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5 **Gafari O, Agyapong-Badu S, Alwan NA, Tully MA, McDonough S, Stokes M**  
6 **and Barker M**

7 **Misaligned or misheard? Physical activity and healthy eating messaging to**  
8 **ethnic minority communities during the COVID-19 pandemic: a qualitative**  
9 **study and scoping review**

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20 scoping review

21 **Article short title:** Public health messaging for UK ethnic minority communities

22  
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39 **Abstract**

40 This mixed-methods study identified physical activity (PA) and healthy eating messages  
41 produced during the COVID-19 pandemic and explored how they were received by UK ethnic  
42 minority communities. A scoping review of research and grey literature identified categories  
43 of PA and healthy eating messaging targeted at ethnic minorities. Individual and group  
44 interviews were conducted, audio-recorded, transcribed and analysed using inductive thematic  
45 analysis. There was active community engagement in all study phases to ensure relevance and  
46 co-production of findings. Interviews were held with 41 study participants aged 18-86 years  
47 (20 men) residing in England and Wales using digital conferencing and in person. The scoping  
48 review identified 24 records containing messages grouped into three categories: 1) PA  
49 messages; 2) healthy eating messages; 3) risk messages. Five themes described participants'  
50 views of these messages: 1) lack of awareness of messaging; 2) responses to PA messaging; 3)  
51 responses to healthy eating messaging; 4) perceptions of risk messaging and 5) perceptions of  
52 conflict in messages. The review revealed that physical activity and healthy eating messaging  
53 specifically targeting ethnic minority communities is limited. This limited messaging was  
54 almost entirely missed by these communities. When received, the messaging was not  
55 interpreted as intended, perceived to be conflicting and risk messaging was perceived as  
56 blaming. More work with ethnic minority communities needs to be done to co-produce  
57 meaningful and appropriate PA and healthy eating messaging in a timely manner.

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## 61 **Introduction**

62 Malnutrition and physical inactivity are two of the most important contributors to the global  
63 burden of disease[1]. Regularly engaging in physical activity (PA) and eating a healthy diet  
64 improves physical and mental wellbeing[2], prevents chronic conditions[3] and reduces  
65 infectious disease risk through improved immune function[4].

66 There are long-standing health inequalities in the UK between the white majority and ethnic  
67 minorities communities, [5], echoing wider social and economic inequalities between these  
68 communities[6]. Compared to their White British counterparts, UK EMCs are more likely to  
69 be unemployed[7], live in more deprived areas[8] and in overcrowded[9] and low-income  
70 households[10], and have less access to health and social care[11]. People from Black and  
71 Asian communities are also less likely to be physically active[12] or eat five portions of fruits  
72 and vegetables daily[13]. This has long-term health consequences and contributes to their risk  
73 of diabetes mellitus[14] and cardiovascular diseases[15], two leading causes of death in the  
74 UK; risks which are higher among these communities[16]. Many chronic health conditions of  
75 public health significance are modifiable through improved nutrition and PA[17].

76 The COVID-19 pandemic exacerbated these inequalities between EMCs and the white  
77 majority, with higher infection and death rates recorded[18]. The UK government's response  
78 to the pandemic included wide-scale Infection Prevention and Control (IPC) messaging  
79 focused on staying home, wearing masks, social distancing and COVID-19 vaccination[19].  
80 During this time, language barriers[20], historical social and economic injustices[21],  
81 messages that clashed with cultural values and underrepresentation of ethnic minority  
82 voices[22], may have led to low uptake and compliance with IPC measures[21, 23]. As further  
83 evidence emerged showing the negative impacts of the lockdown and other restrictions on  
84 health behaviours including diet and PA[24-27], public health messaging began to promote

85 healthy behaviours. It is possible, however, that many in EMCs received this messaging with  
86 the same distrust as they had received previous IPC messaging[20, 28].

87 Although, promoting public health requires a whole systems approach [29, 30], health  
88 promotion messages when appropriately designed have proven useful as one of the whole  
89 systems approach [31, 32] especially at the individual level useful in promoting health  
90 behaviour change [33-35]. Multiple reports have highlighted the need for tailored public health  
91 messaging to underserved groups, including EMCs[20] to ensure greater accessibility and  
92 positive behaviour change. The call has been for messaging that is simple, available in minority  
93 languages, co-produced, consistent with cultural norms and publicised through local  
94 community channels[36]. These suggestions are rarely applied, however, to messaging to  
95 support members of EMCs to eat more healthily and be more active. For such messaging to be  
96 effective, it is important to understand how these underserved communities currently receive  
97 public health messaging and their perceptions of how messaging is shaped.

98 Most of the evidence of the impact of public health communication on the behaviour of  
99 EMCs[20, 36] during the pandemic is limited to the impact of IPC messaging. Evidence of the  
100 acceptability and reception of PA and healthy eating messaging is scarce. A recent government  
101 review of messaging during the pandemic[20] highlighted the need for qualitative evidence to  
102 understand how messaging was received and perceived by these communities.

103 This paper describes: 1) a scoping review undertaken to identify the different categories of PA  
104 and healthy eating messages produced during the pandemic that were targeted specifically  
105 towards EMCs in preparation for a subsequent qualitative study; and 2) a qualitative study  
106 aimed to understand how these different categories of PA and healthy eating messages were  
107 seen, heard, and received by EMCs.

108 This study was conducted as part of a UKRI-ESRC funded project entitled: *Consortium on*  
109 *Practices for Wellbeing and Resilience in BAME Families and Communities (Co-POWeR)*,  
110 within the Work Package on Physical Activity and Nutrition (WP4).

## 111 **Methods**

### 112 **Ethics Statement**

113 This study was conducted according to the guidelines laid down in the Declaration of Helsinki  
114 and all procedures involving research study participants were approved by the AREA Research  
115 Ethics Committee (no. 20-120), University of Leeds and the Faculty of Environmental and Life  
116 Sciences Ethics Committee (no. 65351.A1), University of Southampton. Written informed  
117 consent was obtained from all participants.

### 118 **Study design**

119 A combination of scoping review and qualitative research methods were used to address  
120 research objectives. Community engagement was embedded in the study from start to finish.  
121 People from EMCs were engaged in developing the scoping review search strategy, reviewing,  
122 and refining the interview topic guides, and contributing to all decision-making process on the  
123 study (four CE partners were members of the core project team and attended project planning  
124 meetings). A CE partner also contributed to data extraction and the draft manuscript was  
125 reviewed by an additional CE partner to ensure genuine reflection of EMCs realities.

### 126 **Scoping review**

#### 127 **Rationale**

128 Addressing the first study aim, a scoping review was chosen over a systematic review to  
129 identify the different types of messaging available and allow for inclusion of evidence from a

130 wide variety of sources[37, 38]. The review aimed to include all data sources, including journal  
131 articles, containing messaging. Messaging was taken to mean any information developed for  
132 the public to promote PA and healthy eating. The review followed the 5-step methodological  
133 framework by Arksey and O'Malley[37]; refined using the Joanna Briggs Institute (JBI)  
134 framework for scoping reviews[39], to ensure a critical review of literature from both research  
135 and non-research sources. A decision was taken to also include Community Engagement (CE)  
136 to increase the robustness of the methodology. The Preferred Reporting Items for Systematic  
137 Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) checklist[40] was  
138 followed (S1 checklist).

### 139 **Search strategy**

140 An initial scoping search was conducted using Google Scholar, MEDLINE, NICE Evidence  
141 search, Cochrane reviews and JBI Evidence Synthesis to inform the search strategy. The search  
142 strategy included keywords and synonyms related to: 1) physical activity; 2) healthy eating; 3)  
143 messaging; and 4) ethnic minorities.

144 The UK Office for National Statistics (ONS) definition of ethnic minorities includes every  
145 ethnic group except the White British group. This ONS definition of ethnic minorities was  
146 adopted for use during the scoping review.

