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Social Representation  
and Identity Processes  
in Relation to COVID-19  
Reactions

Edited by  
Rusi Jaspal

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# Social representation and identity processes in relation to COVID-19 reactions: an introduction

*Rusi Jaspal*

*Abstract:* The articles in this special issue enable us not only to reflect upon changes in representation, identity and human reactions during the COVID-19 pandemic, but also to anticipate the effects of future health crises. More generally, they demonstrate the multitude of ways in which research can and should be conducted, but also the value in ensuring a coordinated research effort that seeks to synthesise research findings. It should be noted that in all the articles in the special issue there is a strong focus upon social psychological theory. This is based upon the premise that evidence-based policy approaches to risk reactions that are grounded in robust, testable theory are more likely to be effective. The social sciences have a crucial role to play in enhancing future pandemic preparedness. This special issue presents some key foci for research that seeks to do so.

*Keywords:* COVID-19, health, research, social psychology, pandemic preparedness

*Note on the author:* 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.

COVID-19 was designated a global pandemic on 11 March 2020 and went on to affect virtually every country in the world. By November 2020, 1.2 million people in the United Kingdom had been infected with COVID-19 and over 50,000 had died of the resulting illness. In the same year, 52 million people had been affected globally, of whom 1.3 million lost their lives (WHO 2020). The COVID-19 global pandemic represented not only a significant risk to physical health but also to psychological health (Lopes & Jaspal 2020; Rajkumar 2020; Torales *et al.* 2020; Wang *et al.* 2020). It precipitated significant changes to people's identities, including the reordering of work and family life, social behaviour and travel. It seemed difficult to imagine a return to normality.

Risk perception was central to how COVID-19 and its mitigation strategies (such as social distancing, the wearing of face coverings and vaccination) were considered and acted upon. Scientists, governments and the general public all struggled to understand the risks associated with the virus and continually put into place actions, strategies and tactics to manage these risks. Most governments imposed lockdowns of varying degrees on their populations. Scientists attempted to communicate the science of COVID-19. Many people decided to be vaccinated. There was no uniformity in the management of COVID-19 when it struck. Moreover, there was a great deal of change in reactions to COVID-19 over the course of the pandemic, which in turn gave rise to uncertainty and, in some cases, mistrust.

In order to understand how people will react to crises such as pandemics, an integrative social sciences approach that brings together individual, social and institutional perspectives is necessary. This special issue attempts to address this need. It includes four articles that examine reactions to social representations of COVID-19 risk and its mitigation at an individual level, how people's sense of identity may change as hazards and risks arise and the individual and collective actions that come about through social representational and identity processes. The articles in this special issue are based largely on results from social surveys on beliefs and behaviours related to COVID-19. However, they are intended to inform future pandemic and other crisis preparedness by collating evidence and indeed the lessons learned from the most significant global pandemic in over a hundred years.

Theories from the social sciences and particularly from social psychology play key roles in enabling us to develop evidence-based approaches to pandemic preparedness. The first article, entitled 'Identity resilience, uncertainty, personal risk, fear, mistrust and ingroup power influences upon COVID-19 coping', by Glynis M. Breakwell, introduces a theoretical model based upon identity process theory (IPT) (Jaspal & Breakwell 2014; Breakwell 2015), focusing upon how people attempt to cope with COVID-19. Coping is important because it reflects not only how people think and feel about the pandemic, potentially affecting their psychological well-being, but also

how they will behave (e.g., whether or not they will adhere to preventive measures). Breakwell outlines the interactions between the concepts of identity resilience (defined in IPT as a product of an individual's levels of self-esteem, self-efficacy, positive distinctiveness and continuity), uncertainty, perceived personal risk, fear, mistrust and ingroup power (the perceived influence that one's ingroup has in key spheres of life) in determining how people will cope when faced with a hazard such as COVID-19. In particular, the significance of psychological constructs, such as identity resilience, is shown to be central to determining the extent to which people will react to uncertainty and risk and experience fear, mistrust and ingroup power. To that extent, Breakwell argues that, in addition to individual psychological variables, group processes are key: social representation, group identification processes and intergroup relations can all have effects on individual coping (see also [Jaspal & Lopes, 2021](#)). Although the model focuses upon COVID-19 as a case study, social scientists would benefit from considering the implications of the model for enhancing future pandemic preparedness.

To strengthen preparedness, there has been a major effort to produce social sciences empirical research that can shed light on attitudes and behaviours in the context of COVID-19. Many research teams from a multitude of social sciences disciplines, using many different methods, have been involved in this research effort. One of the unintended consequences of this enormous research effort has been an uncoordinated approach that has resulted in divergent ways of measuring the same concepts. Behavioural intention is a case in point ([Wright \*et al.\* 2022](#)). The second article, entitled 'Methodological considerations and assumptions in social science survey research', by Daniel B. Wright, describes the considerations and assumptions used when conducting survey research in the context of the pandemic and when analysing the resulting data. The focus is upon data from a recent British Academy project on differences between the United Kingdom and the United States, and between ethnicities, with respect to COVID-19 beliefs and behaviours, by the authors of the articles in this special issue (see [Jaspal \*et al.\*, 2022](#)). Wright shows that the scales used appeared to measure the psychological constructs (e.g., identity resilience and trust in science) as intended and that these did seem to influence reports of COVID-19 preventative behaviours. This article provides valuable insight into the methodological considerations that should be central to any social science survey-based study of future pandemic preparedness, including how existing methods must innovate and be bridged in order to yield meaningful policy implications in relation to risk reactions.

The third article, entitled 'Public uncertainties in relation to COVID-19 vaccines in the United Kingdom', has an empirical focus upon one of many challenges that occurred and continues to occur in relation to the pandemic: vaccine hesitancy. Vaccination was central to reducing disease incidence and the mortality rate associated with the virus ([Watson \*et al.\* 2022](#)). Yet not everyone was willing to be vaccinated when the

vaccines finally became available. In their article, Rusi Jaspal and Glynis M. Breakwell note that uncertainties about COVID-19 vaccines and variants have been associated with vaccination refusal on a significant scale. They argue that only an understanding of the substantive nature of people's uncertainties can allow policymakers to address these and thus reduce vaccination refusal. To that end, the study presents a qualitative thematic analysis of a corpus of written texts from 324 participants from the United Kingdom, focusing upon the uncertainties people have about vaccines and vaccination. They draw upon tenets of social representations theory (Moscovici 1988) and, in particular, Breakwell's (2014) concept of personal representations in order to elucidate the individual concerns that people in the United Kingdom appear to have about the COVID-19 vaccines. The study describes five major public uncertainties regarding COVID-19 and argues that policy responses must be informed by an understanding of the factors that instigate and maintain uncertainties in individuals and in wider society. Qualitative insights of this kind can enable researchers and policymakers to anticipate opposition to novel prevention measures in future pandemic contexts.

In seeking to understand COVID-19 reactions, researchers and commentators have acknowledged differences by key demographic features, such as ethnicity (e.g., Jaspal & Breakwell 2023). The final article in the special issue, entitled 'Psychological influences on COVID-19 preventive behaviours and vaccination engagement in the United Kingdom and United States: the significance of ethnicity', by Glynis M. Breakwell, Julie Barnett, Rusi Jaspal and Daniel B. Wright, presents the findings of two studies conducted as part of the aforementioned British Academy project on COVID-19 beliefs and behaviours in the United Kingdom and the United States. The first study reported in the article describes a mapping review of literature on the effect of ethnicity on psychological influences upon COVID-19 responses. Despite the acknowledgment of apparent ethnic differences in relation to COVID-19 reactions, the review reveals that very few empirical studies conducted during 2020–2021 actually examined differences by ethnicity on the psychological influences upon COVID-19 preventive behaviours. Furthermore, it is shown that the few studies that did examine differences provide some evidence that ethnic groups vary on various key social psychological factors (e.g., levels of trust, perceived personal risk) associated with COVID-19 choices. The second study describes the cross-sectional survey conducted in the United Kingdom and the United States by Breakwell *et al.* to examine differences by ethnic group in levels of, and in relationships among, identity resilience, social support, science trust, COVID-19 fear, COVID-19 risk and vaccination likelihood. On the basis of these studies, Breakwell *et al.* suggest that a single model of psychological influences on vaccination decisions may be applicable across ethnic categories.

The articles in this special issue enable readers not only to reflect upon changes in representation, identity and human reactions during the COVID-19 pandemic but

also to anticipate the effects of future health crises. More generally, they demonstrate the multitude of ways in which research can and should be conducted, and also the value in ensuring a coordinated research effort that seeks to synthesise research findings. It should be noted that in all the articles in the special issue there is a strong focus upon social psychological theory. This is based upon the premise that evidence-based policy approaches to risk reactions that are grounded in robust, testable theory are more likely to be effective. The social sciences have a crucial role to play in enhancing future pandemic preparedness. This special issue presents some key foci for research that seeks to do so.

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# Identity resilience, uncertainty, personal risk, fear, mistrust and ingroup power influences upon COVID-19 coping

*Glynis M. Breakwell*

*Abstract:* A model of the relationships between social psychological factors that were influential in determining individual coping responses to the COVID-19 pandemic is presented here. The factors include identity resilience (as defined in identity process theory), uncertainty, perceived personal risk, fear, mistrust and ingroup power. These factors are significantly associated with each other. Higher identity resilience is associated with greater uncertainty, personal risk and fear, but with lower mistrust and ingroup power. Social representation and group identification processes also have important effects on individual coping, and are moderated by identity resilience. Implications of the model for developing future pandemic preparedness include the desirability of fostering greater identity resilience in those at risk and the value of ongoing targeting of information and social support to promote the development of more effective coping responses to fear, risk, uncertainty and mistrust.

*Keywords:* COVID-19 coping, identity resilience, uncertainty, risk, fear, mistrust, ingroup power

*Note on the author:* 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.

## **Introduction**

Many factors influenced how individuals reacted in the COVID-19 pandemic. This article describes social psychological factors that have been shown to be particularly influential in determining individual coping responses during the pandemic. Uncertainty, fear, perceived personal risk (PPR) and mistrust each influence coping choices and their effectiveness. Identity resilience also has significant effects on coping both directly and indirectly, through its effects on fear, risk, uncertainty and mistrust. The expression of identity resilience in the pandemic was influenced by prevailing social representations of the crisis and by the individual's group identifications and beliefs about the power of those groups. Social representations, perceived group power and group identifications also had their own influence on the individual's uncertainty, risk, fear and mistrust levels. Figure 1 provides a schematic of these relationships. Subsequent articles in this special issue report empirical data that test some of the relationships between these factors. Each of the factors has its origin in fundamental intra-psychic, interpersonal, intergroup and societal processes. This article suggests how these processes interact to produce unique as well as common reactions to the pandemic. Each of the factors is described in some detail. These factors are chosen for particular examination here because, as will become evident from the studies cited later in this special issue, they have been individually shown to be capable of predicting variance in reactions to the COVID-19 pandemic. The original contribution of this article lies in bringing all of these factors together in a single model that predicts coping responses.

Figure 1 indicates that social representation processes, intergroup power differentials and group memberships achieve their influence upon coping responses through their effects on cognitive and conative processes in the individual. The figure presents uncertainty, risk, fear and mistrust in a single box. These are treated in the model as a set of interacting variables. All of them as individual variables may be influenced by social representations, ingroup power, group identification and identity resilience constructs. Additionally, the way they interact with each other (in a variety of combinations) may be affected by these influences. The single box in the figure and the paths to it subsume substantial social psychological activity. Notably, the variable labels in this box each represent the negative pole of the construct. This may reflect something of the preoccupation of researchers with explaining coping failures rather than successes.

Identity resilience also has an impact partly through its effects on the same areas of cognition and emotion, but it additionally has a direct effect on coping responses. This is because identity resilience is derived from the individual's own evaluation of their self-esteem, self-efficacy, positive distinctiveness and continuity. The individual

is motivated to optimise these four qualities of identity. In turn, these four qualities shape which coping responses the individual will consider appropriate or feasible choices. For example, low self-esteem or low self-efficacy may result in avoidance of coping tactics that assume confidence or acquisition of new skills (e.g., seeking to take on a leadership role in a crisis). These aspects of identity also motivate behaviour designed to protect the identity structure and evaluation. As a result, some coping responses will not be adopted in a pandemic because to do so might be expected to undermine some important element in identity (e.g., it might call for breaking the norms associated with a valued group membership).

Figure 1 introduces the constructs and relationships hypothesised in this article to be important in accounting for variance in pandemic coping responses. As it stands, Figure 1 does not capture the dynamic two-way flow of influence between all the constructs over time. Nor does it indicate how social representation, ingroup power and group identification interact with each other as well as with the other constructs. Those interactions are important, but are not central to the purpose of this article.

## Social psychological consequences of the COVID-19 pandemic

Explanations for variations in how people coped during COVID-19 should be understood against the wide-ranging threat the pandemic represented to individuals and communities globally. Between March 2020 and December 2023 COVID-19 had resulted in 649,038,437 confirmed cases, including 6,645,812 deaths (WHO, 2022). It also caused societal and economic disruption, increasing poverty and inequalities at a global scale (UNDP, 2022, p. 1). In fact, the use of the past tense when talking about

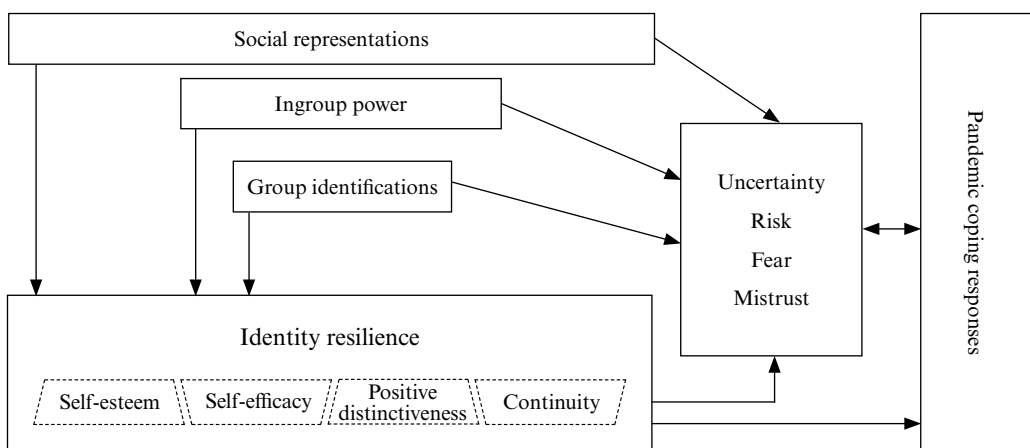


Figure 1. Model of influences on pandemic coping responses.

the impact of COVID-19 is actually inappropriate. The aftershocks of its primary, secondary and tertiary-level impacts continue, as do the infections, as new variants of the virus appear.

The full social-psychological consequences of such widespread, rapid and unanticipated disruption are complex and it is not known how long some will last or how they will evolve. However, it is clear that the pandemic wreaked havoc on social life. The measures taken to limit the spread of the disease perforce changed patterns of social interaction (both at home and in public) by introducing, for instance, social distancing, face masks, self-isolation and greater dependence upon online communications. Social habits were disrupted (notably those associated with crowded venues). Personal social support systems were also disrupted, partially because maintaining contact became difficult but also due to bereavement and illness. Disruption was accompanied by conflicting accounts (including conspiracy theories) of the reasons for the disease, its longer-term consequences and the viability of treatments for it (Yelin *et al.* 2020; Douglas 2021). Measures for managing the disease (including vaccination) were challenged. Disparities in COVID-19 outcomes by age, race, ethnicity and socio-economic status raised questions of intergroup and intergenerational inclusivity and equity (see, e.g., Magesh *et al.* 2021; Bayati *et al.* 2022). The conditions were ripe for high levels of uncertainty, PPR, mistrust and fear. They also pointed to the bases for intergroup differentiation and divisiveness (e.g., based on healthcare or vaccination uptake or availability, economic impacts and nationalist sentiment; see Breakwell *et al.* 2022a; Jaspal & Breakwell 2022a). The social-psychological effects of these disruptions were evident from early in the pandemic, with growing incidence of mental illness and lower psychological well-being not just in those who contracted the disease (Robinson *et al.* 2022) and not only in adult members of the wider public (Samji *et al.* 2022) but also in health professionals (e.g., Aymerich *et al.* 2022). Some coping responses that were being used were clearly not providing the psychological protection that people needed (Taylor 2022).

### **Significance of uncertainty, PPR, fear, mistrust and ingroup power for coping responses**

Age, gender, ethnicity, educational attainment, religious and political beliefs have all been shown to account for individual variation in reactions to some hazards, but none apply to every hazard, nor do they apply the same way across cultures (Breakwell 2014, reviews this literature). However, some individual cognitive and conative factors are influential across hazard types and cross-culturally in shaping behavioural and psychological reactions. As indicated in Figure 1, these are levels of uncertainty, PPR,

mistrust and fear. Perceived ingroup power has also been shown to influence coping responses (Breakwell *et al.* 2022b). Perceived ingroup power refers to the amount of power individuals attribute to a group to which they belong. It is an important influence on coping responses because identifying with a group believed to have power is likely to increase the range of coping options available.

Individuals characterised by greater uncertainty, PPR, mistrust or fear typically cope less effectively with a hazard. Those with less perceived ingroup power similarly cope less well. Essentially, failure to adopt appropriate or recommended coping strategies when responding to the hazard is likely to occur when people are uncertain about what they can or should do, or because they do not trust the advice they are given, or because they are too afraid, or feel too vulnerable, or feel they are not empowered to act by virtue of their group membership. In the COVID-19 pandemic, individuals were shown to have failed to adopt effective self-protection as a result of various combinations of these reasons (Breakwell *et al.* 2021a). They were also more likely to suffer detriment to their physical or psychological well-being (Breakwell & Jaspal 2021; O'Connor *et al.* 2021).

Uncertainty, PPR, fear, mistrust and perceived ingroup power have been found singly or in various combinations in many studies to be important socio-cognitive influences upon behavioural and psychological reactions during the COVID-19 pandemic. They account, in differing degrees, for variation in vaccination willingness (Troiano & Nardi 2021; Kumar *et al.* 2022; Romate *et al.* 2022) and compliance with guidance on other self-protection and prevention measures (Bottemanne & Friston 2021; Breakwell *et al.* 2021a). They have also predicted variation in anxiety and depressive reactions during COVID-19 to restrictions on social interaction and mobility (Bakioğlu *et al.* 2021).

