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Public acceptability of non-pharmaceutical interventions to control a pandemic in the United Kingdom: a discrete choice experiment

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Abstract

Objective

To understand how individuals make trade-offs between features of lockdown interventions to control a pandemic across the four nations of the United Kingdom.

Design

Survey that included a Discrete Choice Experiment (DCE). The survey design was informed using policy documents, social media analysis and with input from remote think aloud interviews with members of the public (n=23).

Setting

Nation-wide survey across the four nations of the United Kingdom. Representative sample in terms of age and sex for each of the nations recruited using an online panel between 29th October and 12th December 2020.

Participants

Individuals who are over 18 years old. A total of 4120 adults completed the survey (1112 in England, 848 in Northern Ireland, 1143 in Scotland and 1098 in Wales).

Primary outcome measure

Adult's preferences for, and trade-offs between, type of lockdown restrictions, length of lockdown, postponement of routine healthcare, excess deaths, impact on ability to buy things and unemployment.

Results

In all four countries, one out of five respondents were willing to reduce excess deaths at all costs. The majority of adults are willing to accept higher excess deaths if this means lockdowns that are less strict, shorter and do not postpone routine healthcare. On average, respondents in England were willing to accept a higher increase in excess deaths to have less strict lockdown restrictions introduced compared to Scotland, Northern Ireland, and Wales, respectively.

Conclusions

The majority of the UK population is willing to accept the increase in excess deaths associated with introducing less strict lockdown restrictions. The acceptability of different restriction scenarios varies according to the features of the lockdown and across countries. Authorities can use information about trade-off preferences to inform the introduction of different lockdown restriction levels, and design compensation policies that maximise societal welfare.

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Strengths and limitations of this study

- This study offers empirical evidence that, unlike existing data from opinion polls and citizens' panels, offers a clear understanding of the trade-offs between restrictions and impacts of lockdown on society.
- Estimating preferences for each nation, and quantifying them in terms of a common denominator, allows a comparison that takes into account the heterogeneity of UK nations and can be used to inform the introduction of different levels of lockdown restrictions in each.
- A limitation of our study is that we are not able to estimate the effect of on-going lockdowns in preferences. Furthermore, our results are not necessarily transferable to other nations.

Introduction

The COVID-19 pandemic has required countries worldwide to introduce non-pharmaceutical interventions to protect the health and wellbeing of their citizens.[1] The majority of European and high-income nations have focused on reducing the R number to less than one and thereby curtailing the epidemic spread of the virus.[2,3] This strategy requires a number of non-pharmaceutical interventions such as enforced social distancing across all age groups, closing schools and non-essential businesses, and a range of other social restrictions.[4] This has led to local and nationwide lockdowns and other restrictions to control infection rates and excess deaths within geographically defined populations.[5-7]

Lockdowns have wider indirect impacts on health and wellbeing, and lockdown decisions require a careful balancing of the direct impacts on mortality caused by COVID-19 with the indirect wider health, social and economic impacts.[8-11] Further, lockdown compliance will determine its effectiveness. Compliance is more likely if policies are acceptable. Policies are more likely to be acceptable if the public's preferences are understood and the diversity of view is recognised. The World Health Organization criteria for deciding whether to lift lockdown restrictions is defined as *"Communities are fully educated, engaged and empowered to adjust to the "new norm" of everyday life*.[12] This criterion requires a better understanding of how the public respond to and value the trade-offs faced during and post-pandemic. For example, are the public willing to accept a certain number of excess deaths to have restrictions eased?

Prior to the COVID-19 pandemic, there was limited evidence on the understanding of how people think of lockdown policies in the UK.[13] During the pandemic, public attitudes to government responses to the pandemic have been explored using opinion polls and qualitative studies.[14-16] The Scottish Government and Bank of England established citizen's panels.[17,18] These instruments offer insight into the views and concerns of the population. However, they provide no understanding of the trade-offs that individuals are willing to make. For example, the Scottish citizen's panel recommended that the Scottish Government should implement an elimination strategy, and where this is not feasible,

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should aim for maximum suppression of the virus, but not the cost of the restrictions that were acceptable to achieve this. Thus, we use a preference elicitation instrument tailored to quantify preferences, a discrete choice experiment (DCE), to provide new evidence on the acceptable number of excess deaths to the UK public when easing or tightening restrictions.