147 Searches of both scientific databases and grey literature were conducted.

148 MEDLINE, CINAHL and Scopus were searched for PA and healthy eating messaging targeted  
149 towards EMCs produced between December 2019 and 30<sup>th</sup> September 2021 (S1 Text). This  
150 start date of December 2019 coincides with the start date of the COVID-19 pandemic in the  
151 UK. Although, it is unlikely considering the length of time it takes to produce and disseminate  
152 public health messaging, that public health messaging would have been available at that time,  
153 the date was chosen to ensure no messaging was missed. The end date of the search was also

154 chosen to coincide with the start of data collection during the qualitative study. This was to  
155 ensure that participants involved in the qualitative study could reflect during data collection on  
156 messaging that was available to them at that point during the pandemic.

157 To identify grey literature and non-research sources, various websites and platforms (S1 Table)  
158 were searched using a combination of keywords and appropriate syntax where supported.  
159 Public members from EMCs were also engaged through CE activities to identify their sources  
160 of healthy eating and PA information, and those were searched. Finally, a hand search of the  
161 reference lists of key studies was conducted.

162 We did not carry out a search in other languages than English, because much of the public  
163 health messaging available in other languages would often have an English version which we  
164 would have picked up in the search and which we included in the review. The search strategy  
165 was developed with input from a librarian and a team of experts. This search was not conducted  
166 to be a comprehensive search of all messaging available but to scope the different categories  
167 of messaging available during the specific period of the COVID-19 pandemic, hence the search  
168 strategy.

## 169 **Study selection**

170 EndNote (version 20) was used to remove duplicates before transferring the scientific search  
171 results (n=802 publications) to Rayyan[41], a web app for systematic reviews, where study  
172 selection was performed in two stages: 1) title and abstracts screening; and 2) full-text  
173 screening. Two independent reviewers (OG, BM-S) reviewed each result against the inclusion  
174 and exclusion criteria in Table 1 and a third reviewer (SA) was available to resolve  
175 disagreements.

## 176 **Table 1. Inclusion and exclusion criteria for scoping review**



Group	Inclusion Criteria	Exclusion Criteria
Content	<p>Contains messages, guidelines or information targeted to the <b>members of the public from ethnic minority background by having at least one of the following:</b></p> <ul style="list-style-type: none"> <li>a) Mentions BAME or other similar words like “ethnic minority”, “immigrants”, “BME” etc.</li> <li>b) Targets at least one BAME group: for example, a paper targeted to only Asians would still be included even though, it doesn’t address Black people</li> <li>c) Have options to view translated versions or copies in a different language</li> </ul>	<p>Messages, guidelines or information not targeted to ethnic minority populations</p>
	<p>Contains messages relevant to physical activity or/and healthy eating</p>	<p>Messages, guidelines or information not targeted to the public e.g., messages to the research community, athletes/sport elites or to the government.</p>
Date	<p>Made publicly available between December 2019 and September, 2021</p>	

Age	Relevant to all or any age group including children, adults or the elderly.	
Population setting	Relevant to the UK population <sup>a</sup> by having at least one of the following: <ul style="list-style-type: none"> <li>a) Written by UK authors or a UK based organization</li> <li>b) Identifies the UK as a target population</li> <li>c) Made use of UK data</li> <li>d) Produced by regional and international authorities like the UN agencies and hence targeted to a global or regional population.</li> </ul>	Messages not applicable to the UK population
Language	Any language	
Design or literature type	Peer reviewed Scientific articles, government policies, guidance and reports <sup>b</sup>	Social media posts, blog posts and media articles made by the people

177 <sup>a</sup>Unsure papers added to a maybe list for one-on-one decision by reviewers at an agreement  
178 meeting.

179 <sup>b</sup>The aim is to limit the review to literature produced at the top level of government and  
180 authority rather than literature produced by the people (social media, personal blogs, etc.)

181

182 For grey literature results, screening was performed using a combination of Rayyan and  
183 Microsoft Excel (version 2022). Full text screening was conducted independently by two  
184 reviewers (OG, SA), with the third reviewer (BM-S) resolving disagreements.

185 Papers and reports were included if they contained PA and/or healthy eating advice targeting  
186 UK EMCs, with types of literature restricted to scientific articles, government policies,  
187 guidance and reports, and content produced by key national stakeholders in public health.  
188 Social media content, blog posts and media articles were excluded. Papers published in  
189 languages other than English were included in the search. Two papers not written in English  
190 were excluded as they did not meet inclusion criteria. Reviewers piloted screening with 10  
191 records to ensure mutual understanding of inclusion/exclusion criteria.

## 192 **Data Extraction and Analysis**

193 Author, title, literature type, aims, date and messages promoting healthy eating and/or PA were  
194 extracted into Microsoft Excel by OG and 20% of the extracted data were checked by BM-S  
195 and SA independently to ensure reliability and reproducibility. The extracted data were then  
196 transferred to NVivo as externals, where the data were grouped into categories of PA and  
197 healthy eating messages.

## 198 **Group and individual interviews**

199 Group and individual interviews were used to address the second study aim, based on  
200 participants' preferences.

## 201 **Study participants and recruitment strategy**

202 People from EMCs aged >15 years, living in the UK during the COVID-19 pandemic were  
203 eligible to take part. For this qualitative study, we used the definition of ethnic minorities that  
204 had been used in the Co-POWeR project; this included people belonging to any UK ONS high-  
205 level ethnic group except the White ethnic group. Care was taken to ensure group interviews  
206 were run with participants of similar ages to aid openness. A variety of means was adopted to  
207 facilitate the recruitment of an ethnically diverse group of participants. This included: 1) face-

208 to-face visits by researchers to community groups and locations resulting in snowballing to  
209 other community groups; 2) Social media recruitment using project posters and 3) Snowballing.  
210 The total number of people approached is unknown due to the recruitment approach adopted.  
211 Of the 43 people recruited, two who originally consented to take part were no longer available  
212 at the time of data collection. A study information sheet was provided to all participants and  
213 study details were explained during a phone call, Zoom call or face-to-face by a researcher  
214 (OG). This approach served to establish a relationship with potential participants before data  
215 collection. Written and verbal informed consent was obtained from all participants prior to data  
216 collection. Participants were given a voucher at the end of the study, as a token of appreciation  
217 for their time.

## 218 **Data Collection**

219 A topic guide was developed with project collaborators and CE partners involved in the wider  
220 Co-POWeR WP4 study. Data on which this paper is based are from the following questions:  
221 1) What general messages have you seen that promotes increase in PA and healthy diet during  
222 COVID-19?

- 223 a) Where did you find the information?
- 224 b) Where do you look for these kinds of information?
- 225 c) What did you think of this information?
- 226 d) Do they make you want to be more active or eat healthy?

227 A pilot group interview was run on the 29<sup>th</sup> of July 2021, after which a total of 10 group  
228 interviews (2 to 6 people per group) and five one-to-one interviews lasting between 60-90  
229 minutes were conducted between the 29<sup>th</sup> of July 2021 and the 8<sup>th</sup> of March 2022. Some  
230 participant groups, including young people and older people (four group and an individual  
231 interview) specifically requested face-to-face data collection. Face-to-face interviews were

232 held at agreed locations (a community group venue, a food bank and on a university campus)  
233 with COVID-19 safety procedures duly followed. All face-to-face group interviews were led  
234 by OG and had the community co-ordinator for the group present to foster open  
235 communication. The rest of the interviews were conducted online using Zoom conferencing  
236 software; facilitated by OG and co-moderated by MS, SA and BS. All had previous experience  
237 of conducting qualitative interviews and CE with people from EMCs, being from these  
238 communities themselves.

239 All interviews were audio-recorded using either Zoom recording or a digital recorder and  
240 transcribed by a professional service with a confidentiality agreement in place. The lead  
241 researcher (OG) checked the transcripts to ensure accuracy and that non-verbal communication  
242 and accent differences were captured. The transcripts were fully anonymised before analysis  
243 begun and participants were given an alphanumeric identifier starting with “I” or “G”;  
244 indicating individual interview or group interview, followed by a serial number.

## 245 **Data Analysis**

246 The six stages of thematic analysis proposed by Braun and Clarke[42] were followed in the  
247 inductive analysis of transcripts: data familiarisation, initial code generation, searching for  
248 themes, reviewing themes, defining, and naming themes and producing the report. The analysis  
249 was carried out using NVivo-12 software independently by OG and SA, after which coding  
250 was compared and any disagreements resolved through discussion. The wider research team  
251 reviewed and agreed on key themes, sub-themes and illustrative quotes to be used. The  
252 Consolidated Criteria for Reporting Qualitative Research (COREQ) was followed in producing  
253 this manuscript.

