	Vaccine positivity	UK – White	.733	UK – Asian	.555	.001
Trust in science	Risk	UK – White	.375	UK – Asian	.160	.041
Trust in science	Risk	UK – White	.375	US – Asian	–.058	.001
Trust in science	Risk	UK – White	.375	UK – Black	.138	.016
Trust in science	Risk	UK – White	.375	US – Black	.041	.002
Vaccine positivity	Risk	UK – White	.279	US – Black	–.026	.010

Note: $p < .05$ after adjusting for multiple p values for the group comparisons.

risk – than a comparison group. The existence of such a very small number of statistically significant differences between ethnic groups in the way in which psychological influences correlate with each other and with vaccination likelihood supports Hypothesis 3.

Discussion

Why vaccination likelihood varies

We hypothesised (Hypothesis 1) that the psychological constructs (identity resilience, social support, science trust, COVID-19 fear, COVID-19 risk and vaccine positivity), taken together, predict a substantial amount of the variability in vaccination likelihood. Our findings support Hypothesis 1. A regression analysis, where all six variables were entered, showed that together they accounted for about half of the variation in vaccination likelihood. All the constructs, except identity resilience, independently accounted for a significant percentage of the variance. It is important to show in a single study that these psychological constructs – which are often described as influences upon vaccination likelihood individually – when considered in unison account for about half the variability in vaccination likelihood.

However, the relationships internal to this group of six variables are not simple. The correlation matrix in Table 2 shows the close association between science trust and vaccine positivity, and that both of these link to COVID-19 risk perception. COVID-19 fear is positively correlated with vaccine positivity and perceived COVID-19 risk but negatively correlated with identity resilience. Social support and identity resilience are highly correlated. It is possible that this explains the absence of a significant separate effect for identity resilience on vaccination likelihood in the regression analysis

once social support has been included in the analysis We return to the relationships between these six constructs when considering Hypothesis 3.

Ethnic differences on the psychological constructs and vaccination likelihood

Hypothesis 2 stated that there would be substantial ethnic differences in mean scores on the psychological constructs and on vaccination likelihood. We did not specify what these differences would be. In fact, we found fifty-five (i.e., 37 per cent) significant pairwise mean differences. These are described in detail in the Data analysis section of this article but some key findings should be highlighted here. The Black UK sample has a different composite profile across the constructs compared to the other ethnic groups, characterised by high identity resilience and low COVID-19 risk, COVID-19 fear, science trust, vaccine positivity and vaccination likelihood. The Black and White UK samples differed significantly on all the constructs except social support. In contrast, the Black US and White US samples differed only on levels of science trust and COVID risk (where White US scored higher on both). The Asian UK sample differed significantly from the Black UK on all the constructs, but from the White UK on only one (where they reported higher COVID-19 fear). There were marked similarities between the Hispanic US, White UK and White US samples on identity resilience, social support, science trust, vaccine positivity and vaccination likelihood. The White UK and Hispanic US differ on both COVID-19 risk and fear, while the White UK and White US differ only on fear. Asian UK and Asian US samples differ only on vaccine positivity.

Identifying the ethnic differences on the psychological constructs may be used to focus ethnically differentiated interventions designed to encourage vaccination uptake. Most obviously, targeting efforts to raise science trust and vaccine positivity in those ethnic groupings in which these constructs are relatively low is a priority (Breakwell, 2021). Our study was not designed to test what type of intervention might be effective. It only identifies where differences exist. It does not examine why they exist or how they might be modified. In reality, there is no reason to believe that the differences found are a product of ethnic categorisation per se. They are more likely to be a by-product of various socio-economic contextual correlates of ethnicity (e.g., type of education, employment, power differentials and socio-historical legacies). Addressing such underlying determinants of ethnic differences in the psychological constructs that influence pandemic responses is important but it would be worthwhile in the short term to pay attention specifically and directly to raising science trust and vaccine positivity. Given the history of significant vaccine hesitancy internationally, any short-term effort is most likely to need to evolve into an ongoing, multidimensional campaign embedded through many social influence channels (including formal and

community-based education and mass media). The unmissable irony in this is that efforts to inculcate trust (whether in science or in vaccines) are inevitably undermined by the feelings of mistrust they try to supplant. In the midst of a pandemic, it is too late to improve trust levels. By then some people are awash, not just with mistrust, but also with fear, risk, confusion and uncertainty. One clear lesson of COVID-19 has been that raising trust levels is a perpetual priority, not just one that has to be addressed once a crisis has been identified.

