Communicating health threats
Linguistic evidence for effective public health messaging during the Covid-19 pandemic

Overview

The Covid-19 pandemic has reinforced the importance of effective and timely public health messaging. As a health threat, the global outbreak of Covid-19 required communication that targeted the entire population while also raising special awareness among segments of the population at higher risk of infection and poor outcomes. At the same time, public health messaging had to be adapted at pace as new evidence about the nature of the virus and the impact of different types of intervention emerged.

More than three years into the outbreak of the Covid-19 pandemic, we are able to take stock of the challenges that have surrounded, and continue to affect, effective public health messaging, especially in relation to the notion of risk and at-risk populations, and the different measures that have been implemented to curtail the spread and impact of the virus.

In this report we present the findings of the AHRC/UKRI-funded project 'Coronavirus Discourses: linguistic evidence for effective public health messaging', which ran from January 2021 to July 2022. The project brought together a multidisciplinary team of linguists, computer scientists and experts in human factors research working in partnership with the UK Health Security Agency, Public Health Wales and NHS Education for Scotland to investigate the trajectories and impact of public health messages during the Covid-19 pandemic. The research team used a wide range of methods, including corpus linguistics (the study of language patterns in large amounts of digitised text), public surveys, and a Public Involvement Panel (PIP) to analyse real-world public health discourse.

The information included in this booklet about health communications, messaging preferences and suggestions for effective health messaging is based on the results of the Coronavirus Discourses project and should be read as UK-specific. If adopted elsewhere, information may need to be adapted to the relevant cultural context.

Additional information about the Coronavirus Discourses project is available at **c19comms.wp.horizon.ac.uk**

Specifically, the project consisted of five main stages:

1. A study of government health messages delivered in England, Scotland and Wales during the Covid-19 pandemic using a corpus linguistic analysis of 1,182 texts (158 from national UK communications, 327 from Scottish public speeches and 697 from Welsh official updates)

2. A review of literature on effective public health messaging

3. Engagement with a Public Involvement Panel (PIP) composed of 12 members from different communities to obtain first-hand insights into the reception of public health messaging

4. An examination of public health messaging reception using a corpus linguistic analysis of 10,393 readers' comments on 50 news articles about specific aspects of Covid-19. The comments totalled 772,700 words and were dated between March 2020 and March 2021

5. Direct testing of public health messaging reception and social perception of health measures through a survey conducted by Ipsos UK on behalf of the University of Nottingham. A nationally representative sample of 1,089 adults aged 16–75 in Great Britain were interviewed in an online Omnibus survey between 1 March and 3 March 2022. Quotas were set on age, gender, region, social grade and working status. Data was weighted (statistically adjusted) to the known offline population for age, working status and social grade within gender and region to correct small-scale imbalances in the profile achieved. Survey design and analysis was conducted by the project team

How this report is structured

Section 1: Key findings provides an overview of the main findings of the Coronavirus Discourses project. Notably, it considers:

1. Demographic factors that affect health message reception and behavioural change: age, social grade, education and household size
2. The most effective characteristics of public messaging: accuracy, eye-catching format and achievable outcomes
3. Public reception of different types of messaging, especially:
    - Messages that emphasise personal responsibility and self-efficacy
    - Messages based on fear appeals
    - Messages that focus on the social consequences of compliance or non-compliance with the measures
    - Moralising messages
4. The relationship between audience involvement and self-reported compliance
5. Common sources of information per age group
6. Importance of online behaviours
7. Gathering fast feedback on health message production and reception
    - Health message production: official government health communications
    - Health message reception

Section 2: Summary recommendations for effective public health messaging provides five main recommendations for effective health communication, which will be elaborated on in Section 3. These recommendations centre on:

1. A collaborative approach and community-specific engagement
2. Inclusion and recognising audience diversity
3. Honesty with the public
4. Empathy and social values
5. Ensuring accessibility and availability

Appendix 1: Effective public health messaging guidelines for message writers includes specific recommendations for health message writers, supported by the findings of the research project and existing literature on health communication. The guidelines include illustrative examples of good practice and aspects that should be avoided. They are structured as follows:

1. Communicating a health threat:
    - Be honest about the health threat while empowering the public
    - Make the message personal
    - Provide illustrative comparisons
    - Employ productive metaphors
2. Engaging with the public and building unity:
    - Promote inclusivity
    - Acknowledge social and individual differences
    - Acknowledge different social values
    - Talk to members of the public
    - Acknowledge audience diversity
    - Promote personal responsibility
3. Message accessibility:
    - Use transparent language
    - Prioritise brevity
    - Provide specific actions and outcomes
    - Be consistent and provide a clear explanation of any changes to the guidance/message
    - Be aware of important nuances
    - Use translations and accessible material
    - Use statistics

Appendix 2: Methods for research on effective health communication and public health message writing offers a brief overview of some of the methods used in the Coronavirus Discourses project that may help health communication professionals design individual messages or campaigns to raise awareness of specific health threats and disease outbreaks. In particular, this section considers how to facilitate a Public Involvement Panel (PIP) and presents some useful tools for non-linguists.

Section 1
Key findings

The following results have emerged from the different strands of research that formed the basis of the Coronavirus Discourses project as outlined in the overview section of this report.

1. Demographic factors that affect health message reception and behavioural change

1.1 Age – the most significant demographic factor affecting health message compliance

Using our survey methods[1], we examined the reported self-compliance for eleven messages that contain six messaging styles:

- Appeals to personal responsibility (for example, "*you must* stay at home")

- Inclusion of threat and fear appeals (for example, "if you go out, you can spread it, *people will die*")

- Allusion to social proximity (for example, "don't put *yourself* in danger", "don't put *your loved ones* in danger")

- Moralising messages (for example, "look her in the eyes and tell her that you didn't break the rules")

- Positive and negative framings (for example, "*only go out* for essential shopping or exercise", "*do not go out unless* it is for essential shopping or exercise")

- Directness of linguistic directives (for example, "you *should* stay at home", "you *must* stay at home")

The survey results show statistical significance between age and self-reported compliance. Self-reported compliance was high for the whole population regardless of messaging, with older people self-reporting as being more compliant than respondents in younger age ranges (who also self-reported as being highly compliant).

Figure 1 illustrates the relationship between overall self-reported compliance and age group.
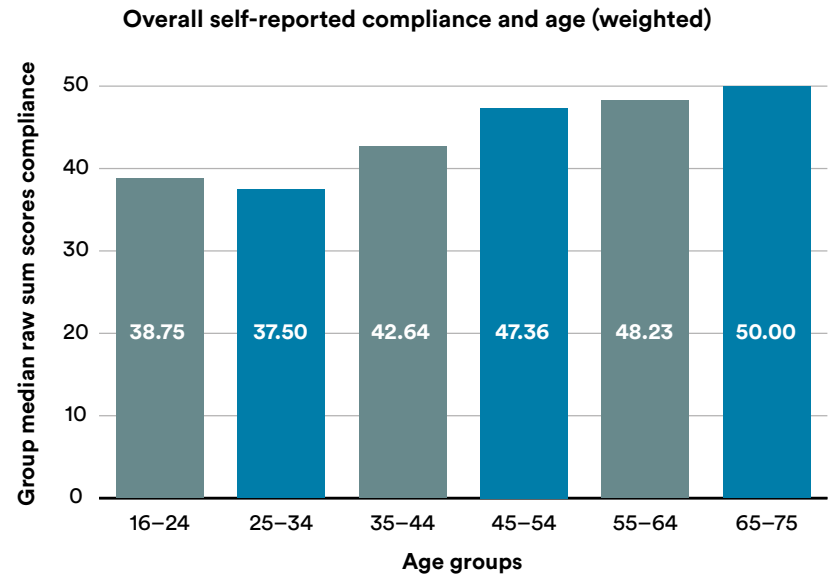
Overall self-reported compliance and age (weighted)

Figure 1 – "How likely or unlikely would you be to follow the guidance in this public health message if such measures were reintroduced as a result of a new Covid-19 variant?" Base: 1,089 adults aged 16–75 in Great Britain, 1–3 March 2022

1 On behalf of the University of Nottingham, Ipsos UK interviewed a nationally representative sample of 1,089 adults aged 16–75 in Great Britain. Following the MRS Code of Conduct, 'interview' is here defined as any form of contact intended to obtain information from or about a participant or group of participants. Interviews took place on the online Omnibus between 1 March and 3 March 2022. Quotas were set on age, gender, region, social grade and working status following the Random Iterative Model (RIM). Data was weighted to the known offline population for age, working status and social grade within gender and region to correct small-scale imbalances in the profile achieved. Survey design and analysis was conducted by the University of Nottingham.

1.2 Social grade, education and household size affect vaccine uptake

The survey shows that age correlates with vaccination status: older people are more likely to be vaccinated. There is a slight positive correlation between social grade[2] and vaccine uptake. Higher incomes and higher levels of education are associated with reports of higher vaccine uptake, although this correlation should not be confused with causation.

People who were under- or unvaccinated were also asked about the reasons for not having had the vaccine. (See Table 1 for an overview of the survey questions and answers related to vaccine uptake, and Tables 2 and 3 for an overview of the survey results across demographics.) Respondents were asked to select all answers that apply. From those respondents who were under- or unvaccinated, higher educated people were less likely to choose "other" as the reason for their vaccination status. Instead, they mentioned potential side effects as the main reason for refusing the vaccine. Household size also correlates with vaccine uptake in our survey – individuals who live in larger households were found to be less likely to be vaccinated. Vaccine refusal in larger households is more likely to be associated with reports of being medically exempt than concerns over side effects.

Survey questions relating to vaccine uptake

Survey question	Available responses
Have you received a Covid-19 vaccine?	1. Yes – 1 dose 2. Yes – 2 doses 3. Yes – 3 doses or more (including a booster dose) 4. No – I have been offered the Covid-19 vaccine, but I have not had it 5. No – I have not received a Covid-19 vaccine nor been invited to have one 6. Prefer not to say
For those who have not had the vaccine or had fewer than three doses, despite being invited: Which of the following best describes why you have only had one dose of/only had two doses of/not yet had the Covid-19 vaccine? *Please select all that apply.*	1. I am worried about side effects of the vaccine 2. I am medically exempt 3. I don't trust the intentions behind wanting to vaccinate the public against Covid-19 4. I don't think the vaccine is effective / don't think it works 5. I don't think Covid-19 is enough of a risk for me 6. I don't have time to attend a vaccine appointment 7. I don't think the vaccine is safe 8. Other reason 9. Prefer not to say

Table 1 – Survey questions: vaccine uptake

The survey data suggests that segmenting the population for the purpose of effective public health messaging might be useful. As one of the main factors for vaccine uptake, age is a good starting point and could be reflected in the multimodal representation (for example, images, videos, text) of messages used to target specific groups. Together with the information reported in section 4 on page 13, it is possible to target different age groups through different channels of communication reflecting the respective preferred ways of receiving public health advice. Further correlations relating to concerns over potential side effects allow messages to be more targeted in relation to an assessment of relative risk and side effects.

2 Following the British National Readership Survey (NRS), in this study "social grade" is understood to be a classification system based on occupation. For more information, see **https://www.nrs.co.uk/nrs-print/lifestyle-and-classification-data/social-grade/**

Responses to the question "Have you received a Covid-19 vaccine?" by demographic (weighted)

		Unweighted base	Yes – 1 dose	Yes – 2 doses	Yes – 3 doses or more	No – I have been offered the Covid-19 vaccine, but I have not had it	No – I have not received a Covid-19 vaccine nor been invited to have one	Prefer not to say	
Social grade	AB	490	2%	14%	74%	5%	4%	1%	
	C1	321	2%	12%	77%	5%	2%	2%	
	C2	101	1%	19%	62%	11%	6%	1%	
	DE	177	5%	15%	54%	12%	11%	2%	*
Age	16–24	160	6%	28%	29%	18%	15%	4%	
	25–34	202	4%	19%	52%	14%	10%	2%	*
	35–44	192	3%	19%	66%	6%	4%	2%	
	45–54	210	1%	10%	81%	5%	2%	–	
	55–75	325	1%	6%	89%	2%	1%	1%	
Household size	1	219	1%	12%	73%	10%	5%	-	
	2	370	2%	9%	80%	5%	2%	1%	*
	3	218	4%	18%	56%	7%	13%	1%	*
	4+	282	3%	24%	56%	10%	4%	3%	
Income	up to £19,999	238	4%	14%	62%	10%	9%	1%	
	£20,000–£34,999	262	3%	15%	69%	8%	3%	2%	
	£35,000–£54,999	265	2%	18%	67%	8%	4%	1%	
	£55,000+	242	1%	14%	76%	5%	4%	1%	*
	Prefer not to say	82	1%	9%	73%	4%	8%	5%	
Education	GCSE/O-level/NVQ12	249	4%	17%	61%	9%	7%	3%	*
	A-level or equivalent	229	2%	18%	62%	11%	5%	2%	
	Degree/Masters/PhD	565	1%	12%	77%	5%	4%	1%	
	No formal qualifications	46	8%	13%	55%	10%	11%	3%	

Table 2 – "Have you received a Covid-19 vaccine?" Base: 1,089 adults aged 16–75 in Great Britain, 1–3 March 2022

* These percentages do not add up to 100% due to rounding.