## 254 **Results**

255 **Scoping review**

256 **Identified studies**

257 From 815 records identified by the scientific database search, 122 duplicates were removed,  
258 and 611 articles were excluded during title and abstract screening, the latter with 88% interrater  
259 agreement, leaving 82 full texts as in Fig 1. The grey literature search identified an additional  
260 878 records, from which 82 duplicates were removed, leaving 796 records for full text  
261 screening. A total of 878 records (82 full texts from the scientific search and 796 from the grey  
262 search) were screened and 855 records were excluded. One record was added after a hand  
263 search of references and a total of 24 records were included in the review.

264 **Fig 1. PRISMA flow diagram of study selection process**

265 Included records comprised three journal articles, two reviews, 15 website articles, some of  
266 which included images, three digital documents/booklet and one poster. The records with  
267 publication dates were published between March 2020 and September 2021. Five records  
268 which were articles on public websites had been further updated by the time of extraction and  
269 so were dated December 2021. Eleven records included information relevant to both PA and  
270 healthy eating, four referred only to healthy eating and nine only PA. Included records and  
271 their characteristics are presented in Table 2.

272 **Table 2. Included records and their characteristics.**

<b>N</b>	<b>Title</b>	<b>Authors</b>	<b>Date</b>	<b>Aim of Paper</b>	<b>Methods/Paper type</b>
1	Helping people get fit to fight COVID[43]	NHS Kent and Medway	Unspecific	Provide information to help people remain fit and	Website article

				healthy to limit the impact of COVID	
2	Covid 19: Vitamin D and BAME populations[44]	Gloucestershire County Council	Unspecified	No clear aim indicated. To address queries on the role of Vitamin D in different COVID-19 outcomes	Web document
3	Children and Young People's Mental Health and Coronavirus (COVID-19); A booklet for Black, Asian and Minority Ethnic (BAME) parents from stem4[45]	Dr Nihara Krause for stem4 charity	2020	Providing guidance and advice to parents especially BAME, on how to support the mental health of children and young people during COVID and beyond	Digital booklet
4	Covid-19 Lifestyle Advice for BAME community[46]	National forum for health and wellbeing and British Association of Physicians of Indian Origin, Indian	October 2020	Poster produced to explain what can be done and how to look after health both during the pandemic and in general. Overall aim is to help everyone adapt healthy lifestyle and lead a healthy life.	Posters

		association Manchester			
5	Coronavirus infection and pregnancy - information for pregnant women and their families[47]	Royal College of Obstetricians & Gynaecologists	Unspecified	To answer frequently asked questions on COVID-19 and pregnancy	Online website article
6	Latest COVID19 Advice for British Muslims[48]	The Muslim Council of Britain	February 2020	COVID 19 advice for Muslims.	Website with extra resources to further government guidance
7	What factors put you at risk from coronavirus? [49]	British Heart Foundation	2020	To explain the kinds of factors that affect risk from coronavirus and what can be done about them to reduce risk	Website article for public
8	Having a healthy Ramadan at home[50]	British Nutrition Foundation	April 20	To provide practical nutrition advice to help Muslims stay healthy, while following	Online web article



				government guidelines in relation to coronavirus	
9	Vitamin D for COVID-19 and Acute Respiratory Tract Infections; SACN and NICE review the evidence[51]	British Nutrition Foundation	Jul-20	To summarize the rapid review of the evidence on Vitamin D and COVID-19 and Acute respiratory tract infections done by NICE and SACN	Online web article
10	Keeping safe in your home during coronavirus[52]	Leeds City council	15-Dec-20	How to keep those you live with safe during COVID-19. Guidance for households with grandparents, parents and children living together	Digital booklet
11	Keeping well at home[53]	The Healthy Ageing Research Group and Manchester Institute for Collaborative Research on Ageing	08-Jun-20	Providing lots of ideas and suggestions to help us keep well. It is written for those with less or no access to online resources	Digital booklet

12	Coronavirus and your wellbeing - for young people[54]	MIND	21-Dec-21	To provide information for young people on looking after wellbeing during coronavirus	Coronavirus and your wellbeing - for young people
13	Coronavirus and mental health tips[55]	Mental health foundation	15-Dec-21	To provide tips that will help people look after their mental health while staying at home	Website article for public
14	Mental health advice for older people during the coronavirus outbreak[56]	Mental health foundation	December 2021	To provide advice to help older people look after their mental health	Website article for public
15	Coping with coronavirus: a guide for young people[57]	The Mental health foundation, MHF Young Leaders and Leaders Unlocked	December 2021	To provide tips for young people on how to cope with the coronavirus	Website article
16	Getting through COVID-19: tips from a key worker[58]	Mental health foundation	December 2021	Suba is a doctor, humanitarian and podcaster who has shared her five top tips for	Website article

				maintaining good mental health as a key worker during the pandemic.	
17	Vitamin D and coronavirus: is there evidence it can help? [59]	Natalie Healey, reviewed by Dr Sarah Jarvis MBE for patient	May 2020	To provide clarity on the link between Vitamin D and COVID-19 risks and advice on the need to take supplements during the lockdown	Website article
18	Why are Black and Asian people at greater risk from COVID-19? [60]	Ellie Broughton, reviewed by Dr Sarah Jarvis MBE for patient	July 2020	To provide advice on understanding how and why the virus is impacting people of different ethnicities in different ways	Website article
19	Look after your mental health and wellbeing when staying at home[61]	Mental Health Foundation	Unspecified	Providing tips to people to help them look after their mental health	Website article
20	Healthwise, Part 2. Eating a balanced diet[62]	Linda Nazarko	June 2021	To explore how readers can remain healthy and well by eating a healthy, balanced diet during the COVID-19 pandemic	Research article

21	Coronavirus and children and young people's mental health - Emerging evidence, Issue 1[63]	Melissa A Cortina, Anna Gilleard and Jess Deighton.	May 2020	A rapid review of evidence from around the world that answers three main questions: 1) What are the key mental health challenges for children and young people during the coronavirus pandemic? 2) Are there any particular vulnerable groups? 3) What might help children and young people manage these challenges?	Rapid review report online
22	Covid-19 lockdown: Ethnic differences in children's self-reported physical activity and the importance of leaving the home environment; a longitudinal and cross-sectional study from the	Daniel D. Bingham, Andy Daly-Smith, Jennifer Hall et al.	September 2021	The study aims to: 1) report children's self-reported physical activity (PA) during the first COVID-19 UK lockdown and identify associated factors; 2) examine changes in children's self-reported PA prior to and during the first UK lockdown	Research article – longitudinal and cross-sectional study

	Born in Bradford birth cohort study[64]				
23	Balancing Immune System[65]	James Paul Pandarakalam	December 2020	To examine the possible factors responsible for the suppressed general immunity among the BAME population	Research article
24	Emerging Evidence: Coronavirus and children and young people's mental health - Issue 8 [66]	Mairi Jeffery, Tanya Lereya, Julian Edbrooke- Childs et al.	June 2021	The last issue of a series of 8 rapid reviews on coronavirus and children and young people's mental health. This final concluding issue aims to reiterate what has been learnt from the reviews of the literature, emphasising some of the key studies and setting out recommendations for supporting children and young people's mental health as the pandemic continues and beyond	Summary and report of a rapid review

273 All 24 records included in this review gave generic information on PA and/or healthy eating  
274 and used words related to ethnic minority groups at least once in their text in line with the  
275 inclusion criteria. However, very little of the messaging within the records was specifically  
276 targeted to EMCs. For example, a record could be a 5-page document on healthy eating advice  
277 but only include one sentence about ethnic minorities.