In thinking about how to prepare for future pandemics, or similar public crises, it is useful to examine why these five factors are important and how they are defined. The issues of definition and measurement are important because there is little consistency across empirical studies in how they are operationalised. Furthermore, all five factors rarely appear in the same study. As a relatively recently introduced construct in this area of research, perceived ingroup power has not been frequently examined thus far. Table 1 summarises some of the various ways that the five factors are defined and the associations they have with coping responses. It emphasises why these factors are important in explaining individual variation in coping responses.

Further empirical exploration of the nature of the interactions among these five factors in Table 1 in accounting for coping responses in crises is needed. It is not clear, in the absence of longitudinal data or large-scale experimental evidence, whether there is a regular causal sequence between the five, or whether causal associations are dependent on specific forms of hazard or particular situations, or whether their

**Table 1.** Definitions of uncertainty, perceived personal risk, fear, mistrust and ingroup power.

<b>Construct</b>	<b>Definition and associations with coping responses</b>
Uncertainty	Defined variously as: being unsure about an event or set of events, or how to interpret or evaluate available information; being unsure about the appropriate action to take; and lacking conviction about one's thoughts or feelings. It arises where information is absent or ambiguous and also when one's objectives are unclear, conflicted or imperfectly understood. Uncertainty is multidimensional. Each dimension is open to measurement separately (e.g., information uncertainty, emotional uncertainty, motivational uncertainty etc.). Uncertainty can range from zero to total. Uncertainty is defined as aversive (people typically seek to avoid it). Being uncertain can undermine one's ability to plan towards goal achievement or to adapt to sudden changes or threat (Fergus & Rowatt 2014). Nevertheless, ill-informed certainty or certainty that is unresponsive to changed circumstances can also be maladaptive. Individuals differ in the extent to which uncertainty disrupts their coping capacity. The existence of the personality trait 'uncertainty intolerance' is reported to be associated with worry, anxiety and mood disorders (Shu <i>et al.</i> 2022). Uncertainty, as a state or a trait, is associated with suboptimal decision-making.
Perceived personal risk (PPR)	PPR refers to the individual's assessment of their own risk of harm (Jaspal <i>et al.</i> 2020). Risk is often loosely operationalised, the distinction between the likelihood of experiencing harm and the severity of harm if experienced is often not examined. The precise form that harm will take may also be unspecified or vaguely specified. For instance, in relation to the PPR of COVID-19, the harm risked could be of infection, complications from infection, death, financial loss, disrupted employment or education, etc. Despite occasional measurement inadequacies, PPR has been shown to be an important factor in mediating and moderating the effects of other influences upon socio-cognitive and behavioural reactions to COVID-19 (Marinthe <i>et al.</i> 2020). Cipolletta <i>et al.</i> (2022), following a systematic literature review, concluded that perceiving the risk of COVID-19 to be high predicts, in general, compliance with preventive behaviours and social distancing measures. Notably, PPR and independent objective assessment of an individual's risk can be uncorrelated.
Fear	Fear refers to an emotional reaction to the presence or threat of harm. Fear is both the emotion felt and the state it arouses. However, 'feeling afraid' and 'knowing fear' can be conceptually separated. The biochemical changes instigated in the presence or anticipation of danger are the platform for feeling afraid. Nevertheless, without marked biochemical changes or evident emotional arousal, people can 'know' their fears. They can recount what fears they have and how they do feel when faced with the objects of their fear. In relation to COVID-19, fear has been typically assessed through self-report and without any imminent danger present. Differences in levels of fear of COVID-19 have been found to account for variance in attitudinal and behavioural reactions during the pandemic but the patterns are complex. Fear can motivate rational and adaptive responses. Fear levels have been shown to relate positively to willingness to self-protect (e.g., through social distancing or vaccination; see Breakwell & Jaspal 2021). Fear can also motivate irrational and maladaptive responses. The role played in pandemic responses has depended on many other factors, particularly the experiences that foster fear and the specific form the fear takes (e.g., fear of exposure to the virus or fear of hospitalisation). Employment and education status play a role in moderating the effects of fear (see Labrague & de Los Santos 2021). Decisions about courses of action in response to fear also influence its impact. For instance, Fino <i>et al.</i> (2022) reported that the impact of fear of COVID-19 on mental health depended on the coping strategies people adopted.

## Mistrust

Mistrust is defined as doubt regarding the honesty, competence, reliability, value or motives of someone or something. It is distinct from distrust since it does not involve total lack of trust. Mistrust can involve a spectrum of levels of doubt (Breakwell 2021a). Being mistrustful is a habitual bias in some people (Lee 2017) and is sometimes linked with borderline personality disorder. However, mistrust is most often targeted and selective. In the context of COVID-19, studies of mistrust have focused upon specific targets for mistrust, particularly science and scientists, political authorities and mass media. Mistrust in science and scientists has been found to be a significant predictor of unwillingness to accept self-protection measures (e.g., vaccination; see Breakwell 2021b; Adhikari *et al.* 2022; Kafadar *et al.* 2022). It has also been associated with lower fear of COVID-19 (Breakwell 2020). Mistrust of mass media has been associated with adherence to conspiracy theories regarding COVID-19 (Aupers 2020).

## Ingroup power

Ingroup power is defined as the degree of control or influence that individuals perceive their own group to have (Breakwell 2023). The concept stems from social identity theory (e.g., Sachdev & Bourhis 1985) and is commonly treated as an aspect of ingroup identity (Dovidio *et al.* 2008). In measurements of ingroup power, people are asked to assess the power possessed by a group with which they identify. The measure can be made in relation to power in a specific domain (e.g., control of the mass media) or power across a range of domains. The form of power considered can range across the spectrum from informal influence to force majeure. The measure is a subjective estimate, it will vary in its relationship with any objective estimates of group power and is likely to be biased by the role that the group membership has for the individual's identity content and evaluation. Less ingroup power has been found to be associated with suboptimal coping strategies in reaction to COVID-19. More ingroup power is associated with more trust in science and scientists and greater likelihood of using self-protection against COVID-19 (Breakwell *et al.* 2023a; Wright 2023).

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causal interactions may be iterative or recursive over time. It is also possible that all five are actually significantly shaped by the activity of some other more generic characteristics of the individual. One candidate for such a generic characteristic would be identity resilience ([Breakwell 2021c](#)). This article addresses the underlying role of identity resilience.

## **The calls for resilience in public crises**

A common underlying theme in rhetoric deployed during a public crisis, irrespective of its nature, is the call for resilience. Resilience is generally defined as the capacity to deflect, withstand or to recover quickly from the impact of challenge. It is particularly associated with the capacity to adapt in order to mitigate the effects of sudden disturbing or unanticipated events. During and in the aftermath of public crises, encouraging resilience in individuals and institutions becomes a prime concern for policymakers and leaders at many different societal levels. For example, the UK House of Lords COVID-19 Committee (2022) called for improved resilience and preparedness for a volatile and uncertain future. They went on to propose that success in raising national resilience will require improving the well-being of every part of society. Clearly this is not a short-term project. Nor one that can afford to ignore how resilience is developed, maintained or undermined. Identity resilience is one aspect that needs to be understood.

## **Identity resilience**

At the individual level, identity resilience is a key determiner of capacity to cope with the threats and hardships that public crises pose. Identity resilience is a construct derived from identity process theory (IPT) ([Jaspal & Breakwell 2014](#); [Breakwell 2015a](#)) and is a central part of the theory's description of how individuals cope with threat and uncertainty ([Breakwell 2021c, 2023](#)). Identity resilience has two sorts of effect and both are part of its functional definition. Identity resilience refers to the ability of a person's existing identity structure to retain its stability and worth when experiencing threats that challenge its constitution or value ([Breakwell 1988](#)). At the same time, identity resilience refers to the effects that having such an identity structure and capacity can have on the individual's thoughts, feelings and actions when faced with other types of threat that are not specifically or immediately directed at identity itself. Thus, a resilient identity protects itself but also supports, more broadly, better adaptation to most sorts of threats or stressors ([Breakwell 2021c](#)).



### Characteristics of identity resilience

While acknowledging that the level and expressions of identity resilience will change across the life span (Breakwell *et al.* in press), IPT treats identity resilience as a relatively stable characteristic of the individual that is determined by the extent to which the individual's identity possesses four characteristics: self-esteem, self-efficacy, positive distinctiveness and continuity. In IPT, these are referred to as 'principles' or 'motives'. They can be seen as both descriptions of aspects of the current state of an individual's identity and as goals for identity that the individual is motivated to achieve. Figure 2 represents these four interacting bases of the individual's identity.

Self-esteem is an individual's subjective evaluation of their own worth (Rosenberg 1965). It reflects the degree to which the components of a person's identity are perceived to be positive. Self-esteem affects many aspects of thought, feeling and action. For instance, self-esteem is generally positively correlated with mental health (e.g., low self-esteem is associated with depressive symptoms; see Sowislo & Orth 2013). It has been shown to influence causal attributions (e.g., concerning failure; see Fitch 1970) and to predict persistence in a task in the face of threat (e.g., Di Paula & Campbell 2002).

The second characteristic, self-efficacy, refers to the extent to which an individual feels competent enough and possessed of sufficient resources to achieve desired objectives despite obstacles (Bandura 1977). Self-efficacy is derived by learning from past

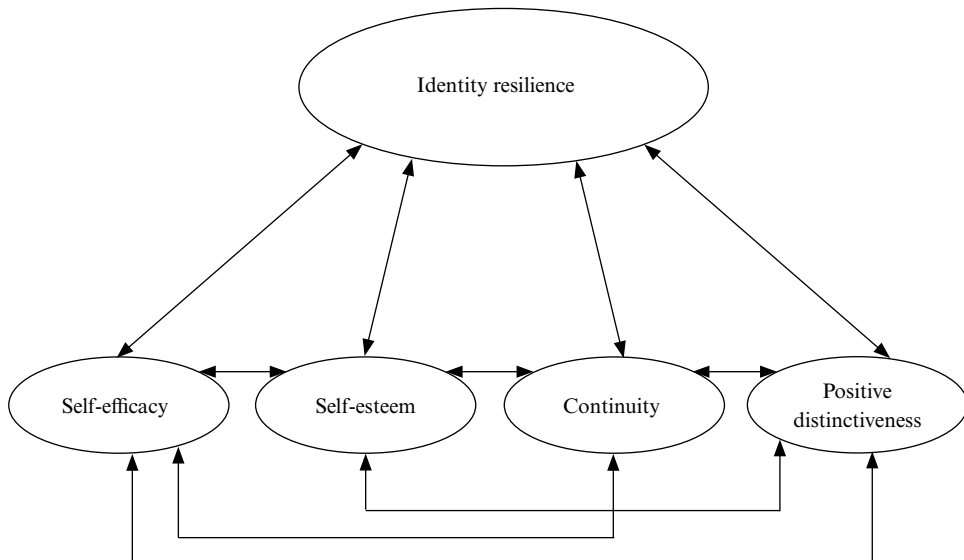


Figure 2. Bases of identity resilience

experience and from what others expect of us. People with high self-efficacy levels stay focused, are more determined to persist when faced with obstacles and infrequently attribute any failure to themselves. Low self-efficacy is associated with low psychological well-being, particularly with more depressive or anxious reactions (Bandura *et al.* 2003).

The third characteristic, positive distinctiveness, concerns the level of satisfaction the individual feels with how he or she differs from other people. Its roots are not mere distinctiveness but the right sort of distinctiveness. IPT asserts that any component of the identity structure is a potential basis for a distinctiveness claim (e.g., intellect, creativity, fearlessness, achievements or social category membership). The desire to achieve positive distinctiveness influences tactical and strategic choices when trying to cope with threat (e.g., choosing to exhibit less fear than others or persist longer in their efforts to cope).

The fourth characteristic, identity continuity, concerns the individual's perception of the continuity of his or her identity through time. Identity continuity is about feeling oneself to be the same person while seeing that there have been changes. Individuals are motivated to achieve this underlying quality of continuity for their identity. When societal change calls for modifications in their identity, they will seek to assimilate or accommodate the developments in such a way as to maintain continuity. Simultaneously, attribution processes will be established that explain any changes to identity in such a way as to make them appropriate and consistent with its previous structure. Many cognitive and behavioural strategies are involved in maintaining identity continuity. For example, reminiscences and narratives of the past are ways of maintaining the image of identities over time, especially when they are shared with others (Wildschut *et al.* 2010). Engaging in nostalgia can be used to retrofit the past identity structure to be consistent with a current identity (Vess *et al.* 2012). Nostalgia, a phenomenon prevalent cross-culturally (Sedikides & Wildschut 2018), allows new shades of meaning to be attributed to past identity components, but it also contextualises speculations about potential, but not yet assimilated, identity components.

While these four characteristics influence psychological and behavioural responses to threat in different ways, together they constitute an individual's overall level of identity resilience. The four identity characteristics are used in combination in assessing identity resilience in IPT because, while they are each conceptually distinct constructs, taken together they represent the amalgam of key factors motivating identity processes. It is recognised that they have somewhat different aetiologies and have been shown empirically to predict behaviour, thought and affect differentially. Yet, they do overlap. Significant correlations between self-esteem and self-efficacy are regularly found (Gardner & Pierce 1998; Lane *et al.* 2004), and both correlate with continuity

and positive distinctiveness (Wang & Xu 2015). Introducing the identity resilience construct makes it possible to capitalise on the synergies of the four in predicting responses to threat or stressors. Identity resilience is regarded as a superordinate construct that incorporates the four characteristics.

### **Explaining the development of identity resilience**

Breakwell (2021b) argues that given the definition of identity resilience used in IPT, all of the theories that explain each of the four identity characteristics might have a role to play in describing how an individual comes to develop a resilient identity. Bandura (2005), in summarising the evolution of his social cognitive theory, provides a description of the processes that allow self-efficacy to be developed. This encompasses a model of social learning that adopts a perspective towards self-development, adaptation and change that emphasises that the individual has agency. Models of self-esteem that stem back to Rosenberg (1965) incorporate the notion that self-esteem is a product of social support, which includes social reinforcement and recognition. The sources of optimal distinctiveness are more often focused upon symbolic interactions (interpersonal, intragroup and intergroup) that influence how individuals know what constitutes approved distinctiveness, and how they learn to express their own distinctiveness (Leonardelli *et al.* 2010). The origins of continuity of identity also lie in different levels of social engagement, but its maintenance is fundamentally dependent upon the capacity of, and interactions between, individual and collective memory (Licata 2022).

These general explanations of the way self-esteem, self-efficacy, distinctiveness and continuity arise and are maintained share many common features. All, in their own way, explain why people will inevitably differ in the extent to which they have these four characteristics. Since they share some of their sources, it is not surprising that the four identity characteristics tend to be correlated, even though they are distinguishable in their effects. The origins of identity resilience may be found in the sources of the four identity characteristics. However, though there has been wide-ranging research on the precursors of psychological resilience in aversive conditions (see, for a review, Atkinson *et al.* 2009), there is limited data on the particular constellation of factors that would result specifically in the development of identity resilience. There is need for empirical research that maps the development of identity resilience across the lifespan. Equally, there is a need for studies of how identity resilience that may have been relatively stable for many years can decline precipitously. Work on the effects of identity resilience in ageing and dementia is particularly needed (Cosco *et al.* 2017; Hayman *et al.* 2017).

### Measuring identity resilience

The Identity Resilience Index (IRI) has been developed to measure the construct (Breakwell *et al.* 2022b). It includes subscales measuring self-esteem, self-efficacy, positive distinctiveness and continuity. The psychometric properties of this measure are considered in detail in another article in this special issue: ‘Methodological considerations and assumptions in social science survey research’ by Daniel B. Wright. IRI measures the ‘general’ identity resilience of an individual. It incorporates what Rosenberg *et al.* (1995) considered global self-esteem and Bandura (1977) termed general self-efficacy. The IRI is not directed at measuring resilience that is specific to particular types of threat or uncertainty but rather at general identity resilience.

### Coping and identity resilience

In IPT, identity resilience is treated as being embodied in an identity structure that facilitates adaptive coping, one that absorbs change while retaining its subjective meaning and value, and that rejects or minimises the potentially damaging effects of threats and of having to cope with them. People reporting higher identity resilience respond more favourably to, and cope more effectively with, events and situations that question or threaten their identity (e.g., Breakwell & Jaspal 2021). This is hardly surprising since the four identity characteristics that are the foundations for identity resilience have been shown individually to be instrumental in facilitating favourable coping responses to stressors (e.g., Brewer 1991; Dumont & Provost 1999; Sadeh & Karniol 2012). The four characteristics each play a different part in establishing coping capacity against threat, offering specific types of psychological resource. Fundamentally, self-esteem offers assurance based on current personal worth and respect; self-efficacy offers assurance of problem-solving competency bred of past learning; positive distinctiveness offers assurance of uniqueness and ability to stand apart from others; and continuity offers assurance from an ongoing self-narrative that provides personal meaningfulness and predictability. These resources will vary in the role they play across different types of threat. They will be prioritised differently over time and across circumstances (Breakwell 2015a). The coping responses they motivate are not always compatible. Their effects will interact, mostly to heighten coping success by improving the variety and flexibility of responses to threat but also, sometimes, to introduce complexity and ambivalence.

The form and effectiveness of coping strategies used during threat depend on the overall level of identity resilience and the differential prioritisation of the four identity characteristics (and the psychological resources that they represent). Coping will also depend on the way identity resilience interacts with other components of identity.

The individual's value system certainly interacts with identity resilience to shape decisions. [Bardi \*et al.\* \(2014\)](#) report how an individual's values influence how important any identity component is felt to be. Value systems may channel identity resilience so it is manifested preferentially in certain types of coping. For instance, if individuals attach great value to caring for others, having high identity resilience might grow in salience during a pandemic as it motivates them to feel capable of acting to support others, though simultaneously putting themselves at greater risk. Higher identity resilience is not necessarily associated with narrowly defined self-interest.