Motivation for vaccine refusal by demographic (weighted)

		Unweighted base	I am worried about side effects of the vaccine	I am medically exempt	I don't trust the intentions behind wanting to vaccinate the public against Covid-19	I don't think the vaccine is effective / don't think it works	I don't think Covid-19 is enough of a risk for me	I don't have time to attend a vaccine appointment	I don't think the vaccine is safe	Other reason	Prefer not to say
Social grade	AB	109	31%	9%	16%	25%	18%	10%	14%	25%	3%
	C1	61	33%	2%	18%	19%	27%	11%	8%	27%	3%
	C2	31	23%	2%	29%	28%	50%	11%	17%	19%	3%
	DE	57	31%	10%	15%	25%	21%	18%	21%	15%	7%
Age	16–24	81	17%	9%	13%	24%	34%	17%	15%	14%	4%
	25–34	71	32%	5%	20%	18%	23%	15%	8%	22%	3%
	35–44	48	45%	5%	24%	29%	28%	13%	20%	15%	7%
	45–54	37	21%	6%	19%	28%	25%	10%	10%	26%	4%
	55–75	21	40%	-	29%	30%	41%	-	33%	42%	2%
Household size	1	38	43%	4%	27%	34%	41%	5%	28%	20%	2%
	2	56	28%	1%	19%	30%	24%	9%	11%	15%	3%
	3	64	28%	5%	15%	17%	26%	18%	14%	23%	2%
	4+	100	23%	10%	19%	20%	28%	17%	12%	24%	7%
Income	up to £19,999	70	37%	7%	26%	26%	35%	15%	19%	13%	5%
	£20,000–£34,999	63	33%	1%	21%	27%	27%	12%	15%	25%	3%
	£35,000–£54,999	66	21%	4%	14%	24%	32%	11%	15%	28%	5%
	£55,000+	50	19%	11%	18%	18%	17%	16%	7%	14%	5%
	Prefer not to say	9	33%	23%	11%	20%	29%	9%	11%	37%	-
Education	GCSE/O-level/NVQ12	74	21%	5%	17%	17%	27%	11%	18%	32%	5%
	A-Level or equivalent	70	30%	6%	11%	23%	35%	11%	16%	18%	3%
	Degree/Masters/PhD	99	40%	6%	30%	31%	29%	16%	15%	14%	3%
	No formal qualifications	15	12%	7%	17%	32%	19%	10%	4%	18%	6%

Table 3 – "Which of the following best describes why you have only had one dose of the Covid-19 vaccine?"/"Which of the following best describes why you have only had two doses of the Covid-19 vaccine?"/"Which of the following best describes why you have not yet had the Covid-19 vaccine?" Base: all adults who have not had the vaccine despite having been invited, or who have had 2 or fewer doses, 273 adults aged 16–75 in Great Britain, 1–3 March 2022

2. The most effective characteristics of public health messaging – accuracy, eye-catching format and achievable outcomes

Our Public Involvement Panel (PIP) helped us to identify ten characteristics associated with effective health messaging. (See Figure 2 for the results of the PIP activity.) These message characteristics comprised:

- easy to relate to
- concise
- offered by a reliable source
- timely
- informative
- memorable
- achievable
- accurate
- eye-catching
- encouraging

Survey respondents were asked to select up to three characteristics that were most important for effective public health messages. Their answers were cross-referenced with the rest of their survey responses about message styles (see Figure 3 and Table 4). As a reminder, the six message styles were appeals to responsibility, inclusion of fear appeals, allusions to social proximity, moralising messages, using positive or negative framings, and providing strong or hedged directives.

Characteristics of effective health communication

Figure 2 – Results of the Google Jamboard PIP activity, 27 January 2022

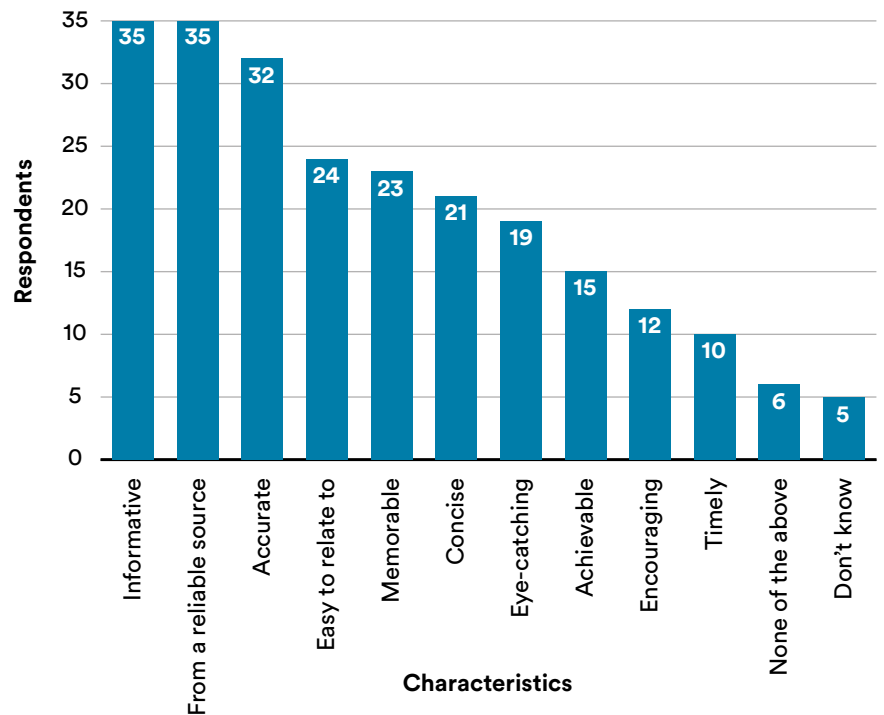**Characteristics of effective health messaging**

Figure 3 – "Which of the following, if any, do you think would be most important in making Covid-19 public health messages effective?" Base: 1,089 adults aged 16–75 in Great Britain, 1–3 March 2022

Correlations between health message features and messaging types

| Features	Correlations with other survey question results and implications
Accurate	Respondents who thought that effective health messages should be accurate also showed a preference for messages with directives that displayed strong obligations and strong certainty. For example: "If you go out you *can* spread it. People *will** die" shows a stronger obligation and greater certainty than "If you go out, you *could* spread it. People *would* die". This suggests that, in general, strong obligations and expressions of certainty are perceived as being more accurate than those that include mitigations.
Eye-catching	Respondents who identified effective messages as being eye-catching showed a slight preference for messages that allude to social proximity and the consequences of the health threat for family and friends. For example: "Stay at home this bank holiday weekend. Don't put *your friends and family in danger*" This suggests that when messages allude to the consequences that a health threat may have for loved ones, they will be more powerful if they are also eye-catching, for example, including relevant striking visuals.
Achievable	Respondents who identified effective messages as being achievable also showed a preference for moralising messages (for example, "I wear this to protect you. Please wear yours to protect me") and the inclusion of directives that displayed strong obligations. This suggests that, when moralising messages are used, they should include a clear indication of feasible behaviours and attainable outcomes (for example, in the preceding message, wearing a mask).
Easy to relate to	Being relatable was considered to be important for all messaging types. This means that, regardless of which messaging types communicators decide to follow, messages should be relatable for the public.
Concise	Conciseness was considered important by those self-reporting high levels of compliance for all messaging types.
From a reliable source	Reliable sources were considered important by those self-reporting high levels of compliance for all messaging types.
Informative	Providing relevant and informative messages was considered important by those self-reporting high levels of compliance for all messaging types.
Memorable	Being memorable was considered important by those self-reporting high levels of compliance for all messaging types.
Encouraging	Being encouraging did not correlate with high self-reported compliance for any messaging type in any significant way.
Timely	Being timely did not correlate with high self-reported compliance for any messaging type in any significant way. Despite this perception from survey respondents, it is important to emphasise the significance of timely health communication for preventing fatalistic attitudes. Delays in communication have been associated with a higher likelihood of misinformation and public mistrust [4].

Table 4 – "How likely or unlikely would you be to follow the guidance in this public health message if such measures were reintroduced as a result of a new Covid-19 variant?"/"Which of the following, if any, do you think would be most important in making Covid-19 public health messages effective?" Base: 1,089 adults aged 16–75 in Great Britain, 1–3 March 2022

Cognitive theories of threat perception have identified the following factors as key determinants of how people perceive a threat: how soon the threat is likely to happen, the probability of it happening, its likely duration and perceiving the threat as dynamic, approaching the person. Importantly, after prolonged threat exposure, people tend to positively reappraise the threat regardless of its continuation or remission [1, 2, 3]. These observations highlight the importance of providing timely communication during the first stages of the outbreak of a new health threat to ensure public understanding of its severity and to achieve behavioural change.

* Italics are used for emphasis.

3. Public reception of messaging types

Different types of messaging generated different levels of self-reported compliance. Although these differences are not statistically significant, some messages show higher levels of compliance than others, which should be considered when producing public health messages. Notably, differences are observed across moralising, self-efficacy and fear-based messages. We take these results as the basis for the following recommendations.

3.1 Emphasise personal responsibility and self-efficacy

Survey respondents reported a higher level of compliance with messages that included clear health guidance and a direct reference to individual responsibility (for example, "Stopping the spread starts with *you*", A in Figure 4) than with messages referring to the community (for example, "Stopping the spread starts with *all of us*", B in Figure 4).

Self-reported compliance for self-efficacy messaging
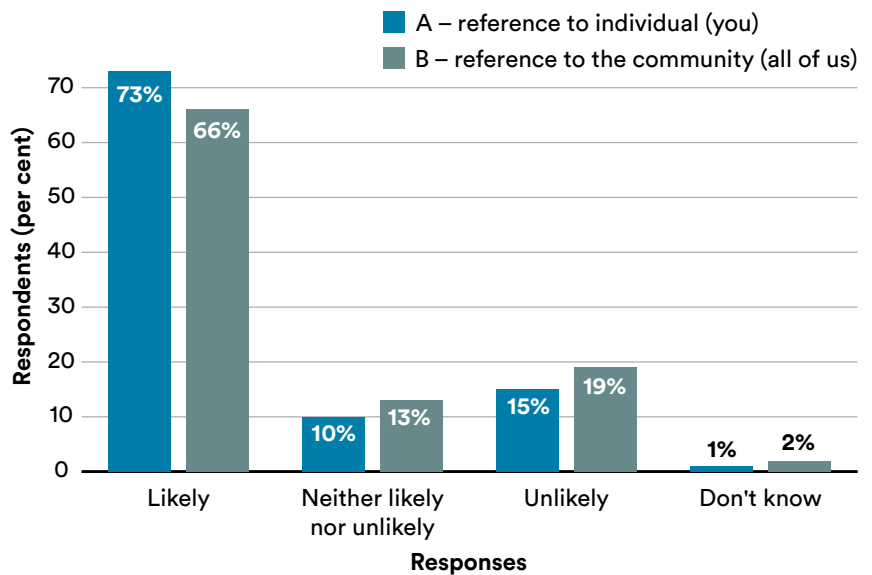
Figure 4 – "How likely or unlikely would you be to follow the guidance in this public health message if such measures were re-introduced as a result of a new Covid-19 variant?" Base: 1,089 adults aged 16–75 in Great Britain, 1–3 March 2022

3.2 Moderate use of fear appeals and focus on the health threat

Messages that focus on the consequences of the threat for close relationships (for example, "Stay at home. For *your family*. For *your friends*", A in Figure 5) showed higher levels of compliance than those that focus on the wider community (for example, "Stay at home. For *your neighbours*. For *our NHS*", B in Figure 5). However, as shown in the guidelines (Appendix 1, Communicating a health threat), messaging based on fear appeals can be counterproductive and promote polarisation and othering.

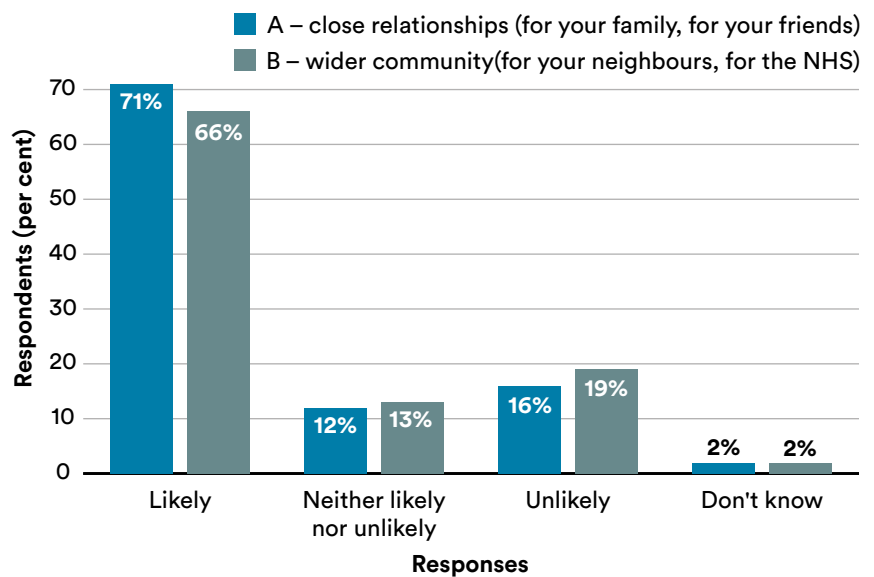**Self-reported compliance for messages with threat and fear appeals**

Figure 5 – "How likely or unlikely would you be to follow the guidance in this public health message if such measures were reintroduced as a result of a new Covid-19 variant?" Base: 1,089 adults aged 16–75 in Great Britain, 1–3 March 2022

3.3 Focus on social consequences

No statistically significant variation was found between self-reported compliance for messages that focus on the consequences of the threat for family and friends and those that focus on consequences for the individual (Figure 6). Contrary to previous research, which has highlighted that women tend to show more compliance with messaging that emphasises the social consequences of the threat than men [5], such differences were not significant in our study.