278 Three main categories summarised the included messages: PA, healthy eating and risks.

### 279 **Category 1: Physical activity**

280 This category included messaging encouraging people to be active, its benefits and  
281 recommendations. People were encouraged to be active around the home or engage in activities  
282 they enjoy such as walking or dancing. The two main benefits of PA highlighted were better  
283 mental health and wellbeing[45, 48, 65] and improved immune function[53, 65]. Other benefits  
284 mentioned included prevention of long-term conditions[53], weight management[53] and  
285 improved balance and energy[53, 65]. The importance of PA in pregnancy[47] was mentioned  
286 and one record targeted older adults and provided detailed information on safety measures  
287 during PA to prevent falls and injuries [53]. One record also mentioned the WHO  
288 recommendations for PA for adults[46] while another stressed daily PA and promoted brief,  
289 consistent activity as beneficial[53].

### 290 **Category 2: Healthy Eating**

291 This category described messaging encouraging people to eat healthily, what foods were  
292 healthy and their benefits.

293 These records stressed the main benefit of healthy eating was to improve immune function to  
294 prevent COVID-19 infection and other diseases[53, 65]. Specific nutrients like Vitamins C and  
295 E, folate, beta-carotene and zinc as well as specific food groups like fruit and vegetables, and

306 foods rich in omega-3 fatty acids were highlighted for their immune regulating properties.  
307 People were encouraged to drink water and cut down on processed and sugary foods and  
308 drinks[50, 53, 62, 65]. Tips to ensure healthy eating despite the lockdown included planning  
309 food shopping to avoid waste[50, 53, 62], going for dried foods as they have longer shelf-  
310 lives[50, 62] and adopting healthy cooking methods[50, 62].

311 Records also referred readers to healthy eating recommendations such as the UK Eatwell  
312 guide[50, 62] and the Asian healthy eating pyramid[46]. Only one record explained portion  
313 sizes for fruit and vegetables[62]. A myth about the use of alcohol to kill the coronavirus was  
314 refuted, and information on the negative effects of alcohol consumption was provided including  
315 its associations with long term conditions, reduced immune function and consequently  
316 increased COVID-19 risk[65]. Alcohol consumers were encouraged to do so in moderation up  
317 to 14 units spaced across a week[46, 53]. Nutrition advice during Ramadan fasting was  
318 provided by one record [50].

### 309 **Category 3: Risk**

310 Compared to the other categories, this category included more targeted messaging for EMCs.  
311 Messaging focused on the higher risks of infection and death from coronavirus amongst EMCs  
312 and how PA and healthy diet could reduce this risk[43, 46, 47, 49, 60, 65].

313 Many of the risk messages were focused on Vitamin D. It was explained that people from  
314 ethnic minorities were more prone to vitamin D deficiency because higher melanin levels in  
315 their skin resulted in reduced Vitamin D production in the skin[44, 65]. Although unclear and  
316 not well-evidenced, links between Vitamin D and COVID-19 risk in EMCs were mentioned in  
317 some records[44, 59], as was the link between sufficient Vitamin D and a healthy immune  
318 system[44, 65]. Most of this messaging was focused on advising EMCs to take Vitamin D

319 supplements[46, 51, 59, 60, 65]. Oily fish, eggs and fortified breakfast cereals were also  
320 mentioned to be good sources of Vitamin D [59, 65].

321 The importance of having a healthy weight for optimal immune functioning was highlighted  
322 by one record explaining that fat cells suppress immune function[65]. Another record shared  
323 information on what a healthy Body Mass Index, waist-hip ratio and waist circumference  
324 were[46]. Switching to a low-carbohydrate diet or total elimination of carbohydrates as a  
325 weight loss technique was advised against and people were encouraged to adopt healthier ways  
326 of losing weight[49, 62].

## 327 **Qualitative study**

328 A total of 41 participants (21 women) between 18-86 years old took part in the focus groups  
329 and interviews (Table 3). Over half of participants (68%) identified as Black, Black British,  
330 African and Caribbean according to the ONS 2021 ethnicity classification, while the other 32%  
331 were from Asian, Mixed and other EMCs. Participants were mostly resident in England (63%).

332 **Table 3. Participants' characteristics**

<b>Age group (years)</b>	<b>Number of participants (%)</b>
18 – 19 (Teenagers)	8 (20)
20 – 34 (Young adults)	12 (29)
35 – 64 (Adults)	18 (44)
≥ 65 (Older adults)	3 (7)
<b>Gender</b>	
Men	20 (49)
Women	21 (51)
<b>Ethnicity</b>	



Asian or Asian British	4 (10)
Black, Black British, Caribbean or African	28 (68)
Mixed or multiple ethnic groups	4 (10)
Other ethnic groups	5 (12)
<b>Country of Residence</b>	
England	26 (63.4)
Wales	14 (34.2)
Scotland	1 (2.4)

333

334 Five main themes were identified that described the data: 1) lack of awareness of messaging;  
 335 2) responses to PA messages; 3) responses to healthy eating messages; 4) perceptions of risk  
 336 messaging; and 5) perceptions of conflict in messages. An underlying theme of trust in the  
 337 messaging was observed across all themes.

338 Most participants in all age groups and ethnicities, either had not seen or could not remember  
 339 seeing any PA and healthy eating messaging during the COVID-19 pandemic. Those who had  
 340 seen messages attributed these to sources such as social media, and ethnically diverse  
 341 community groups to which they belonged to. Most messages seen were on PA; only a few  
 342 participants acknowledged seeing messaging on healthy eating which was mostly focused on  
 343 the benefits of healthy eating for improved immune function. Participants also spoke about  
 344 how messaging suggested an inherent COVID-19 risk among EMCs. Some described how,  
 345 over time, they had become aware that the higher infection and death rates were not inherent  
 346 but due to other factors such as increased exposure to the virus as frontline workers. Finally,  
 347 some participants especially teenagers and young adults spoke about their perceptions of  
 348 government messaging being conflicting and how this reduced their trust in the government  
 349 and messaging. For example, government messaging to stay healthy was not reflected in the

350 government's choice to re-open fast-food restaurants while gyms remained close. Table 4  
351 provides a detailed summary of these themes, subthemes and illustrative quotes.

352

353

354 **Table 4: Detailed Themes, subthemes and illustrative quotes from qualitative study**

Theme	Sub-themes	Explanation of themes	Example Quotes
Lack of awareness of messaging	Personal reasons (prior negative experiences resulting in distrust, social circle, geographical location)	Some participants explained they avoided seeking such messages due to previous negative experiences with government COVID-19 information. This led to a lack of trust in the government and its messaging.	<p>“I just thought they were contradicting themselves. Masks. No masks...I thought they knew what they were doing...I just did not trust. I lost my trust in them” I16, adult</p> <p>“You know I told you I have stopped watching the news ‘cos it puts so much fear in me.” I40, adult</p>
		Some adults also attributed this to their social circle by saying that they just did not watch enough TV to see messages or that their friends just did not talk about these things.	<p>“I don’t think that message is out there, and then again, maybe my circle of friends.” I38, adult</p> <p>“Mainly because I didn’t really watch much television. It was more Netflix, so I didn’t see any adverts” I41, adult.</p>

Theme	Sub-themes	Explanation of themes	Example Quotes
		Only one adult woman attributed this lack of messaging specifically to their city of residence.	“[City withheld] needs an upgrade cause they are focusing on other things, so we are left behind at the moment”. I13, adult
	Lack of government messaging	Mostly teenagers and young adults emphasised they did not come across messages because public health priorities were focused elsewhere.	<p>“Not much has been put forward in regard to physical activities and eating right, because I think the government were busy fighting, closing borders and putting people on furlough” G02, young adult.</p> <p>“The news wasn’t talking about people sorting out their health, they were mostly talking about when are we getting the vaccine... instead of focusing on what a person can do today...” G23, teenager</p>
	Delay in producing and disseminating	Members of a community youth group spoke about the insufficient priority placed on translating messages.	“I think they delayed in our communities – especially the languages, because they said it in English. Half of our community do not even understand English. Most of them