### **Identity resilience influence on uncertainty, PPR, fear and mistrust**

IPT proposes that the nature and extent of uncertainty, PPR, fear or mistrust that individuals feel in the presence of a specific hazard will be influenced by that individual's established levels of identity resilience ([Breakwell \*et al.\* 2023b](#)). This is likely to be the case because the level of a person's identity resilience affects how they search for and interpret information about the hazard and about its implications for themselves, and the coping skills that they feel competent to use (particularly those associated with self-protection) (e.g., [Karademas \*et al.\* 2007](#)). In addition, people with higher identity resilience are likely to have had a stronger network of social support in the past and are more likely to have one that they can still call upon ([Jaspal & Breakwell 2022b](#)). Higher identity resilience is linked to more purposive information collection that can support adaptation and coping in threatening situations. It can be instrumental in achieving more realistic estimates of personal risk. Notably, it is not necessarily linked to lower levels of PPR because a realistic estimate may be a higher estimate. Also, having such information does not inevitably reduce uncertainty, but if uncertainty continues it is related to an evidence base rather than simple ignorance or confusion ([Breakwell & Jaspal 2021](#)). Indeed, it might be regarded as rational or reasoned uncertainty. Higher identity resilience is found to be correlated with lower fear in relation to COVID-19. It may be that having a greater sense of personal worth and continuity enhances confidence in one's coping ability and consequently limits fear reactions. It is also possible that, at very high levels, identity resilience initiates self-serving cognitive biases that diminish willingness to acknowledge fear and simultaneously increases belief in one's own ability to cope with the danger.

Overall, higher identity resilience is predicted to be associated with lower levels of uncertainty, perceived risk and fear in response to COVID-19, more confidence in coping capacity and greater adherence to behavioural guidelines for self-protection against the disease. However, the effects of identity resilience upon the factors that influence attitudinal and behavioural reactions to COVID-19 (and other hazards) will depend upon the specifics of the hazard itself and the context in which it is located.

The impact of identity resilience will depend on a complex mosaic of social processes at work around it, especially on social representation and group identification processes. The ways mistrust and ingroup power relate to identity resilience, particularly, have to be modelled in relation to these social processes.

Identity resilience influences coping not just through its effects on fear, risk, uncertainty and mistrust, but also through emphasising personal worth and perseverance over time. This suggests that coping responses that are deployed will have feedback for identity resilience. Success and failure in coping over time will alter identity resilience. The path in Figure 1 between identity resilience and coping responses might easily have merited a two-way arrow if the model was trying to capture iterative change.

### **Social representation processes during public crises**

In a public crisis, like a pandemic, those involved often encounter a threat they have never experienced before, that is evolving rapidly and likely full of unexpected dangers. Yet they each carry into it a nexus of emotions, knowledge, beliefs, values, interpersonal relationships, group identifications, desires and memories of experiences and dreams that embody their personal history and reflect the content and valuation of their identity.

The precise content and evaluation of anyone's identity is unique. However, this unique configuration is forged through many interactions with other people during a lifetime, and with societal structures and influence processes. An identity is not solely a personal product, it is the outcome of a shared enterprise between the individual and society over time (e.g., [Cooley 1902](#); [Mead & Schubert 1934](#); [Allport 1955](#); [Rosenberg 2015](#)). The shared enterprise of identity construction continues irrespective of pandemics or other crises. In fact, in changing or unexpected situations the societal processes that affect identity become even more evident. Social representation is one such process. It focuses upon constructing explanations for novel phenomena.

[Moscovici \(1988, 2001\)](#), in the theory of social representations, described how people give meaning to new phenomena by negotiating, through their interactions with others, shared understandings. Moscovici described how usually this involves 'anchoring' and 'objectification'. Anchoring links a new phenomenon to pre-extant understandings and objectification gives it substance by associating it with familiar exemplars. For instance, initially policymakers and the media used the parallels between COVID-19 and other infectious fatal diseases (notably the 1918 influenza pandemic, H1N1, MERS-CoV, SARS, Ebola, measles, smallpox and tuberculosis) to, in some way, make the new disease explicable. Given the complexity and scale of uncertainties that COVID-19 constituted, it was inevitable that alternative, conflicting

social representations would soon emerge (e.g., conspiracy theories claiming that the virus was deliberately manufactured or that vaccines were more dangerous than the disease they were supposed to cure).

The way social representations develop during a public crisis, such as a pandemic, can have marked direct effects on the way individuals respond. For instance, the social representations can serve to emphasise the risk or promote fear or magnify uncertainties or prompt intergroup hostilities or arouse mistrust of individuals or of whole institutions. The context in which the individual's awareness of uncertainties, risk, fear, mistrust or ingroup power develops is constructed by the interface between social representation, social structure and the physical environment. However, the individual is an active participant in the construction process.

Breakwell (2010, 2015b) described how individuals can be agentic in their dealings with social representations. Individuals may differ in their awareness, understanding, acceptance and assimilation of a particular social representation and the prominence they attribute to it. There is scope for the individuals to resist social representations that are, in some way, threatening (Breakwell 2010; Duveen 2013). Existing characteristics of the individual may precipitate resistance against a social representation. This is possibly more feasible when several social representations of the same object exist and are incompatible. In the COVID-19 situation, preference given to one social representation of the disease or its treatments over others could significantly modify an individual's levels of uncertainty, PPR, fear, mistrust and ingroup power.

Individual resistance to social representations, once they are elaborated and established, is difficult, primarily because such representations are woven into intergroup power differentials when they are identified as the product of particular groups or supported by them. This suggests two things: individual resistance to a social representation that is potentially personally damaging will be strongly influenced by that person's existing group identifications and those groups' links to the social representation, and by the level of the individual's identity resilience. Being willing and able to resist a threatening social representation is more likely to occur if someone has higher identity resilience.

### **Group identification and ingroup power effects upon coping responses**

In addition to the factors already considered, Figure 1 indicated that social representations, group identification and ingroup power influence pandemic coping responses. Once group identification is introduced into the model, ingroup power emerges as a more significant factor in explaining pandemic reactions. As defined earlier, ingroup



power depends on how the social position of a group is understood and evaluated by an individual who identifies with the group.

Social identity theory (Tajfel 1978; Abrams & Hogg 1990) refers to belonging to groups as ‘social identification’. It is associated with the adoption of beliefs and attitudes that characterise other members, and with conformity with the social norms of behaviour prevalent in members. Once having socially identified with the group or category, the individual is hypothesised to be under pressure to comply with the expectations of membership and be motivated to further the interests of the group or category. This would include accepting and using the social representations that the group promulgated or supported. It would also include mistrusting the people or things that the group judged untrustworthy or dubious (a judgement that might itself be presented as part of more wide-ranging or elaborated social representations). Orchestrating and then using social representations are important ways of inculcating compliance and unity in members. They provide useful ways for articulating the boundaries of group membership.

IPT refers to ‘belonging’ to a group as group identification. IPT treats group identification as the point at which the group or category membership is assimilated into the person’s identity structure. This is the start of a process of integrating the group membership into the wholistic identity structure. With every new element that is incorporated, the identity structure will need to change, to a greater or lesser extent, to accommodate it. The accommodation process may occur quickly or only over a long period of time. IPT does not conceptualise group identification as a one-off decision that, once taken, is irretrievable. Satisfaction with group identification may reduce (e.g., due to the group or category changing, or to other more attractive but mutually exclusive options opening up, or because other modifications in the individual’s life result in alternative priorities). It may not be possible for the individual to exit the group or category, but identification with it may wane significantly or be lost. Changes to the holistic identity structure would follow, along with changes in patterns of group-related action, thought and feelings.

Identification with one group is relatively simple to conceptualise, even when it encompasses dimensions that cut across beliefs, values, feelings and actions. It becomes more difficult to build a picture of group identification when tracking this across multiple group memberships that may intersect and may involve groups that are in conflict. IPT (Breakwell 2023, ch. 7) proposes that group identifications will be developed in ways that contribute to one or more of the major objectives of the identity processes – self-esteem, self-efficacy, positive distinctiveness or continuity. As memberships multiply, the relative contribution that identification with each of them can make towards these objectives will change. Choices about which group identifications to adopt, retain or reject will be made against the backdrop of this complex



matrix of evaluations of their value to the holistic identity structure. This proposition is inevitably subject to the proviso that some group memberships are not under the individual's control. Some social categorisations are problematic to eliminate (e.g., age group). Nevertheless, identification with them can be resisted.

In relation to perceived ingroup power, group identification has two important connections. First, people will be more likely to identify with groups that they rate as having greater power (assuming membership is open). Second, people who are identified with a group are motivated (biased) to perceive it positively (Castano *et al.* 2002). They are likely to see it as more powerful than non-members would (Kershaw *et al.* 2021). They are also more likely to promote its power where feasible or downplay the relative significance of evident power deficits. For group identifications that are important to an individual's identity structure (and not all will be), ingroup power differentials are something that individuals monitor. People who perceive their ingroup power to be higher are more likely to report higher self-esteem, self-efficacy and positive distinctiveness. Ingroup power is therefore a key source and support for identity resilience. There is synergy between ingroup power and identity resilience. A group that is itself characterised by resilience is more likely to be perceived as having ingroup power. Those who identify with it are more likely to believe themselves to have identity resilience and to behave in ways that exhibit that resilience. Identity resilience in a group's members is then likely to further enhance group resilience and again raise perceived ingroup power. However, this 'virtuous circle' is clearly not a closed system and the symbiosis can be disrupted, particularly by unforeseen public crises that change the context in which the group operates. Nonetheless, IPT proposes that the significance of the interaction between ingroup power and identity resilience remains. A public crisis raises the importance of ingroup power differentials because power differentials influence coping options.

### Forms of coping

Figure 1 does not specify the types of pandemic coping responses that are involved. The box in the figure could extend from intra-psychic, through individual, interpersonal and intragroup, to intergroup or societal-level coping responses (behavioural or psychological). It is possible to assume that different response types will be associated with different configurations of prior or contemporaneous influences. For instance, greater identity resilience would be more often associated with coping responses that involved specific goal-oriented action (e.g., vaccination) and less often with passive or fatalistic responses.

A comprehensive qualitative catalogue of the forms that coping has taken in the COVID-19 pandemic is not available. There is a rich collection of studies of the

psychiatric and psychological problems that have manifested during the COVID-19 period (especially ones associated with behavioural restrictions during the pandemic) (e.g., [Krishnamoorthy et al. 2020](#); [O'Connor et al. 2021](#); [Sun et al. 2021](#)). Other research has particularly focused on describing coping that was compliant with the health policies introduced to curtail the pandemic (e.g., self-isolation, quarantine, social distancing, self-testing, vaccination, masking, working from home, home education, handwashing). The model in Figure 1 has been shown to be effective in accounting for variance in 'compliance' coping responses (e.g., accepting vaccination). Other types of coping response are less well researched but, when they have been, the model has proven applicable. For instance, creativity in coping has rarely been examined, however, [Breakwell & Jaspal \(2022\)](#) examined how a community came together to respond during COVID-19. Their study reports the efforts of a male voice choir to continue their musical practices and performances during lockdown. It is a good example of how group identification (with a choir and with the local rugby club), moderated fear and risk and potentiated an active and creative coping response. Other forms of group identification (e.g., religious affiliation; see [Lee et al. 2022](#)) have also been found to engender alternative effective coping strategies.

The general model of influences on pandemic coping responses can probably be elaborated to be applied to most specific forms of coping. Nevertheless, a more systematic examination of more unusual forms of coping and their relative effectiveness for the individuals deploying them is needed. It is notable that many studies have been conducted on the factors accounting for coping responses but very few have included an appraisal of the after-effects of such coping or their feedback effects on subsequent coping. Since some types of coping response (e.g., vaccination, COVID-19 testing) require repetition, the longevity of a coping response pattern and the factors influencing it are interesting and may have practical significance.

### **Support for and barriers against coping responses**

The model described in this article, derived from IPT, was used to inform the design of the data collection for the study that our team (Barnett, Breakwell, Jaspal and Wright) conducted as part of the British Academy's research programme on future pandemic preparedness.<sup>1</sup> The model was deemed relevant for that research because it focused on the effects of ethnicity upon pandemic coping responses in the United Kingdom and the United States. The examination of group identification and ingroup power

<sup>1</sup> For details see <https://www.thebritishacademy.ac.uk/funding/covid-19-recovery-usa-uk/>; British Academy research grant CRUSA210025.

related to ethnicity effects was considered particularly important. However, analysing the complex implications of ethnicity during the pandemic across two countries served to emphasise that this model, while useful, ignores at least two important factors that also play a vital role in accounting for pandemic coping responses. These are social support and discrimination. Other articles in this special issue describe relevant empirical results from this work. However, additional research is needed to test how social support and discrimination interact with the constructs presented in the model before attempting to integrate them into the model. This is particularly important because both are complex constructs. It would be wrong to have ignored them in this article because what we have found so far does align with the model presented here.

Social support is an amorphous concept. Virtually any sort of interaction that involves the transfer of something useful (material or psychosocial) between people can be designated social support. People differ in the amount of social support that they perceive they have available to them and the conditions under which they receive it. Feeling socially supported is associated with using more adaptive coping responses in acute or chronic threat situations (e.g., [Ferber \*et al.\* 2022](#); [Zysberg & Zisberg 2022](#)). Feeling socially supported is also usually positively correlated with identity resilience.

Discrimination, at its simplest, entails being treated unfairly because of who you are or because you have certain characteristics. Discrimination takes many forms, and how it is perceived, and thus its effects, is a product of long-term social psychological processes. In any public crisis, and especially longer-run crises such as pandemics, discrimination will influence coping responses, both of those who discriminate and those discriminated against. At the most basic level, discrimination will affect access to resources. The perception of discrimination, and the fear or antipathy it engenders, will also directly affect willingness to adopt prescribed coping responses. A simple example of this comes from the unwillingness of young black men in some US cities to wear masks on the street because, they explained, they were more likely to be challenged by the police if they did ([Christiani \*et al.\* 2022](#); [Hearne & Niño 2022](#)).

Having or lacking material or social resources affects both coping response preferences and their execution. Depending upon their precise nature, both the absence of social support and presence of discrimination typically result in material and/or social resource deficits that will then affect coping. [Jaspal & Breakwell \(2022b\)](#) report how socio-economic inequalities in social networks and loneliness were related to mental health problems during the COVID-19 pandemic. [Jaspal & Breakwell \(2023a, 2023b\)](#) also describe how social support and ethnic discrimination moderate the effects of social representations of vaccination, mistrust of science, ingroup power and identity resilience upon COVID-19 vaccine hesitancy. The effects of social support and discrimination upon coping intentions and behaviour operate at many levels, particularly through their differential impacts upon the development and opportunities for

expression of identity resilience. The degrees of social support and discrimination experienced throughout a lifetime are major determiners of identity structure and of identity resilience. Identity resilience then, to some degree, influences every aspect of an individual's thoughts, feelings and actions. When we try to understand an individual's response during a pandemic, we are actually trying to explain the very tip of an iceberg of consequences of psychological and social processes across that individual's lifetime, including those operative at the point in time that the response occurs. Every model available is, as a result, inevitably only capable of representing a shard of the whole nexus of processes.

### **Identity resilience: some implications for pandemic preparedness**

To return briefly to the calls for resilience that are so common during public crises, typically individuals are asked to show resilience. The House of Lords Select Committee report, referenced earlier in this article, emphasised that national resilience can only be achieved through long-term improvements in the well-being of every part of society, underpinned by fostering strong connections within and between diverse communities and by greater social and economic equity. Work on identity resilience could contribute to underpinning this approach. Social conditions that allow individuals to develop greater self-esteem, self-efficacy, positive distinctiveness and continuity will predispose the growth of greater identity resilience. Social and economic conditions that provide more social support and discourage discrimination will facilitate the growth of identity resilience. Supporting individuals who are a part of the community to achieve greater identity resilience contributes to the possibility of the whole community gaining greater resilience. This is, however, a possible rather than an inevitable outcome. It is yet to be proven that individuals who have high identity resilience will actually collaborate within a community or organisation so as to imbue it with high resilience. Intragroup dynamics (e.g., interpersonal competitiveness) may interfere with that.

Fostering identity resilience over time, either in individuals or across communities, is an important way to raise coping capacity. However, simply raising identity resilience is not enough in itself to ensure we are better prepared for future global pandemics (or other long-lived public crises). Identity resilience, once established, has to be appropriately channelled. Part of preparedness is planning how identity resilience effects can be optimised. High identity resilience will not inevitably result in the most constructive coping responses. For instance, it might result in ignoring public health priorities while being confident in one's alternative coping route. Research on the effects that identity resilience has on uncertainty, fear, risk and mistrust should support this planning. However, if identity resilience is to be used systematically in

response to crises in the future, it will need to be monitored in the meantime so as to provide a practical understanding of baseline levels of identity resilience and the coping capacity associated with these. Optimising the value of identity resilience is likely to rely upon targeted communication, appropriate messaging and authentic leadership based on valid information.

Based on the model presented here, one important proposal for developing pandemic preparedness should be emphasised. In addition to ongoing societal efforts to foster greater identity resilience, it is sensible to have measures in place to mitigate the known effects of lower identity resilience as they manifest in the specific situation. The established connection between lower resilience and greater uncertainty and mistrust would point to the need for focusing upon promoting the forms of certainty and trust most relevant to the particular crisis that is emerging. Linking this to clear instructions about which coping responses should be used, by whom and when, may interrupt the negative feedback loops between PPR and fear in those with lower identity resilience. This all revolves around targeting messaging to resonate differentially across identity resilience levels in order to achieve a shared goal: effective coping responses. It would help if more people were aware of the effects that their own identity resilience has upon how they think, feel and behave.

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# Methodological considerations and assumptions in social science survey research

*Daniel B. Wright*

*Abstract:* The articles in this special issue are based largely on results from online social surveys on beliefs and self-reported behaviours related to COVID-19, with an emphasis on ethnicity differences. There are many considerations and assumptions used when conducting this type of research, and when analysing the resulting data, which are often not discussed in the resulting journal articles. These include how the research questions are chosen, how the measurement of the key constructs is done and the analytic approach. The article goes through several of the steps necessary to conduct social science survey research that are often not reported in papers. The aim is to provide a backstage view of how this approach to social scientific questions occurs, pulling back the curtain on these issues.

*Keywords:* methodology, assumptions, surveys, COVID-19, statistics

*Note on the author:* Daniel B. Wright is Professor in Educational Psychology at the University of Nevada, Las Vegas. His interests are in quantitative methods and applied cognitive science (in particular, learning in groups).

When COVID-19 began spreading across the world, social scientists began studying the psychological effects of the pandemic on both individuals and societies. They attempted to measure behavioural changes influenced, in part, by the guidelines imposed by health researchers and politicians, and they tried to account for these behaviours using hypothesised psychological constructs and to design interventions both to improve people's psychological well-being and their compliance with health guidelines.