Self-reported compliance for messages that focus on the consequences of the threat
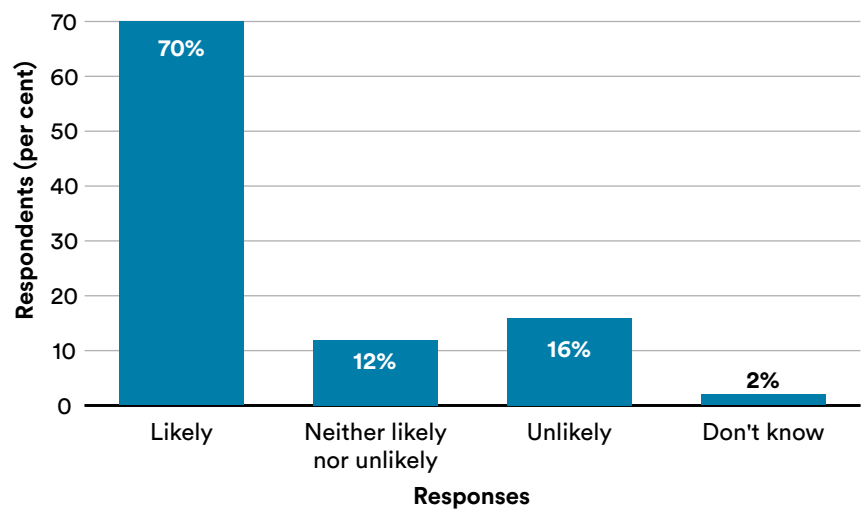

Figure 6 – "How likely or unlikely would you be to follow the guidance in this public health message if such measures were reintroduced as a result of a new Covid-19 variant?" Base: 1,089 adults aged 16–75 in Great Britain, 1–3 March 2022
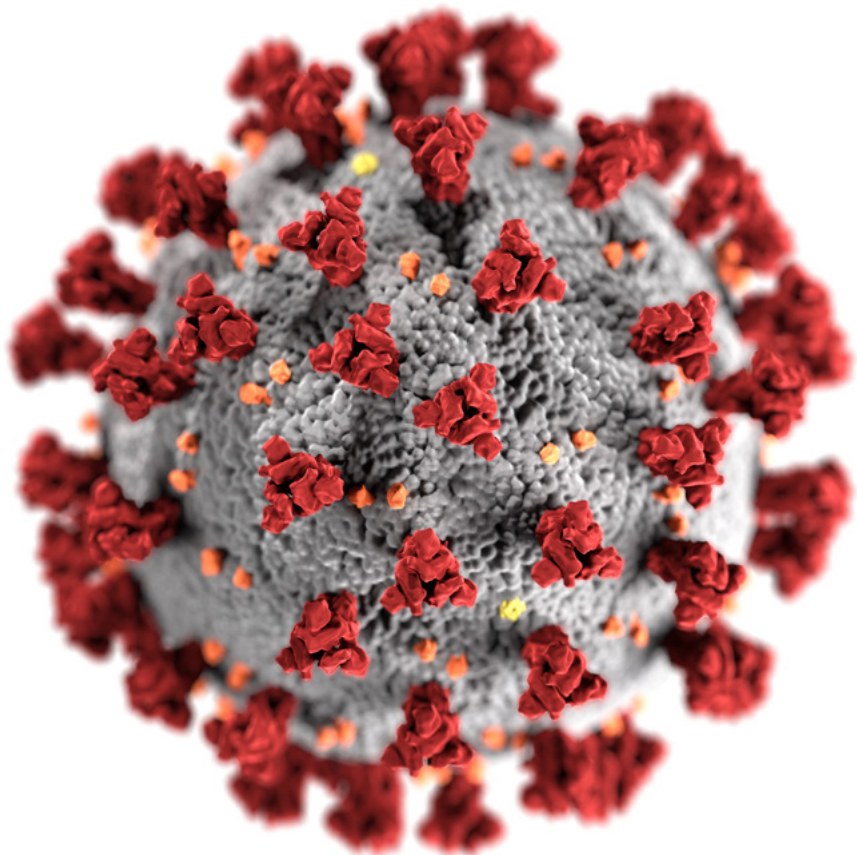
Photo by CDC on Unsplash

3.4 Appreciate the nuances of moralising messages

The effectiveness of moralising messages was examined via a closed question about the message displayed in Figure 7 and open-text responses to Figure 9. The study shows that while slightly moralising messages generated high self-reported compliance, highly moralising messages are counterproductive. Closed-question responses show high levels of self-reported compliance overall (Figure 8). However, corpus linguistic analysis of open-text responses to Figure 9 showed polarised reactions and strong negative reactions among some respondents. These included recurrent accusations of "scaremongering", "propaganda", "manipulative", "scare tactics", and "shaming" and "guilting" people into adhering to guidance (Table 5). Furthermore, the responses that showed an effective reception of the message (Table 5) frequently included discursive othering and stigmatisation of the non-compliant individuals (for example, "Makes me cross when Covid-idiots won't obey rules meant to protect everyone").

Figure 7 – HM Government / NHS moralising message 1

Self-reported compliance for moralising messages

Figure 8 – "How likely or unlikely would you be to follow the guidance in this public health message if such measures were reintroduced as a result of a new Covid-19 variant?" Base: 1,089 adults aged 16–75 in Great Britain, 1–3 March 2022
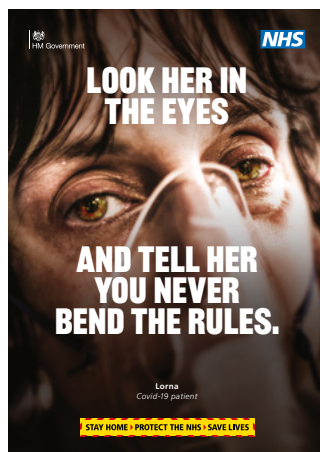

Figure 9 – HM Government / NHS moralising message 2

	References to	Responses
Negative reception	scaremongering	11
	scary, scare	26
	blackmail	5
	guilt, guilty	73
	non-compliant individuals as selfish	13
Effective reception	compliance (obey, comply, adhere)	53
	vulnerable, ill	65

Table 5 – Examples of polarised responses to moralising message 2

4. Relationship between audience involvement and self-reported compliance

Audience involvement was determined by whether the survey participant or one of their close friends and family had been significantly affected by Covid-19. Examining correlations between audience involvement and self-reported compliance revealed that:

- People who had experienced significant consequences of Covid-19 reported greater compliance with moralising messages and messages that emphasise the social consequences of the threat
- Individuals with family members affected by Covid-19 reported greater compliance with messages that
  (i) highlight personal responsibility and self-efficacy,
  (ii) emphasise the social consequences of the threat, and
  (iii) adopt a positive framing in expressing directives (for example, *"you should…"* in contrast to *"you should not"*)
- Individuals with close friends affected by Covid-19 did not report greater compliance with the messaging

5. Sources of information

In order to better understand the most common sources of information, survey respondents were asked for the different ways in which they had seen, heard or received information during the pandemic. A list of 24 possible answers was provided and respondents were asked to select all that applied to them. (In Table 6 the highest numbers of respondents for each information source have been highlighted in blue. Note that respondents were able to choose multiple sources.)

Audience engagement with sources of information (weighted)

Sources	Age (years)				
	16–24 (Unweighted base: 160)	25–34 (Unweighted base: 202)	35–44 (Unweighted base: 192)	45–54 (Unweighted base: 210)	55–75 (Unweighted base: 325)
TV	33%	35%	53%	72%	85%
Government briefings/updates	26%	25%	44%	58%	72%
Mainstream news outlet online/app	27%	23%	41%	50%	49%
Family	27%	31%	35%	43%	45%
Radio	14%	24%	34%	47%	44%
Friends	24%	25%	33%	41%	39%
Print media	13%	18%	23%	33%	44%
Medical professionals	15%	15%	18%	33%	41%
Posters or billboards	20%	17%	23%	33%	28%
My employer	20%	22%	31%	34%	17%
Colleagues	14%	21%	18%	37%	14%
WhatsApp or other private messaging apps	14%	14%	9%	6%	6%
Other social media	18%	11%	12%	12%	6%
Facebook timeline	24%	21%	17%	22%	12%
Twitter timeline	14%	17%	18%	12%	8%
Community leaders/groups	13%	11%	8%	8%	6%
Research papers in academic journals	12%	10%	7%	8%	7%
Professional/academic conferences	11%	8%	7%	6%	3%
Podcasts	9%	6%	4%	8%	5%
Facebook Messenger	11%	8%	6%	4%	2%
Charity communications	8%	6%	2%	7%	4%
Direct Message on Twitter	6%	5%	4%	1%	1%
None of these	3%	9%	8%	4%	3%
Don't know	5%	6%	2%	2%	-

Table 6 – "In which of the following ways, if any, have you seen, heard or received information about Covid-19?" Base: 1,089 adults aged 16–75 in Great Britain, 1–3 March 2022

Audience engagement with sources of information per age group (weighted)
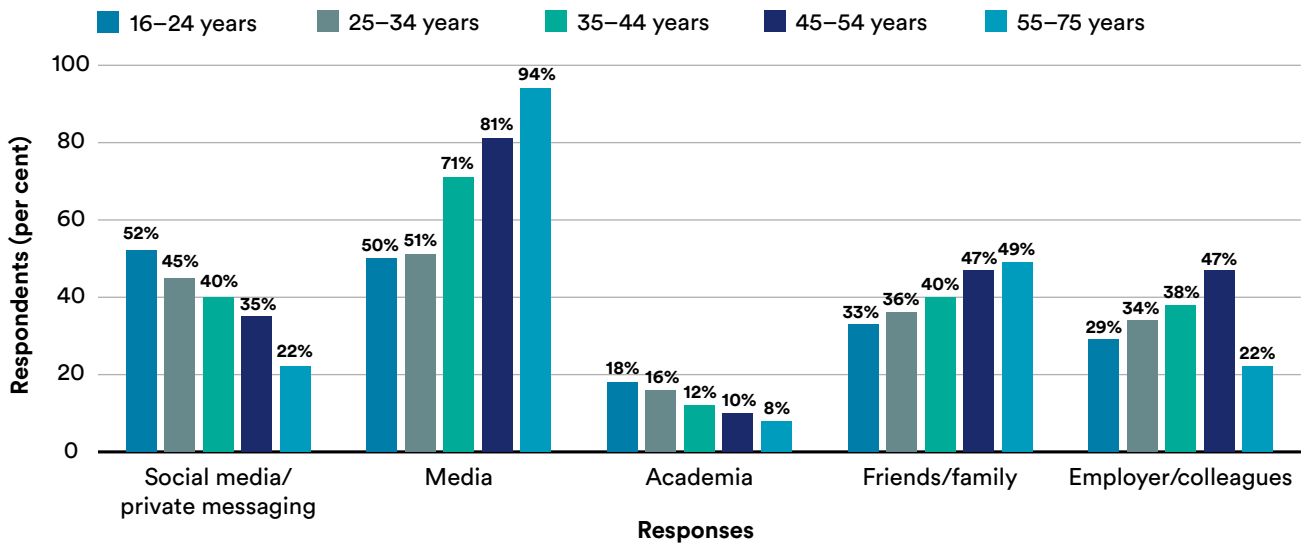

Figure 10 – "In which of the following ways, if any, have you seen, heard or received information about Covid-19?" Base: 1,089 adults aged 16–75 in Great Britain, 1–3 March 2022

As shown in Figure 10, older age groups reported more engagement with government briefings, TV and radio. Younger people, on the other hand, were more likely to report receiving information about Covid-19 through social media (including Facebook and WhatsApp). People who received Covid-19 information from mainstream media (for example, TV, radio) also reported higher levels of concern about new variants of the virus. In turn, higher levels of concern about new variants were positively correlated with higher levels of compliance with health messaging.

Photo by Obi - @pixel7propix on Unsplash

The infodemic of the pandemic

In the era of communication technologies, the internet can have a detrimental effect on the spread of misinformation, conspiracy theories and pseudoscientific therapies that put public health at risk, as observed during the Covid-19 pandemic [6, 7, 8]. The Covid-19 infodemic was attributed to a decrease in trust in official sources of information, which resulted from the lack of understanding of the health threat and measures adopted [9]. Lack of trust in official health message providers may lead to the adoption of alternative behaviours, such as alternative medicine or prayer, as first-line health strategies. This has been particularly observed among ethnic minorities [10, 11].

Social media use in a health crisis

Research showed an increase in psychological distress, anxiety and depression during the Covid-19 pandemic [12, 13, 14]. Although distress is to be expected during a health crisis, research found that social media exposure during the pandemic increased stress and anxiety among users [15, 16]. Along with the spread of misinformation and sensationalist news, social media platforms have also been associated with the promotion of stereotypes and racist rhetoric, particularly during the outbreak of the pandemic when there was a rise in discrimination towards the Chinese community [17, 18].

A factor analysis condensed respondents' preferred sources of information into five main factors, which showed some overlap in preferences.

- Factor 1: traditional media (TV, radio, government briefings and updates, mainstream news, print media, posters and medical professionals)
- Factor 2: interpersonal relationships (friends, family, colleagues)
- Factor 3: academic publications and conferences (this factor can also include podcasts and Twitter)
- Factor 4: social media (WhatsApp, Facebook and Facebook direct messages)
- Factor 5: employers

These groupings offer an insight into the trajectories of Covid-19 messaging and can support the targeting of future public health information according to audience and source. The analysis shows that directing the majority of messages through information channels belonging to the same factor (for example, traditional media) risks missing audiences who mainly rely on channels associated with another factor (for example, social media). These results further highlight the importance of the role of interpersonal relationships in health message reception, as reflected in factors 2 and 4.

Social media influencers (SMIs) are an important social capital that traditional health authorities can use to engage with their audiences [9]. Engagement with SMIs during the pandemic was minimal, with some notable exceptions, including a partnership between the WHO and an Instagram influencer, and a United Nations campaign to warn against the dissemination of misinformation [19].

Correspondances between sources of information and health messaging characteristics

As shown in Table 7, respondents who received Covid-19 information from the different factors also showed different preferences for effective health messaging characteristics.

