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9 **ABSTRACT**

10 **Introduction**

11 Shielding aimed to protect those predicted to be at highest risk from COVID-19 and was
12 uniquely implemented in the United Kingdom during the first year of the pandemic, from
13 March 2020. As the first stage in the EVITE Immunity evaluation, we generated a logic
14 model to describe the programme theory underlying the shielding intervention.

15 **Design and participants**

16 We reviewed published documentation on shielding to develop an initial draft of the logic
17 model. We then discussed this draft during interviews with 13 key stakeholders involved in
18 putting shielding into effect in Wales and England. Interviews were recorded, transcribed and
19 analysed thematically to inform a final draft of the logic model.

20

21 **Results**

22 The shielding intervention was a complex one, introduced at pace by multiple agencies
23 working together. We identified three core components: agreement on clinical criteria;
24 development of the list of people appropriate for shielding; and communication of shielding
25 advice. In addition, there was a support programme, available as required to shielding
26 people, including food parcels, financial support, and social support. The predicted
27 mechanism of change was that people would isolate themselves and so avoid infection, with
28 the primary intended outcome being reduction in mortality in the shielding group.

29 Unintended impacts included negative impact on mental and physical health and wellbeing.

30 Details of the intervention varied slightly across the home nations of the UK, and were
31 subject to minor revisions during the time the intervention was in place.

32

33 **Conclusions**

34 Shielding was a largely untested strategy, aiming to mitigate risk by placing a responsibility
35 on individuals to protect themselves. The model of its rationale, components, and outcomes
36 (intended and unintended) will inform evaluation of the impact of shielding and help us to
37 understand its effect and limitations.

38

39

40 Strengths and limitations

- 41 • This paper presents the first description of the rationale for shielding which was an
42 internationally unique and untested public health intervention implemented in the
43 UK during the COVID 19 pandemic
- 44 • Our paper combines formal documentation on the shielding programme in the UK
45 with interviews with those with those involved in creating and implementing it, so
46 allowing for an exploration of how the rapidly implemented policy was
47 operationalised on the ground
- 48 • This logic model provides the first step in undertaking the EVITE Immunity study, a
49 population-scale national assessment of effects of shielding on COVID-19 infection
50 rate, mortality, serious illness, use of NHS resources, health-related quality-of-life
51 and behaviour.
- 52 • While we collected views from policy makers in England and Wales, the majority of
53 interview participants were based in Wales, so their experience may not be
54 representative of all other parts of the UK.
- 55 • Developing this logic model within EVITE Immunity study has involved people with
56 direct experience of shielding from the outset, with public contributors represented
57 across all aspects of research development and implementation, reflecting strong
58 views that evidence about effects of shielding is needed.

59

60 Main text: 3892 words

61

62 Background

63 As an early response to the COVID-19 pandemic, the four UK nations introduced a policy of
64 'shielding' for clinically extremely vulnerable (CEV) people. Those identified as being at the
65 highest risk from COVID-19 infection, due to pre-existing conditions such as lung disease or
66 current immunosuppressant medications, were strongly advised to strictly self-isolate, not
67 leaving the home unless it was vital. The policy was the subject of rapid development and
68 implementation. It was first discussed by SAGE (UK's Scientific Advisory Group for
69 Emergencies) on 13th March 2020, and put into place within ten days. To support the
70 shielding policy, a programme of practical and financial support was made available by a
71 range of statutory, commercial and third sector partners.

72 The shielding intervention was in place for a total of 10 months over two periods, before
73 being suspended in the spring of 2021. It eventually included over 4 million people across
74 the UK [1].

75 Shielding was introduced as a novel precautionary response to an unprecedented situation,
76 with no underpinning empirical evidence about its effectiveness at reducing SARS-CoV-2
77 infections, serious illness or deaths.

78 We undertook an evaluation of shielding in Wales (EVITE Immunity), where records for the
79 130,000 people who were identified for shielding are already anonymously linked with
80 other integrated data sources, utilising the MRC funded ConCOV project in the Secure
81 Anonymised Information Linkage (SAIL) Databank [2]. Initial findings show that people were
82 more likely to have been identified for inclusion in the shielding intervention with increasing
83 age, frailty and residence in deprived areas; and that reported infection rate was higher in
84 the shielded cohort than the non-shielded general population, though testing rates were
85 higher and infection rates amongst those not tested in each cohort were unknown [3]. We
86 will also report how shielding affected deaths, health care utilisation, immunity status, NHS
87 costs, and quality-of-life, and how people complied with guidance [4].