There are several methods that social science researchers use, but the primary method for much social science COVID-19 research has been some form of survey. This is the approach that our group (Rusi Jaspal, Glynis Breakwell, Julie Barnett and myself) has used for most of our research, and some of this is discussed in this special issue. The data discussed are from a British Academy-funded project where we examined the role of identity and other psychological constructs on COVID-19-related beliefs, such as vaccine positivity and behaviours, such as hand washing. Research findings – including our own – are usually disseminated through brief research articles that include a handful of statistics and a couple of figures with arrows connecting the key constructs. This succinct approach to sharing the results, which is efficient for many purposes, can make the decisions involved in conducting such research appear uncontroversial and de-emphasise the considerations and assumptions underlying the approach. The goal here is to focus on the considerations and assumptions. Some findings are reported, but these are only presented as illustrative of the types of research questions addressed. It is rare for the considerations and assumptions to be made explicit in typical journal articles. As such, this article will focus on more methodological concepts and less on psychological theories and their impacts on policies. See the article in this issue, 'Identity resilience, uncertainty, personal risk, fear, mistrust and in-group power influences upon COVID-19 coping' by Glynis M. Breakwell, for a discussion of the theories.

The purpose of this article is to describe, to the broad audience of the *Journal of the British Academy*, the steps that those social scientists who rely on surveys and questionnaires take while conducting research. By making the steps explicit I hope to provide readers with an understanding of not just the research undertaken by myself and my colleagues, but also that of others using this approach. Further, I hope that the article will encourage social science survey researchers to question and to justify their processes/assumptions. The following are, broadly, the key points that our group considered when discussing how to conduct our research and to analyse our data. I use these to structure this article.

1. Create a research team and define research questions/problems to be addressed.
2. Delineate the underlying theories and perspectives that will inform the research.
3. Establish the research design (including population of interest, sampling, *etc.*).

4. Lay out the theoretical constructs to be estimated.
5. Consider the relationships among these constructs.

All of these are interconnected. These are presented as illustrations of the considerations and assumptions that need to be taken into account when undertaking this type of research.

### **Research team and research questions**

Deciding upon the research team and the research questions are often done in concert and affect how the rest of the research pans out.<sup>1</sup> While some research can be undertaken by individuals working alone, it is often useful to have several people with different areas of expertise working together on a project. Sometimes there are people in one's own department who complement your skills, but it is also possible to meet people at conferences or on social media. Our group is composed of senior academics who, through years of experience, have several contacts with complementary skills. A research team may exist and decide what research questions to address, or an individual (or funding organisation) may describe some broad research questions and a team will coalesce around these and fine-tune the questions. In most cases the questions are a combination of researchers' interests and external pressures. Our research team was composed of people with particular social psychological knowledge and different methods skills. We had worked on several projects related to this project together. When the British Academy offered funding on social science research related to ethnicity and COVID-19, our team came together.

Our primary research question for this project, discussed throughout this special issue, was how well identity process theory (IPT) can account for individual differences in vaccine positivity and self-reported likelihood of being vaccinated among different ethnic groups in the United Kingdom and the United States (see the article 'Psychological influences on COVID-19 preventive behaviours and vaccination engagement in the United Kingdom and the United States: The significance of ethnicity' in this special issue). This topic was chosen because of the expertise of our team with respect to this theory and to the methods needed to conduct the social science research. We believe identity resilience is a critical factor that influences people's beliefs and behaviours during a health crisis. This, as discussed in the next section and in detail

<sup>1</sup> I refer to research questions broadly, and simply mean seeking information from the research that will change what the researchers believe on a topic. If a study turns out exactly as expected, the change would be greater certainty in the original beliefs. These might be applied problems that exist in the world, or specific questions that the researchers have concerning a particular theory.

in Breakwell's article 'Identity resilience, uncertainty, personal risk, fear, mistrust and in-group power influences upon COVID-19 coping' in this special issue, is a perspective we bring to the research. The role of identity resilience and other constructs in predicting outcomes is complex and this framework allows us to build a model of these dependencies. It also allows us to examine several research questions simultaneously. Our main research questions are about estimating the size of different relationships.

It is important to note that research groups often come together because participants work in the same department, were at graduate school together, meet at a conference, like the same football team, and so on. Sometimes at large research organisations there is deliberate matching of people, skills, and needs, but even in these settings people often choose who to work on based on how well they get along. Some disciplines and some research questions do not require research teams (e.g., in philosophy and law, articles often have a single author), while others do (e.g., some physics articles will have dozens of authors). If a person's interests are in areas where research teams are useful and they do not have appropriate colleagues in their locale, networking at conferences and on the Internet can help them to find like-minded potential collaborators.

### Our perspectives/biases

All research is influenced by the perspectives of the researchers. [Francis Bacon \(2019 \[1620\]\)](#) recognised this, describing how the *idols* of mind could distort how we interpreted the world. His advice was to avoid these prejudices, so that nature would more truthfully reveal itself. Researchers' beliefs affect how they undertake and interpret research, but completely removing all biases is neither possible nor desirable, as people would then be unable to undertake research or interpret results (e.g., [Popper 1994](#), ch. 4). The legacy of Bacon's desire to be without bias, coupled with the observation that society has achieved some (perhaps much) of his vision of the science-produced industrial society prophesied in *New Atlantis* ([Bacon 2020 \[1626\]](#)), has led to the myth that natural scientists have successfully removed their beliefs, prejudices and biases from the scientific process. In the social sciences, where this myth is less widely believed than in the natural sciences, it seems to have morphed into a desire to emulate natural science, believing that the myth is true for natural scientists, despite the fact that they also succumb to human biases.

One aspect of distancing the researcher from the research is the third-person writing style: 'The author did ...' or '*Author's Name* did ...', rather than 'I did'.<sup>2</sup> The intent

<sup>2</sup> For papers submitted to blind review this means authors often refer to themselves in the third person when their papers are originally submitted in order to not reveal who they are to the reviewers. Sometimes this third person style is not changed in later versions.



is to distance the research from the researchers. It is not about making the research more objective, but instead props up the illusion that Bacon's goal of removing the idols of mind has been achieved. Norman Campbell (a British physicist and philosopher) questions whether this third-person style is morally correct: 'Here a moral issue is raised. If we are not prepared to make a personal statement in a personal form, are we justified in making it at all?' (Campbell 1928: 1021). Like Bacon, I recognise that people have their beliefs, prejudices and biases and that these affect their research, but like Campbell I believe the formality of much scientific writing, in attempting to discount these influences, is wrong. I will use 'I' when referring to my beliefs/actions and 'we' when referring our group's beliefs/actions. People choose what to study and how to study it, and interpret the observed data using what they already know. Researchers should be both knowledgeable and interested in what they research, and these biases should be influential. But researchers should remain sceptical of any individual findings, particularly their own. Feynman advises scientist that they should be 'bending over backwards to show how you're maybe wrong' (Feynman 1974: 12).

With respect to our group's research, within a survey context we believe that respondents' answers to our survey questions provide information about their attitudes. This implies that they have some level of access to this information. It is known that for many tasks humans do not have conscious access to why they make decisions (e.g., Nisbett & Wilson 1977) and that alternative approaches may be necessary to tap into certain information (e.g., Greenwald *et al.* 1998). Our assumption is that asking people their views, while not having them give precise accurate information about their beliefs, provides responses that are similar enough to their beliefs to be of use. Specifically, we think that responses to questions that we believe a priori are related to a construct can be used to estimate values for each person for the intended construct. Further, we assume that while the individual items will relate to a great many things, taken together the intended construct will be the most prominent of these. These assumptions underlie how much research that uses scales works, and there are psychometric techniques to help evaluate these assumptions.

This does not mean that we believe responses are perfectly accurate. For example, social scientists, referring to COVID-19, often ask behavioural frequency questions, such as: how often do you wash your hands or wear a face mask? Answering questions like this is difficult if respondents are meant to recall each time they did these activities. Surveys usually have respondents choose from a list of either numeric (e.g., one to two times a day) or verbal alternatives (e.g., 'sometimes'); we show that the choice of response alternatives affects estimates and group comparisons (Wright *et al.* 2022). While the numbers that we use to estimate behaviours like hand washing will not be perfectly accurate, we assume that if questions are written appropriately for the sample those people who report more hand washing (or whatever behaviour) will tend

to experience this behaviour more than those who report less hand washing; however, we also recognise that systematic biases occur.

Many of the surveys conducted during COVID-19, including our own, have used online survey instruments. There are advantages and disadvantages to this in comparison to other administrative modes. While the sampling is restricted to those who sign up with a company (e.g., MTurk, Prolific), the samples are more representative than, for example, the convenience samples often possible with research on university campuses (Sheehan & Pittman, 2016). Response rate is a problem for all types of surveys. There are problems with all sampling methods and often response rates are low. Pew Research estimates only 6 per cent of the people sampled in its telephone surveys responded in 2018,<sup>3</sup> which also makes estimating non-response bias as difficult. According to the National Research Council (2013) growing non-response rates ‘threaten to undermine the validity of inferences obtained through the collection of information from subjects through surveys’ (p. x). With online instruments that require respondents to sign up both to the organisation that manages the instrument (e.g., Prolific, Qualtrics, MTurk) and to the specific survey if they see a particular call for that survey in time, a response rate cannot be meaningfully calculated. In much online social science research the interest is in comparing groups that have all been sampled in the same way, either at the same time or over time, and/or exploring associations among people in the sample. Making valid inferences requires assumptions that non-response affects the different groups/times in a similar way.

When online surveys began to become popular there were concerns that respondents would pay less attention to the questions than those taking part in studies in person. However, results show online sample groups often pay more attention than in-person samples, and Prolific samples perform well in comparison with other online sampling methods (Peer *et al.* 2022). Further, the ease of recording response times and click behaviours allows researchers more ways to check the attention paid by respondents than traditional pencil-and-paper surveys.

In addition, it is important to state that our beliefs influence what we choose to examine. Consider our choice to use a ‘trust in science’ construct. We work in academia and while we hope to be critical about all research, including our own, we believe that the scientific process is better than existing alternatives for allowing wise decision-making, though its error-correction mechanisms could be more efficient. Our belief in the value of the scientific method has influenced our choice to include this construct and our *a priori* belief that it plays an important role in adherence to health guidelines. We trust, to some extent, the scientific literature and rely on this for our

<sup>3</sup> <https://www.pewresearch.org/short-reads/2019/02/27/response-rates-in-telephone-surveys-have-resumed-their-decline/> (accessed 15 August 2023).

methods. For example, we use a Trust in Science Scale by [Nadelson \*et al.\* \(2014\)](#), where they report the psychometric properties for their scale using the data from their sample. The psychometrics they report are specific to their sample and to the time when they administered the scale. As scientists, we remain cautious accepting that any scale measures what the developers say it measures (e.g., [Wolff \*et al.\* forthcoming](#)). A scale does not, for example, have a particular level of reliability. It only has this in relation to a sample. As such, we assume that the scale should have good qualities for our samples, but we do examine this. Later in this article I reveal some of the ways that we did this. That scale is now a decade old and it was created prior to COVID-19. Because we wanted respondents to complete the whole study in a relatively short time, we used a short form of the original questionnaire, composed of six items. Another belief that we have is that IPT provides a good framework to examine the relationships among variables, including identity-related variables. The research described in this special issue is not designed to test IPT as a theory, but to use the theory as a framework to examine various components across respondents from two countries.

## Research design

### Population and sampling

Details of why a specific population is of interest and why particular sampling approaches are used is not always discussed in empirical papers, so here our rationale is described. Our project aimed to examine differences, by ethnicity, in people in the United Kingdom and United States, applying IPT to COVID-19 beliefs and behaviours. While we are also interested in the relationship among these constructs in other countries, for this project the United Kingdom and United States were our focus. We are interested in the general adult population, meaning all adults above 18, although, as discussed, the sampling procedures mean not all groups were likely to be represented (e.g., with internet surveys, those who seldom use computers will be under-represented). We did not include people under 18 for two reasons. First, people under 18 in the countries of interest do not have complete authority on whether to have, for example, a vaccine. In most US states parental consent is required for COVID-19 vaccines.<sup>4</sup> In the United Kingdom the situation is slightly more complicated. If a parent does not want their child vaccinated, but the child is judged to be *Gillick competent* (a medical term related to the child being competent to provide consent

<sup>4</sup> <https://www.kff.org/other/state-indicator/state-parental-consent-laws-for-covid-19-vaccination/> (accessed 15 August 2023).

without parental consent), the healthcare professional will try to attempt a reconciliation between the child and parent, but the parent cannot overrule a Gillick competent child's decision. The second reason is more pragmatic. Not including people under 18 makes conducting the research simpler as many ethics guidelines require people under that age to provide parental consent to take part in studies.

As noted, the sampling in our studies was done using Prolific and this means the sample is not likely be representative of the population of interest. Not only will those who take part have to have access to the Internet, they will also have to have signed up to Prolific. This means, among other restrictions, that respondents would need to be familiar with Prolific (this probably is why Prolific samples tend to have many current and recent university students as it was created for university research) and would want to take part in research for money. While this is an issue, alternatives during the COVID-19 pandemic were not practical. We thus chose to use an online survey, and we constructed the survey using the popular tool Qualtrics.<sup>5</sup> This allowed a link for the survey to be posted using Prolific,<sup>6</sup> which gave us the option to set up filters (e.g., we wanted UK and US respondents, with quotas that allowed us to have enough respondents in several ethnic categories to allow comparisons). Our survey received ethical approval from the University of Brighton's Cross-School Research Ethics Committee C (Ref: 2022-9564-Jaspal) and all respondents provided consent.

With all surveys, some respondents' data may not be appropriate to use and therefore exclusion criteria exist. Online studies allow some data to be collected that are not available with traditional survey administrative modes. The IP (internet protocol) address is usually available. In our studies we excluded duplicate IP addresses because this may relate to one person who is using two Prolific accounts (as it may not, both accounts are paid for completing the survey). Response times can also be recorded. These can provide a valuable window into the respondent's cognitive processing while answering questions (Luce 1986). Extremely fast responses can indicate that insufficient cognitive processing was done to adequately to answer the questions (see Wise & Kong 2005; Wise 2017, for related discussion). Attention-checking questions, which often include a phrase like 'ignore the rest of this question, just tick option B' (see Gummer *et al.* 2021, for detailed discussion), are often included in both online and other survey formats to check if respondents are reading the questions, but they can confuse some respondents. There are numerous guidelines for constructing online surveys (e.g., Biffignandi & Bethlehem 2021). With online surveys it is possible to force people to respond to each item. If a question is poorly worded or there is some other reason why the respondent feels it is inappropriate for them to respond, this

<sup>5</sup> <https://www.qualtrics.com/> (accessed 15 August 2023).

<sup>6</sup> <https://www.prolific.co/> (accessed 15 August 2023).

can annoy the respondent and affect the quality of all their subsequent responses or cause them to leave the survey. However, for the types of scales that we use in this study, having people provide an answer for all questions is useful. There are methods to address missing data (e.g., Rubin, 1987; van Buuren, 2018), but if it is believed that each person can provide a meaningful response to an item it is worth having complete surveys.

### Which demographics?

The demographics that we were most interested in for the research described in this special issue were ethnicity, gender, age, education, and we also asked some questions about political affiliation. The reasons for this are addressed in the other articles in this special issue. We also asked questions that are of particular importance to the COVID-19 guidelines, including the number of people in a household, because this is related to number of contacts and therefore the possibility of contagion. How demographic questions are asked and which categories are included in the response alternatives can be very contentious. The meaning of, for example, ethnic categories, differs between the United Kingdom and the United States. We tended to follow the ways in which government surveys (e.g., Census Bureau) ask these questions as well as the phrasing suggested in the materials of both our survey programme (Qualtrics) and the sampling program (Prolific). With ethnicity, it is obvious that there is no clear way to differentiate all people and that there is much ethnic variety within any of the categories we choose. For ethnicity, we had Prolific perform a quota sample for the categories it uses for ethnicity. Quota sampling means that you attempt to get a predetermined number of people (a quota) for each category (Kalton 2021). The breakdown we achieved is shown in Table 1. No method for classifying the complexity of ethnicity (or race) adequately captures all the differences.

**Table 1.** Ethnicity categories for the United Kingdom and United States, as used in the article ‘Psychological influences on COVID-19 preventive behaviours and vaccination engagement in the United Kingdom and the United States: the significance of ethnicity’ in this special issue.

	UK	UK%	US	US%
Asian	390	35%	111	15%
Black (Black African, Black Caribbean, African American)	388	35%	207	27%
Hispanic, Latino or Spanish of any other origin			180	24%
White (Non-Hispanic)	316	28%	247	32%
Two or More Races/Mixed	17	2%	14	2%
Other	6	1%	4	1%
Total	1117	100%	763	100%

The gender breakdown was 940 (50 per cent) female, 928 (49 per cent) male, 11 (1 per cent) other and there was one missing value. The survey asked respondents for their age in years. Two said they were 9 years old (to have a Prolific account they must be 18 or older, so they likely did not type the first digit), three said they were over 100 (listing their likely year of birth) and one left the age variable blank. Excluding these, the median was 32 years old and the mean was 34.43 years old. The skew towards younger responses is predicted as Prolific began in universities and was seen as a convenient way for students and recent alumni to earn extra money. More details of the demographics are covered in the articles dealing with those. Here the only demographic comparisons were by country: 1117 were from the United Kingdom and 763 were from the United States.

## Why R?

There are many statistical packages and no single package is best for all situations. Here we use the free statistical environment R (R Core Team, 2022; for a brief description see Chambers, 2009; for a thorough description see Chambers, 2008). This is one of the most used systems for data analysis; it has been described by Mizumoto & Plonsky (2016) as a *lingua franca* (a shared or bridging language) for both learning and implementing statistics. We used R for this research for at least three reasons. First, it is free, which means anyone can replicate our findings without having to buy expensive software. Second, with over 20,000 free add-on packages and the ability to write your own functions, it allowed us to conduct all the statistical analyses for this project. And finally, this article was written as a document composed of R code for statistical work and LaTeX for word processing, and then these were combined using knitr (Xie, 2015) into a pdf document. One of the concerns about the statistics is not being able to replicate the findings in research reports; this approach allows the finding to be easily replicated (Mair, 2016). The final submitted document can be found on GitHub.<sup>7</sup>

## Estimating psychological constructs

Scientists construct models that:

1. They believe approximate nature closely enough to be useful.
2. They believe provide a useful framework to interpret their findings.