Preferred characteristics of effective health messaging by Covid-19 information source

Source of Covid-19 information	Characteristics of effective health messaging (in order of preference)
Mainstream news	From a reliable source, accurate, relatable, concise, informative
Interpersonal sources	From a reliable source, accurate, informative
Social media	Encouraging
Academic sources	Encouraging

Table 7 – "In which of the following ways, if any, have you seen, heard or received information about Covid-19?"/"Which of the following, if any, do you think would be most important in making Covid-19 public health messages effective?" Base: 1,089 adults aged 16–75 in Great Britain, 1–3 March 2022

The association between factors and characteristics attributed to effective health messaging, notably the association of interpersonal sources with reliable sources and accuracy, highlights the importance of health literacy among the general public and the need to tackle misunderstanding and misinformation. Wherever possible, it is important to pre-empt where issues may arise with individual interpretation to avoid any potential confusion that may promote the spreading of misinformation.

It is also worth noting that the characteristic of "accurate messaging" has a negative correlation with online behaviours, suggesting that people who share and create online content (factor 4, social media) are not as interested in whether a specific public health message is accurate.

Audience profiling according to health messaging engagement and trust

Audience profiling can help health message providers tailor their communications. Previous research based on (i) people's engagement with health messaging, (ii) people's confidence in official sources, and (iii) people's actions in response to official information has identified six different population groups within the UK who responded differently to the threat posed by the Covid-19 pandemic [20]:

- Individualist risk takers
- Non-information-seeking sceptics
- Information-seeking rule followers
- The complacently confident
- Information-seeking critics
- The experientially risk averse

6. Importance of online behaviours

Online creation and sharing of content (online behaviours) are negatively correlated with age in our survey. In other words, younger people reported creating and sharing more online. Online behaviours also correlate negatively with vaccine uptake, with a medium association. People who create content online reported lower levels of vaccine uptake. To a lesser extent, this is true of people who are sharing content online. Finally, people who are more engaged with online behaviours (that is, they create or share content online) are more likely to say they're medically exempt or "other" when asked about vaccine refusal. There is a medium association here.

> **Amount of information and mode of communication**
>
> One major challenge in information delivery is how to provide the maximum amount of relevant information without overwhelming the public. The optimum level of information will not be consistent across the population, and difficulties in navigating different information types and sources can result in an overwhelmed audience [20], ultimately leading to information disengagement.
>
> The mode of communication can have a direct impact on making the health message more memorable. For example, spoken communication is easier to forget if it is not accompanied by any written information [21].

7. Gathering fast feedback on health message production and reception

Corpus linguistic analysis is an effective way to obtain quick insights into health message production and reception, which can be further expanded or contrasted with findings obtained via other methods. Official communications, such as government speeches, and secondary data produced by the public, such as comments posted below online news articles, can be easily processed by corpus linguistics software. (See Appendix 2 for an overview of common corpus linguistics tools.)

7.1 Health message production – official government health communications

A corpus linguistic analysis of the official health communications of the UK, Scottish and Welsh governments showed convergence in promoting social unity to encourage adherence to guidance, and in presenting vaccination as a first-line preventive strategy. The main linguistic strategies employed to foster social unity included:

- repeated references to the wider population (for example, "we", "our", "UK", "country")
- expressing empathy and support towards the public (for example, "I know people are missing seeing their families")
- evoking shared political and social values (for example, referring to "business" and "economy")

However, strategies to specifically target at-risk populations were less well developed in formal government communications. Where references were made to at-risk populations, these were mainly related to ethnicity, socio-economic background and health-related conditions. References to minority groups and low-income populations were particularly prominent in the Scottish and Welsh communications, especially in contexts outlining the different types of support available. The Scottish and Welsh government speeches referred to the negative consequences of the pandemic for individuals with pre-existing health conditions. Additionally, government updates also focused on the impact of the virus on children and people with disabilities. These references were frequently accompanied by descriptions of the support offered to these groups.

7.2 Health message reception

The corpus linguistic analysis of comments posted below articles in *The Guardian* considered the public reception of the following five health campaigns:

- hands face space
- 1/2/3 metre rule
- the tier system
- stay at home
- the rule of six

The findings reported in this section only relate to readers of *The Guardian* online, so they can't be considered representative of the general population. Nevertheless, they provide valuable insight into potential issues to be addressed in health communication, and some of the results resonate with those observed in the analysis of the open questions from the representative public survey.

Overall, 44% of the 247 comments contained some criticism of public health measures or the leadership delivering the messages and associated guidance. Readers' critical feedback mainly related to:

- **Difficulties in understanding** the health messaging due to exceptions to the rules, legal uncertainty, and changes in messaging
- **Confusing messages** due to incongruity in how the guidance was applied across public and private domains (for example, pubs and restaurants or homes and gardens)
- **Perceptions of patronising and misleading tones** because their reality was more complex than the messaging implied
- **Inflexibility** of the guidance for not taking into consideration exceptional personal circumstances
- **Perceived lack of evidence** for the application of (or changes in) the guidance, causing some readers to feel unsure about why they should follow rules without understanding the specific scientific motivations behind them

Importantly, these criticisms were not only related to the content of public health messaging, but also directed towards the associated guidance, interpretation and delivery of the content. Effectiveness of health messaging was also influenced by readers' frustrations with political leadership due to delayed and changeable responses. In criticising the public health measures, some commenters politicised the pandemic, for example, by ironically adapting campaign slogans to condemn political leadership and decisions. Regional comparisons and unfavourable comparisons between the UK's response to the pandemic and that of other countries also featured in the comments. Explicit criticisms of measures and political leadership, as well as comparisons between nations and countries, increased as the pandemic progressed.

Socio-economic inequalities (class, financial and regional) resulting from, or exacerbated by, the implementation of Covid-19 measures was another point of concern among those commenting. However, despite recognising social inequalities and describing messages as confusing, the readers did not extend lenience to those who did not follow guidance, showing a tendency for social polarisation that intensified over time. Finally, although the majority of comments provided little support for the guidance or leadership, they nonetheless offered recommendations for changes to measures, which increased throughout the pandemic, showing engagement with health messaging and a proactive attitude, thus highlighting the benefits of public engagement in health communications.

Section 2
Recommendations for effective public health messaging

1. A collaborative approach and community-specific engagement

Collaborating with behavioural scientists to develop interventions and associated communications can increase the efficacy of health messaging. Community involvement is essential when faced with fast-spreading health threats such as Covid-19 [23, 24, 25]. Building a partnership with the public is particularly important when it comes to gathering feedback on the effectiveness of individual public health messages and campaigns, especially if partnerships are timely and enduring so as to build trust and resilience [25].

We recommend that the development of public health messaging and campaigns should include an element of large-scale, community-specific engagement to make sure messaging is inclusive and relevant to diverse audiences. Partnerships with the public are also essential to counter the spread of misinformation [26]. Through public partnerships, political and scientific authorities will develop a better understanding of the needs of the public when it comes to health literacies.

Assessing the effectiveness of individual public health messages involves drawing on feedback from a large enough cohort to ensure statistically significant findings and representation. In particular, ways to access communities that have been disproportionately affected by a health threat should be considered and developed as key mechanisms to draw on from the inception of a public health message to the evaluation of its effectiveness. A dynamic, community-focused response will allow health message writers to identify and address challenges to message uptake quickly, and build trust with the public. We have highlighted different ways of doing this in this report, from setting up a Public Involvement Panel (PIP) to running large-scale surveys and analysing linguistic feedback on public health messaging online.

2. Inclusion and recognising diversity

Health messages must be as inclusive as possible in addressing the different audiences and, in particular, at-risk social groups. This can be done through verbal or visual cues in the actual messaging. Since the effects of a health threat may vary across at-risk populations, it is important not to address them as a homogeneous group. Additionally, it is important to acknowledge that people with specific medical conditions might require exemptions to general health measures.

In addressing ethnic populations, it is essential to avoid stereotyping by, for example, ensuring that messages do not just refer to ethnic minorities in terms of religion. Diversity in information-seeking behaviours needs to be recognised – some population groups may seek information from others in their community rather than from public channels.

3. Honesty with the public

Honesty with the public about the threat they are facing is essential. Health measures should provide evidence to show they are informed by scientific knowledge and data. In general, members of the public appear to trust experts more than political authorities, so it is important to formulate official health guidance according to scientific research, and to show the audience that expert opinion is being taken into consideration [27, 28, 29].

Being honest with the public also involves recognising any mistakes in health guidance, for example, due to a lack of sufficient scientific knowledge [30]. In communicating about a new health threat, it is important that the public understands the rapidly evolving nature of scientific research, otherwise changing messages may promote distrust, especially among audiences who show reticence towards official authorities.

Finally, building public trust is an ongoing enterprise. It is essential that health authorities work to build public trust on a day-to-day basis, not just when faced with a major health threat, since then it may be too late to mobilise a rapid public response [25, 31].

4. Empathy and social values

Health messaging should be aligned with the social values of different social communities, particularly when it targets specific groups. However, messages must not appear incongruous. Values of any group should always be reflected accurately.

Empathy makes the messenger and the message seem more trustworthy [25] and should be prioritised over appearing professional. The public responds more positively to messages where there is a clear expression of concern. This means acknowledging the difficulty of the situation as well as the public's anxieties and personal experiences. Finally, expressions of empathy have to be supported by concrete measures of action so that they do not appear disingenuous.

5. Ensuring accessibility and availability

It is vital that health messages are as accessible as possible and widely available. In public health messaging, accessibility is understood to be the ability of individuals to consume and comprehend messages to a point where they are appropriately informed to be able to form responsive behaviours. On the other hand, availability involves the readiness of information to be obtained and consumed. Information has to be spread widely, using different channels and modes such as online and offline printed and audio materials. It must also be clearly signposted, especially when it targets particular groups. However, greater availability should not involve excessive repetition of messages, which can provoke messaging fatigue and have a negative impact on public engagement [32].

To achieve a change in public health-related behaviours, a human-centred design [33] should be applied to the health messaging throughout the development process – at the point when a need is identified, through iterative design phases, during evaluation, and once communications are released for public consumption. Central to the success of health communication for public understanding is addressing the multifaceted nature of accessibility, which involves accounting for:

- the readability of the messages
- adjusting any technical language for a lay person
- the reading age of the target audience
- literacy and health literacy of the public
- cognitively impaired audiences
- second language audiences

Existing resources such as the Accessible Information Standard [34] focus specifically on certain service user groups.

Appendix 1 provides a new resource for public health professionals on how to develop effective, inclusive public health messaging. By considering accessibility in its widest terms and against a backdrop of human-centred design, a strategy is presented for public health messaging that can target, reach and impact on the full, diverse range of intended message recipients.

Appendix 1
Effective public health messaging guidelines for message writers

1. Communicating a health threat

1.1 Be honest about the health threat while empowering the public

Portrayals of a health threat are important for the audience to understand the severity of the problem and their own susceptibility in order to motivate them to take action [21]. Balance portrayals of the severity of the threat with encouraging behaviours that emphasise the benefits of following measures [21, 35] so that:

- The public understands their vulnerability, which will encourage them to take action and follow the health guidance
- The public understands the harmful consequences, physical and social, that may follow from not adhering to the guidance [21]
- The public feels that following the health guidance will effectively improve the situation, providing them with a sense of self-control over the health threat [21]

Example

Figure 11 – Public Health England "Have your Covid-19 vaccines!"

This message was used to promote Covid-19 vaccination among pregnant women during the pandemic. The text-based message explicitly describes the danger of refusing vaccination (the virus can be a risk for pregnancy) while the image portrays the benefits of adhering to the guidance.

To be avoided

Promoting fear

Behaviour towards a common good is affected by threat perception [36, 37]. However, different groups respond differently to fear appeals – while they may be effective for older adult populations, they do not tend to provoke positive outcomes among young adults [35]. Our survey results also reflected a tendency to stigmatise non-compliant individuals among respondents who showed support for messaging based on fear appeals. Audiences who are highly involved in health messaging respond well to loss frames that portray the health threat in terms of its costs and promote preventive actions, but the effect of these messages may be reversed in audiences who show poor engagement with health communication. We suggest that if fear appeals are employed, the following points should be considered:

■ Provide a rationale for the health threat and public vulnerability in order to increase the credibility of the messaging

■ Avoid evoking negative attitudes among the public, such as perceptions of scaremongering or the use of fear tactics, which can trigger resistance to the guidance

Example

Figure 12 – HM Government / NHS "We're all at risk"

This message aimed to raise awareness of vulnerability among the general population. It generated polarised responses from our survey respondents, with some of them applauding the message (21 respondents) and others expressing strong rejection, criticising the perceived intention to scare the public and describing it as "scaremongering" (23 respondents).

The following issues may have led to the negative responses:

■ **Not providing a clear explanation of the risk –** an alternative message alluding to the lack of immunity of the population might have worked better because it implies risk but also gives the reason why the public is vulnerable

■ **Lack of coherence between the slogan and the image –** "stay home" appears incongruous with the image of people outside their homes, which reflects the guidance of a social distancing campaign

■ **Communication noise –** although this message is not moralising and does not evoke particularly strong emotions of fear, by the time the public was exposed to it they had consumed a great quantity of information that was overtly moralising and explicitly evoked fear, together with intense news media reporting. It is important to consider how a particular message may be perceived in relation to the information the public has been exposed to previously, and how this can affect their reception of the new message

1.2 Make the message personal

- Emphasising the negative consequences that the threat poses for relatives or close friends can make messages more persuasive, especially for people who are more community oriented[3] [35]. These messages may also induce less fear than messages emphasising the negative physical consequences for the individual [35]. According to our survey, messaging that references family and the individual generates the highest levels of self-reported compliance

- Emotional messages tend to be more persuasive than non-emotional ones [35]

- Testimonials increase engagement with messages and the healthy behaviours promoted [11], particularly among individuals who are not highly involved in health communication [35]. Including real examples that provide concrete information is a good way to illustrate how the health threat may affect the public [38]

- When presenting guidance and showing support, it may help to engage in direct dialogues with readers, such as through directives and first and second person pronouns (we, you). Explicit addresses to the public help to engage them in written health messaging [38]

Example

These messages show the potential dangers of Covid-19 by highlighting the negative consequences it could have for loved ones. Combining text-based messages about the health risk with images portraying different social relationships effectively emphasises that everyone is at risk of contracting the virus.