Methods

Study Sample

We conducted a cross-sectional survey among a representative sample of adults aged over 18 from across the four nations of the United Kingdom. The survey was implemented between 29th October and 12th December 2020. Respondents were recruited using an online survey research panel maintained by the company Qualtrics. The survey was piloted in early October 2020 (n=50 per nation). Respondents were screened by the recruiting company using sex and age using quotas to ensure a balance in each nation. The research company excluded respondents that completed the survey in less than half the median time of completion of the pilot stage of the survey (14 minutes).

Discrete Choice Experiment

Respondents completed a self-complete online survey that asked about the individual's experience during the COVID-19 pandemic, lockdowns that had occurred, any impacts on their healthcare, their spending ability and employment. The survey included a discrete choice experiment (DCE), a choice-based survey that quantifies preferences for attributes (or features) of goods, services or policies. Respondents completed a series of eight choice tasks based on the features of government restrictions. The hypothetical choice tasks focussed on six features of government restrictions that describe different types of lockdown and their likely health and economic consequences.

Features used to describe the *type of lockdown* were: restriction severity using a colour-based tier system (Figure 1), length in weeks, and postponement of routine healthcare procedures. The *health consequences* were the number of excess deaths (we also report infection numbers as a complement based on the infection rate).[19] The *economic consequences* included respondent's household's ability to buy things (personal impact) and the number of job losses (societal impact). See the online Supplemental Table 1 for the features and associated levels. The features and levels were informed by policy documents,[12] impacts of interventions that were implemented in response to COVID-19,[4] literature on preferences for lockdown measures from previous pandemics,[20,21] and a social media analysis. A more detailed description of the development stage can be found in the study's published protocol.[22]

[Figure 1 here]

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Lockdown features and levels were combined into pairwise choice tasks using a D-efficient design.[23,24] The design results in 24 tasks. Respondents were allocated randomly to one of the three survey versions, each with eight tasks. Respondents were asked to choose between two lockdown descriptions (Figure 2). The order of the eight tasks was randomised for each respondent to minimise ordering effects.[25]

[Figure 2 here]

Patient and Public Involvement

Adult members of the public were invited, using two targeted social media campaigns, to take part in the study development stage (see online Supplemental Figures 1–5). These engagements were used to create the survey's content and format, and to construct the framing of the Discrete Choice Experiment's features and levels (see online Supplemental Material document). Twenty-three think-aloud interviews were carried out between the months of June and August 2020. The outcome of each interviews was used iteratively, until saturation was achieved, to make edits to the survey to ensure it captured the intended preferences, was understandable, and minimised respondent burden. The study results will be disseminated to the wider public, with the help of the SAG, using layperson summaries and multimedia content through mass media. Furthermore, the study's Stakeholder Advisory Group (SAG), which includes a member of Scotland's Chief Scientist Office's Public Engagement Group, has been involved since its conception and provided insight into the research questions, overall design and dissemination strategy. Because of the study's ethical approvals, it is not possible for us to contact the members of the public who took part in the survey development stage, nor respondents of the main survey, to disseminate results individually.

Statistical Analysis

The devolved governments of the UK set their own lockdown policies; therefore, statistical analysis was conducted separately for each of the four devolved nations of the UK. The minimal sample size for the DCE given the eight tasks per respondent, a baseline choice probability of 50% (given there were two options in each choice set), an accuracy level of 90% and a confidence level of 95%, using Louviere´s formula for choice proportions, was 49 respondents.[22] Given that we aimed to estimate preferences using flexible logit models, we aimed for a conservative size of 1000 per nation in the UK.

We first test if any respondents were unwilling to accept an increase in excess deaths for improvements in other features. This was defined as respondents who always chose the description with the lowest number of excess deaths. The response pattern for these respondents is shown in the online Supplemental Table 2. We estimated a logit regression model to understand the characteristics of this group for each nation. Predictors included: sex, age, self-perceived health, number of children in household, household income quintile, whether they were asked to shield during previous lockdowns, had their main job

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impacted (furloughed, reduced hours or made redundant), had caring responsibilities and if they had seen their standard of living worsened during the COVID-19 pandemic.