88 In line with the latest MRC guidelines on evaluating complex interventions [5], the first stage
89 of the EVITE Immunity study aimed to develop a programme theory to explain the
90 intentions of the policy, making explicit all components of the intervention (defined here as

91 being the shielding policy plus support programme), and representing these in a logic
92 model, presented in this paper. Logic models can have a particular value in helping to
93 articulate causality in the evaluation of public health interventions [6]. We will use this logic
94 model to guide the analysis and interpretation of evaluation findings.

95

96 Methods

97 Our study was designed as case study research. Based on published information, we
98 prepared a draft logic model describing the components of the intervention, the
99 mechanisms by which it was assumed to work, outcomes, intended impact, risks, and
100 relevant contextual factors. We conducted individual interviews (n=3) and group interviews
101 (n=4) online with a total of 13 key stakeholders: senior policymakers and clinicians from
102 Public Health and Chief Medical Officers' teams, and representatives from local government
103 and the voluntary and community sector, in Wales (n=12) and England (n=1). Respondents
104 were recruited to provide a range of relevant perspectives. Interviews were conducted by
105 experienced qualitative researchers from Swansea University. In advance of the interview,
106 we shared an information sheet on the study with participants and they completed written
107 consent forms.

108 We used a semi-structured interview schedule [Supplementary file EVITE Immunity
109 Rationale for shielding March 2023 Appendix Interview questions.docx (v1.0)] to explore the
110 rationale for shielding, steps undertaken to create and implement the intervention, and
111 individual/organisational roles. We showed participants the draft logic model and invited
112 comments and discussion. Data collection took place between March and May 2021.

113 We recorded and transcribed interviews, with participants' consent. We analysed the data
114 using a framework approach to thematic analysis, incorporating a tabular data summary of
115 cases/codes and data extracts [7], and refined the logic model into a final version. Each
116 transcript was reviewed and coded by two members of the study team; findings and
117 implications were discussed by the whole study team, including public participants.

118

119 Patient and public involvement

120 People affected by the shielding policy have been directly involved throughout development
121 of the research design [8-10]. Two were co-applicants on the funding proposal and are
122 members of the Research Management Group overseeing study implementation (LG, LD).
123 They work with six more public contributors via a Patient Advisory Panel. An independent
124 Study Steering Committee includes two further public contributors. Our public contributors
125 and some academic co-applicants were personally, directly or indirectly, affected by the
126 implementation of the shielding policy.

127

128 Results

129 The final version of the logic model describing the shielding intervention is shown in Figure
130 1. This incorporates some changes made following analysis of the interviews, including
131 reduced deaths among the shielding population being highlighted as the primary intended
132 impact, while the proximate outcome of 'avoided infection' was changed to 'reduced
133 infection'. Small additions were made to inputs, context and unintended impacts. Below, we
134 present and discuss the key aspects of the logic model and report the experience and
135 reflections of the stakeholders we interviewed.

136 [Figure 1 Logic Model describing the shielding intervention]

137 *Inputs: components of the intervention*

138 The intervention was complex. There were three core processes relevant to all people
139 advised to shield: the Chief Medical Officers of the four nations reaching agreement on the
140 clinical criteria for inclusion on the CEV list; identification of people to be added to the list;
141 and communication with those identified.

142 Identifying and communicating with CEV people took place in phases, with batches of
143 individuals being added to the list over the time the shielding programme was 'live' and
144 much smaller numbers being removed. Across the UK, CEV people were identified through
145 searches of centralised databases (which produced the majority of names for the list in
146 Wales), and through primary and secondary care records, in conjunction with doctors'
147 clinical judgement [11]. This mixed approach was described as '*build the list nationally first
148 and then ask GPs to review*' (Participant 2 Policy Maker). Some GPs and practice managers

149 responded to people requesting to be removed from, or added to, the list. As one
150 respondent noted, this was more significant than a mere administrative process:

151 *'The GP had the authority to put people on and off, but a lot of the GPs hadn't*
152 *realised... what the implication of that was for the individual about going back to*
153 *work, back to school, or actually getting access to the food box or not.'* (Participant 9
154 Local government)

155 The development of the QCovid risk prediction tool, which identified clinical and
156 demographic risk factors for COVID-19-related hospitalisations and deaths [12 ,13] led to
157 substantial numbers being added to CEV lists in the summer of 2020.