Providing some brief information about the symptoms to look out for would make the messages clearer.

Figure 13 – HM Government / NHS "Anyone can get it"

Figure 14 – HM Government / NHS "Don't guess, get a test"

3 Cultures can be characterised, in broad terms, as being prone to collective or individualistic attitudes, depending on whether they prioritise independence, freedom and individual goals or group interdependence and solidarity. Health communication focused on relational obligations towards kinship, friends and the social group will be more effective for collective cultures, whereas focusing on individual risks and the self can have better results among individualistic cultures [39].

1.3 Provide illustrative comparisons

Making comparisons with other illnesses or risks already known to the public makes it easier to understand the new health threat and its severity [40].

Example

This message compares the Covid-19 virus with smoke particles, something the public is familiar with. Mixing verbal and visual modes is also a good way to make the message easier to understand. In this poster, the text-based message includes an explicit comparison between the virus and smoke, which is also represented in the image, with viral particles forming a smoke cloud. The image helps to illustrate and emphasise the dangers of not following the measure of opening windows.

Figure 15 – HM Government / NHS "Stop Covid-19 hanging around"

To be avoided

Comparisons that can lead to misappraisals of the health threat

Although comparisons can be useful to help the public understand a new health threat, care should be taken to ensure they do not minimise the potential dangers. There is a risk of promoting misunderstandings and triggering resistance to guidance.

1.4 Employ productive metaphors

Metaphors can be helpful resources to portray and explain a health threat and evoke specific reactions among the population. However, some metaphors are more empowering than others.

A particularly productive metaphor to represent a health threat such as a pandemic is the fire metaphor ('the health threat is a big fire', 'we are all firefighters of a big fire') [41].

Fire metaphors evoke the urgency of action, but also facilitate portrayals of the health workers (firefighters), the different phases of the pandemic (stages of a fire) and the inequalities triggered by the health threat (some people will be more affected by the consequences of a fire than others).

Fire metaphors are also accessible because everyone understands the associated danger/risk of fire.

Example

The use of the fire metaphor can be seen in this quote [42]:

Think of Covid-19 as a fire burning in a forest. All of us are trees. The R0 is the wind speed. The higher it is, the faster the fire tears through the forest. But just like a forest fire, Covid-19 needs fuel to keep going. We're the fuel.

To be avoided

Metaphors that can disempower the public – losing battles and being defeated

Some popular metaphors may not be an effective way to communicate a health threat or may only be appropriate during specific stages of a health campaign. Portrayals of health threats in terms of war ('we are fighting the health threat') are often used in health communication and proliferated in Covid-19 messaging [43, 44, 45, 46, 47].

While war metaphors can promote awareness of the severity of the situation and social unity in the early stages ('we are all together in this fight'), and are occasionally even reported to evoke positive emotions and social cooperation [48], they can disempower the audience, particularly sufferers and their family members (sufferers are losing a battle). Notably:

- War metaphors can evoke negative emotions, leading to fear, prompting panicked responses and promoting fatalistic attitudes, which may prevent people from engaging in positive health behaviours, and increase feelings of guilt among sufferers [41, 49]. Such portrayals can also trigger the stigmatisation of people who do not follow the measures [44, 45]

War metaphors have also been associated with populist discourses [50].

2. Engaging with the public and building unity

2.1 Promote inclusivity

Public togetherness, or unity against a health threat, is essential for persuading people to act in the interests of a common good [51, 52, 53].

- Address the public as being part of the same team or group (for example, "*we* must act")
- When speaking to a multicultural audience, include different social groups and religions in your message so everyone can identify with the information [54, 55], otherwise message providers risk being perceived as only addressing the dominant group

Example

These NHS posters below are good examples of an inclusive strategy, advising the public to enjoy Iftar safely and practise nightly Taraweeh prayer at home. This messaging effectively reflects religious commitments among Muslims. Remember, though, that ethnic minorities are diverse and this should be reflected in the messaging. Make sure that different ethnic minorities are not only represented in relation to religion, with health messaging that reflects social values instead.

Figure 16 – NHS "Enjoy Iftar safely"

Figure 17 – NHS "Nightly Taraweeh prayer at home"

2.2 Acknowledge social and individual differences

Promoting social togetherness should come with an acknowledgement of the individual differences of the public, which include socio-economic factors and cultural background, ethnicity and religion, underlying health conditions and disabilities.

- Showing awareness of differences and acknowledging a range of abilities to follow rules is essential for all audiences to feel represented in health messaging and achieving social unity [53, 56].
- While recognising differences, the message needs to target all social groups and promote the need for collective action. Targeting particular groups exclusively could risk marginalisation, stereotyping and stigmatisation [57].

Research in health communication has observed that lower socio-economic levels negatively impact health behaviour, putting deprived communities more at risk [58, 59, 60, 61, 62, 63, 64, 65]. In the context of the Covid-19 pandemic, the risk of loss of income and multigenerational households have had a detrimental impact on compliance with preventive measures [58, 66].

Example

This message shows understanding of the constraints experienced by the essential workers who could not self-isolate during the Covid-19 lockdown.

Figure 18 – HM Government / NHS "Work from home if you can"

To be avoided

Promoting a false identity

- If socio-political divisions are not considered, it can affect the public's perception of unity in health messages
- Recognise any national divisions and socio-economic differences that may make it difficult for disadvantaged groups to adhere to the prescribed measures

Lack of consistency across the different nations

- The different UK health agencies need to be consistent in communicating facts about the health threat, even if the nations adopt different measures depending on the approach taken by their respective governments

2.3 Acknowledge different social values

Aligning the messaging with different social values shows that social differences are well recognised, making health communication more effective [67].

In targeting multiple and varied audiences, messages should be congruent with cultural values. For example, while gain-framed messages are appropriate for individualistic cultures, prevention should be the focus for community-oriented groups, such as East-Asian communities [39, 59].

To be avoided

Appearing incongruous

If you are appealing to social and political values, make sure you have selected the appropriate values [40]. For instance, the members of our Public Involvement Panel (PIP) who celebrated Eid al-Fitr commented that the example below did not reflect their lived experiences because the food, family unit and dress depicted was inappropriate or unexpected and therefore the messaging was less effective. They also criticised the poster because of stereotypes relating to women in the kitchen and being overly focused on food. Crucially, some PIP members interpreted the message to mean that they should invite people to their house to celebrate rather than go out to celebrate when the intended message was that people should stay in their respective family homes.

Figure 19 – NHS "Celebrate Eid at home"

2.4 Talk to members of the public

- Consult the individual communities that are disproportionately affected by the threat at each stage of the message construction [68]
- Include the voices of ordinary people in your messages to show you are in touch with public concerns, for example, through testimonials [11]. Setting up a Public Involvement Panel (PIP) can support the development of effective targeted messaging and campaign evaluation
- Collaborations with organisations, lay educators and respected members of religious groups from targeted communities [68, 69] can help increase trust in health communications. Health messages can be made more relatable by including the logo of a trusted organisation in the message, and organisations can increase the availability of the message by helping to circulate it among their members
- Working with community partners will make it easier to talk to communities who do not trust the government or are disadvantaged [68, 70, 71]

2.5 Acknowledge audience diversity

Acknowledging audience diversity and tailoring messages accordingly is key for effective health communications. To demonstrate recognition of diversity, it is important to make explicit references to different minority groups and at-risk populations [53, 56] with health messaging that shows:

- **Inclusivity and alignment**
  Explicitly address minority groups and at-risk communities as part of the audience. References may be made via using text or images. Not referring to minority groups can promote disengagement within these communities, leading to lower adherence to health measures

- **Acknowledgment of different abilities to follow guidance**
  For example, it may be the case that people with specific medical conditions cannot follow a general health measure and require exemptions or allowances. During the Covid-19 pandemic, the Welsh Government updates were particularly good at acknowledging this

- **Awareness of different impacts of the health threat**
  Some populations may be more affected than others, either because of prevalent clinical conditions and health needs or poor socio-economic factors that may have a detrimental impact on an individual's general health and access to healthcare services

- **Efforts to tackle the challenges faced by different groups**
  For example, by mentioning exemptions or the services put in place to support disadvantaged communities

To be avoided

Evoking stereotypes

Mentioning minority groups only to depict them in relation to risks or dangers, even if these are more significant for a specific group, may foster negative stereotypes associated with the community.

Example

Making official statements highlighting vaccine hesitancy among specific groups can promote negative portrayals of the community in question, cause scapegoating, jeopardise social cohesion and, ultimately, prevent adherence to health measures. However, visual cues can be an effective way to portray a group.

Figure 20 – HM Government / NHS "Join the millions already vaccinated"

Forced inclusivity

Respondents to the pilot survey articulated frustration at what they perceived to be pictures/messages with a representation of many different ethnic minorities at the centre. This suggests that diversity for diversity's sake will be perceived as tokenism and can be counterproductive.

Example

This vaccination campaign aims at being inclusive, portraying an audience of different cultural backgrounds. However, pilot survey respondents raised concerns about what may appear to be forced inclusivity, relying on depicting a member of each ethnic community to evoke diversity.

Figure 21 – Public Health England / NHS "You can have the vaccine during Ramadan"

2.6 Promote personal responsibility

Moderate references to personal responsibility promote higher public engagement and can make the message more effective [72, 73].

- Make direct references to the public's ability to take action ("we can", "we must")
- Recommend specific actions to give the public some sense of control [25]
- Focus on the benefits that will be obtained from adhering to guidance, not the negative consequences that will follow from non-compliance
- Ensure that the actions appear well-justified
- Ensure the message is informative but not judgemental

Example

When asked about their understanding of this message, survey respondents evaluated the poster and message as sensible and informative. Respondents also self-reported high levels of compliance with the proposed measures.

Figure 22 – NHS "Do your bit"

To be avoided

Disempowering the public by provoking anxiety or fear

Over-emphasising public responsibility can increase anxiety and distress, especially in cases where someone is in a disadvantaged position with regards to proposed measures (for example where people were unable to work from home during the Covid-19 lockdowns) [74]. When stressors are not under an individual's control, inducing fear may also promote fatalistic attitudes and beliefs [74].

Example

These two messages have the same headline ("act like you've got it") but they could evoke very different attitudes from the public. The one on the right is likely to evoke feelings of anxiety among those who identify with the image because they associate the virus with hospitalisation. Messages that promote responsibility without triggering negative emotions and fear may work better in this context.

Figure 23 – NHS "Act like you've got it" message 1

Figure 24 – NHS "Act like you've got it" message 2

To be avoided

Promoting guilt as a means for measure adherence

Messages that evoke a strong sense of guilt must be avoided [75]. Survey research on moralising messages used during the Covid-19 pandemic showed that they can be highly counterproductive because:

- They cause strong negative reactions. Highly moralising messages were repeatedly described as scaremongering, propaganda, manipulative, scare tactics and shaming/guilting people into adhering to guidance. These negative attitudes may have a ripple effect on the public's perception of other health messages
- They have a direct negative impact on the public's wellbeing, causing anxiety and fear. This is particularly the case for those who have close relatives or close friends affected by the illness

Example

Special care should be taken over the presentation of moralising messages such as the one on the right. In particular, messages should:

- Provide factual information and not rely on the audience's interpretation. This message relies on the inference that the woman depicted is suffering from Covid-19, the focus of the health campaign.
- However, people who are resistant to adhering to guidance are more likely to show active opposition to this inference and find alternative explanations for the scenario
- Provide practical guidance for action. This message illustrates the negative consequences of contracting the virus, but no constructive advice is provided regarding the actions to be taken. This can contribute to negative judgement of the communication as being impressionistic but not practical
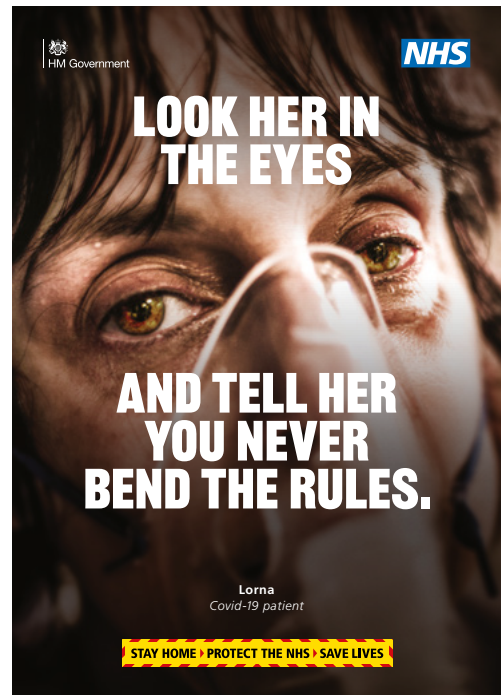

Figure 25 – NHS "Look her in the eyes"

3. Message accessibility

3.1 Use transparent language

Low literacy levels can prevent comprehension of health communications and access to health support [76], as well as adherence to health guidance. Health messaging must be easy to understand for a diverse audience with different language and literacy abilities. Language free from jargon and vague, abstract or technical terms helps the public understand the messaging better [21, 36].