Their choice is often influenced by the statistical methods they use, but these statistical methods also influence their theories (Gigerenzer 1991). A popular model that

<sup>7</sup> <https://github.com/dbrookswr/BAwork/blob/main/jba2dbwed1.pdf> (accessed 15 November 2023).

social science researchers assume is the latent variable model and, as will be clear in this section, this choice relates to both theories and methods. I concentrate on two of the scales discussed in the other articles: six items from the Trust in Science Scale (Nadelson *et al.* 2014) and the sixteen-item Identity Resilience Index (IRI) (Breakwell *et al.* 2022). More details of these are provided in the article ‘Psychological influences on COVID-19 preventive behaviours and vaccination engagement in the United Kingdom and the United States: The significance of ethnicity’ in this special issue. However, when social scientists use scales in their own contexts the norm is to check at least some of the psychometric qualities of the scale. Because of journal word-length restrictions authors often only give a brief summary of their explorations of the scale.

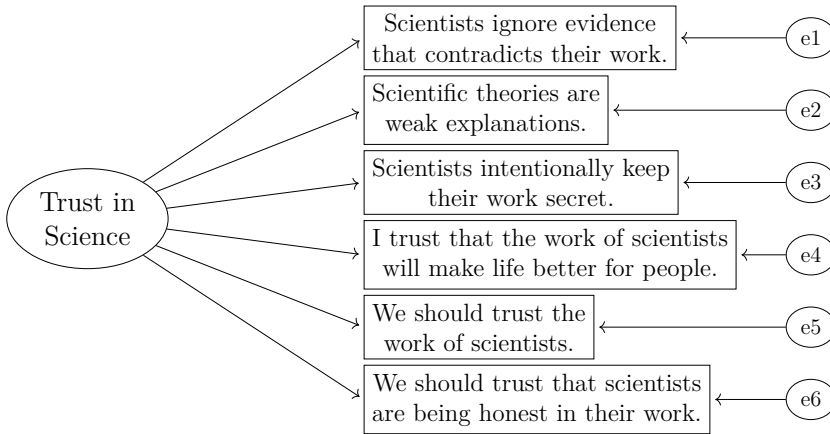
### A latent variable conceptualisation

Latent variable models are taught in both under- and postgraduate social science methods classes. Loehlin and Beaujean (2017) provide an excellent introduction to latent variable models, mathematical details can be found in Bartholomew *et al.* (2011) and Muliak (2010), while Spearman (1904) is a seminal historic text.

An assumption of much social and psychological research is that responses to several related items can be combined to estimate a single construct. For the latent variable model this is because the latent construct is assumed to influence how people answer each of those items. Suppose that you have six variables and believed each is related to a particular construct, say *trust in science*. Figure 1 shows a latent variable model that might be used for this; for the six items we had respondents answer on a 1 to 5 scale from strongly disagree to strongly agree. The arrows mean that what is described in the node at the nock of the arrow *influences* what is described in the node at the arrow’s head. The assumption is that responses to each question, for example the *Scientists ignore ...* rectangle, are influenced by variation in a respondent’s trust in science construct. In addition, responses are also affected by a combination of idiosyncratic aspects of this item and random variation, shown by the *e* nodes to the right of each rectangle. These are often called the error terms associated with the individual items, but it is important to note that they are a combination of error and systematic variation specific to the item. For the model shown in Figure 1, these error terms are assumed to be independent of each other. This means that after taking into account trust in science the variables themselves are independent. There are ways to examine if this assumption is justified, discussed later in this article. In these plots, the most popular convention is to have the latent variables shown in ellipses and the observed variables shown in rectangles.

An important question is whether the latent variable is a dimension, for example from not trusting science at all to trusting science uncritically, or whether the latent





**Figure 1.** Assumed relationship between a psychological construct, trust in science and six survey items.

variable is categorical, placing people into a small number of groups that share characteristics regarding trust. Latent variable framework allows for both of these characterisations (Bartholomew *et al.* 2011). An approach called taxometric methods (Waller & Meehl 1998) exists that allows researchers to see if the data are more consistent with one or other of these two characterisations, but in many cases the data do not show either being better than the other (Bartholomew 1993). In these cases the researcher chooses what seems most appropriate for their purposes.

When creating scales that other people will use, often those other people will have small samples or even just a few individuals, and will want to create summary measures. This means that using complex methods that require large samples to estimate values for people's constructs may not be practical. Scale designers take this into account and try to design scales where taking the mean of responses, often reverse scoring some of the variables,<sup>8</sup> provides a good estimate for the construct. There are advantages to having a simple method for allowing others to estimate these psychological constructs, and often scales are developed such that the mean of the responses provides a good estimate. This is similar to how teachers report the percentage of correct responses on an assessment for their students. This will probably not have as good statistical properties as more complex procedures (McNeish & Wolf 2020), but in some contexts it is a good option (Widaman & Revelle 2022). The ease of calculating these measures plus the transparency for the students (if Josh and Tommy each get thirty-six questions right, they get the same score) may outweigh other statistical considerations. An often reported measure that is consistent with using the mean of the items to estimate the

<sup>8</sup> The rule for reverse scoring items is if an item goes from  $m$  to  $n$ , letting  $newvar_i = (n + m) - oldvar_i$ , means the minimum and maximum possible are the same as the other items.



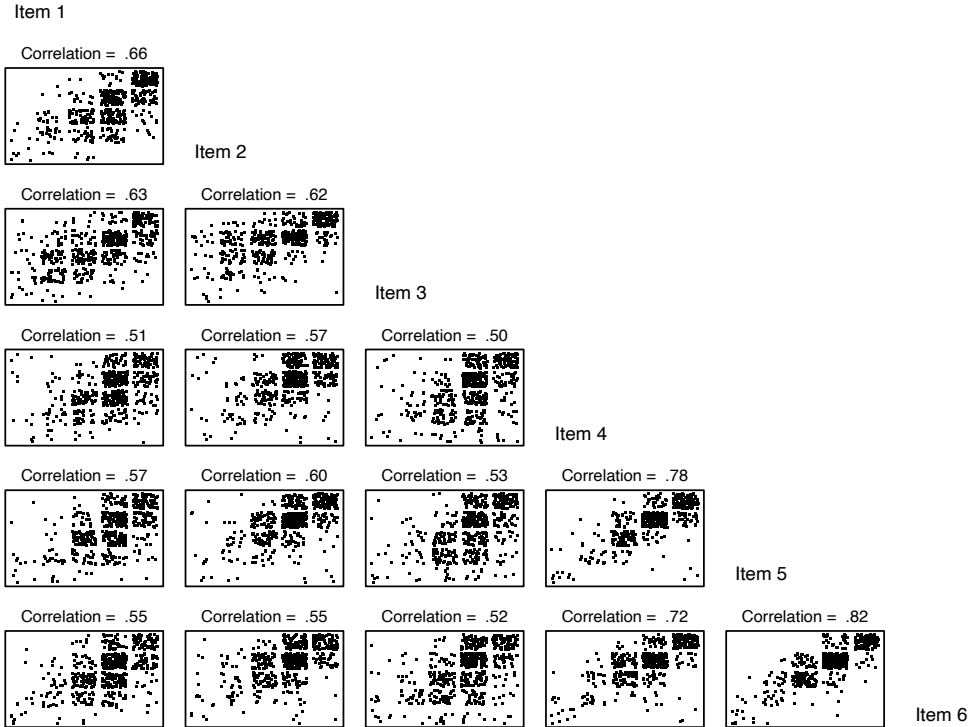
construct is Cronbach's  $\alpha$ , also called Guttman's  $\lambda_3$  (Guttman 1945; Cronbach 1951). Sometimes this assumption is not valid, but it is still reported. In fact, it is so common reviewers will often ask for it to be reported so that this measure can be compared with others. Several authors have discussed problems with the overuse of and conceptual issues with this measure (e.g., Thompson 2003; McNeish 2018).

### Exploring dimensionality with the scree plot

As stressed in the last subsection, the psychometric values of a scale can change over time and with different samples. There are different ways to explore if a scale is measuring the number of constructs that it is intended to measure. I will consider two of the scales that we used in more detail. This illustrates what is done for all scales, but which seldom makes it into articles due to page constraints.

The first measure is the six items from the Trust in Science Scale. Three of the items were reverse scored so that high values on each correspond to more trust in science. The assumption in Figure 1 is that a single latent variable influences all of the observed variables. The assumption is that the scale is unidimensional, with idiosyncratic influences that affect the individual items. This assumption can be examined empirically and it will never be true (i.e., some items will always be more closely related to some other items), but the question is whether the assumption is close enough to be true to be useful. Exploratory data analysis should be conducted, including looking to see if all items are correlated as they should be, prior to creating any latent variables (Wright & Wells 2020). This can be done with both statistical tests, like Pearson's correlations, and visually with scatter plots (see Figure 2). The scatter plots allow outliers to be identified and researchers to check when a straight line seems to describe the relationship well. With typical survey items that are measured on discrete rating scales it is useful to add a small random variable to each point so that each point can be seen. This is called *jittering*. In addition, only 600 of the data points are shown in order to make identifying which coordinates have the most values easier. With most social science applications, the data points are spread out so trying to tell if a pattern is approximately linear is difficult. At this point of the analysis the researcher is usually looking only for clear signs of non-linearity (e.g., is there a floor or ceiling effect) or if the relationship is not monotonic.

Two things can be concluded from these scatter plots. First, there are more responses above 3 (the mid-point on the five-point scale) than below it: 66 per cent compared with 12 per cent. Thus, our sample shows more trust than distrust in science, although there is a spread in responses. Second, the correlations are all at or above  $r = .5$ . Cohen (1992) describes  $r = .5$  as a *large* correlation, so in his terminology all of the associations are large, but his terminology is context dependent. Using Figure 1 as a way of



**Figure 2.** Scatterplot matrix of the six trust in science items. Six hundred cases were randomly chosen and jittered so that it is easier to see the relationships.

describing the size of correlations, suppose that there is a normally distributed latent variable with a standard deviation (SD) of 1 and two observed variables that are this variable plus an item-specific error variable with a SD of 1. Provided that these two error variables are unrelated, the correlation between these two variables would be about  $r = .5$ . Looking at the spread of the data in the scatter plots also helps one get a feel for what the different values of  $r$  mean with respect to how spread out the data are. It is also important to identify any pairs with particularly high or low values.

One of the most used methods to examine the number of dimensions of a set of items is a *scree* test (Cattell 1966). This deserves further explanation as it is often used in a mechanistic way where the researcher just chooses a single value produced by the computer as if this is the ‘right’ number of dimensions. Scree is the geological term for the loose rubble that has accumulated at the base of a steep hillside. The statistics to construct a scree plot are calculated using the eigenvalues of the correlation matrix. The sum of the eigenvalues of most correlation matrices is the number of variables. The first eigenvalue, which will be the largest, shows how much of this total can be accounted for by a linear combination of the variables or, in lay terms, how much of the variation can be accounted for by a single dimension. The second is how much

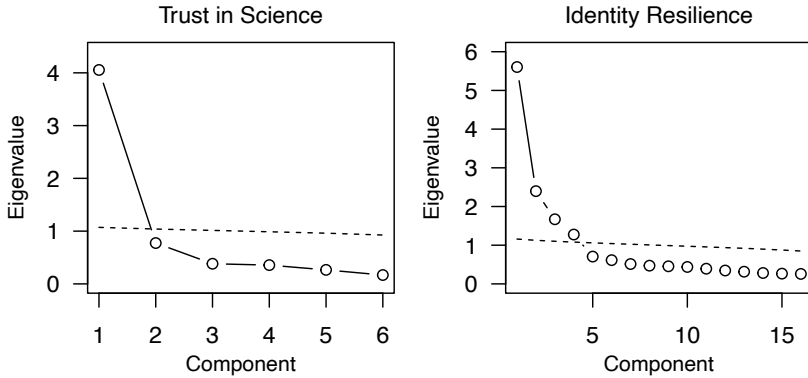
more can be accounted for by a second dimension and so on. A scree plot is made by drawing a line connecting the eigenvalues. If there are six items, there will be six eigenvalues providing no item is a linear combination of the other five.

The amount accounted for necessarily decreases with each dimension. Cattell likened the underlying structure of a scale to a hillside where the ‘scree represents a “rubbish” of small error factors’ (Cattell 1966: 249). He describes methods to identify where the scree bends – the elbow – and to use this as the number of dimensions, though he notes that using this approach ‘requires the acquisition of *some* art in administering it’ (p. 256, emphasis in original).

There are several procedures that can be helpful to guide this art. The most useful in my opinion is adding a line to show how the scree would look if there were no structure to the data. This is called *parallel analysis*. To be part of the hillside you would want to use the dimensions shown on the scree that are well above the random line. What ‘well above’ means is up to the discretion of the analyst. Velicer *et al.* (2000; see also Auerwald & Moshagen 2019) described several statistical procedures that aim to identify the number of dimensions, and some of these are used later in this section. It is worth noting that reality is much more complex than our models, and that a near infinite number of likely related constructs will inform how people answer any of these questions. Cattell was aware of this: ‘There is no such thing as “the true number of factors to extract”, since the only possible assumption is that both the number of substantive and the number of error common factors each exceed  $n$ , the number of variables’ (Cattell 1966: 273). The analyst must decide what is appropriate simplification for their purposes to allow them to make what they believe are wise decisions. The scree plots for the trust in science and identity resilience variables are shown in Figure 3, along with lines created to show what the scree would be like for random data. A single eigenvalue stands out above the random scree line for the Trust in Science Scale, but there are several eigenvalues above this line for the Identity Resilience Scale (Breakwell *et al.* 2022).

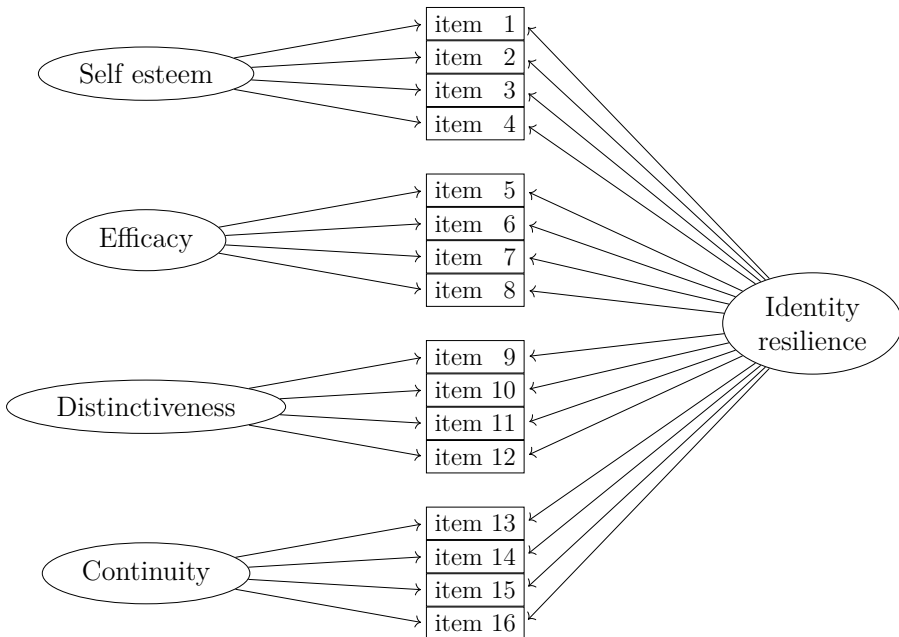
The second scree plot is for the Identity Resilience Scale, which is discussed in greater detail in other articles in this special issue. It was designed to have four components, and there are four eigenvalues above the line. In most cases like this there are a priori beliefs about the number of dimensions, their meanings and which items each construct will primarily influence. Confirmatory factor analysis (CFA) can be used in this situation. In addition, it is believed that there is still an underlying identity resilience construct that influences all the items, but each item is also influenced by one of the four components (self-esteem, efficacy, distinctiveness and continuity). Thus, the first item can be thought of as:

$$\text{item 1} = \text{Identity Resilience} + \text{Self-Esteem} + e_1 \quad (1)$$



**Figure 3.** Scree plots for Trust in Science and Identity Resilience Scales.

This is called the bifactor model and is depicted in [Figure 4](#). It shows each of the four proposed components of identity resilience influencing four items (listed on the left side of the figure), and all sixteen of the items being influenced by some overall identity resilience construct. The fit of this model was compared with several alternatives, and this model fits better than the alternatives tested. The choice between exploratory and confirmatory approaches is often difficult. In one sense, exploratory approaches are more data driven, while confirmatory approaches are more guided by, depending on one's perspective, Bacon's idols of the mind or the research questions driving the



**Figure 4.** The bifactor plot for the Identity Resilience Scale.

research. Here a confirmatory approach is used, as both previous studies and theoretical analysis support this conceptualisation (Breakwell 2023).

### Comparing scales by countries

To illustrate typical comparisons, here the values on these constructs (the single trust in science measure, the bifactor identify resilience and the four components) for the two countries are compared. Table 2 shows the means, their 95 per cent confidence intervals (CI), a *t* test comparing these and a common effect size for this comparison called Cohen's *d* (the difference in means divided by the SD). The *p*-values for the individual tests are printed as well as those after adjusting using Holm's method. Holm's method is used because having six *t*-tests means the probability of getting a significant result (i.e.,  $p < .05$ ) on at least one of these, even if there are no differences in the population, is much higher than 5 per cent (Bretz *et al.* 2010). An alternative way to consider these differences is to look at the effect sizes. Cohen (1992) describes  $d = .20$  as a small effect ( $d = .50$  as medium and  $d = .80$  as large). From this, the effects are 'small' for trust in science and distinctiveness for UK respondents, with US respondents tending to score higher.

There are several assumptions of these *t*-tests, including that the within-group population distributions are normally distributed and with equal variances. These assumptions will never be correct: researchers should 'move from [the idea that] all assumptions are right towards all assumptions are wrong' (Tukey 1986: 72). This does not mean that they should be ignored, but that even with relatively small deviations the results will probably still enable wise decision-making. Another assumption is that the group variable is measured without error. This should not be an issue for these comparisons as people should accurately know which country they are in. It is also assumed that the data are independent of each other. This is another reason that only using a single respondent from each IP address is good practice. Two people from the same IP address are likely to be more similar to each other and while there are methods to take into account non-independence of data (e.g., Goldstein 2011), they would not be practical to apply for a small number of duplicate IP addresses.

### The relationships among these constructs

In several of our articles in this special issue and elsewhere (e.g., Breakwell *et al.* 2023), and in papers by others using social surveys, researchers put forward a causal model for the relationships among variables, seeing how well the data fit the model and then focusing on the relationships between the pairs of constructs. This is called *path*

**Table 2.** Comparing the means for the United Kingdom and United States. Student *t*-tests with their associated *p*-values (without and with Holm's adjustment for the number of tests) are shown with Cohen's *d*. 95 per cent. CIs (confidence intervals) are shown below the means and *d*.