<b>Theme</b>	<b>Sub-themes</b>	<b>Explanation of themes</b>	<b>Example Quotes</b>
	relevant government messaging		only understand our first language”. Community group Leader, Adult
		Delays affected well-meaning efforts to increase reach of messaging making it harder for accurate messaging to be accepted once misinformation has been propagated.	“We were trying to find the information ourselves, where someone may be finding the wrong information. So, the first time someone hears something that’s what they’re going to think and you’re going to have to convince them afterwards” G23, Teenager
		Efforts to reach targeted community and religious groups affected by the delays in dissemination.	“They...started targeting the mosques to reach the community but at the same time the mosques were closed so how could they do that”. Community group leader, Adult
Responses to PA messaging	Sources of PA messaging	Participants (mainly adults regardless of ethnicity and country of residence) reported their main sources to be the	“But the parliament news, that’s where you get the real thing, they tell you to try and do the exercise on a daily basis” G33, adult

Theme	Sub-themes	Explanation of themes	Example Quotes
		news, parliamentary briefings and television.	
		Young people reported social media and other digital platforms as their main source.	“They weren’t from the government though; they were just general people that were fit and were trying to get people to understand why they should get fit. Generally normal people...Nothing from people who were actually meant to help us.” G23 and G22, teenagers.
		Specific examples reported across all age groups were YouTube channels, especially content created by Joe Wicks, and podcasts.	“I don't know if you know Joe Wicks, this exercise guy on YouTube, he's a fitness coach. I feel like he did more for promoting physical activity during the lockdown than the government really did... he made it fun and exciting... He was targeted at kids, adults, anybody of any age. It was very much accessible to everybody. Why isn't the government working more with Joe Wicks to change the

Theme	Sub-themes	Explanation of themes	Example Quotes
			language and to change the mindset towards exercising at home during the pandemic?” G01, young adult woman.
		All age groups identified community groups and social networks as key sources.	“He is our community leader. he’s keeping us active, if it wasn’t him, we will all stay the same, now we are keeping active and it is helping our mental health” G21, teenager
		Parents and guardians with children reported school homework to be their main, and in some cases, only source.	“...I think what brought more exercise to me was because of the children. In his school they were always directing us to...a PE teacher that became very popular... So, I think that just made me realise that ok, this exercise thing is good, but apart from that, I don’t remember seeing any adverts” I14, Adult.
	Perceptions of Government	Government guidelines on outdoor physical activity engagement was	“...I know that in the news they kept saying you can go out and do your exercise. Though we weren’t allowed to

<b>Theme</b>	<b>Sub-themes</b>	<b>Explanation of themes</b>	<b>Example Quotes</b>
	guidelines during lockdown	perceived to be important by mainly adult participants.	go out, you could go out and exercise so, I think that showed how important exercise was” I38, adult
		Teenagers and young adults believed the messages were not encouraging.	“No, the government were just like, oh, please, just do one small hour and then go back inside.” G03, Young adult.
Responses to healthy eating messages	Sources	Digital sources such as YouTube and other social media platforms.	“There was a lot about it especially on social media...Some people were trying to motivate people to eat healthily” G27, teenager.
		Community groups, youth activity clubs and their coaches.	“...They used to teach us this in the boxing club. During the pandemic, I used to have elderly people in my family, and I see the community leader and group come with good bags of food, some vegetable, he used to bring it to families around the docks” G21, teenager.
	Messages on benefits of healthy eating	Improved immune function to fight against the virus.	“They did say during the lockdown...we have to eat well because when you eat well your immunity is stronger... I would say to some extent that yes, it has moved us to look



Theme	Sub-themes	Explanation of themes	Example Quotes
			<p>at what we eat especially sugar – to reduce our sugar intake. since covid happened it has given us the impetus to move a lot more towards a plant-based diet.” I38, Adult.</p>
		<p>Perceived benefits of Vitamin D for improving immunity.</p>	<p>“I know that there was a research that was carried out. I think a lot of hospitals were doing it. Vitamin D helps with the immune system, and it helps in fighting, so I don't know how solid that research was, but a lot of health workers were taught to take Vitamin D.” G02, Young adult.</p>
<p>Perceptions of risk messaging</p>	<p>Generic risk messages</p>	<p>Risk messages focused on staying at home, wearing masks, getting vaccinated and infection and death updates.</p>	<p>“The only public health messages that I came in contact with was like on the billboards. It will be like, stay at home. If you go out, you'll kill somebody or something like that. You know, the very, very strong emphasis on</p>

Theme	Sub-themes	Explanation of themes	Example Quotes
			staying at home, which is good, you know” G03, Young adult.
	Inherent COVID-19 risk in EMCs	Participants from Black and mixed ethnicities raised concerns that inherent risk messaging led to increased discriminatory behaviour.	“I think we were treated in a different way because people were thinking that our skin, our people, like African people were getting this virus worse than others... we were the one that people can point their fingers at...they are dying too much, maybe because they don’t believe, they have too much faith, so they don’t protect themselves, maybe they have lack of knowledge... So, it’s like, they were treating us in a different way” I39, adult.
	Emerging risk factors	Participants now perceive other risk factors such as housing arrangements, work conditions and exposure to the virus to be responsible for higher COVID-19 infection and deaths.	“I mean after 20 months or more now, we now know that minority people are not dying because of their ethnicity. It is because they were probably more exposed to it. Because in Africa (country withheld) where I come from, they are not as strict, social distancing is almost non-existent and

Theme	Sub-themes	Explanation of themes	Example Quotes
			<p>people are not dying there as much. So, there must be a reason why minority people here died as much as they did.” I38, adult</p> <p>“I think it is generally the kind of jobs that BAME people do that exposes them to the virus more...” I19, adult.</p>

Theme	Sub-themes	Explanation of themes	Example Quotes
Perceptions of conflict in messaging		Teenagers and young adults perceived government messaging to be contradictory to their corresponding actions making them feel confused.	<p>“Every time Boris Johnson would come and speak, he would speak and then they would put up [a fast-food brand mentioned] is open, we’re going to open xxx on this day, xxx on this day. So basically, they were pushing you not to train and to be unhealthy. Then the same person would come and tell you oh yes, you need to run, you need to train for at least an hour per day, but xxx is open, why couldn’t they open the gyms? That would motivate more people as they would be like, there’s no fast food so I’ll just go to the gym and get my workout in and see how I feel” G27, teenager.</p> <p>“I found the messages by the government were very antagonistic. Like, okay, make sure you're running where there's lots of air. Stay away from anybody you don't</p>

Theme	Sub-themes	Explanation of themes	Example Quotes
			<p>know. If you have to run wear a mask. Do it in the early hours. You know, I know they didn't say things like that, I'm just over exaggerating, but that was kind of the vibe and the tone that you get from the message. It was very much like, you know, keep away from everybody and unless you really have to, don't do it". G01, young adult.</p> <p>"The same amount of bigger vigour or vehemency is not given to, stay healthy, keep your mind active, go do physical activity" G03, young adult.</p>
		<p>Refusal to consider subsequent government messaging as a result of contradictions and lack of trust.</p>	<p>"Personally, I never paid attention to that [referring to messages from the government] because to me it doesn't make any sense. Now, they brought out the vaccines and they tell you that you have to take two vaccines to be able to avoid getting covid but when you get the vaccines they</p>

Theme	Sub-themes	Explanation of themes	Example Quotes
			tell you, you're still able to catch covid...At one point, I stopped listening to all of it". G27, teenager

355

## 356 **Discussion**

357 This mixed-methods scoping review and qualitative study identified the PA and healthy eating  
358 messages targeted at EMCs during the COVID-19 pandemic of 2020 to 2021 and explored how  
359 these communities received such messages. Analysis showed that: 1) public health messaging  
360 specifically targeted to EMCs to improve PA and healthy eating was limited; and 2) this limited  
361 messaging was either entirely missed by these communities or, where received, was not  
362 interpreted as intended.

### 363 **What were the main categories PA and healthy eating messaging** 364 **targeting EMCs?**

365 During the COVID-19 pandemic, there was an enormous amount of public messaging mainly  
366 focused on IPC associated behaviours[67], but also on other health behaviours including PA  
367 and healthy eating[68]. The findings of the present study suggest that amongst this plethora of  
368 messaging, there was very little that specifically targeted EMCs. This is in line with previous  
369 studies[20, 28, 36, 69, 70] that found most government messaging not to be targeted or  
370 culturally appropriate and while some guidance was translated, the release was slow and  
371 usually difficult to access[70]. These reports have, however, been focused on COVID-19 IPC  
372 and vaccination messaging. To the best of the authors' knowledge, there has been no previous  
373 review of the PA or healthy eating messaging targeting EMCs during the pandemic.