- Latin and Greek scientific terminology is common in medicine but it may make the message more difficult to understand for people with lower health literacy. Provide an English term if it's available, or both the Latin/Greek and English versions
- If the situation requires the use of technical terminology, provide a brief explanation of the concept

Example

This message includes a reference to the R number. It provides a definition of the concept, which is good, but larger fonts and an explanation that includes a definition of the word "rate" would improve clarity (for example, "number of people that someone with the virus can infect").
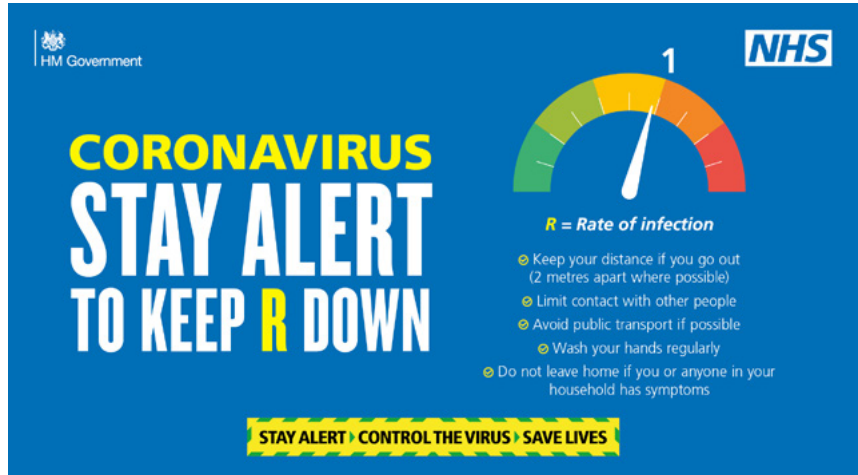

Figure 26 – NHS "Stay alert"

Example

This message urges the public to stay at home by evoking self-responsibility ("play your part") and presenting a clear benefit by appealing to the values of the social community ("protect your friends and family"). That said, it may not be clear for all members of the public what "self-isolate" entails. A brief explanation could prevent potential misunderstandings.

Figure 27 – NHS "Self-isolate when alerted"

3.2 Prioritise brevity

Brevity helps to make messages more understandable and keep the audience interested [21, 36]. Avoid verbosity, both in written and spoken messages.

Example

This message is minimalistic, but very clear. Indicating the distance would have been a good reminder for people less familiar with the measures. Likewise, some explanation about how fresh air can be obtained (for example, opening the windows) would make the guidance more explicit.

Figure 28 – "Hands Face Space Fresh Air"

Example

These two messages convey the same information – whenever possible, you should work from home. The wording of the message on the left is less complex than the one on the right.

Figure 30 – HM Government "Work from home" message 2

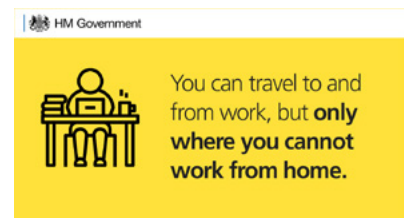*Figure 29 – NHS "Work from home" message 1*

3.3 Provide specific actions and outcomes

Descriptions of the measures to be taken should be accompanied by clear depictions of the anticipated outcomes. Care should be taken not to appear overly optimistic or create false expectations because this could lead to a lack of trust if these expectations are not met.

Example

This message clearly presents actions to be taken and the rationale for following these measures. However, it could give the false impression that staying 2 metres apart is enough to prevent contagion on its own.

Figure 31 – HM Government "Save lives now"

3.4 Be consistent and give a clear explanation of any changes to the guidance

It is important to show that decisions are informed and consistent with expert knowledge [27, 28, 29]. When scientific development suggests that changes in public health guidance are needed, these changes must be explicitly stated and justified to preserve the public's trust [77]. Explaining the new measures and the rationale for change in a simple way will ensure that:

- The public can follow the new guidance effectively
- The public has a good understanding of the rationale that motivated the change and does not lose trust in official authorities

To be avoided

Being vague

Caution should be taken in reducing technical language because this can compromise clarity and accuracy or may make the message appear too vague.

For example, while statements such as "we will continue to drive this virus down" show assertiveness and make a promise to the public, if the actions being taken are not sufficiently explained, feelings of uncertainty regarding the actual measures may arise.

Ambiguous visuals

Using animations, audio files and graphical aids makes the message more understandable for low literacy groups. Images also help to make the message more memorable. If the visuals are not clear enough, though, they may create confusion among the audience.

Example

This message urges the public to wash their hands and the justification for the guidance is supported by an image. However, it may not be clear for all members of the public that the image is representing a door handle with virus particles on it. Explicit pictures or cartoons of a virus on the door handle could have helped to make the message more obvious.

Figure 32 – HM Government / NHS "Wash your hands"

To be avoided

Ambiguous metaphors

Metaphors help to make the message more accessible, and new and creative metaphors can make the message more memorable (for example, the fire metaphors on page 24). When using a metaphor as part of a health campaign addressing multilingual audiences, it is important to consider any difficulties that second language speakers may have with understanding the metaphor's meaning. Combining verbal and visual modes can help to illustrate the meaning (for example, the smoke metaphor on page 23).

Example

While the bubble metaphor might not be clear for all members of the public, the accompanying visual of a snow globe containing three houses to represent the Christmas bubble helps to illustrate the meaning.

Figure 33 – HM Government / NHS "Christmas bubble"

3.5 Be aware of important nuances in expressing obligation

- **Obligation or recommendation?**
  Make explicit what is a measure that the public must adhere to and what is a recommendation that the public may decide to follow [37, 78]. Do not leave it up to the audience's interpretation
- **Slogans are not instructions**
  While slogans can be a useful aide memoir (for example, "Hands, Face, Space"), they should not be the sole source of instruction because they may not always be perceived as providing guidance
- **Expressing obligation**
  Our survey results show that messages that appeal to personal responsibility achieve greater acceptance if they use medium expressions of obligation. For example, survey respondents self-reported higher levels of compliance for the message "you should wear a face covering" than its counterpart "you must wear a face covering"
- **Avoid the imperative**
  Our survey respondents also favoured messages that formulated guidance in declaratives (statements) over messages expressed as imperatives. For example, the message "staying at home saves lives" (declarative) had higher levels of self-reported compliance than "stay at home, save lives" (imperative)

3.6 Use translations and accessible material

Language barriers can hinder effective health communication [79, 80]. When messages are targeting a specific cultural group that does not share the same first language with the main social group, consider:

- Translating the message into different languages [81] to ensure that the target audience understands the information and perceives it as being relevant to them

- Providing visual support and audio files to make the information more accessible. However, it is important to combine written and spoken communications because spoken communication alone tends to be easier to forget [21]

According to the UK census (2011), the ethnic communities with the lowest English language skills are:

- the Asian Bangladeshi community, with 13.2% of people who could not speak English well and 3% who could not speak it at all

- the Asian Chinese community, with 13% of people who could not speak English well and 2.3% who could not speak it at all

- the Arab community, with 8.9% of people who could not speak English well and 1.8% who could not speak it at all

See UK.GOV "English language skills" (7 February 2018) Available at: **https://www.ethnicity-facts-figures.service.gov.uk/uk-population-by-ethnicity/demographics/english-language-skills/latest**

Example

This vaccination campaign targets a particular community, and it has included a translation into Arabic to bring the message closer to its audience. Using translations is productive because it helps to make the message relatable and accessible for the target community (although it is important to establish what percentage of the target audience can read the translation). To make the message more effective, members of our Public Involvement Panel (PIP) identified some areas for improvement:

- Translate the health information into different languages, rather than just part of the message

- Keep the message brief, otherwise it appears too cluttered and may lose its focus

- Ensure coherence between text and image – while the health measure specifies that people should keep 2 metres apart, everyone appears close together in the picture

Figure 34 – Public Health England / NHS "You can have the vaccine during Ramadan"

3.7 Use statistics

Including statistics in communications about a health threat can help the public gain a better understanding of the risk and perceive the information as being objective. However, a large part of the population finds it difficult to understand numerical information [21]. Some things to consider [40]:

■ Providing absolute numbers when reporting risks helps to minimise misinterpretations

■ Interpreting percentages can be difficult when absolute numbers are not also provided. For example, commenting on the 20% increase or decrease in a disease does not reveal much if the public does not know whether the disease affects 1 in 1,000 individuals or 1 in 100,000 individuals

■ It can be helpful to make comparisons with known risks if relevant comparisons are available

■ People tend to assume causal relationships. It should be made clear for the public that a statistical association does not entail causality. For example, avoid reports such as "hair dye *causes* cancer" if statistics have reported that high regular exposure to hair dye and other chemicals are associated with cancer. It is worth pre-empting cases where there is a risk of drawing causal inferences and make it clear for the audience that the figures report an association only

■ Include data visualisations to make numerical information easier to understand [38]

Numerical information was central in Covid-19 communications, especially during the first stages [82]. Using numbers helped to represent the health threat, presenting the fatalities and portraying the threat as dynamic, increasing and decreasing in impact with the measures that were implemented. Numerical information helped to present the measures as necessary, legitimate and effective, and the Government as reliable [82]
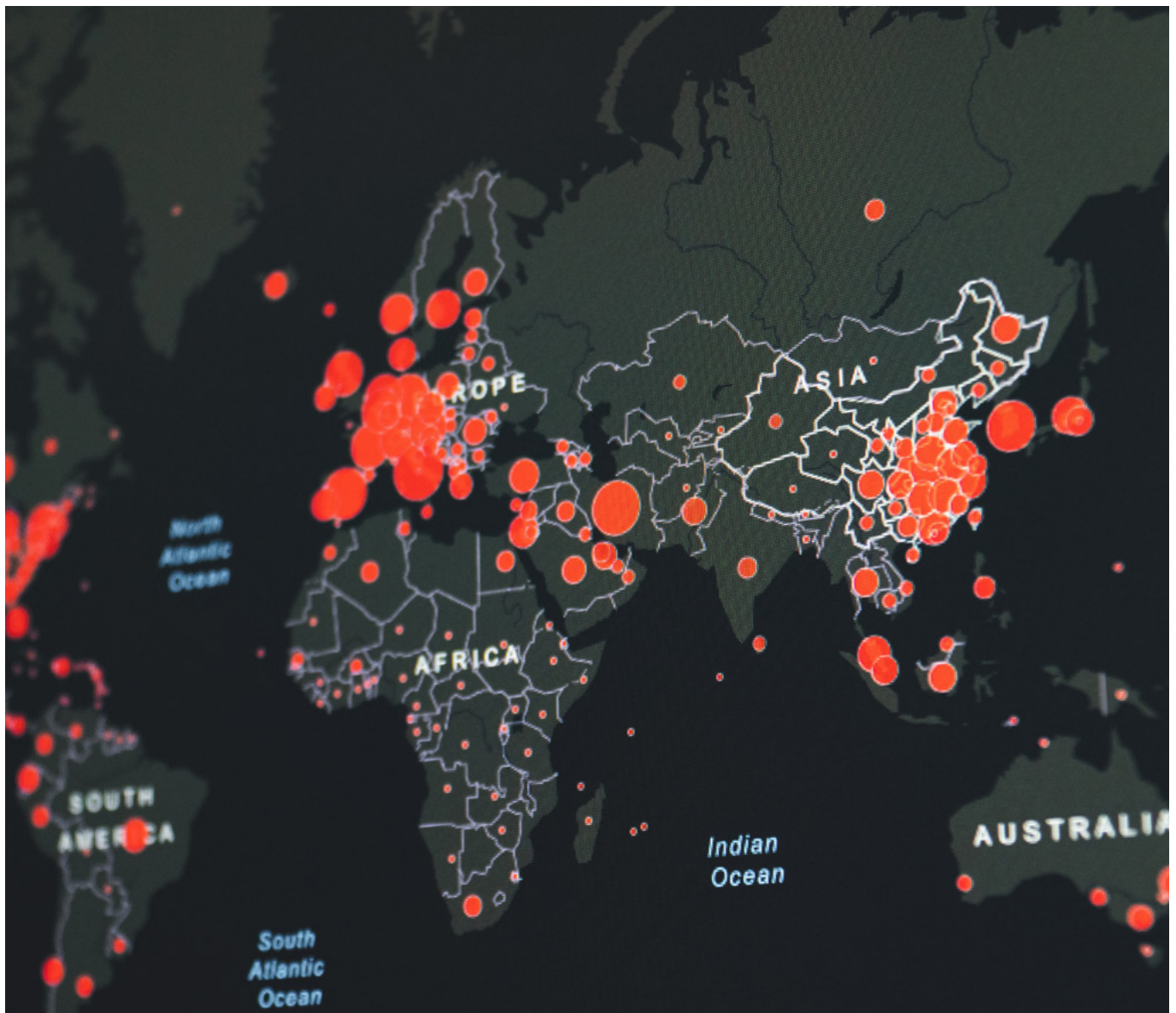

Photo by Martin Sanchez on Unsplash

Appendix 2
Methods for research on effective health communication and public health message writing

This section provides an overview of some of the methods we have used in the Coronavirus Discourses project that can be replicated to benefit future public health messaging during disease outbreaks.

Facilitating a Public Involvement Panel (PIP)

Collaborating with representatives from the public is a valuable strategy to gain understanding of different social concerns, identifying potential communication barriers and building trust with different communities [83]. Researchers have developed comprehensive frameworks for how to increase public participation in health communication research and ensure the inclusion of different social communities.

Some relevant resources are:

- Osmanlliu and colleagues' Patient and Public Involvement model [83]
- Farooqi and colleagues' toolkit for the inclusion of ethnic minorities in health and social care [84]
- Greenhalgh and colleagues' framework to promote public involvement in research [85]
- The public involvement guidelines facilitated by the National Institute for Health and Care Research (NIHR) [86]

In Figure 35, we provide a brief overview of the key steps to set up a Public Involvement Panel (PIP), which is an effective way to get the audience involved.