	$\bar{x}_{UK}$	$\bar{x}_{US}$	<i>t</i>	<i>df</i>	<i>p</i>	<i>p<sub>adj</sub></i>	Cohen's <i>d</i>
Trust in Science	-0.085	0.124	4.305	1,878	< .001	< .001	0.202
CI	(-0.145, -0.025)	(0.049, 0.199)					(0.110, 0.295)
Identity Resilience	0.034	-0.050	2.012	1,878	.044	.177	-0.095
CI	(-0.015, 0.083)	(-0.119, 0.019)					(-0.187, -0.002)
Self Esteem	0.018	-0.027	1.424	1,878	.155	.309	-0.067
CI	(-0.020, 0.056)	(-0.077, 0.023)					(-0.159, 0.025)
Efficacy	0.018	-0.027	1.216	1,878	.224	.309	-0.057
CI	(-0.025, 0.062)	(-0.087, 0.034)					(-0.149, 0.035)
Distinctiveness	-0.070	0.103	4.041	1,878	< .001	< .001	0.190
CI	(-0.122, -0.018)	(0.036, 0.170)					(0.098, 0.282)
Continuity	-0.030	0.044	1.856	1,878	.064	.191	0.087
CI	(-0.079, 0.020)	(-0.016, 0.103)					(-0.005, 0.179)

*analysis.* One popular approach is called *structural equation modelling* (SEM). There are a few approaches to this. Most frequently this involves simultaneously fitting a model that incorporates both the measurement of the latent constructs and the relations among them. This model could be run separately for the United Kingdom or United States, or with both to compare the effects for each country. This would allow the examination of differences by the constructs and the relationships among them, resulting in a complex model. Alternatively, a two-step approach (e.g., [Anderson & Gerbing, 1988](#)) where the measurement of the constructs occurs in the first step and the relationships among the constructs, or the structural part of the model, in the second is possible. This is also called the *structural after measurement* (SAM) approach. This means that constructs are constructed in the same way for the two countries. While there are other approaches that could be used, the SAM approach will be used for illustration. It is important to note that it is not always possible to conceptually separate the measurement and structural parts of a model.

One approach to this two-stage approach would be to estimate the constructs, as was done earlier in this article, and use these in a set of regression equations. As discussed with respect to *t*-tests, these would assume that the predictor variables are measured without error. Rosseel and Loh (in press) describes several problems with this approach but note that it is still popular. As with the correlations, it tends to underestimate the associations among the variables. The alternative is to include the uncertainty in these estimates in the model. Rosseel and Loh (in press) show the equations for doing this and provide a function *sam* in a new version of the package *lavaan* ([Rosseel 2012](#)). This is the approach used here. More variables are

included here to show the approach and to match our research elsewhere in this issue.

SEM, and more generally using sets of regression models to create path diagrams, is sometimes referred to as causal modelling, as if causation can suddenly be determined from the correlations by using fancy statistics. [Morgan and Winship \(2015\)](#) note how some people blamed the over-reliance and over-optimism in these models for many negative consequences in the social sciences.

Naive usage of regression modeling was blamed for nearly all the ills of sociology, everything from stripping temporality and context from the mainstream, ... the suppression of attention to explanatory mechanisms, ... the denial of causal complexity, ... and the destruction of mathematical sociology. ([Morgan & Winship 2015: 13](#))

[Cartwright \(2014: 308\)](#) describes the situation succinctly as ‘no causes in, no causes out’. I assume identity resilience, social support and trust in science are related, and that trust in science influences COVID preventative behaviours, but our statistical procedures cannot show if the direction of causation is accurate. This is a framework in which to test our hypotheses about country differences. Country is treated as exogenous, and none of these other variables will influence it appreciably (there may be some influence, for example, someone who really trusts science might feel compelled to move to the United Kingdom, but this influence will be small enough for us to ignore). Our interest is in whether country influences trust in science and whether, after accounting for the influence of trust in science on COVID behaviours, country further influences COVID behaviours. It does. This can be shown by comparing the model in [Figure 5](#) without the dashed line with the model with the dashed line. The difference in fit is:  $\chi^2(1) = 39.72, p < .001$ . This suggests this effect (the dashed arrow of [Figure 5](#)) should be included in the model.

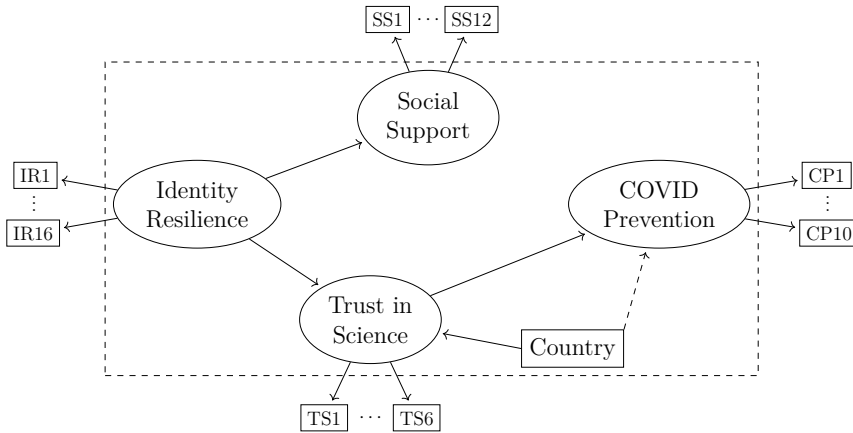
Like the procedure itself, the numeric results from the SAM model are separated into measurement and structural parts. The measurement part estimates the reliability for each construct. These are (for the model, including the dashed line in [Figure 5](#)):

Identity Resilience	.901
Trust in Science	.927
Social Support	.915
COVID Prevention	.853

Statistics related to the structural aspects of the model are shown in [Table 3](#). The largest effects are for the identity resilience to social support edge and the trust in science to COVID prevention edge. Identifying these is important for understanding the

**Table 3.** Path coefficients and related statistics for the model shown in Figure 5.

Path	Coef.	se	z	p
Identity Resilience → Social Support	-0.551	0.026	-21.546	< .001
Identity Resilience → Trust in Science	-0.084	0.023	-3.726	< .001
Country → Trust in Science	-0.154	0.035	-4.437	< .001
Trust in Science → COVID Prevention	-0.484	0.038	-12.772	< .001
Country → COVID Prevention	0.275	0.048	5.704	< .001



**Figure 5.** A SAM model (Rosseeel & Loh, in press) of the relationships among COVID-19-related constructs.

*Note:* The observed variables that make up the constructs and their error terms are not shown. The dashed rectangle encloses the structural part of the model. The measurement is shown by the paths between the constructs inside the rectangle and the items outside it. Each of the observed items, other than country, also has an implied error term associated with it, but these are not shown as the figure already is fairly complex. The coefficients for this model are shown in Table 3.

relationships among these constructs and related behaviours like having the vaccine. In particular, the path between trust in science and preventative behaviours suggests increasing trust in science may improve behaviours that in turn may lessen the impact of pandemics.

### Summary

Considerations and assumptions are part of all research, even when not evident in the descriptions of the research in scientific journals. The aim of this paper, like *Toto*, is to pull back the curtain that obscures how the procedures work, but unlike the film *Wizard of Oz* where the ‘wizard’ did not want people to see what occurred behind the curtain, I want you to pay attention to those considerations and assumptions behind



the curtain of scientific protocols. Word limits, blind reviews and years of training have led social scientists to report the main findings from research in a succinct and formal manner that obfuscates decisions made when conducting the research. The format of journals and fifteen-minute conference slots make this inevitable and we do not believe the approach used here is appropriate for all dissemination. For this special issue, focused on several of our research ideas and written for a broad audience, it is worth describing our considerations and assumptions in more detail. Further, reflecting on these helps to focus on these decisions and forced me to make the reasons why certain choices were made explicit.

We created a research team and developed research questions in response to a call from the British Academy. Our aim was to explore different aspects of IPT in the United Kingdom and United States with focus on different ethnicities within the context of COVID-19. Our main method, for much of our research, has been to present a set of scales to survey respondents and draw conclusions about how people think and behave based on the associations among their responses. This is a tall order and requires both assumptions and some empirical checks of *some of* these assumptions. We assume that the sample achieved online through Prolific will be similar enough to others to provide useful and meaningful results. We assume that participants' responses inform us about their beliefs and behaviours consistent with our intent. We assume these can be aggregated and represent the intended psychological constructs. The choice of statistical methods for this aggregation and for looking at the associations among the constructs also require decisions. In the typical article, the authors focus more on *what* they did rather than *why* they did what they did, and *why* they didn't do the alternatives.

Social science theory and methods can help inform policy and other applications related to societally important issues. The COVID-19 pandemic is an example. While medical and economic research are vital for pandemics, so is understanding how people will psychologically react to health guidance and restrictions. Social scientists have many tools at their disposal. When faced with a global crisis the research tools from many disciplines can be useful. Each discipline has tacit protocols. Being explicit about the protocols helps readers to better understand the approaches and the research implications.

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or Educational Psychology, University of Nevada, Las Vegas, Box 453001, 4505 S. Maryland Pkwy., Las Vegas, NV 89154-3001, USA.

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# Public uncertainties in relation to COVID-19 vaccines in the United Kingdom

*Rusi Jaspal and Glynis M. Breakwell*

*Abstract:* Uncertainties about COVID-19 vaccines and variants have been linked to vaccination refusal on a significant scale. To optimise public health communication on vaccination and inform vaccination policy, it is necessary to understand the substantive nature of these uncertainties. Our study, using a corpus of texts from 324 UK citizens, examines these uncertainties. The results suggest that major public uncertainties regarding COVID-19 vaccines are expressed in terms of: (1) concerns about the safety of the vaccines; (2) concerns about the effectiveness of the vaccines; (3) perceived lack of trustworthiness and/or competence of actors in the vaccination process; (4) concerns about the logistics of the vaccination roll-out; and (5) uncertainty about the longer-term need for vaccines and social consequences. Public uncertainties regarding COVID-19 are complex and will continue to evolve. Policy responses must be informed by an understanding of the factors that instigate and maintain uncertainties in individuals and the wider society.

*Keywords:* COVID-19, vaccination, vaccines, uncertainty, social representations

*Notes on the authors:* 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.

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.

## Introduction

When COVID-19 was designated a global pandemic, most nations struggled to contain the virus. Large-scale vaccination was widely identified as a principal means of reducing both disease incidence and the risk of mortality in those infected. At the end of 2020, the first vaccines against COVID-19 began to emerge. The Oxford-AstraZeneca and Pfizer/BioNTech vaccines were approved for use in the United Kingdom in December 2020, with Moderna following in January 2021. Subsequently, attempts were made to vaccinate large parts of the adult population, with other vaccines also being deployed as they became available. Unsurprisingly, the potential impact of vaccination hesitancy (frequently abbreviated to ‘vaccine hesitancy’) or refusal upon the ability of countries to manage the spread of COVID-19 became a major concern. It was, at the time, unclear how many people would be vaccinated. Uncertainties that people had about COVID-19 vaccines and variants have been linked in the United Kingdom with vaccination refusal on a significant scale (Paul *et al.* 2021; Soares *et al.* 2021).

Vaccine hesitancy is a long-standing public health issue, including in the United Kingdom (Breakwell & Jaspal 2023). Research into attitudes and uptake in the context of other vaccines, such as Measles, Mumps, Rubella (MMR), show the powerful effects of misinformation, decreased knowledge and mistrust (Torracinta *et al.* 2021). All of these factors can generate vaccine uncertainty. Research on public acceptability of COVID-19 vaccination suggests that it is related to various social psychological issues (e.g., Bertin *et al.* 2020; Breakwell & Jaspal, 2023). Uncertainties about COVID-19 vaccines appear to be a key barrier to their acceptance. It is noteworthy that uncertainties about vaccines and about vaccination may be related but are not synonymous. The present study, using a corpus of short written texts from 324 individuals recruited in the United Kingdom, examines what uncertainties people have about COVID-19 vaccines and, coincidentally, about vaccination in general. To optimise public health communication on vaccination and inform vaccination policy it is necessary to understand the substantive nature of these uncertainties. Since the processes of COVID-19 vaccine choice and roll-out differed across the United Kingdom, we use qualitative thematic analysis and tenets of social representations theory to examine the specific elements of uncertainty in relation to COVID-19 vaccines.

### COVID-19 vaccination hesitancy and socio-demographic factors

Many studies on the prevalence of vaccination hesitancy have used quantitative survey methods. A non-probability survey conducted in the United Kingdom just before the COVID-19 vaccination roll-out found that 16.6 per cent of respondents

were very unsure about being vaccinated and that 11.7 per cent were strongly hesitant (Freeman *et al.* 2020). Moreover, Neumann-Böhme *et al.* (2020), from a survey of seven European countries in April 2020, found that, in the UK sample, 79 per cent of respondents indicated that they would get vaccinated, 15 per cent were unsure and 6 per cent stated they would refuse.

In a nationally representative sample in the United Kingdom and Ireland, Murphy *et al.* (2021) found that females, younger people and those from lower socio-economic backgrounds were more likely to be vaccine hesitant and resistant, and that decreased trust in healthcare professionals and scientists were predictors of vaccine hesitancy. Moreover, those who relied on the mainstream media to acquire information about COVID-19 were less likely to be vaccine hesitant and resistant. These findings are consistent with those of Robertson *et al.* (2021), who also found that, although vaccination hesitancy was relatively low (18 per cent) in their UK sample, some ethnic minority groups (namely, Black, Pakistani and Bangladeshi respondents) had the highest levels of vaccination hesitancy. Some of the social psychological underpinnings of vaccine hesitancy in ethnic minorities in the United Kingdom have been examined elsewhere (Jaspal & Breakwell 2023).

Recent research into vaccination hesitancy has also focused upon the COVID-19 booster vaccine, showing the continued relevance of this issue. In their analysis of data from 22,139 fully vaccinated adults in the United Kingdom, Paul & Fancourt (2022) found that 4 per cent of the sample reported that they were uncertain about having the COVID-19 booster vaccine and that 4 per cent were unwilling to have it. Respondents who reported having no pre-existing health condition were more likely to report uncertainty or unwillingness. Lower levels of education, lower socio-economic status and being aged below 45 were also associated with increased uncertainty. In another study, Paul *et al.* (2021) found a 16 per cent prevalence of mistrust about vaccines in their sample, which was associated with lower levels of education, lower annual income and poor knowledge of COVID-19. Concerns about future unforeseen side effects constituted a major determinant of uncertainty regarding vaccination.

It is important to note that surveys of vaccination intentions and attitudes that focus on socio-demographic differences rarely examine the substantive details of the uncertainties about COVID-19 vaccines that their respondents hold. This is the focus of the present study.

### **Vaccine acceptance and social psychological processes**

Social psychological processes appear to contribute to vaccine acceptance (Breakwell & Jaspal 2023). For instance, Robertson *et al.* (2021) note that belief in conspiracy theories regarding the origins of coronavirus (e.g., as a man-made laboratory-based



creation) is associated with decreased vaccine acceptance in UK-based research (see also Salali & Uysal 2022). Freeman *et al.*'s (2020) study echoed findings elsewhere that perceptions concerning the collective importance, efficacy, side effects and speed of the vaccine development predicted vaccination willingness. They also suggested that 'excessive mistrust' (i.e., belief in conspiracy theories, negative perceptions of healthcare professionals and negative healthcare experiences) predicted hesitancy. Similarly, Bertin *et al.* (2020) found in French samples that the endorsement of both COVID-19 conspiracy beliefs and general conspiracy beliefs were negatively related to vaccine acceptability.

Troiano & Nardi (2021) reviewed COVID-19 vaccine acceptance internationally and found that the most common reasons for refusing vaccination were: opposition to vaccination in general (an 'anti-vaxxer' stance); concerns about the safety and effectiveness of the vaccines (associated with believing that they were developed hastily compared to other vaccines); believing the virus harmless and, thus, that being vaccinated is futile; generally lacking trust in authorities (political, scientific, health-related); and conspiracy theorising regarding coronavirus itself.

Many competing representations of vaccination in general have emerged and have shaped both acceptability and uptake in the general population (Bish *et al.* 2011; Larson *et al.* 2014). Neumann-Böhme *et al.* (2020) found in several European countries that concerns about the efficacy and side effects of the vaccines constituted a key impediment to their acceptance. Similarly, Sherman *et al.* (2021) found that beliefs that the vaccine would cause side effects or be unsafe, and perceived deficiency in the information required to take an informed decision, were associated with lower vaccination intention in their UK sample.

In a qualitative study of twenty individuals in Bradford in the United Kingdom, where there was relatively low uptake of the COVID-19 vaccines, Lockyer *et al.* (2021) found that exposure to COVID-19 misinformation resulted in confusion, distress and mistrust in relation to the vaccines. Participants expressed safety concerns, negative accounts of others being vaccinated and negative beliefs that they themselves held about the vaccines, all of which decreased their own likelihood of being vaccinated. In their survey study based on data collected in late 2020, Jaspal & Breakwell (2022) found that access to social support was conversely associated with vaccination likelihood. They attributed this to the emergence and endorsement of vaccination as a collective social norm within support networks.

A qualitative study of twenty-four healthcare workers from two London hospital trusts revealed uncertainties in relation to the long-term safety of vaccines due to the belief that government decisions regarding the vaccination programme had not been based on evidence-based science; this adversely impacted the healthcare workers' level of trust and confidence in the programme (Manby *et al.* 2022). Similarly, another



qualitative study of sixteen ethnic minority individuals in the North East of England indicated mistrust based upon a perceived lack of scientific research underpinning vaccination development (Eberhardt *et al.* 2023). Brown *et al.* (2022) used interpretative phenomenological analysis to examine qualitative interviews regarding concerns about COVID-19 vaccine development. They found that uncertainties regarding the pandemic were associated with the desire for credible information regarding vaccines, which at the time they felt was unavailable. Specifically, there was a recurrent theme of uncertainty in relation to the speed of vaccine development.