374 The available PA and healthy eating messaging either presented the benefits of, and  
375 recommendations for, being active and eating healthily or focused on informing EMCs of their  
376 vulnerability to COVID-19 infection. There were difficulties in defining what targeted  
377 messaging was as all records included in the review were in English and only a few explicitly  
378 identified EMCs as their target. Although all 24 papers included words relating to EMCs, only

379 COVID-19 risk-related information tended to be specific to these communities. Most of the  
380 PA and healthy eating messages addressed the general population. Studies have shown when  
381 PA and healthy eating messages are not tailored and targeted, messages will not necessarily be  
382 relevant to or take account of the needs of minority communities and therefore risk  
383 accentuating existing inequalities[71, 72]. The importance of tailoring messaging to EMCs was  
384 highlighted in an evidence summary published by the Scientific Advice Group for Emergencies  
385 in September 2020[36]. This group proved that culturally tailored messaging increased  
386 accessibility and acceptability of COVID-19 IPC messages to EMCs. Conversely, targeting  
387 messaging to EMCs may also have disadvantages, such as possibly being perceived as  
388 stigmatising[36] and if not made specific, may ignore important cultural and other differences  
389 between minority communities. Care needs to be taken to avoid these negative impacts.

### 390 **How was PA and healthy eating messaging received by EMCs?**

391 The lack of targeted messaging on PA and healthy eating was confirmed in the qualitative data  
392 collected during this study. Most participants reported that they had not come across any  
393 messaging on PA and healthy eating at all during the pandemic.

394 There are several possible explanations for this perception, all of which relate in some way to  
395 EMCs levels of trust in the UK government. As some participants said, previous negative  
396 experiences with government and public health messaging at the start of the pandemic[20], led  
397 to distrust and avoidance of subsequent messaging. This phenomenon was also observed in a  
398 study of young people of diverse ethnicities in Southampton, London and Edinburgh[22],  
399 where some young people avoided specific sources of government information and messaging  
400 because they perceived it as negative and anxiety-causing, and because they no longer trusted  
401 the government's handling of the pandemic[22]. This may have also led to people moving away  
402 from government sources of information to more trusted community-based sources. For



403 example, participants in the present study who did come across PA and healthy eating  
404 messaging emphasised that most of this came through groups in their communities and on  
405 social media. These community groups tended to be age-specific and include people from  
406 diverse ethnicities. It is well-established that some ethnic minorities have greater trust in their  
407 communities and religious leaders than in more anonymous government institutions, and so  
408 prefer to receive messaging from them[36, 73]. This is despite the fact that people from diverse  
409 communities acknowledge the government as a source of official information[22].

410 The sources of PA and healthy eating messaging accessed was a focus for participants’  
411 reflections on how the UK government failed to address the needs EMCs during the pandemic.  
412 Some participants, especially young people, expressed dissatisfaction with the lack of health  
413 relevant messaging on PA and healthy eating by the government and public health authorities  
414 “*who were meant to help us*”; leaving them to rely on social media and other sources for  
415 information. They suggested that the government partner with content creators who already  
416 had the following to promote PA and healthy eating. Participants also expressed frustration at  
417 the fact that the focus of messaging for ethnic minorities was on COVID-19 IPC measures and  
418 vaccination, with an apparent disregard of other health relevant behaviours. Despite low trust  
419 of the authorities by EMCs, there is still an expectation for the government to be the key source  
420 for reliable and accurate messaging. There is a contradiction apparent in this. It could be, as  
421 has been observed before [74], that availability of better messaging may facilitate and rebuild  
422 trust in the government addressing the disillusionment that many EMCs experienced during  
423 COVID. It may also be, however, that effort needs first to be put into rebuilding trust before it  
424 is worth additional government campaigns to promote PA and health eating in EMCs. One  
425 positive step would be a genuine commitment to co-production of these message[36, 74, 75]  
426 followed by co-dissemination of messaging with community and religious groups as was

427 advised in the present study There is some evidence that this would facilitate increased  
428 acceptance of public health messaging[36, 74, 75].

429 Social media was another key source of information during the pandemic, to the point where  
430 the WHO described it as an infodemic[76]. While some social media messages were accurate,  
431 much of it was misinformation, myths and disinformation, deliberately sponsored to prevent  
432 people from complying with guidelines; this was seen particularly in anti-vaccine  
433 messaging[76]. Study participants felt that the delay in government messaging reaching their  
434 communities led them to resort to seeking information from other sources which may have  
435 been less accurate. If mis- and disinformation is first heard, it may become difficult for people  
436 to accept later, more accurate messaging; the first source of messaging is likely to be the most  
437 trusted[77].

438 In line with some previous studies, participants interpreted some of the risk messages as finger-  
439 pointing, indicating that there was something inherently wrong with their communities,  
440 therefore, being racially discriminatory[73, 74]. Both minority and white ethnicity participants  
441 in a qualitative study in England and Wales in 2020, expressed their displeasure at the framing  
442 of messaging on the ethnic inequalities in COVID-19 risk and how it contributed to further  
443 inequalities and obscured wider structural inequalities present in the country[74]. The same  
444 was expressed by community leaders from EMCs in a qualitative study in the West  
445 Midlands[73]. Messaging perceived as discriminatory and racist is likely to provoke a  
446 defensive response, which might in turn lead people to be unreceptive to subsequent messaging.  
447 For example, most of the COVID-19 risk messaging seen identified in the present scoping  
448 review was centred on Vitamin D, its role in improving immune function and the potential role  
449 in reducing risks of either COVID-19 infection or its severity. However, only one participant  
450 in our qualitative study had actually seen any information on the Vitamin D-COVID link and  
451 this was because of their role as a health worker. It is possible that Vitamin D messaging, like

452 other risk messaging, was perceived as racist and was less likely to be heard by EMCs; they  
 453 may have already stopped listening to any government messaging at this point. There is a  
 454 tension between the need for specific, tailored messaging relevant to EMCs and the need to  
 455 ensure messaging is not blaming and discriminatory because it is specific to certain  
 456 communities and cultural practices. This leaves a problem for official information sources. The  
 457 most obvious solution to this problem is to ensure proper co-production of such risk messaging  
 458 with the communities to which it is targeted.

459 Young people in particular perceived the tone of the small amount of PA and healthy eating  
 460 messaging they found during the pandemic to be “conflicting and antagonistic.” For example,  
 461 the re-opening of fast-food restaurants whilst gyms remained shut was seen to be at odds with  
 462 the instruction to eat healthily and keep active; or the perceived use of a “*don’t do it except you*  
 463 *really have to*” tone in PA messages. Young people from Quebec in a study of their perceptions  
 464 of public health communication during the pandemic[78] also recognised the non-verbal  
 465 aspects of messaging, including the messaging tone and how they sometimes were  
 466 stigmatising. The importance of tone and other non-verbal messages when developing or  
 467 conveying public health messages is clear; messages from the government that clash may lead  
 468 to confusion, dissatisfaction and all further messaging being ignored.

469 Learning from these discussions, we summarise six recommendations (six Ts) for improving  
 470 the impact of public health messaging to EMCs (Table 5).

471 **Table 5: Recommendations for improving the impact of public health messaging to EMCs**

Topic	Recommendation
<b>Together</b>	Togetherness underpins all other recommendations. To facilitate greater acceptance of public health messaging, co-production with community and religious group should be adopted as a strategy by

	the government, building on trust that already exists within these groups.
Trust	Prioritise actions to rebuild trust within EMCs by actively working with and building relationships with community and religious groups and leaders. Engage them in communicating health messaging to their communities. These actions should be consistent and sustained efforts demonstrating commitment to trust building.
Tailoring	Tailor health promoting messages to the needs and realities of EMCs. This tailoring goes beyond just mentioning these communities or including images of them in messaging. Communities need to be actively involved in the development and dissemination of the messaging to avoid the risk of messaging perceived as stigmatising.
Timing	Work with social media platforms and community groups to provide speedy, reliable, and accurate information targeted to relevant communities. This messaging needs to be swiftly produced to avoid the risk of people being exposed to persuasive misinformation as the first thing they hear or read. It also needs to be clear and precise to prevent contradiction.
Tone	Message needs to be considered carefully. This may best be done by co-producing messages with specific ethnic minority communities.
Truth	Government and public health authorities should be true to the messaging they are promoting and act in a way that is consistent with that messaging.