Working with a Public Involvement Panel (PIP)

1 Recruitment
Recruitment advertisements should inform about the project, including special characteristics of the PIP (for example, demographics, interests), types of activities the PIP may be involved in, and what level of commitment (example, time, location) is needed.

2 Canvas for support and advice
Recruitment typically involves approaching several sources, such as local radio and television, local, regional and national voluntary and support organisations, organisational online magazines and newsletters, local voluntary services bureaux and personal contacts.

3 Engaging PIP members
Keeping regular contact with PIP members helps to maintain their engagement with the PIP. Make sure that the members know their role by circulating terms of reference that reflect the PIP members' functions.

4 Keeping participants motivated
Ensure that PIP members feel rewarded. Provide timely feedback and gratitude to the participants, particularly to those who show higher levels of commitment.

5 Planning for attrition
In long projects, drop-outs are to be expected. Recruit as many PIP members as possible, within a range that allows the group to function effectively in meetings. Maintain effective, regular engagement with PIP members throughout their period of involvement.

6 Data processing
PIP members' contributions must be processed in line with current data protection legislation.

7 Celebrating accomplishments
Acknowledge PIP members' contributions in your work.

Figure 35

For the Coronavirus Discourses project, our Public Involvement Panel (PIP) provided feedback that helped improve and refine the research design. Members of the PIP helped us to understand regular sources of health information, guided the wording of the survey questions, provided feedback on specific health messages during the survey design, and contributed to the design of particular questions on effective health communication.

Corpus tools for non-linguists

Corpus Linguistics involves the study of language patterns in large bodies of digitised texts (a corpus / corpora). Below we present three commonly used tools to identify patterns in language use. These methods can also be used by health communication professionals not trained in linguistics.

Frequency analysis

Frequency analysis makes it possible to determine how many times a particular word, such as "stay" or "home", appears within or across the public health messages included in the corpus. It provides a simple word list with the number of occurrences of each word. This can help to identify which words or phrases are likely to be encountered most often by the audience. Frequency analysis can be conducted automatically using corpus linguistic software. Some example tools include AntConc, #LancsBox, SketchEngine or Wordsmith Tools.

Keyword analysis

A keywords analysis reveals words that appear statistically more saliently in a focus corpus (for example, a corpus of newspaper articles about vaccine uptake) than in a reference corpus, which is usually very large and represents language use more generally (for example, all newspaper articles over a given time period). Analysing keywords can reveal which words or phrases are most salient in your corpus. We used keyword analysis to help us identify differences in the way that the different UK governments spoke to their audiences about Covid-19. For example, we looked at keywords in the UK government's public health messaging about Covid-19 in order to find what distinguished Boris Johnson's speeches from typical spoken English. In the top 50 keywords, we found references to:

Coronavirus and healthcare	Preventative measures
NHS, virus, coronavirus, disease, covid, symptoms, [clinically] vulnerable, spread, cases, peak	measures, testing, vaccine, protect, test(s), restrictions, distancing, alert, advice, rules, set out [rules] lockdown

Economy	Education
businesses, local [businesses]	schools

Collocations

Collocations are words that go together with a frequency greater than chance (for example, "stay" and "home" co-occur in the public health message "stay at home"). Examining collocations can help you to identify key phrases in health messaging. For example, we used collocation analysis to find that, in his public addresses about Covid-19, Boris Johnson used the word "British" alongside the words "people" and "public" to construct national unity. Similarly, our analysis revealed that Boris Johnson frequently used "will" in the company of "we" and "I" (for example, "we will move to step two of our roadmap") to construct a sense of certainty. Collocation analysis can also reveal the evaluation attached to a particular word, helping you to understand whether something is perceived positively or negatively. For example, the word "substance" appears to be neutral, but it often co-occurs with words like "harmful" and "toxic", so it takes on a negative meaning from its context.

Concordances

Concordance lines, or keywords in context (KWIC), are lines of text from your corpus with your searched term in the middle. They provide the context surrounding the particular word or phrase you are interested in. For example, if we search for the word "vulnerability" in a sample of 158 Covid-19 briefings by the UK government delivered during the pandemic, we can see concordance lines like:

Figure 36 – KWIC visualisation from Sketch Engine

Concordances allow you to see how the word you are interested in is being used across longer stretches of text and by different people and groups.

Visualisations

Corpus linguistics researchers have started to create visualisations of the use of language related to the Covid pandemic on Twitter. This allows us to detect time sensitive changes in language around major milestones and events during the pandemic [87].

Extracting and analysing linguistic data in a way that preserves privacy

In a world of pervasive and ubiquitous computing, there are growing opportunities for technology to have a role in the extraction and analysis of language in use. Internet users' data provides useful insights about message reception, public health concerns, values and interests that can be processed in order to tailor health messaging and campaigns more effectively. However, methods of data extraction such as web crawling and mass surveillance of online conversations raise serious legal and ethical concerns about privacy rights and extracting data provided by unaware participants. The General Data Protection Regulation (GDPR) stresses the importance of transparency in data processing, as well as data minimisation and storage limitations.

To respond to these concerns, we have developed a prototype tool to extract patterns in language reception and production data in line with the privacy preserving regulations. Updates on the tool are published on our project website (**https://c19comms.wp.horizon.ac.uk/pripa/**) The tool works as a plug-in that research participants can install in any Chrome based web browser. For a given use, the plug-in only extracts data about specified keywords from a defined list of websites, and users have full control of what, if anything, is submitted – they can check their data and delete anything they do not want to share. Widespread adoption of tools like this will ensure that linguistic analysis can be applied quickly and at scale to understand the reaction of different communities to future health threats.

References

[1] Riskind, J. H. (1997). Looming vulnerability to threat: A cognitive paradigm for anxiety. *Behaviour Research and Therapy*, *35*(8), 685–702.

[2] Riskind, J. H., Abreu, K., Strauss, M. & Holt, R. (1997). Looming vulnerability to spreading contamination in subclinical OCD. *Behaviour Research and Therapy*, *35*(5), 405–414.

[3] Riskind, J. H. & Calvete, E. (2020). Anxiety and the dynamic self as defined by the prospection and mental simulation of looming future threats. *Journal of Personality*, *88*(1), 31–44.

[4] Adam, M., Bärnighausen, T., & McMahon, S. A. (2020). Design for extreme scalability: A wordless, globally scalable COVID-19 prevention animation for rapid public health communication. *Journal of Global Health*, *10*(1).

[5] Dubé, L., & Morgan, M. S. (1996). Trend effects and gender differences in retrospective judgments of consumption emotions. *Journal of Consumer Research*, *23*(2), 156–162.

[6] Naeem, S. B., Bhatti, R., & Khan, A. (2021). An exploration of how fake news is taking over social media and putting public health at risk. *Health Information & Libraries Journal*, *38*(2), 143–149.

[7] Tahmasbi, F., Schild, L., Ling, C., Blackburn, J., Stringhini, G., Zhang, Y., & Zannettou, S. (2021, April). "Go eat a bat, Chang!": On the Emergence of Sinophobic Behavior on Web Communities in the Face of COVID-19. In *Proceedings of the web conference 2021* (pp. 1122–1133).

[8] United Nations. (2020). *UN Tackles "Infodemic" of misinformation and cybercrime in COVID-19 Crisis*. United Nations. **https://www. un.org/en/un-coronavirus-communications-team/un-tackling-%E2%80%98infodemic%E2%80%99-misinformation-and-cybercrime-covid-19**

[9] Archer, C., Wolf, K., & Nalloor, J. (2021). Capitalising on chaos—exploring the impact and future of social media influencer engagement during the early stages of a global pandemic. *Media International Australia*, *178*(1), 106–113.

[10] Patel, N. R., Chew-Graham, C., Bundy, C., Kennedy, A., Blickem, C., & Reeves, D. (2015). Illness beliefs and the sociocultural context of diabetes self-management in British South Asians: a mixed methods study. *BMC-Family Practice*, *16*(1), 1–12.

[11] Williams, E. D., Whitaker, K. L., Piano, M., & Marlow, L. A. (2019). Ethnic differences in barriers to symptomatic presentation in primary care: A survey of women in England. *Psycho-Oncology*, *28*(12), 2336–2343.

[12] Duan, L., & Zhu, G. (2020). Psychological interventions for people affected by the COVID-19 epidemic. *The Lancet Psychiatry*, *7*(4), 300–302.

[13] Lima, C. K. T., de Medeiros Carvalho, P. M., Lima, I. D. A. A. S., de Oliveira Nunes, J. V. A., Saraiva, J. S., de Souza, R. I., da Silva, C.G.L., & Neto, M. L. R. (2020). The emotional impact of Coronavirus 2019-nCoV (new Coronavirus disease). *Psychiatry Research*, *287*, 112915.

[14] Van Bavel, J. J., Baicker, K., Boggio, P. S., Capraro, V., Cichocka, A., Cikara, M., Crockett, M. J., Crum, A. J., Douglas, K. M., Druckman, J. N., Drury, J., Dube, O., Ellemers, N., Finkel, E. J., Fowler, J. H., Gelfand, M., Han, S., Haslam, S. A., Jetten, J., Kitayama, S., Mobbs, D., Napper, L.E., Pennycook, G., Peters, E., Petty, R.E., Rand, D.G., Reicher, S. D., Schnall, S., Shariff, A., Skitka, L. J., Smith, S.S., Sunstein, C.R., Tabri, N., Tucker, J.A., van der Linden, S., van Lange, P., Weeden, K.A., Wohl, M.J.A., Zaki, J., Zion, S.R & Willer, R. (2020). Using social and behavioural science to support COVID-19 pandemic response. *Nature Human Behaviour*, *4*(5), 460–471.

[15] Gao, J., Zheng, P., Jia, Y., Chen, H., Mao, Y., Chen, S., Wang, Y., Fu, H. and Dai, J. (2020). Mental health problems and social media exposure during COVID-19 outbreak. *PloS ONE*, *15*(4), 1–10.

[16] Holmes, E.A., O'Connor, R.C., Perry, V.H., Tracey, I., Wessely, S., Arseneault, L., Ballard, C., Christensen, H., Silver, R., Everall, I., Ford, T., John, A., Kabir, T., King, K., Madan, I., Michie, S., Przybylski, A. K., Shafran, R., Sweeney, A., Worthman, C. M., Yardley, L., Cowan, K., Cope, C., Hotopf, M, & Bullmore, E. (2020). Multidisciplinary research priorities for the COVID-19 pandemic: a call for action for mental health science. *The Lancet Psychiatry*, *7*(6), 547–560.

[17] Pei, X., & Mehta, D. (2020). #Coronavirus or #Chinesevirus?!: Understanding the negative sentiment reflected in Tweets with racist hashtags across the development of COVID-19. arXiv:2005.08224

[18] Wen, J., Aston, J., Liu, X., & Ying, T. (2020). Effects of misleading media coverage on public health crisis: a case of the 2019 novel coronavirus outbreak in China. *Anatolia*, *31*(2), 331–336.

[19] Williams, R. (2020, April 6). 'WHO enlists virtual influencer for COVID-19 prevention campaign', *Mobile Marketer*. Retrieved May, 20, 2022 from **https://www.mobilemarketer.com/news/who-enlists-virtual-influencer-for-covid-19-prevention-campaign/575493/**

[20] Moss, G., & Konstantinova, N. (2021). *Communicating the pandemic: A qualitative analysis of public responses to official communication about COVID-19*. University of Leeds. **https://ahc. leeds.ac.uk/downloads/download/244/communicating_the_pandemic_a_qualitative_analysis_of_public_responses_to_official_communication_about_covid-19**

[21] Berry, D. (2006). *Health communication: Theory and practice.* McGraw-Hill Education.

[22] Schoch-Spana, M., Franco, C., Nuzzo, J. B. & Usenza, C. (2007). Community engagement: leadership tool for catastrophic health events. *Biosecurity and Bioterrorism*, *5*(1), 8–25.

[23] Covello, V. T. (2003). Best practices in public health risk and crisis communication. *Journal of Health Communication*, *8*(S1), 5–8.

[24] Frohlich, K. L. & Potvin, L. (2008). Transcending the known in public health practice: the inequality paradox: the population approach and vulnerable populations. *American Journal of Public Health*, *98*(2), 216–221.

[25] Seeger, M. W. (2006). Best practices in crisis communication: An expert panel process. *Journal of Applied Communication Research*, *34*(3), 232–244.

[26] Brennen, J. S., Simon, F. M., Howard, P. N., & Nielsen, R. K. (2020, April). 'Types, sources, and claims of COVID-19 misinformation'. University of Oxford & Reuters Institute, *7*: 1–13.

[27] Pearse, H. (2020). Deliberation, citizen science and COVID 19. *The Political Quarterly*, *91*(3), 571–577.

[28] Scheinerman, N., & McCoy, M. (2021). What does it mean to engage the public in the response to covid-19? *BMJ*, 373:n1207

[29] Archard, D., & Whittal, H. (2020). *Statement: COVID-19 and the basics of democratic governance.* The Nuffield Council of Bioethics. Retrieved April, 27, 2022 from **https://www.nuffieldbioethics. org/news/statement-covid-19-and-the-basics-of-democratic-governance**

[30] Wardman, J. K. (2020). Recalibrating pandemic risk leadership: Thirteen crisis ready strategies for COVID-19. *Journal of Risk Research*, *23*(7-8), 1092–1120.

[31] Coombs, W. T. (2021). *Ongoing crisis communication: Planning, managing, and responding.* Sage Publications.

[32] Koh, P. K. K., Chan, L. L., & Tan, E. K. (2020). Messaging fatigue and desensitisation to information during pandemic. *Archives of Medical Research*, *51*(7), 716.

[33] Giacomin, J. (2014). What is human centred design? *The Design Journal*, *17*(4), 606–623.