Absence of ethnic variations in the model of psychological influences

Hypothesis 3 stated that the model of psychological influences upon vaccination likelihood will apply well across ethnic categories. As reported, there were a large number of ethnic differences in self-reported levels of the six psychological constructs. However, the pattern of correlations between these constructs and vaccination likelihood was remarkably similar. From a theoretical viewpoint, this finding is important. It emphasises the reliability of the relationships between these psychological constructs and between them and vaccination likelihood. It suggests that these six constructs will be useful in the same way in predicting vaccination likelihood irrespective of the ethnic category involved. Differences in these constructs do help account for ethnic variance in vaccination likelihood. Furthermore, it does not suggest that these are the only constructs that could be valuable in accounting for ethnic differences in vaccination likelihood. Other constructs may be added to the model subsequently to make it more predictive of ethnic differences in vaccination likelihood. For instance, including ingroup power may be a valuable addition. [Jaspal & Breakwell \(2023: 147\)](#) argue that ingroup power (a measure of the perceived political, economic and cultural influence of one's own group) moderates how available social representations of past and current vaccines influence science trust and vaccine positivity. Hopefully, the theoretical model that is used to account for variance in vaccination likelihood will evolve and will probably become more complex. As it does, it will be important to monitor whether the model continues to be equally reliable across ethnic categories.

Methodological limitations

Sampling

It can be argued that the level of granularity in identification of ethnic differences was inadequate and that the breadth of the categories used masked or ignored important intra-category differences. For instance, Black UK included people identifying either as Black Caribbean or Black African while Hispanic/Latinx US includes people from

different ethnicities. Using a small number of broad categories made it possible to collect large enough samples to make valid statistical comparisons. In future research, larger sample sizes from a wider range of clearly defined ethnic categories would be valuable. This needs to be done on a large scale to allow reliable analyses of differences.

Data collection

Using an online survey platform for collecting data has many advantages (e.g., speed of data collection and simultaneity of data collection internationally) especially in a pandemic. However, the method introduces some biases into the sample (e.g., biasing participants in favour of the digitally literate and those with online access, which in turn tends to result in over-representation of younger and better educated respondents). For the purposes of this study, it is important that we have no reason to believe that these biases might have occurred differentially across ethnic categories in such a way as to invalidate our findings.

Time of data collection

It is inevitable when collecting data in a single, short period during an ongoing real world crisis that the findings may be influenced by the specific conditions of the crisis at that time. Data were collected in early January 2022. At this time, the pandemic was not subsiding. For the United Kingdom, the weekly confirmed number of cases was 370,335, a weekly increase of 40.18 per cent. For the United States, the weekly confirmed number of cases was 968,036, a weekly increase of 20.67 per cent.¹ However, vaccination availability and information had improved by January 2022 in both the United Kingdom and the United States. There is no research to suggest that people who were less likely to get vaccinated were more unaware of their options or more unable to access the vaccine by this time period in the pandemic. It is also possible that by this stage in the pandemic people generally were better informed of both the advantages and limitations of the COVID-19 vaccines. It is against this backdrop that our findings should be considered. There is nothing obvious that occurred regarding the pandemic during the data-collection window that would be likely to bias the findings reported (e.g., no new reports of vaccination side effects and no change in vaccination conspiracy theorising).

¹ <https://covid19.who.int/region/>.

Measurement

Our measures of psychological constructs are all based on self-report and open to the biases associated with such subjective self-assessments. Future researchers may have greater opportunities to establish the validity of such reports (e.g., using medical records to check vaccination uptake or objective indices of social support). Our findings only reflect what people were willing to say in the middle of the pandemic about their COVID-19 thoughts, feelings and behaviour. We regard this as important information in its own right but it needs to be recognised for what it is.

General Conclusions

We draw three main conclusions from the mapping review and the survey work reported here:

1. There was little coordinated, international, empirical examination of ethnic differences on psychological constructs likely to influence preventive behaviours (including vaccination) during the early part of the pandemic. In preparation for future pandemics, it is important now to develop and test theoretical models of the psychological influences that will account for variability in engagement in preventive behaviours. These models will need to span levels of analysis (intra-psychic to societal). Applicability of these models across ethnic categories will need to be established.
2. A small number of psychological influences account for about 50 per cent of the variability in COVID-19 vaccination likelihood. These are science trust, vaccine positivity, perceived risk, COVID-19 fear, identity resilience and social support. Ethnic groups vary in their self-report ratings on these six constructs. However, there is a marked similarity across ethnic groups in the way these six variables interact to account for variance in vaccination likelihood. This suggests that a single model of psychological influences on vaccination decisions will be applicable across ethnic groups. This may be the foundation for differential intervention strategies designed to increase vaccination acceptance across ethnic groups when associated with data on how ethnic groups vary on baseline levels of these psychological constructs.
3. Prediction of the responses of varying subsections of the public as pandemics emerge and evolve is vitally important. As a discipline, psychology offers theoretical and methodological tools that can be used as a basis for prediction. However, there is a need for more psychology researchers to learn how to

work (across government departments and internationally) with policymakers tasked with pandemic preparedness. It might be easier to coax a new generation of researchers to work with policymakers if we document very clear evidence of the significance of the contributions of psychologists during COVID-19.