## 472 **Strengths and Limitations**

473 The scoping review method used enables the inclusion of records from more publicly  
474 accessible sources, relevant to a review of public perceptions of public health messages. Social  
475 media messages and audio-visuals were excluded; as significant sources of publicly consumed  
476 information, this may represent a limitation of the review. The qualitative study addressed this  
477 shortcoming by asking participants to think about all forms of messaging and were given  
478 examples that included research articles, posters, videos, TV ads and banners at bus-stops to  
479 aid recall. The findings from the qualitative study did not reveal any substantially different  
480 categories of messages than those identified by the scoping review.

481 Qualitative data was collected between July 2021 and March 2022, after the first and second  
482 UK COVID-19 waves. It is possible that pandemic experiences and responses had changed  
483 between these times, resulting in an inaccurate reflection of earlier COVID-19 experiences.  
484 Also, due to the extended data collection period, the recall frame may differ from participants  
485 based on their interview date. Participants' access to and opinions on messaging may also be  
486 subject to recall bias. Time was allowed, however, for reflection and use of probing questions  
487 to facilitate recall. This resulted in some participants mentioning other health messaging they  
488 accessed, most of which were COVID-19 vaccination and IPC messaging and not on PA or  
489 healthy eating. This suggests that recall bias may have had little impact on the findings.

490 As is common with qualitative studies, findings from this study cannot be widely generalised.  
491 The study sample included men and women from all adult age groups ( $\geq 16$ ) and from all ONS  
492 (Office for National Statistics, UK) main groups of EMCs. Some population groups were,  
493 however, more represented than others; there were more people from Black ethnicities, more  
494 people living in the South of England and South Wales and all the teenagers were young men.  
495 There are likely to be biases in the data which relate to the specific experiences of these groups.

496 This study does, however, provide a basis from which to explore how messages are being  
497 received by UK EMCs. In addition, a better understanding of participants characteristics  
498 including their socio-economic status may have resulted in a more robust analysis and  
499 understanding of the data. Data collection was carried out during the peak of the COVID-19  
500 pandemic however, during high profile conversations about inequalities, racial discrimination,  
501 and George Floyd's death. The study team encountered considerable distrust while trying to  
502 engage with ethnic minority communities. As a result, the decision was made not to request  
503 any information that would make people think they were being chosen on the basis of specific  
504 characteristics other than ethnicity or to ask them for information they were not willing to share.  
505 For these reasons, socio-economic data was not collected. An important strength of the study  
506 is the active CE (often called Patient and Public Involvement) embedded in the research process  
507 from start to finish. This process of genuine engagement helped to build trust with EMCs  
508 leading to more open and honest conversations, and a better research environment for both  
509 researchers and study participants.

## 510 **Conclusion**

511 PA and healthy eating messaging specifically targeting EMCs during the COVID-19 pandemic  
512 was limited and not well received. The tone of the messaging, government actions during the  
513 pandemic, negative interpretations of messaging and previous negative experiences all  
514 contributed to EMCs dismissing and distrusting the messaging they received. The most  
515 important activities to improve public health messaging and the way EMCs receive those  
516 messages is to commit to real, long-term engagement focused on trust building and to produce  
517 relevant, specific, and credible support for PA and healthy eating for EMCs. All these have  
518 great potential for improving health and wellbeing and reducing inequalities.

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## 749 **Supporting information**

750 S1 Checklist. Completed PRISMA-ScR checklist for scoping review

751 S1 Text. MEDLINE search strategy for scoping review

752 S1 Table. Grey literature search strategy for scoping review

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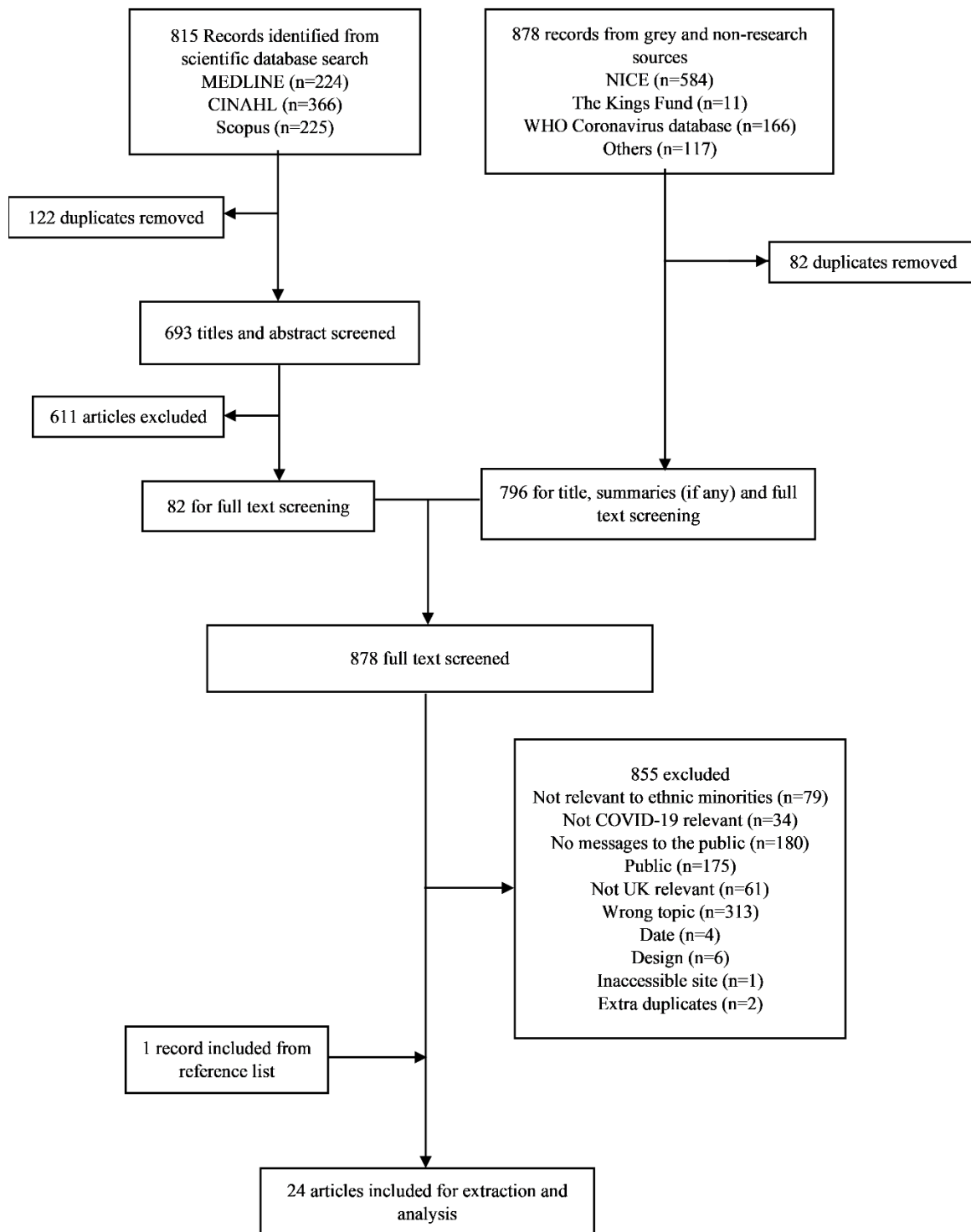
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761 **Fig 1. PRISMA flow diagram of study selection process**

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**S1 Table: Grey Literature search strategy for scoping review**

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*Table 1: Grey Literature resources searched that yielded articles*