158 The 'binary' nature of inclusion on the list was seen by one respondent as problematical:

159 *'It didn't reflect the spectrum of risk. So you were selecting a group of people for*
160 *really quite an austere set of advisory statements, but actually nothing for the rest.'*
161 *(Participant 1 Policy Maker)*

162 Letters were sent to CEV people strongly advising them to shield from 23rd March 2020,
163 initially for 12 weeks [14]. Respondents reported considerable thought going into the exact
164 wording of the letters, with an emphasis on them giving advice, not instruction:

165 *'We were telling people they could rather than telling people they must.It was*
166 *strong advice, but it was set in advisory terms.'* (Participant 7 Policy maker)

167 Where telephone numbers were available, reinforcement of the advice was sent by text
168 message.

169 The other aspect of the intervention was the support programme, a range of components
170 experienced by some CEV people as required. These included eligibility (achieved through a
171 change in legislation) for Statutory Sick Pay for CEV people, even if they were not ill, to allow
172 them to take time off work if their job could not be done at home. For those who needed
173 them, the UK government contracted with commercial providers to deliver weekly food
174 parcels. CEV people could also access delivery of medications and were given priority by
175 supermarkets for food delivery.

176 Other forms of support were available through local government and partner organisations,
177 and CEV people were invited to register to access this. Welsh local government respondents

178 described taking a proactive approach to contacting CEV people who might be in need of
179 help, through welfare telephone calls:

180 *'trying to keep [CEV people] linked into their society, their communities. So it was*
181 *very much a kind of social response to it...Most of the people doing the calling were*
182 *our librarians.'* (Participant 10 Local government)

183 Although changes to data sharing rules allowed lists of CEV people to be supplied to local
184 government, significant challenges were reported with using the shared data:

185 *'It was incomplete. It wasn't accessible...It wasn't transferable. It didn't match any of*
186 *the other datasets. We couldn't identify individuals through it. I think the first lot*
187 *didn't even have people's names. It just had their NHS number.'* (Participant 11 Local
188 government)

189 Voluntary and community sector (VCS) organisations often worked in co-ordination with local
190 and central government, running telephone helplines offering advice and emotional support
191 for isolated people:

192 *'We switched from a Monday to Friday, nine to five operation, to a seven day a week*
193 *operation. ...We were even doing things like contacting very local suppliers, and*
194 *shops, to see if we could get deliveries put in place for people.'* (Participant 3
195 Voluntary and community sector)

196

197 *Predicted mechanisms of change and outcome*

198 The predicted mechanism of change was that people would isolate themselves, with the
199 outcome of avoiding infection. Some respondents expressed anxiety about the loss of
200 liberty this represented, even though *'it was really quite an honourable aim'* (Participant 1
201 Policy Maker). Initially, shielding people were advised to avoid all contact with others, even
202 within the home. Respondents were aware that this was problematical:

203 *'Everybody realised that wasn't realistic for ninety per cent of people, who don't live*
204 *in houses with west wings and east wings. And so... it then became a household*
205 *isolation, which was even worse.'* (Participant 1 Policy Maker)

206 Equally, some of those shielding would require care at home, with care workers a potential
207 source of infection:

208 *'A number of these people were vulnerable, they had comorbidities, they required*
209 *support to manage that, and therefore contact would occur'. (Participant 5, Policy*
210 *Maker)*

211 Respondents were aware that adherence to shielding advice would vary between
212 individuals, and also over time, but felt that overall risk would still be reduced:

213 *'It's not an all or nothing, it's not if you break it once, you've broken the law, like with*
214 *the legislative regulations.'* (Participant 2 Policy Maker)

215

216 *Intended impact*

217 The primary intended impact was a reduction in mortality among CEV people. This was
218 emphasised strongly by most respondents.

219 *'The idea is that if we isolate them they're less likely to get it, because if they get it*
220 *they're probably going to be really, really poorly and die.'* (Participant 5, Policy
221 *Maker)*

222 Some respondents described a broader range of beneficial impacts, including limiting the
223 burden on the NHS, engendering of community spirit, and more social and voluntary
224 support for isolated vulnerable people.