A common thread runs through these studies: vaccination hesitancy is linked to belief systems that contest the effectiveness and safety of the vaccines but also tie into mistrust of information provided by those authorities responsible for managing the pandemic because those authorities are themselves mistrusted (Breakwell 2021). Indeed, in their study of 22,421 participants in the United Kingdom, Chaudhuri *et al.* (2022) found that negative attitudes (including mistrust) towards public officials and the government were associated with lower willingness to be vaccinated. Similarly, Roberts *et al.* (2021) found that lower levels of trust in decision-making and institutional truthfulness were associated with increased likelihood of vaccine refusal.

Social context and culture are also key determinants of how individuals will react to uncertainty in relation to vaccination. Lu (2022) observed that, in view of prevalent concerns about side effects associated with COVID-19 vaccination, people in cultures that are less tolerant of uncertainty are more likely to express vaccination hesitancy. Uncertainty is a significant component of thinking about vaccination hesitancy and thus must be investigated.

Studies do not generally differentiate between people who are certain that vaccines are ineffective and unsafe and those who simply say that they are not sure whether they are ineffective and unsafe. Yet this is a crucial distinction for public health interventions. The messages that will persuade the uncertain to be vaccinated will need differ from those directed at people who are certain in their negative beliefs. Redressing uncertainty is, in itself, an important task – one that is impossible without understanding the substance and content of those uncertainties.

### **Vaccination uncertainty and social media**

Social media representations of the vaccines may have an important role to play in initiating and shaping uncertainties about vaccination. In their study based on a representative sample of 5114 individuals from the United Kingdom, Chadwick *et al.* (2021) found that news avoidance, social media dependence and conspiracy theorising were all associated with higher levels of exposure to online discouragement of

vaccination. A qualitative study of healthcare workers in London showed that the spread of misinformation regarding vaccines online was related to lower trust and confidence in the vaccination programme, especially among those at a junior level and those from ethnic minority backgrounds (Manby *et al.* 2022). Interestingly, Piltch-Loeb *et al.* (2021) found that those acquiring information from traditional societal channels of information, such as television and national and local newspapers, were more likely than those who relied on social media to accept the vaccine.

Social media usage may stimulate uncertainty about vaccines in at least three ways. First, they may offer many different, often contradictory, representations of the vaccines without guidance on their relative viability. Second, they may provide channels for vociferous one-sided anti-vaccination rhetoric. The anti-vax messages may not persuade but may confuse and create doubt or mistrust in those who would otherwise accept vaccination by offering apparently plausible reasons for doubt (Breakwell 2021). Third, they embolden people to acknowledge their own uncertainty by revealing how many others seem to share that uncertainty. Once it is openly shared, uncertainty can be regarded as socially justified or at least permissible.

### **Social representation processes and vaccine uncertainties**

Moscovici (1988) argued that something unfamiliar is subjected to societal interpretations through negotiation and contention that produce social representations of it. A social representation is said to consist of a network of ideas, values and practices. Social representations enable people to make sense of the novel and previously unknown. Social representations often involve making something unfamiliar understandable by associating it with something already commonly understood (this is called *anchoring*) or, if it is inherently abstract, by linking it with something more concrete (this is called *objectification* and frequently involves the use of metaphors).

Social representations of COVID-19 and its vaccines have been studied as they have evolved (Páez & Pérez 2020). Social representations of the disease will evolve over many years (Jaspal & Nerlich 2020). It is already evident from the work on conspiracy theorising concerning most aspects of the pandemic (e.g., Douglas 2021) that the development of widely accessible, but competing, social representations of COVID-19 vaccines (e.g., Cordina *et al.* 2021) will heavily influence the forms and levels of uncertainty citizens have about vaccines.

Even when social representations of an object (e.g., vaccines) exist, individuals do not necessarily become exposed to them, or choose to pay attention to them, or, indeed, accept their veracity. Many factors will determine how an individual is affected by the existence of a social representation (Breakwell 2015a). One important factor concerns how the social representation relates to the individual's desire

to maintain self-esteem, self-efficacy, positive distinctiveness and continuity and thus identity resilience. Identity process theory (IPT) (Jaspal & Breakwell 2014; Breakwell 2015b) predicts that individuals will try to actively manage their engagement with social representations and their implications in order to maintain a positive evaluation of their identity (see also the article by Breakwell, this issue). When conflicting social representations of an object are present the individual has greater agency in determining what to access, accept and use.

Our study was designed to explore the diverse range of uncertainties that individuals are now recognising exist, with a view to identifying what social representational content and structure is emerging. We address this empirical question by drawing upon Breakwell's (2014) notion of personal representations, that is, 'the manifestation of a social representation at the level of the individual' (p. 120). Indeed, the present study was intended to elicit individuals' own personal uncertainties concerning COVID-19 vaccines. Identifying the prevailing uncertainties about COVID-19 vaccines is an important part of predicting how people will respond both immediately and in the medium term. Therefore, in this study we examine the personal representations evinced by individuals in their reported uncertainties, that is, those that they are aware of, understand and accept (Breakwell 2014).

### **The present study**

It is necessary to distinguish between being uncertain about whether to have any particular COVID-19 vaccination (sometimes labelled 'vaccine hesitancy') and uncertainties about the COVID-19 vaccines themselves. This distinction is important because uncertainties about vaccines may contribute to the social representations that people are motivated to accept and use about being vaccinated (see Breakwell 2014). This in turn will guide cognition, affect and, crucially, behaviour in relation to vaccination.

Our study was exploratory, aimed specifically at elucidating people's uncertainties about COVID-19 vaccines. Respondents provided free text responses within a survey questionnaire to a single question and we used thematic analysis to determine the range of different uncertainties that were described and their clustering within themes. Recognising the range and relationships of these uncertainties may provide the basis for more targeted health communication campaigns to improve vaccination uptake (Chevallier *et al.* 2021). In general, the studies reviewed in this article would suggest that uncertainties would focus upon two domains: efficacy and side effects. The aim is to understand emerging personal representations of uncertainty and their constituent elements.

## Methods

### Ethics approval

Nottingham Trent University's Schools of Business, Law and Social Sciences Ethics Committee provided ethics clearance for this study (REF: 2021/30). The study was conducted in accordance with the British Psychological Society Code of Ethics and Conduct. Participants provided electronic consent before completing the study.

### Participants

Data collection took place in March 2021. By 26 March in the United Kingdom 45.2 per cent of the population had received one dose and 4.4 per cent had received two doses of a COVID-19 vaccine (NHS England 2021).

Using Prolific, an online participant recruitment platform, a sample of 324 (147 identifying as male, 173 as female, 4 non-disclosed) was recruited in the United Kingdom. The mean age of the sample was 32.02 years ( $SD = 10.679$ ). The age range in the whole sample was skewed to people under the age of 50.

All respondents were asked to read the following text:

The COVID-19 vaccines are new. They have only recently been authorised for use by medical authorities. Different vaccines have been reported to have varying degrees of effectiveness. The timetable for the vaccination being available for everyone is unclear. In your view, what are the five biggest uncertainties about the COVID-19 vaccines?

The factual statements about vaccines at the start of the question were presented in order to encourage people to acknowledge their uncertainties rather than to suppress them. It was also designed to allow for a range of uncertainties that respondents considered important to be described. Participants were asked to produce a short summary of the crux of their uncertainties and thus did not elaborate on them. Consequently, the analysis presented in this article does not provide a fine-grained linguistic analysis of the material they provided but rather a broader thematic analysis. It should also be noted that the timing of asking this question is an important determinant of the nature of participants' response. At the time, the COVID-19 vaccines were relatively unknown. This study therefore provides an empirical snapshot of uncertainties at that point in time.

### Analytic approach

Qualitative thematic analysis, which has been described as 'a method for identifying, analysing and reporting patterns (themes) within data' (Braun & Clarke 2006, p. 78),

was used to analyse the data, using the analytic principles outlined by Jaspal (2020). In this study, themes in participants' reported uncertainties concerning COVID-19 vaccines were identified. A realist epistemological stance was employed and, accordingly, participants' reports were considered to reflect underlying cognitions. In particular, in the analysis, there is a focus upon experiential themes, that is, 'subjective viewpoints such as intentions, hopes, concerns, beliefs, and feelings captured in the data' (Ronkainen & Wiltshire 2021: 164). Clearly, other dimensions of participants' meaning-making, such as inferential themes and dispositional themes, which are also of relevance to realist enquiry, should be examined in data generated through other means. The approach we employed is useful in examining personal representations. Consistent with the qualitative thematic analysis approach employed, there was no attempt to quantify the 'prevalence' of particular observations (Braun & Clarke 2006; Jaspal 2020).

On the basis of prior research, summarised earlier in this article, we expected themes to have the following characteristics:

*Structurally:*

- Uncertainties expressed through unanswered questions.
- Uncertainties pertaining to the past, present and future.
- Uncertainties that involve direct personal consequences and those that affect others or society generally.

*Content concerning:*

- safety
- effectiveness
- logistics.

The corpus of textual data was analysed by the second author. Both researchers subsequently reviewed and discussed the analysis. The aim was to curb any potentially idiosyncratic interpretations of the data and to reach consensus and thus agree upon a single set of themes.

During each reading of participants' comments, all uncertainties listed by respondents were noted. These were examined to determine commonalities across exemplars. These were then collated into potential themes, which captured the essential qualities of the responses with the original research questions in mind. The list of themes was reviewed rigorously against the data to ensure their compatibility and specific extracts were listed against each corresponding theme. Five superordinate themes that reflected the analysis were specified and are described next.

## Results

As stated, responses fell into five superordinate themes (some respondents produced several answers that fitted within a single theme). Within each theme, there were subsets of uncertainties. The majority of the uncertainties were posed as questions. The objective of this qualitative study was to examine the structure and content of uncertainties regarding vaccines rather than to quantify how many people described each uncertainty theme. However, it is noteworthy that virtually everyone mentioned theme 1 (safety) and theme 2 (effectiveness). The majority of respondents mentioned some aspects of themes 3, 4 and 5.

Each of the five themes encompasses a variety of important questions. The questions listed are excerpts taken from the texts produced by respondents.

### 1. Uncertainties about the safety of the vaccines

Respondents expressed uncertainties about the safety of the vaccines, which featured concerns regarding the speed at which the vaccines had been developed, the risk associated with use of an mRNA base and possible side effects, especially for particular groups. Overall, there was a perception that the vaccines would not be safe for use in the general population.

- Have they been tested/trialled rigorously? How could they be developed so quickly? Respondents knew that they were being told that the vaccines had been trialled sufficiently, but they were uncertain about how this could have been achieved so quickly.
- Is the use of an mRNA base for vaccines scientifically sound? Respondents were unfamiliar with the technology and were uncertain about the meaning of the information that they had available.
- What side effects do they have (immediate or long term)? Particular concerns raised included potential interactions with other medications, allergies and effects on fertility or mental health. References to previous unanticipated long-term side effects of medication were made (e.g., the effects on foetuses of thalidomide). It is notable that this is an example of anchoring described in social representations theory.
- Do they pose a differential risk for varying subgroups (e.g., the immune-suppressed, disabled, Black, Asian, and Minority Ethnic (BAME) people, pregnant women, children)? In posing this question, respondents were not simply repeating issues that were being raised in the media at the time. Some respondents gave examples from their personal experience of people, from such categories, who had become ill after having the vaccine.

- What is in it? The fact that different vaccines were based on differing complex biotechnologies raised for some respondents an uncertainty about what was actually in any one of them and why they were different. Not knowing what they were being expected to have injected into themselves bred other uncertainties about the unknown effects of the vaccines.

## **2. Uncertainties about the effectiveness of the vaccines**

The effectiveness of the vaccines was pervasively questioned in participants' accounts of their uncertainties. These focused upon how well the vaccine would work, whether it would work equally as well across all groups and how long the vaccine would last.

- What is the evidence that they are effective?
- Are they effective for everyone?
- Does everyone need to have the vaccine?
- How do they work for people who have already had COVID-19?
- Will the virus adapt to vaccines?
- Which vaccine is best?
- Will vaccines be effective against new variants?
- What is the risk of a new deadly variant arriving before the vaccine roll-out is complete?
- Can foreign vaccines that are imported cause or introduce new variants?
- Can different vaccines be mixed?
- Is one dose effective? This uncertainty was associated with uncertainties about implications of the decision taken by some governments to offer one dose or to lengthen the gap between dose 1 and 2.
- What is the right dosage and what is the wastage rate?
- How quickly do these vaccines 'wear off'?
- Do vaccines protect or prevent? Does it stop you catching the virus or passing it on? Particular concerns included how long after vaccination before protection develops; if vaccinated can you still transmit the virus; effects on death rates; do they stop the spread of COVID-19; and do they provide herd immunity.
- Will life get back to normal once everyone is vaccinated? This clearly ties into the broader question of whether the vaccines solve the crisis.

Most of these effectiveness uncertainties are clearly linked to questions about the factors that may directly influence both the efficacy and effectiveness of the vaccines. Yet, it is notable that respondents were also indicating how uncertain they were about the longer-term societal effects of the use of the vaccines.

### **3. Uncertainties about the trustworthiness and/or competence of actors in the vaccination process**

There were concerns about the trustworthiness of actors involved in the vaccination process, most notably scientists and politicians but also pharmaceutical companies. It appeared that vaccination uncertainty was being anchored to general mistrust of these actors.

- Are the data on vaccines trustworthy? Are data on the vaccines being deliberately misrepresented? This question was sometimes voiced with others that suggested the respondent believed misrepresentation was occurring.
- Scientists have hidden motives. Who can give us unbiased science information?
- Are the companies producing them to be trusted?
- Are pharma companies indemnified?
- Is the government acting quickly enough and in the right way? This was often associated with fairness and equality issues in the prioritisation of the subgroups to be vaccinated.
- Can government figures on the numbers vaccinated be trusted?
- Is there corruption behind the scenes?
- Did scientists/medics know about COVID-19 long before disclosure (tied to speed of development of vaccines)?

Some of the questions just listed are not concerned with uncertainties about the vaccines per se but rather about the legal and socio-political context in which vaccine information was produced. Other responses, not phrased as questions, emphasise these concerns:

- Journalists speculating mean the public is poorly informed.
- Information is confusing, unreliable, missing and/or conflicting.
- Disinformation and fake news effects on public confidence and behaviour.

### **4. Uncertainties about the logistics of the vaccination roll-out**

In view of the novelty of COVID-19 vaccines and the unprecedented challenge posed by quick vaccination roll-out in order to manage the pandemic, respondents expressed uncertainty about the logistics of the vaccination roll-out.

- How many will get the vaccine?
- How fast will the roll-out be?



- Will the NHS ‘break’? This clearly echoes a phrase repeatedly used in mass media at the time predicting that the NHS could not cope with the demands of vaccination roll-out and COVID-19 patient treatment.
- Will people behave irresponsibly after having the vaccination?
- What does vaccination cost?
- How will vaccines be distributed globally?
- How will shortages and availability be handled?
- How will anti-vax sentiment be dealt with?
- Who will refuse vaccination?

#### **5. Uncertainties about longer-term need for vaccines and social consequences**

A common source of uncertainty focused upon how long the pandemic would actually last – more specifically, whether there would be a long-term need for vaccines and, if so, what the social consequences of this need would be.

- Will vaccination be mandatory in the future?
- Will we need vaccine passports?
- Will we have to take them forever?
- Will they be annual? How often will they be needed?
- Who will have to pay for vaccination in the long term?
- Will people be reckless if they believe everyone is vaccinated?
- What will be the impact on travel – in the present and over time?
- Will the vaccinated be tracked?
- What are the ethics of testing for the virus? What are the ethics of compelling vaccination for those incapable of informed consent (e.g., children)?
- With vaccination, will other precautionary behaviours be unnecessary?

## **Discussion**

The thematic analysis reveals the complexity of the web of uncertainties about COVID-19 vaccines in a relatively young sample of people in the United Kingdom. Although there were relatively few participants aged 50 and over, we believe that the focus on younger people is also valuable, especially as there was generally less concern about the effects of COVID-19 infection in this population (i.e., lower perceived risk) (Barber & Kim 2021). Furthermore, in the United Kingdom, younger people were more likely to have been infected during the Delta variant period, indicating that the infection rate was higher for this group (ONS, 2023). There is also evidence that in the United Kingdom younger people were generally more vaccine hesitant

(Murphy *et al.* 2021; Paul & Fancourt 2022). It is also noteworthy that the data were collected at one point in time – in March 2021 when the COVID-19 vaccine roll-out was not yet complete. This empirical snapshot of COVID-19 uncertainties is important because it tells us about the content of a nascent common social representation regarding people's vaccination concerns at an early point in the pandemic and the lessons learned could in turn enhance future pandemic preparedness, including future vaccination roll-out. Indeed, the commonality of uncertainties between COVID-19 vaccines and those in relation to other diseases is striking (e.g., Torracinta *et al.* 2021).

The question we asked participants was designed to elicit the most important uncertainties that they recognised. Although we provided examples of uncertainties expressed in public discourse concerning the vaccines at the time, some of which were also cited by participants themselves, there were others. The data may not reflect all of their uncertainties – some of those omitted by participants may be of little personal significance even though they exist. This study deals only with those that matter to participants and that they decided to disclose. Although it is acknowledged that they may have had other uncertainties, it is likely that participants were disclosing the vaccine uncertainties that they subjectively deemed to be significant at a specific point in time during the pandemic. These uncertainties would undoubtedly be shaped, at least in part, by broader social representations circulating at that time. Social representations, of course, evolve and develop in accordance with time and context (Jaspal & Nerlich 2020).

Our sample was concerned not only with issues of safety or effectiveness, even though these were present. These uncertainties were located in the context of uncertainty about the trustworthiness of those people and organisations determining what vaccines were used and how they were used (Breakwell 2021). Participants were looking towards the future implications of vaccination for the behaviour of other people and for legislative, health and commercial systems. Respondents' answers show the complexity of the public uncertainty. The distinct elements concerning safety, effectiveness, trustworthiness, logistics and the long-term need of the vaccines reflected the personal representations of uncertainty observable in the sample.

The amount of mass media emphasis upon COVID-19 vaccines, and specifically upon the questions surrounding their development and use, had, by the time of data collection, offered ample opportunity for respondents to be exposed to aspects of alternative and elaborate social representations of the uncertainties attached to the vaccines. However, no single dominant (hegemonic) social representation of the COVID-19 vaccines had emerged. Personal representations appeared to coalesce around safety, effectiveness, trustworthiness, logistics and the long-term need of the vaccines. Individuals are likely to differ in the elements of the available social representations that they access and use (Breakwell 2014). Our analysis is not

focused on these individual variations. The thematic analysis produces a composite image of the contributions from all of our respondents. The aim of this study was to examine themes that might contribute to an emerging social representation of vaccine uncertainty. However, during the process of the analysis it was clear that there was variation across individuals in the uncertainties they reported. In future research it would be valuable to examine this individual-level variation, which could be explained in terms of identity processes since individuals will select, reject and use those social representations that provide them with a positive sense of identity (Breakwell 2015a).