<b>Website or Resources searched</b>	<b>Search terms</b>
NICE Evidence Search	(Covid19 OR pandemic OR lockdown OR isolation OR quarantine) AND (BAME OR BME OR "ethnic minority") AND (nutriti* OR diet* OR immun* OR sport* OR food OR nutrient* OR exercis* OR "physical activit*" OR obesity OR sedentary)
WHO Global literature on coronavirus disease database	(Covid19 OR pandemic OR lockdown OR isolation OR quarantine) AND (BAME OR BME OR "ethnic minority") AND (nutriti* OR diet* OR immun* OR food OR nutrient* OR exercis* OR sport* OR "physical activit*" OR obesity OR sedentary)
The Kings Fund	nutriti* OR diet* OR immun* OR sport* OR food OR nutrient* OR exercis* OR physical activ* OR obesity OR sedentary AND (BAME or BME or Ethnic OR minorit) AND (Covid19 OR pandemic OR lockdown OR quarantine)
Patient UK	(Black OR Asian OR BAME OR BME OR "Ethnic minority") AND (COVID 19) AND (diet OR food OR nutrition OR nutrient OR immun OR "physical activity" or exercis OR sport OR obesity OR sedentary)
WHO Coronavirus disease advice for the public, Diabetes UK, British lung foundation, Mental health foundation (6), Migrant information Hub (2), Partnership for Maternal, New-born and Child Health, The Health foundation, British heart foundation, Google search, British Nutrition Foundation, UNICEF tips and guidance for families	Hand searched using: healthy eating, physical activity, exercise, sedentary, nutrition, diet, food, BAME, BME, ethnic, ethnic minority and COVID.

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**S1 Text: MEDLINE Search strategy for scoping review**

775 Ovid MEDLINE(R) <1996 to October Week 3 2021>

776 1. Minority Groups/ or Minority Health/ or Ethnic Groups/ or Asian Continental Ancestry  
777 Group/ or African Continental Ancestry Group/ or Continental Population Groups/ or  
778 Culture/

779 2. (ethnic\* adj1 minorit\*).ti,ab,kw,kf.

780 3. (Africa\* or Asia\*).ti,ab,kw,kf.

781 4. (Mixed adj1 ethnic\*).ti,ab,kw,kf.

782 5. (Multiple adj1 ethnic\*).ti,ab,kw,kf.

783 6. (Black\* adj1 ethnic\*).ti,ab,kw,kf.

784 7. (BAME\* or BME\* or rac\* or cultur\* or underserv\* or disadvantag\* or depriv\* or unequal\*  
785 or marginali\* or vulnerab\* or Caribbean\*).ti,ab,kw,kf.

786 8. (migrant\* or immigrant\* or Refugee\* or (Asylum\* adj1 seek\*).ti,ab,kw,kf.

787 9. Coronavirus/ or Coronavirus Infections/ or COVID-19/ or Pandemics/ or Quarantine/ or  
788 Patient Isolation/

789 10. (coronavirus\* or coronovirus\* or coronavirinae\* or CoV).ti,ab,kw,kf.

790 11. ("2019-nCoV\*" or 2019nCoV\* or "19-nCoV\*" or 19nCoV\* or nCoV2019\* or "nCoV-  
791 2019\*" or nCoV19\* or "nCoV-19\*" or "COVID-19\*" or COVID19\* or "COVID-2019\*" or  
792 COVID2019\* or "HCoV-19\*" or HCoV19\* or "HCoV-2019\*" or HCoV2019\* or "2019  
793 novel\*" or Ncov\* or "n-cov" or "SARS-CoV-2\*" or "SARSCoV-2\*" or "SARSCoV2\*" or  
794 "SARS-CoV2\*" or SARSCov19\* or "SARS-Cov19\*" or "SARSCov-19\*" or "SARS-Cov-  
795 19\*" or SARSCov2019\* or "SARS-Cov2019\*" or "SARSCov-2019\*" or "SARS-Cov-  
796 2019\*" or SARS2\* or "SARS-2\*" or SARScoronavirus2\* or "SARS-coronavirus-2\*" or  
797 "SARScoronavirus 2\*" or "SARS coronavirus2\*" or SARScoronavirus2\* or "SARS-  
798 coronavirus-2\*" or "SARScoronavirus 2\*" or "SARS coronavirus2\*" or covid).ti,ab,kw,kf.

799 12. (stay\* adj1 home\*).ti,ab,kw,kf.

800 13. "severe acute respiratory syndrome".ti,ab,kw,kf.

801 14. (pandemic\* or lockdown).ti,ab,kw,kf.

802 15. Policy/ or Public Policy/ or Guideline/ or Government regulation/ or World Health  
803 Organization/

804 16. Health Literacy/ or Health Promotion/ or Health Policy/ or Health Behavior/ or Health  
805 Knowledge, Attitudes, Practice/ or Health Communication/ or Health Education/ or  
806 International Health Regulations/ or Patient Education as Topic/ or Consumer Health  
807 Information/

808 17. Mental health/ or Public health/ or Population health/ or Health/ or Public Health  
809 Practice/

810 18. "Diet, Food, and Nutrition"/ or Diet, Healthy/ or Diet, Reducing/ or Diet Therapy/ or  
811 Diet/ or Diet, Western/ or Diet Fads/

812 19. Food Preferences/ or Food/

813 20. Nutrients/ or Nutrition Policy/ or Nutrition Therapy/ or Nutritional Requirements/ or  
814 Nutritional Status/ or Nutritional Support/ or Malnutrition/

815 21. Eating/ or Feeding Behavior/

816 22. Weight Loss/ or Overweight/ or Obesity/ or Obesity Management/

817 23. (food\* or eat\* or diet\* or meal\* or nutri\*).ti,ab,kw,kf.

818 24. (nutri\* adj1 immun\*).ti,ab,kw,kf.

819 25.Exercise/

820 26. Physical Fitness/

821 27. Sedentary Behavior/

822 28. ((physical\* adj1 activ\*) or (exercis\* or sport\*) or active liv\* or active\* lifestyle\* or  
823 (work\* adj1 out\*)).ti,ab,kw,kf.

824 29. ((health\* adj1 liv\*) or health\* lifestyle\*).ti,ab,kw,kf.

825 30. ("physical\* activity\*" adj1 (advi\* or recommend\* or tips or briefing\* or consideration\*  
826 or guidance\* or guideline\* or messag\* or statement\* or myth\* or report\* or policy\* or  
827 policies or regulati\* or promot\* or inform\* or communicat\*)).ti,ab,kw,kf.

828 31. (nutri\* adj1 (advi\* or recommend\* or tips or briefing\* or consideration\* or guidance\* or  
829 guideline\* or messag\* or statement\* or myth\* or report\* or policy\* or policies or regulati\* or  
830 promot\* or inform\* or communicat\*)).ti,ab,kw,kf.

831 32. (diet\* adj1 (advi\* or recommend\* or tips or briefing\* or consideration\* or guidance\* or  
832 guideline\* or messag\* or statement\* or myth\* or report\* or policy\* or policies or regulati\* or  
833 promot\* or inform\* or communicat\*)).ti,ab,kw,kf.

834 33. (food\* adj1 (advi\* or recommend\* or tips or briefing\* or consideration\* or guidance\* or  
835 guideline\* or messag\* or statement\* or myth\* or report\* or policy\* or policies or regulati\* or  
836 promot\* or inform\* or communicat\*)).ti,ab,kw,kf.

837 34. (exercis\* adj1 (advi\* or recommend\* or tips or briefing\* or consideration\* or guidance\*  
838 or guideline\* or messag\* or statement\* or myth\* or report\* or policy\* or policies or regulati\*  
839 or promot\* or inform\* or communicat\*)).ti,ab,kw,kf.

840 35. (sport\* adj1 (advi\* or recommend\* or tips or briefing\* or consideration\* or guidance\* or  
841 guideline\* or messag\* or statement\* or myth\* or report\* or policy\* or policies or regulati\* or  
842 promot\* or inform\* or communicat\*)).ti,ab,kw,kf.

843 36. 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8

844 37. 9 or 10 or 11 or 12 or 13 or 14

845 38. 15 or 16 or 17

846 39. 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29

847 40. 30 or 31 or 32 or 33 or 34 or 35

848 41. 38 and 39

849 42. 40 or 41

850 43. 36 and 37 and 42

851 44. limit 43 to yr="2019 - 2021"

852