225 *'It's about protecting the NHS, because that's in all our interests, isn't it, but actually*
226 *on a local level, it was very much about supporting our communities.'* (Participant 10,
227 *Local government)*

228

229 *Risks/unintended impact*

230 All participants described potential risks or unintended impact of shielding, and in particular
231 the impact which it might have on mental health, through isolation and anxiety:

232 *'Some people who are shielding are still able to be effectively engaged somehow with*
233 *society. They're working from home or whatever. But others have suffered, probably*

234 *a lot...It created a whole lot of knock-on anxiety and everybody who was related in*
235 *any way with the shielded person [was] put in a state of heightened awareness and*
236 *heightened anxiety.'* (Participant 1 Policy Maker)

237 Concerns about the long-term mental health impact were reported as a factor in the
238 decision to pause shielding advice in July 2020:

239 *'The effect on mental health started to outweigh the benefit once the prevalence was*
240 *low enough.'* (Participant 2 Policy Maker)

241 In addition, concerns were widely expressed about the impact of shielding on physical
242 health, including muscle wastage:

243 *'The debilitation from not leaving the house ...this was not just that you were telling*
244 *ninety- year-olds and eighty-year-olds, you were telling this to often quite fit young*
245 *people who just had another condition to stay in the house.'* (Participant 4, Policy
246 *Maker)*

247

248 Other unintended impacts included that on the workforce, as CEV people whose jobs could
249 not be done from home were no longer available to work.

250

251 *Contextual factors*

252 The shielding policy was based on the assumption that the CEV group would have enhanced
253 protection over that of the general population. Almost as soon as shielding started, a
254 lockdown was introduced for the wider population, imposing legally mandated restrictions
255 on spending time outside the home except for certain exemptions. The national lockdown
256 also brought certain whole-population initiatives, such as the 'furlough scheme' to subsidise
257 wages for staff on temporary leave.

258 Respondents reflected that although lockdown was likely to have slowed the spread of the
259 virus in the wider population, continuing steady rates of infection meant that shielding
260 needed to continue to run in parallel:

261 *'It went on an awful lot longer than was envisaged in the first instance.'* (Participant
262 *4 Policy Maker)*

263 Since the shielding policy was developed in the context of a crisis, it - along with the
264 associated shielding programme - was devised and implemented at an unusually fast rate,
265 and participants spoke of a clear shared purpose:

266 *'We all had to make decisions differently and quickly, and we all had to use a bit*
267 *more common sense than the traditional waiting for somebody else to come up with*
268 *a strategy.'* (Participant 8 Local government)

269 Local government respondents reported that there was a blurring around the edges of the
270 population receiving their input, as they added people they knew to be vulnerable to their
271 lists for this type of support, in addition to CEV people on the shielding list.

272 *'Our proactive calling quickly extended to older people who were not necessarily*
273 *shielding, but we felt they were also vulnerable – a number of them were... in effect*
274 *shielding themselves.'* (Participant 10 Local government)

275 In addition to the formal social support available from local authorities and third sector
276 organisations, many CEV people were likely to have been able to access a wide range of
277 other resources within the community, which enabled shielding to happen, especially
278 informal support from family and friends. However, some would have lacked informal
279 support from family, friends, and neighbours and may have become increasingly isolated.

280

281 *Discussion*

282 *Principal findings*

283 Our logic model provides a visual presentation of our understanding of the programme
284 theory underlying the shielding intervention introduced across the UK to protect the most
285 vulnerable people during the early phases of the COVID-19 pandemic. It captures the key
286 components of the shielding intervention (policy plus support programme), and identifies
287 the mechanism by which it might make a difference, potential impacts, both unintended
288 and intended, and key contextual factors. The logic model will underpin our evaluation of
289 the impact of the shielding intervention, and we will continue to review it as the evaluation
290 is finalised, in order to provide a structure to evaluating an intervention which to an extent
291 was fluid and extemporised.