References

- Ahorsu, D. K., Lin, C. Y., Imani, V., Saffari, M., Griffiths, M. D. & Pakpour, A. H. (2020), 'The fear of COVID-19 scale: development and initial validation', *International Journal of Mental Health and Addiction*, 20: 1537–1545. <https://doi.org/10.1007/s11469-020-00270-8>
- Bhanu, C., Gopal, D. P., Walters, K. & Chaudhry, U. A. (2021), 'Vaccination uptake amongst older adults from minority ethnic backgrounds: a systematic review', *PLoS Medicine*, 18(11): e1003826. <https://doi.org/10.1371/journal.pmed.1003826>
- Breakwell, G. M. (1994), 'The echo of power: a framework for social psychological research [the Myers Lecture]', *The Psychologist*, 7(2): 65–72.
- Breakwell, G. M. (2014), *The Psychology of Risk* (Cambridge, Cambridge University Press). <https://doi.org/10.1017/CBO9781139061933>
- Breakwell, G. M. (2021), *Mistrust* (London, SAGE). <https://doi.org/10.4135/9781529770070>
- Breakwell, G. M. & Jaspal, R. (2023), 'Vaccines and COVID-19', in Cockerham, W. C., Gabe, J., Quah, S. & Ryan, J. M. (eds), *The Wiley-Blackwell Encyclopedia of Health, Illness, Behavior, and Society* (2nd edn; Chichester, Wiley-Blackwell).
- Breakwell, G. M., Fino, E. & Jaspal, R. (2022), 'The Identity Resilience Index: development and validation in two UK samples', *Identity*, 22(2): 166–182. <https://doi.org/10.1080/15283488.2021.1957895>
- Breakwell, G. M., Jaspal, R. & Wright, D. B. (2023), 'Identity resilience, science mistrust, COVID-19 risk and fear predictors of vaccine positivity and vaccination likelihood: a survey of UK and Portuguese samples', *Journal of Health Psychology*, 28(8): 747–759. <https://doi.org/10.1177/13591053231161891>
- Cohen, S., Mermelstein, R., Kamarck, T. & Hoberman, H. M. (1985), 'Measuring the functional components of social support', in Sarason, I. G. & Sarason, B. R. (eds), *Social Support: Theory, Research and Applications* (NATO ASI Series, Vol. 24) (Dordrecht, Springer). https://doi.org/10.1007/978-94-009-5115-0_5
- Despard, M., Banks, A. & Dukes, L. (2022), 'Covid-19 job and income loss and mental health: the mediating roles of financial assets and well-being and the moderating role of race/ethnicity', *Social Work in Mental Health*, 21(1): 28–45. <https://doi.org/10.1080/15332985.2022.2063042>
- Freeman, D., Loe, B. S., Chadwick, A., Vaccari, C., Waite, F., Rosebrock, L. & Lambe, S. (2022), 'COVID-19 vaccine hesitancy in the UK: the Oxford coronavirus explanations, attitudes, and narratives survey (Oceans) II', *Psychological Medicine*, 52(14): 3127–3141. <https://doi.org/10.1017/S0033291720005188>
- Grant, M. J. & Booth, A. (2009), 'A typology of reviews: an analysis of 14 review types and associated methodologies', *Health Information & Libraries Journal*, 26: 91–108. <https://doi.org/10.1111/j.1471-1842.2009.00848.x>
- Gross, C. P., Essien, U. R., Pasha, S., Gross, J. R., Wang, S. Y. & Nunez-Smith, M. (2020), 'Racial and ethnic disparities in population-level Covid-19 mortality', *Journal of General Internal Medicine*, 35(10): 3097–3099. <https://doi.org/10.1007/s11606-020-06081-w>