[34] NHS. (2022). *Accessible Information Standard*. Retrieved June, 26, 2022 from **www.england.nhs.uk/ourwork/accessibleinfo/**

[35] Keller, P. A., & Lehmann, D. R. (2008). Designing effective health communications: A meta-analysis. *Journal of Public Policy & Marketing*, *27*(2), 117–130.

[36] Wolf, M. (2012). Health Literacy. In B. Fischhoff, N. T. Brewer, J. S Downs (Eds.), *Communicating risks and benefits: An evidence-based user's guide* (pp. 77–88). Government Printing Office.

[37] Rogers, M. B., & Pearce, J. M. (2013). Risk communication, risk perception and behavior as foundations of effective national security practices. In B. Akhgar, & S. Yates (Eds.), *Strategic intelligence management* (pp. 66–74). Butterworth-Heinemann.

[38] Luzón, M. J. (2022). 'Coronavirus explainers' for public communication of science: Everything the public needs to know. In A. Musolff, R. Breeze, K. Kondo & S. Vilar-Lluch (Eds.), *Pandemic and Crisis Discourse. Communicating COVID-19 and Public Health Strategy* (pp. 97–114). Bloomsbury.

[39] Uskul, A. K., Sherman, D. K., & Fitzgibbon, J. (2009). The cultural congruency effect: Culture, regulatory focus, and the effectiveness of gain-vs. loss-framed health messages. *Journal of Experimental Social Psychology*, *45*(3), 535–541.

[40] The Royal Society. (2001). *Guidelines on science and health communication*. Retrieved February, 16, 2023 from **https:// royalsociety.org/-/media/Royal_Society_Content/policy/ publications/2001/guidelines-12-12-2001.pdf?la=en-GB&hash=0AF 1020B0CB19228B9B18AA911CC70DD**

[41] Semino, E. (2021). "Not soldiers but fire-fighters"–Metaphors and Covid-19. *Health Communication*, *36*(1), 50–58.

[42] Wilson, F. P. (2020, March 31). *COVID-19 death predictions: What do we need to know?* Medscape. Retrieved January, 11, 2023 from **https://www.medscape.com/viewarticle/927791**

[43] Bates, B. (2020). The (In) appropriateness of the WAR metaphor in response to SARSCoV-2: A rapid analysis of Donald J. Trump's rhetoric. *Frontiers in Communication*, *5*, 1–12.

[44] Oswick, C., Grant, D. & Oswick, R. (2020). Categories, crossroads, control, connectedness, continuity, and change: A metaphorical exploration of COVID-19. *The Journal of Applied Behavioral Science*, *56*(3), 284–288.

[45] Sabucedo, J. M., Alzate, M. & Hur D. (2020). COVID-19 and the metaphor of war (COVID-19 y la metáfora de la guerra). *International Journal of Social Psychology, 35*(3), 618–624.

[46] Varma, S. (2020). A pandemic is not a war: COVID-19 urgent anthropological reflections. *Social Anthropology/Anthropologie Sociale, 28*(2), 376–378.

[47] Wicke, P. & Bolognesi, M. M. (2020). Framing COVID-19: How we conceptualize and discuss the pandemic on Twitter. *PloS ONE*, *15*(9), e0240010.

[48] Pan, M. X. & Chen, J. Z. (2022). When wars are good: Emotional unpacking anti-coronavirus measures through metaphors in HK press conferences. In A. Musolff, R. Breeze, K. Kondo & S. Vilar-Lluch (Eds.), *Pandemic and Crisis Discourse. Communicating COVID-19 and Public Health Strategy* (pp. 225–240). Bloomsbury.

[49] Hendricks, R. K., Demjén, Z., Semino, E., & Boroditsky, L. (2018). Emotional implications of metaphor: Consequences of metaphor framing for mindset about cancer. *Metaphor and Symbol*, *33*(4), 267–279.

[50] Lasco, G. (2020). Medical populism and the COVID-19 pandemic. *Global and Public Health, 15*(10), 1417–1429.

[51] Jetten, J., Reicher, S., Haslams, S. A., & Cruwys, T. (2020). *Together apart: The psychology of COVID-19*. Sage.

[52] Tomasini, F. (2021). Solidarity in the Time of COVID-19? *Cambridge Quarterly of Healthcare Ethics*, *30*(2), 234–247.

[53] West-Oram, P. (2021). Solidarity is for other people: identifying derelictions of solidarity in responses to COVID-19. *Journal of Medical Ethics*, *47*(2), 65–68.

[54] Comello, M. L. (2013). Conceptualizing the intervening roles of identity in communication effects: The prism model. In D. Lasorsa, A. Rodriguez (Eds.), *Identity and communication: New agendas in communication* (pp. 186–206). New York: Routledge.

[55] Jetten J., Haslam S. A., Cruwys T., Greenaway K. H., Haslam C., Steffens N. K. (2017). Advancing the social identity approach to health and well-being: Progressing the social cure research agenda. *European Journal of Social Psychology. 47*(7), 789–802.

[56] Fuks, N., Lanzing, M., Paul, K., Sharon, T., Siffelds, L., van der Steen, M. (2021). *Solidarity without an Expiration Date*. Retrieved April, 27, 2022 from **https://digigov.univie.ac.at/solidarity-in-times-of-a-pandemic-solpan/solpan-blog-english/blog-posts/news/ solidarity-without-an-expiration-date/**

[57] Haour-Knipe, M., Fleury, F., & Dubois-Arber, F. (1999). HIV/ AIDS prevention for migrants and ethnic minorities: three phases of evaluation. *Social Science & Medicine*, *49*(10), 1357–1372.

[58] Clissold, E., Nylander, D., Watson, C. & Ventriglio, A. (2020). Pandemics and prejudice. *International Journal of Social Psychiatry*, *66*(5), 421–423.

[59] Fenton, K., Pawson, E., & de Souza-Thomas, L. (2020). *Beyond the data: Understanding the impact of COVID-19 on BAME communities*. Public Health England. **https://assets.publishing. service.gov.uk/government/uploads/system/uploads/attachment_ data/file/892376/COVID_stakeholder_engagement_synthesis_ beyond_the_data.pdf**

[60] Khunti, K., Singh, A. K., Pareek M. & Hanif W. (2020). Is ethnicity linked to incidence or outcomes of covid-19? *BMJ*, *20*(369), 1–2.

[61] Bentley, G. R. (2020). Don't blame the BAME: Ethnic and structural inequalities in susceptibilities to COVID-19. *American Journal of Human Biology*, *32*(5), e23478, 1–5.

[62] Hu, Y. (2020). Intersecting ethnic and native–migrant inequalities in the economic impact of the COVID-19 pandemic in the UK. *Research in Social Stratification and Mobility*, *68*, 100528.

[63] Otu, A., Ahinkorah, B. O., Ameyaw, E. K., Seidu, A. A., & Yaya, S. (2020). One country, two crises: what Covid-19 reveals about health inequalities among BAME communities in the United Kingdom and the sustainability of its health system? *International Journal for Equity in Health*, *19*(1), 1–6.

[64] Tai, D. B. G., Shah, A., Doubeni, C. A., Sia, I. G., & Wieland, M. L. (2021). The disproportionate impact of COVID-19 on racial and ethnic minorities in the United States. *Clinical Infectious Diseases*, *72*(4), 703–706.

[65] Wilder, J. M. (2021). The disproportionate impact of COVID-19 on racial and ethnic minorities in the United States. *Clinical Infectious Diseases*, *72*(4), 707–709.

[66] Martin, C. A., Jenkins, D. R., Minhas, J. S., Gray, L. J., Tang, J., Williams, C., Sze, S., Pan, D., Jones, W., Verma, R., Knapp, S., Major, R., Davies, M., Brunskill, N., Wiselka, M., Brightling, C., Khunti, K., Haldar, P. & Pareek, M. (2020). Socio-demographic Heterogeneity in the Prevalence of COVID-19 during Lockdown Is Associated with Ethnicity and Household Size: Results from an Observational Cohort Study. *eClinicalMedicine*, *25*(100466), 1–8.

[67] Venkatraman, K., & Manoharan, A. (2023). Public engagement as the fifth dimension of outbreak communication: Public's perceptions of public health communication during COVID-19 in India. *Health communication*, *38*(2), 285–297.

[68] Crouse Quinn, S. (2008). Crisis and emergency risk communication in a pandemic: a model for building capacity and resilience of minority communities. *Health Promotion Practice*, *9*(4_suppl), 18S–25S.

[69] Lasker, R. D. (2004). *Redefining Readiness: Terrorism Planning Through the Eyes of the Public: Appendix to the Study Report*. Center for the Advancement of Collaborative Strategies in Health, New York Academy of Medicine. **https://collections.nlm.nih.gov/catalog/nlm:nlmuid-101233538-pdf**

[70] Mupandawana, E. T., & Cross, R. (2016). Attitudes towards human papillomavirus vaccination among African parents in a city in the north of England: A qualitative study. *Reproductive Health*, *13*(1), 1–12.

[71] Grace, C. (2011). Nutrition-related health management in a Bangladeshi community. *Proceedings of the Nutrition Society. 70*(1), 129–134.

[72] Thompson, D., & Bayer, E. (Eds.). (2015). *Communicating to advance the public's health: Workshop summary*. National Academies Press.

[73] Neuhauser, N. (2012). Readability, comprehension and usability. In B. Fischhoff, N. T. Brewer, J. S. Downs (Eds.), *Communicating risks and benefits: An evidence-based user's guide* (pp. 129–148). Government Printing Office.

[74] Maar, M. A., Yeates, K., Toth, Z., Barron, M., Boesch, L., Hua-Stewart, D., Liu, P., Perkins, N., Sleeth, J., Wabano, M.J., Williamson, P., & Tobe, S. W. (2016). Unpacking the black box: a formative research approach to the development of theory-driven, evidence-based, and culturally safe text messages in mobile health interventions. *JMIR mHealth and uHealth*, *4*(1), e4994.

[75] Täuber, S. (2018). Moralized health-related persuasion undermines social cohesion. *Frontiers in Psychology*, *9*, 909.

[76] Ochieng, B. M. (2013). Black African migrants: the barriers with accessing and utilizing health promotion services in the UK. *The European Journal of Public Health*, *23*(2), 265–269.

[77] Hyland-Wood, B., Gardner, J., Leask, J., Ecker, U.K.H. (2021). Toward effective government communication strategies in the era of COVID-19. *Humanities and Social Sciences Communications*, *8*(1), 1–11.

[78] Rogers, M. B., Krieger, K., Jones, E., & Amlot, R. (2014, October). *Responding to emergencies involving chemical, biological, radiological and nuclear CBRN hazards: Information for emergency responders about public responses to CBRN incidents*. Retrieved February, 16, 2023 from **https://kclpure.kcl.ac.uk/portal/files/31647448/Brochure_Professional_V2_4.pdf**

[79] Gerrish, K. (2001). The nature and effect of communication difficulties arising from interactions between district nurses and South Asian patients and their carers. *Journal of Advanced Nursing*, *33*(5), 566–574.

[80] Marlow, L. A., Waller, J., & Wardle, J. (2015). Barriers to cervical cancer screening among ethnic minority women: a qualitative study. *Journal of Family Planning and Reproductive Health Care*, *41*(4), 248–254.

[81] Kumar, K., Dubey, S., Samanta, A., Bosworth, A., & Moorthy, A. (2020). COVID-19 and ethnicity: challenges in rheumatology. *Rheumatology*, *59*(8), 1802–1803.

[82] Jarvis, L. (2022). Counting coronavirus: Mathematical language in the UK response to Covid-19. In A. Musolff, R. Breeze, K. Kondo & S. Vilar-Lluch (Eds.), *Pandemic and Crisis Discourse. Communicating COVID-19 and Public Health Strategy* (pp. 79–93). Bloomsbury.

[83] Osmanlliu, E., Paquette, J., Grenier, A. D., Lewis, P., Bouthillier, M. Ê., Bédard, S., & Pomey, M. P. (2022). Fantastic perspectives and where to find them: Involving patients and citizens in digital health research. *Research Involvement & Engagement*, *8*(37), 1–10.

[84] Farooqi, A., Jutlla, K., Raghavan, R., Wilson, A., Uddin, M. S., Akroyd, C., Patel, N., Campbell-Morris, P. P., & Farooqi, A. T. (2022). Developing a toolkit for increasing the participation of black, Asian and minority ethnic communities in health and social care research. *BMC Medical Research Methodology*, *22*(1), 17.

[85] Greenhalgh, T., Hinton, L., Finlay, T., Macfarlane, A., Fahy, N., Clyde, B., & Chant, A. (2019). Frameworks for supporting patient and public involvement in research: systematic review and co-design pilot. *Health Expectations*, *22*(4), 785–801.

[86] National Institute for Health and Care Research. (2020). *A brief guide to public involvement in funding applications*. Retrieved June, 28, 2022, from **https://www.nihr.ac.uk/documents/a-brief-guide-to-public-involvement-in-funding-applications/24162#:~:text=Public%20involvement%20is%20at%20the,contributing%20different%20perspectives%20and%20experiences**

[87] TRAC:COVID – Trust and Communication: A Coronavirus Online Visual Dashboard, Birmingham City University. Available at: https://www.bcu.ac.uk/english/research/english-linguistics/rdues/research-projects/trac-covid

Attribution:

Any enquiries regarding this publication should be sent to:

Professor Svenja Adolphs, School of English, Trent Building, University of Nottingham NG7 2RD (svenja.adolphs@nottingham.ac.uk)

When citing this report please use:

Adolphs, S., McAuley, D., Vilar-Lluch, S., Knight, D., McClaughlin, E., Nichele, E., Clos, J., Barnard, P., Parnell, T., Lang, A. (2023). *Communicating health threats: Linguistic evidence for effective public health messaging during the Covid-19 pandemic*. University of Nottingham.

Acknowledgements:

UKRI Arts and Humanities Research Council