292 Our interviews with the key stakeholders add three main areas of insight: into the iterative
293 and fluid process of developing and implementing shielding; into the range of activities
294 which local government and the third sector introduced to support shielding people, outside
295 the formal bounds of the programme; and into the feelings of many of those involved in the
296 process, who revealed uncertainty about not only the logic but also the justice of shielding.
297 The shielding policy, like many other aspects of the UK government’s response to SARS-CoV-
298 2, was introduced at pace. This left those involved in implementing the policy and delivering
299 the shielding programme to work out the details at speed, once the decision had been
300 made. The policy implementation and support programme were designed and iteratively
301 refined by the many different parties collaborating on the work across the four nations of
302 the UK – not just SAGE, civil servants and clinicians, but also those involved in providing
303 services at local and community level. In the delivery of the shielding support programme,
304 there was some blurring, as the formal shielding policy ended up being delivered alongside
305 support interventions for those regarded as vulnerable for social rather than clinical
306 reasons. This does not undermine the programme theory, but instead is integral to it.

307 The nature of implementation as a process over time could also be observed. Although the
308 basic principle of shielding remained the same throughout the time period of the
309 intervention, the details evolved significantly – in terms of the nature of the advice, the
310 definition of who should be on the shielding list, and in turn, the numbers of those included.
311 As the pandemic continued, the evolution of the innovative attempts to deal with its impact
312 were obvious, with new ways of working emerging between national government, local
313 government and the voluntary and community sector.

314 There was some ambiguity about who was doing the shielding: the use of the term ‘Shielded
315 Patient List’ in guidance from the Department of Health and Social Care [15] implies that
316 those at risk were being shielded by the state; yet the advisory nature of the guidance
317 suggests that people were being asked to actively shield themselves – shielding rather than
318 being shielded.

319

320

321

322 *Context of other literature*

323 The changes in the intervention over time noted in our study reflect the evolving nature of
324 the shielding list, and the slippage between guidance and advice in public discourse, has
325 been tracked in detail by Herrick [16]. Emerging evidence suggests that, despite the
326 shielding intervention, there were still high rates of infection, hospitalisation and mortality
327 in the shielding group [3,17] casting doubt on the mechanism proposed. This may in part be
328 due to the impracticality of truly isolating people, particularly those who were in contact
329 with clinical care providers and carers due to their vulnerability. Modelling has suggested
330 that under an 'imperfect' but realistic shielding strategy, in which contacts for those shielding
331 were reduced by 80%, would still allow high rates of infection of high risk individuals, with
332 deaths estimated at 150% -300% higher than under an implausible 'perfect' shielding model
333 in which contacts were reduced to zero [18]. High rates of nosocomial COVID-19 infection
334 have been identified, likely to disproportionately affect CEV people [19-21].

335 Our findings confirm previous studies which have identified the crucial role of local
336 government and VCS organisations in supporting the implementation and operationalisation
337 of the shielding policy [22], and previous work discussing local variation in how the CEV list
338 was created and the proportion and make-up of population on it [1], in particular associated
339 with the addition of people to the list by local clinicians [23]. Communication with CEV
340 people to inform them of the support available has been reported elsewhere as missing
341 thousands of people, as records were incomplete [23]. A rapid evaluation in Scotland
342 concluded that while the principle of shielding was valid, the intervention should not be
343 repeated in exactly the same format [24].

344 The concerns expressed in our interviews about potential negative impacts of shielding
345 reflect suggestions from other studies that people advised to shield may have experienced
346 increased anxiety and mental ill-health and struggled to access routine healthcare [1 ,25],
347 and there may have been an additional strain on unpaid carers who were left without their
348 usual support [26].

349

350

351 *Strengths and limitations*

352 This is the first study to develop a logic model examining all components of the UK COVID-
353 19 shielding policy and programme, and to report the perspective of those involved in
354 operationalising it.

355 In this phase of the EVITE Immunity evaluation, we did not record the perspective of CEV
356 people themselves, who will have adhered to a greater or lesser extent, with adherence
357 perhaps changing over time [11]; later phases of EVITE Immunity will explore the experience
358 of this group.