- Holm, S. (1979), 'A simple sequentially rejective multiple test procedure', *Scandinavian Journal of Statistics*, 6(2): 65–70. [JSTOR 4615733](https://doi.org/10.2307/2346157)
- Jaspal, R. & Breakwell, G. M. (2021), 'Social support, perceived risk and the likelihood of COVID-19 testing and vaccination: cross-sectional data from the United Kingdom', *Current Psychology*, 41(1): 492–504. <https://doi.org/10.1007/s12144-021-01681-z>
- Jaspal, R. & Lopes, B. (2021), 'Discrimination and mental health outcomes among British Black and South Asian people during the COVID-19 outbreak in the United Kingdom', *Mental Health, Religion & Culture*, 24(1): 80–96. <https://doi.org/10.1080/13674676.2020.1871328>
- Jaspal, R. & Breakwell, G. M. (2023), 'The significance of ethnicity in vaccination uptake: social psychological aspects', in Ryan, M. J. (ed.), *COVID-19: Surviving a Pandemic* (Abingdon, Routledge). <https://doi.org/10.4324/9781003302698-11>. p.147.
- Jaspal, R., Assi, M. & Maatouk, I. (2023), 'Coping with COVID-19 in Lebanon: a social psychological perspective', in Ryan, M. J. (ed.), *COVID-19: Surviving a Pandemic* (Abingdon, Routledge), 84–100. <https://doi.org/10.4324/9781003302698-8>
- Jaspal, R., Fino, E. & Breakwell, G. M. (2022), 'The COVID-19 Own Risk Appraisal Scale (CORAS): development and validation in two samples from the United Kingdom', *Journal of Health Psychology*, 27(4): 790–804. <http://doi.org/10.1177/1359105320967429>
- Jaspal, R., Lopes, B. & Maatouk, I. (2019), 'The attitudes towards Pre-Exposure Prophylaxis (PrEP) scale: development and validation', *Journal of HIV/AIDS & Social Services*, 18(2): 197–205. <https://doi.org/10.1080/15381501.2019.1596861>
- Kamal, A., Hodson, A. & Pearce, J. M. (2021), 'A rapid systematic review of factors influencing COVID-19 vaccination uptake in minority ethnic groups in the UK', *Vaccines*, 9(10): 1121. <https://doi.org/10.3390/vaccines9101121>
- Khanijahani, A., Iezadi, S., Gholipour, K., Azami-Aghdash, S. & Naghibi, D. (2021), 'A systematic review of racial/ethnic and socioeconomic disparities in COVID-19', *International Journal for Equity in Health*, 20(1): 1–30. <https://doi.org/10.1186/s12939-021-01582-4>
- Khunti, K., Abrams, K. R., Nellums, L. B. & Pareek, M. (2020), 'Ethnicity and clinical outcomes in COVID-19: a systematic review and meta-analysis', *eClinicalMedicine*, 29: 100630. <https://doi.org/10.1016/j.eclinm.2020.100630>
- Lu, Y., Kaushal, N., Huang, X. & Gaddis, S. M. (2021), 'Priming COVID-19 salience increases prejudice and discriminatory intent against Asians and Hispanics', *Proceedings of the National Academy of Sciences of the United States of America*, 118(36): e2105125118. <https://doi.org/10.1073/pnas.2105125118>
- Magesh, S., John, D., Li, W. T., et al. (2021), 'Disparities in COVID-19 outcomes by race, ethnicity, and socioeconomic status: a systematic review and meta-analysis', *JAMA Network Open*, 4(11): e2134147. [doi:10.1001/jamanetworkopen.2021.34147](https://doi.org/10.1001/jamanetworkopen.2021.34147)
- Nadelson, L., Jorcyk, C., Yang, D., Jarratt Smith, M., Matson, S., Cornell, K. & Husting, V. (2014), 'Trust in science and scientists', *School Science and Mathematics*, 114: 76–86. <https://doi.org/10.1111/ssm.12051>
- Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D. & Moher, D. (2021), 'The PRISMA 2020 statement: an updated guideline for reporting systematic reviews', *BMJ*, 372(71). <https://doi.org/10.1136/bmj.n71>
- Pan, D., Sze, S., Minhas, J. S., Bangash, M. N., Pareek, N., Divall, P. & Pareek, M. (2020), 'The impact of ethnicity on clinical outcomes in COVID-19: a systematic review', *eClinicalMedicine*, 23: 100404. <https://doi.org/10.1016/j.eclinm.2020.100404>
- Proto, E. & Quintana-Domeque, C. (2021), 'COVID-19 and mental health deterioration by ethnicity and gender in the UK', *PloS One*, 16(1): e0244419. <https://doi.org/10.1371/journal.pone.0244419>