Social representations can be described in terms of their core and peripheral components (Abric 1993). Our analysis does support our initial expectation that safety, effectiveness and logistics questions would be important domains for vaccine uncertainty. These could be regarded as elements in the core system of the social representations of the vaccines. They have, of course, been reflected in debates concerning other vaccines (Chatterjee & O'Keefe 2010). These themes clearly subsumed many subsidiary issues. In addition to what was happening in the present (e.g., who was eligible for the vaccination), these were couched in terms of both what had already happened (e.g., where did the virus come from?) and what would happen in the future (e.g., would vaccination be made mandatory?). Personal representations of uncertainties stretch through time. They also encompass uncertainties that have direct personal relevance (e.g., if I'm vaccinated, will I be able to travel abroad?) and those that impact on the broader community (e.g., how will anti-vax sentiment be dealt with?). These corollary questions or elaborations could be considered the peripheral system of the social representation. They also show the multiple levels at which vaccination hesitancy must be considered, as well as the multiple levels of identity – individual and collective – that matter (Breakwell 2021).

Any social representation of vaccine uncertainties may be expected to evolve as the COVID-19 pandemic and its management changes. Social representations respond to events (even if only to deny the reality of an event). Consequently, we would expect that, while the core system of social representations of vaccine uncertainties may remain, the peripheral system would be reshaped. For example, the uncertainties concerning the greater mobility rights allotted to the vaccinated might be alleviated by clear government guidelines. Thus, the focus of uncertainty may be readjusted. It will require time series data to monitor how these changes in the social representations of uncertainty evolve. The uncertainties expressed by participants at this particular point in the pandemic focused largely on concerns in relation to safety, effectiveness, trustworthiness, logistics and the long-term need of the vaccines, but the salience of these elements of uncertainty may have changed during the course of the pandemic as novel information came to light and as some information was revealed to be (in)accurate.

In any pandemic context, the evolution of uncertainties needs to be studied over time, ideally using longitudinal methods.

The most notable feature of the way in which uncertainties were expressed in our study is that they were mostly presented in the form of questions. A minority of respondents, having stated a question, went on to elaborate why they thought it important (e.g., the information provided is confusing, unreliable, conflicting or missing). The vast majority simply listed their uncertainties. There seem to be several types of question that appear. It is possible to distinguish between the unanswered and the unanswerable questions or between the unanswered questions and the questions with unaccepted answers. It seems reasonable to assume that respondents recognised these distinctions but this does not mean that the questions lost their significance in precipitating vaccine hesitancy. Simply recognising that no one could answer their questions could give rise to doubt about the value of being vaccinated. The apparent inability or unwillingness of recognised authorities to offer answers could also engender mistrust and further uncertainty (Vullioud *et al.* 2017). Indeed, Breakwell & Jaspal (2021) found mistrust and uncertainty in regard to COVID-19 to be strongly related.

The range and complexity of uncertainties were wider than those we originally expected, namely uncertainties expressed through unanswered questions, uncertainties pertaining to the past, present and future, uncertainties that involve direct personal consequences and those that affect others or society generally, and uncertainties around the safety, effectiveness and logistics of the vaccines. The majority of respondents presented a list of related and interacting uncertainties and these were well articulated. There was much coherence in responses. People apparently had previously thought about these uncertainties and this is not surprising given the active social representation processes ongoing in public debates (Nerlich & Jaspal 2021). Rationality rather than emotion was at the forefront of participants' responses. They did not spontaneously report their emotional reactions to their uncertainties, nor did they suggest how they would like their uncertainties to be addressed.

Our data do not provide a direct insight into how uncertainties might be assuaged. Others have sought to address this question using other research methods (e.g., Brown *et al.* 2022). However, they do reflect the notion that people in the United Kingdom were very alert to the complex questions surrounding the vaccines. The findings of this study tell us that concerns about safety, effectiveness, trustworthiness, logistics and the long-term need of the vaccines could become barriers to getting vaccinated. This suggests that assuaging these concerns directly could have a positive effect on people's decision-making in relation to vaccination. However, in order to establish how this awareness might motivate willingness to get vaccinated and subsequently to follow behavioural guidelines, it will also be important to examine the association of uncertainty with key emotions (e.g., fear). Powerful negative emotions, such as fear and

anxiety, can block the assimilation or use of information that might reduce uncertainty and improve vaccine take-up (Meijnders *et al.* 2001). Incidentally, social representations can also precipitate particular emotional responses, essentially shaping the way in which people ‘ought’ to feel in response to a stimulus (Wagner & Hayes 2005).

Our qualitative thematic analysis revealed a common pattern of vaccine uncertainty and the five themes that we identified represent the basis for a nascent common social representation of vaccine uncertainty present in the United Kingdom. These results are important because they enable us to identify the content of this representation. The uncertainties described include themes that cover the broad societal significance of usage of the vaccines and the trustworthiness of their developers, manufacturers, distributors and advocates. Uncertainty centred on mistrust, not only of the vaccines themselves but of the system offering them, is common and may be a crucial factor in shaping vaccination choices (Moore *et al.* 2021; Petersen 2021). Indeed, in addition to concerns about the vaccines themselves, participants expressed uncertainties regarding the trustworthiness and/or competence of different actors in vaccination process, the logistics of the vaccination roll-out, and the longer-term need for vaccines and their social consequences. These uncertainties all concerned the broader system offering the vaccines.

However, it is not inevitable that these uncertainties will result in vaccination refusal. People regularly make choices in favour of some course of action despite their uncertainties because they are driven by social or institutional pressures (see Breakwell *et al.* 2021). Although the effects of unwarranted certainty cannot be deduced from this study due to its design, there is some evidence that communicating with unwarranted certainty about vaccines can lead some people to report a greater loss of trust and vaccination intention – perhaps because the source of the information is generally not trusted (Batteux *et al.* 2021). In three experimental studies, Vullioud *et al.* (2017) found that participants were more likely to follow advice received from a confident (versus unconfident) source, but that, once the advice was revealed to be misguided, they shifted their trust to the initially unconfident source. This shows the mutability of trust based upon levels of uncertainty – in both the source and the perceiver. We need more evidence on the relationship between different forms of vaccine uncertainty and actual decision-making and action. Future research should examine how patterns of uncertainty about vaccines are related to degree of uncertainty about vaccination intentions and, indeed, actual refusal of vaccination.

The personal representations of vaccines reported by respondents are not static. New contributions to it are made and other elements are discarded all the time. This is a typical product of social interactions. Indeed, social representations differ in their status – they may be coercive and pervasive or contested and peripheral (Moscovici 1988). Individuals in our sample reported only aspects of social representations of

vaccines operating in their social context. An image on a screen is made of many individual pixels, each playing its part, and each subject to removal and substitution so that the image can change. Personal representations of vaccine uncertainties will be comprised of many elements metaphorically similar to those pixels. Most individuals will 'see' and report only some of those pixels. The reasons for focusing on some pixels over others cannot be deduced from this study, but IPT (Breakwell 2015b) proposes that these differences between people will not be random. They may be motivated by the individual's desire to maintain self-esteem, self-efficacy, positive distinctiveness and identity continuity. People do have the room to choose elements to concentrate on and, in so doing, justify or motivate their course of action regarding vaccination.

### **Limitations**

Before drawing conclusions from our study, we wish to acknowledge that conclusions are inevitably affected by the design and method we adopted. First, using an online survey recruitment method is likely to explain the skewed age range of the sample (to those below 50 years). This study provides insight into some of the key uncertainties expressed by younger people and the findings cannot be generalised to other age groups. It is unclear whether including an older age range would have substantially changed our findings. However, the cost-benefit of vaccines for older age groups could be an important factor in shaping social representation access and use. This is an important agenda for research into vaccine uncertainties. Second, the technique for eliciting uncertainties may influence the conclusions that can be drawn. We used a direct question about vaccine uncertainties that was designed to indicate that uncertainties could be expressed. We were aware that this might have primed a particular focus on the novelty and effectiveness of the vaccines. In practice, if there was a framing effect, it did not deter people from reporting a broad range of uncertainties beyond that frame. This study should be complemented by other more 'bottom-up' approaches to data generation. Third, it could be argued that we focus too exclusively in this study on uncertainties. It may have been valuable also to ask about certainties. Comprehensive social representations of the vaccines would be likely to include both certainties and uncertainties, though it is possible that, in this highly contested domain, finding any social representation in which certainties and uncertainties were given equal space would be difficult. Fourth, it should be noted that participants were asked to summarise their main uncertainties. This generated brief observations, which precluded a fine-grained linguistic analysis of their accounts. Future research should examine these uncertainties using other data generation methods, such as interviews, whose data would be suitable for other data analytic techniques, such as

discourse analysis. Finally, the data do not provide insight into the affective dimension of the uncertainties expressed. Indeed, this is an important aspect of uncertainties (Breakwell 2021).

## Conclusions

This study provides some insight into vaccine uncertainties in a relatively young sample of individuals in the United Kingdom. Respondents were clearly aware of a large range of uncertainties that can be organised around five themes: safety, effectiveness, trustworthiness, logistics and societal consequences. They were concerned with uncertainties lying in the past, present and future. They posed the questions that they felt were unanswered or not answered acceptably. They showed that they regarded it as legitimate to ask and to want answers to these questions.

The novelty of this study lies in its identification of the content of a nascent common social representation of vaccine uncertainty at one particular point during the pandemic. This can enable policymakers to focus on addressing these uncertainties with confidence in view of the scientific evidence, while noting that these uncertainties will inevitably evolve in accordance with time, space and individual identity concerns (Breakwell 2021). Failure to provide answers inevitably strengthens the basis for vaccine hesitancy or refusal, especially in view of research demonstrating that one is more likely to follow the guidance from a confident information provider, provided of course that the advice is not later revealed to be misguided (Vullioud *et al.* 2017). The identification and contextualisation of uncertainties in a time of great risk and danger is very important in shaping attitudes and behaviour.

Personal representations of the uncertainties of COVID-19 vaccines have many implications for health policy and its implementation, both in the COVID-19 pandemic and in future pandemics. It would be beneficial to focus upon addressing major uncertainties in relation to COVID-19 vaccines in public health communication. Campaigns to promote COVID-19 (and perhaps other forms of) vaccination should actively engage with the uncertainties that surround vaccines. Acting quickly throughout the pandemic and its aftermath to give information and reassurance that can be validated and deemed trustworthy seems essential (Vullioud *et al.* 2017). Our study showed fairly consistent patterns of uncertainty in sample. Although our study focused upon the United Kingdom, it should be noted that that uncertainties do not respect national borders, so policymakers should work together internationally to address uncertainties. The international decision to shift categorisation of COVID-19 variants from country names to letters of the Greek alphabet was an example of this (Breakwell *et al.* 2022). The mass media and the social representations that they



disseminate operate across geographical, cultural and linguistic boundaries. There is a need for ongoing monitoring of emergent uncertainties throughout a pandemic. Preparedness for future pandemics will involve establishing international systems for tracing uncertainties to their sources and tracking their development over time and geographies. It will require nations to work together to assuage uncertainties using multiple channels of communication, ensuring public engagement.

It is unlikely that ignoring public uncertainties or labelling them as a product of ignorance or derived from ulterior motives will be helpful (Jaspal & Nerlich 2022). Stigmatising uncertainty will not make it go away. In fact, responding to uncertainty aggressively or with disdain may just confirm public doubts about the trustworthiness and motives of the authorities promoting vaccination. It may further substantiate the conspiracy theories that have abounded during the pandemic. Our work emphasises that uncertainties do not sit in isolation, they form systems manifested in many questions and sustained by social representation processes. They may also reflect individuals' own identity concerns.

The results of this study suggest that responses to uncertainties need to be informed by gaining an understanding of the factors that instigate and maintain uncertainties in individuals and in wider society. Monitoring of uncertainties needs to sit alongside modelling their sources. We did not model in this article the influences (e.g., social media exposure, interpersonal contacts, educational experiences, emotional states or traits etc.) that may have influenced individuals' personal representations of the uncertainties surrounding COVID-19 vaccines. This needs to be done systematically to support pandemic control policies in the future. While vaccine uncertainties may not always be the sole or direct predictors of acceptance of vaccination (Breakwell & Jaspal 2023), it will be important to identify when they are and how to address vaccination hesitancy moving forward.

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# 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. Coterminously, 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.

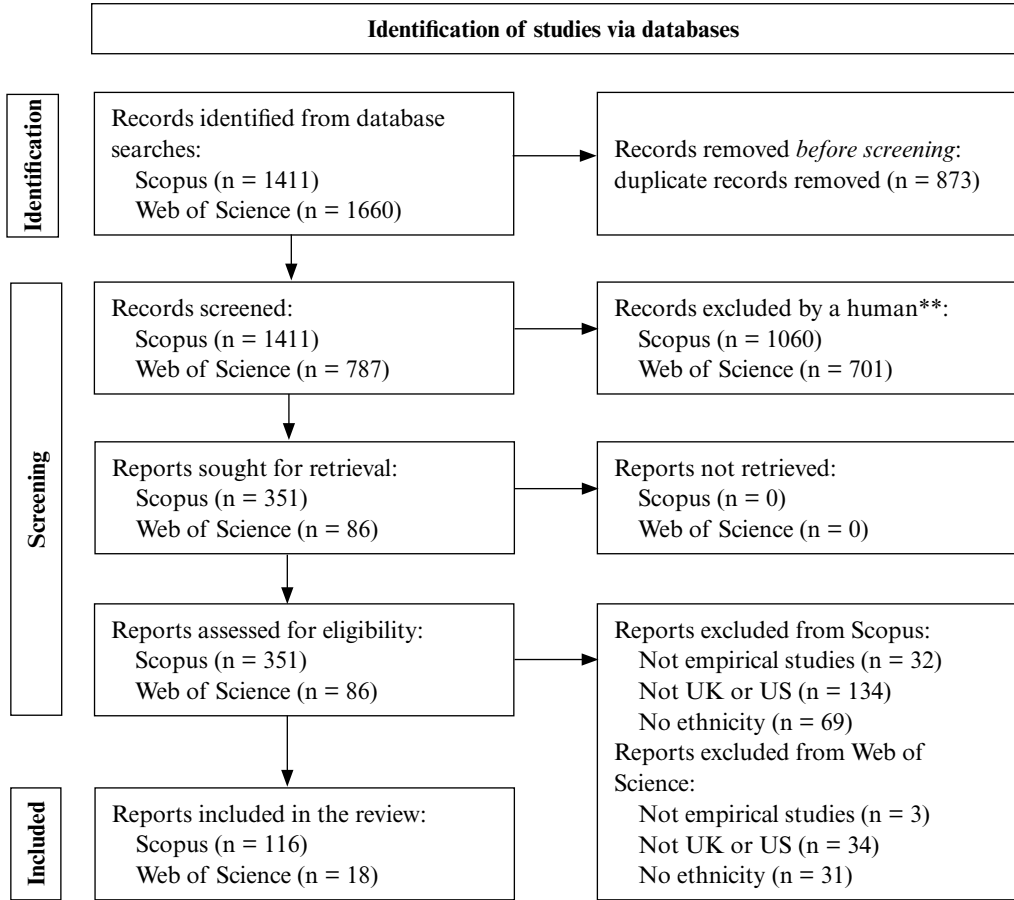
### *Inclusion and exclusion criteria*

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



**Table 1.** Levels of Analysis Framework for the Mapping Review

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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 deviation (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.

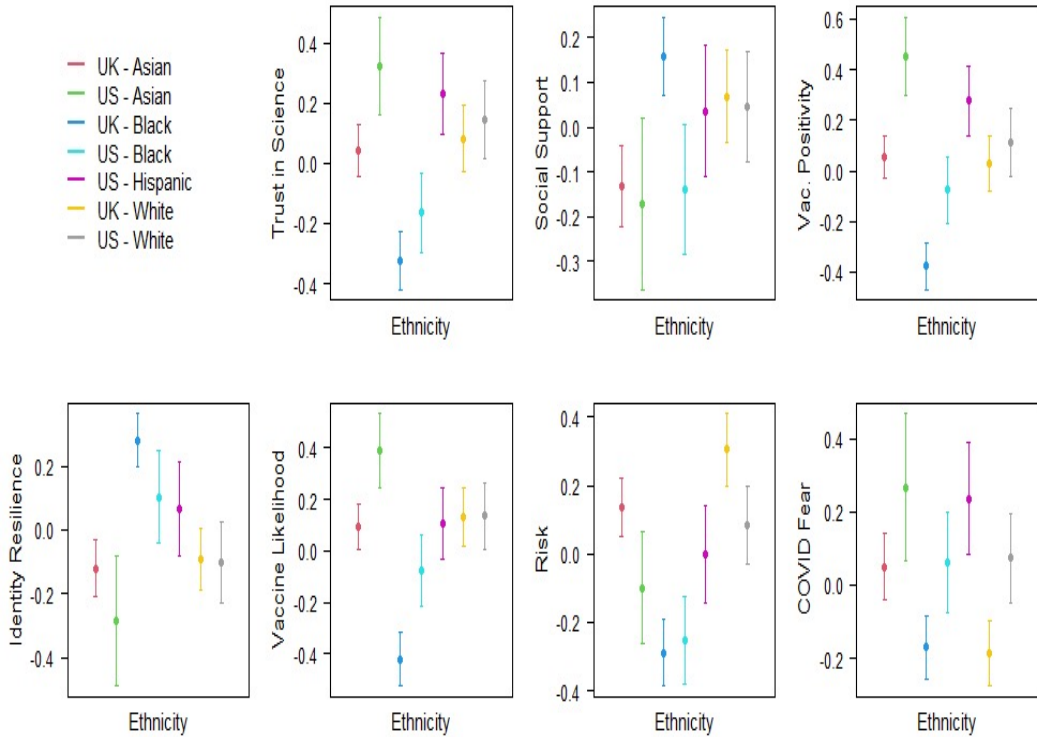
### *Vaccination likelihood*

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.

	<b>Trust in science</b>	<b>Social support</b>	<b>Vaccine positivity</b>	<b>Identity resilience</b>	<b>Vaccination likelihood</b>	<b>Risk</b>
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.<sup>1</sup> 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).

<sup>1</sup> <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.

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*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).

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