359 *Implications*

360 The UK's response to the pandemic of advising shielding for the most vulnerable was an
361 unusual one, paralleled most closely in Europe by Ireland and by Sweden, where a policy of
362 shielding people aged over 70 contrasted with the general population lock downs of its
363 Nordic neighbours [27]. Although initial modelling in the UK explored a similar community
364 level, age-based approach to shielding [28 ,29], the adoption instead of an approach based
365 on identifying and targeting individual clinical vulnerability was substantially more complex,
366 and perhaps was regarded as more acceptable to the public. The emphasis in the UK on a
367 mitigation approach – reducing the peak of infection while protecting the vulnerable – was
368 soon overtaken by the imposition of general population lockdowns, but the two policy
369 approaches continued to run in parallel, at least initially. Modelling early in the pandemic
370 had identified a potential trade-off between increasing protection of the vulnerable and
371 relaxing restrictions on the non-vulnerable [11]. However, the overlapping lockdown and
372 shielding restrictions in the UK, together with the 'leakage' of shielding through necessary
373 personal contacts, along with rates of full compliance reported as down to less than two
374 thirds of those on the list by early summer 2020 [30] make it hard to measure how this has
375 played out. The impact of shielding will have depended in part on people's willingness to
376 comply with guidance, shaped in turn by media narrative and social norms. There was no
377 equivalent guidance on second level shielding, for those essential close contacts of the
378 shielded population, and measures to control infection within the wider population were
379 imperfect.

380 Over time, there has been an evolution of risk within the shielded population resulting from
381 subsequent waves of coronavirus infection, along with the vaccination programme.
382 Shielding has now formally ended in both England and Wales. The most recent government
383 guidance to previously shielding people in England reassured that, with protection from the
384 vaccine, they would no longer be at substantially greater risk than the rest of the population
385 [31], though new mutations challenge the efficacy of existing vaccines. A now much better
386 defined core high risk subset remains, consisting of those unable to respond to vaccination
387 appropriately [32].

388 In terms of both infection rates and mortality in the UK, the pandemic has been identified as
389 having an unequal impact on the population, reflecting health inequalities ultimately rooted
390 in social inequalities [32]. The shielding policy may have exacerbated these, as those living in
391 more crowded accommodation would have found it more challenging to maintain isolation
392 from others.

393 Conclusion

394 The shielding intervention was introduced to save lives by protecting the most vulnerable to
395 SARS-COV-2 infection. The shielding programme of support was introduced particularly
396 rapidly and involved novel collaborations between various agencies. Components varied
397 slightly but were broadly similar across the UK. It was a hitherto largely untested strategy
398 based on 'common sense' risk mitigation rather than evidence based interventions.

399 Naturally, this large scale initiative created challenges both for those attempting to
400 implement the policy and for those meant to benefit from it. Our logic model allows us to
401 understand the different impacts (intended and unintended) of the shielding programme on
402 organisations and populations, and spells out its rationale, components, and mechanisms.
403 Developing the logic model with input from key stakeholders has given additional insight to
404 help us understand the causal links which will inform our evaluation of the impact of
405 shielding and help us to understand its effect and limitations.

406

407

408 **Ethics:**

409 The EVITE Immunity study has received approval from the Newcastle North Tyneside 2
410 Research Ethics Committee (IRAS 295050).

411 **Transparency statement:**

412 Alison Porter is the manuscript's guarantor and affirms that the manuscript is an honest,
413 accurate, and transparent account of the study being reported; that no important aspects of
414 the study have been omitted; and that any discrepancies from the study as originally
415 planned (and, if relevant, registered) have been explained.

416

417 **Contributorship statement:**

418 AP contributed to the conception and design of the study, to data acquisition, analysis and
419 interpretation, and led the drafting of the paper. BE and VW contributed to the conception
420 and design of the study, to data acquisition, analysis and interpretation, and critically
421 reviewed the draft paper. LD and LG contributed to the conception and design of the study,
422 contributed to data analysis and interpretation, and critically reviewed the draft paper. AA,
423 AC-S, JD, AE, AJ, SJ, MK, RL, JM, BS, AW contributed to the conception and design of the
424 study and critically reviewed the draft paper. HS led the study, contributed to the
425 conception and design of the study and critically reviewed the draft paper.

426

427 **Competing interests:**

428 Ronan Lyons, Stephen Jolles, Ann John and Adrian Edwards are members of the Welsh
429 Government COVID-19 Technical Advisory Group. Ann John is also co-Chair of the Scientific
430 Pandemic Insights Group on Behaviours (SPI-B) which is a subgroup of the Scientific Advisory
431 Group for Emergencies (SAGE) advising the UK government. Stephen Jolles is also a member
432 of the Welsh Government Testing TAG and Cardiff University COVID Strategic Advisory Board
433 (SAB). No other authors have competing interests.

434

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437

438 **Data availability statement:**

439 No additional data available.

440

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442

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