- Raharja, A., Tamara, A. & Kok, L. T. (2021), 'Association between ethnicity and severe COVID-19 disease: a systematic review and meta-analysis', *Journal of Racial and Ethnic Health Disparities*, 8(6): 1563–1572. <https://doi.org/10.1007/s40615-020-00921-5>
- Rodrigues, F., Block, S. & Sood, S. (2022), 'What determines vaccine hesitancy: recommendations from childhood vaccine hesitancy to address COVID-19 vaccine hesitancy', *Vaccines*, 10: 80. <https://doi.org/10.3390/vaccines10010080>
- Rogers, A. A., Cook, R. E. & Button, J. A. (2021), 'Parent and peer norms are unique correlates of COVID-19 vaccine intentions in a diverse sample of US adolescents', *Journal of Adolescent Health*, 69(6): 910–916. <https://doi.org/10.1016/j.jadohealth.2021.09.012>
- Routen, A., Darko, N., Willis, A., Miksza, J. & Khunti, K. (2021), 'The impact of Covid-19 and lockdown measures on self-reported life satisfaction and social relationships does not differ by ethnicity', *Journal of Public Health*, 43(2): e241–e243. <https://doi.org/10.1093/pubmed/fdaa160>
- SAGE Working Group. (2014), 'Report of the SAGE Working Group on vaccine hesitancy', World Health Organization. https://www.who.int/immunization/sage/meetings/2014/october/1_Report_WORKING_GROUP_vaccine_hesitancy_final.pdf (accessed February 2023).
- Sze, S., Pan, D., Nevill, C. R., Gray, L. J., Martin, C. A., Nazareth, J. & Ongkeko, W. M. (2021), 'Disparities in COVID-19 outcomes by race, ethnicity, and socioeconomic status: a systematic review and meta-analysis', *JAMA Network Open*, 4(11): e2134147. <https://doi.org/10.1001/jamanetworkopen.2021.34147>
- Tiwari, B. B. & Zhang, D. S. (2022), 'Differences in mental health status among Asian Americans during the COVID-19 pandemic: findings from the Health, Ethnicity, and Pandemic Study', *Health Equity*, 6(1): 448–453. <https://doi.org/10.1089/hecq.2022.0029>
- UK Census. (2021), 'Ethnic group, England and Wales: Census 2021'. <https://www.ons.gov.uk/peoplepopulationandcommunity/culturalidentity/ethnicity/bulletins/ethnicgrounglandandwales/census2021> (accessed 9 February 2023).
- US Census. (2020), '2020 Census illuminates racial and ethnic composition of the country'. <https://www.census.gov/library/stories/2021/08/improved-race-ethnicity-measures-reveal-united-states-population-much-more-multiracial> (accessed 9 February 2023).
- WHO (World Health Organization). (2022), 'COVID-19 pandemic dashboard'. <https://covid19.who.int/region/> (accessed 12 February, 2023)
- Wright, L., Steptoe, A. & Fancourt, D. (2021), 'Predictors of self-reported adherence to COVID-19 guidelines: a longitudinal observational study of 51,600 UK adults', *The Lancet Regional Health – Europe*, 4: 100061. <https://doi.org/10.1016/j.lanepe.2021.100061>
- Wright, D. B. (2023), 'Methodological considerations and assumptions in social science survey research', *Journal of the British Academy*, 11(s5): 1–00. <https://doi.org/10.5871/jba/011s5.000>

Note on the authors: Professor Dame Glynis Breakwell is a psychologist whose research focuses upon identity processes, social representations and the psychology of risk management, perception and communication. She has been an adviser to both public and private sector organisations on the use of psychological methods and theories, particularly concerning responses to public crises and major emergencies.

Professor Julie Barnett is Associate Pro-Vice-Chancellor (Research) and Professor in Health Psychology at the University of Bath. She has a particular interest and expertise in risk: public appreciation of risk, risk communication and risk management. Other research interests include the role of social connection in addressing loneliness and social isolation, social prescribing and the increasing integration of digital technology with our everyday lives.

Professor Rusi Jaspal is Pro-Vice-Chancellor (Research and Knowledge Exchange) and Professor of Psychology at the University of Brighton. He has produced over two hundred peer-reviewed publications, including six books, which mainly focus on aspects of identity in the context of social change.

Daniel Wright is Professor of Educational Psychology. His interests are in quantitative methods and applied cognitive science (in particular learning in groups).

To cite the article: Breakwell, G. M., Barnett, J., Jaspal, R. & Wright, D. B. (2023), 'Psychological influences on COVID-19 preventive behaviours and vaccination engagement in the United Kingdom and United States: the significance of ethnicity', *Journal of the British Academy*, 11(s5): 83–112.
<https://doi.org/10.5871/jba/011s5.083>

Journal of the British Academy (ISSN 2052–7217) is published by
The British Academy, 10–11 Carlton House Terrace, London, SW1Y 5AH
www.thebritishacademy.ac.uk