We then analysed the choice tasks using an errors-component logit model, allowing for the panel structure of the data.[26] Parameter estimates represented the effect of each feature on preferences. The ratio of estimates represents the trade-off between two features. Further, trade-offs between different features, when elicited in terms of a common denominator, can be added to estimate the overall trade-off for a particular lockdown scenario. When elicited in terms of excess deaths, these trade-offs indicate the maximum number of lives that need to be saved to introduce a hypothetical lockdown scenario. For example, how many excess deaths would need to be saved when introducing a four-week strict lockdown that cancels all non-COVID-19 healthcare procedures?

The difference in trade-offs between two lockdown scenarios can be interpreted as the maximum number of excess deaths that would be accepted if the more preferred scenario were introduced. To illustrate how these differences can inform policy, we assume that each nation faces a four-week red level (see Figure 1) restriction lockdown that postpones all non-COVID-19 healthcare procedures, and estimate the acceptable number of excess deaths to have this eased to less strict lockdown scenarios. Specifically we compare easing to 12 different lockdowns made up of combinations of amber and yellow restrictions (Figure 1) that vary in length between 8,10 and 12 weeks, and in whether they postpone healthcare services.

Data was weighted to ensure a representative sample in terms of age and sex using iterative proportional fitting.[27] All logit models were estimated using maximum likelihood techniques using the statistical software R (version 3.6.3). Standard errors and confidence intervals (CIs) were computed using the delta method.

Results

4120 respondents completed the survey: 1112 in England, 848 in Northern Ireland, 1143 in Scotland, and 1098 in Wales. Table 1 shows the sample descriptive characteristics across nations.

The number of respondents who consistently chose the alternative with the least excess deaths was 225 (20.2%) in England, 193 (22.8%) in Northern Ireland, 262 (22.9%) in Scotland, and 247 (22.5%) in Wales. Results from the logit model are shown in Table 2. In England, none of the considered variables were associated with respondents always choosing the lowest number of excess deaths. In Northern Ireland, this response pattern was negatively associated with respondents who experienced an impact on employment (adjusted odds ratio [OR] 0.58 [95% CI 0.35–0.97], p=0.04). In Scotland, this response pattern was also negatively associated with respondents who experienced an impact on employment (0.62 [0.40–0.95], p=0.03), and household income of £20,800-£31,200 compared to the reference level of £0-£10,400 (0.54 [0.31–0.95], p=0.03). Furthermore,

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this response pattern was positively associated with having a higher education degree (compared to less than higher education) (1.77 [1.28–2.45], p<0.01) and fair self-reported health compared to very good (1.82 [1.11–2.97], p=0.02). In Wales, this response pattern was negatively associated with age over 55 compared to 18-34 (0.63 [0.40–0.98], p=0.04), household incomes of £10,400-£20,800 (0.49 [0.29–0.83], p=0.01), £20,800-£31,200 (0.57 [0.34–0.96], p=0.04) and over £52,000 (0.49 [0.79–1.56], p=0.03) compared to £0-£10,400. Univariate analyses for each factor are shown in the online Supplemental Table 3.

The preference parameter estimates and corresponding trade-offs in terms of excess deaths based on responses to the choice tasks are shown in Table 3. Across the four nations, respondents prefer lockdowns with less strict restrictions (i.e., green and yellow level) to strict ones (i.e., amber and red level), shorter lockdowns, fewer excess deaths, fewer job losses, and less impact on their ability to buy goods. In England, Northern Ireland and Scotland, respondents prefer no postponement of routine healthcare procedures (at the 10% level). The maximum number of lives (out of 10,000) that need to be saved to accept a change in each of the lockdown features and consequences is shown in the MRS column for each nation.

Figure 3 shows the acceptable maximum excess deaths for easing restrictions from a further 4-week red lockdown to the less strict lockdowns. The highest aversion to strict lockdowns is found in England, followed by Scotland, Northern Ireland and Wales, as seen by the higher number of acceptable excess deaths for lockdown easing. For example, the maximum number of acceptable deaths when easing to an 8-week yellow restriction with no healthcare postponement is 3.62 (95% CI 2.67–4.58) in England, 2.22 (1.21–3.24) in Northern Ireland, 2.41 (1.57–3.24) in Scotland, and 1.10 (0.18–2.02) in Wales. These rates equal 18958, 361, 1265, and 323 excess deaths for each nation, respectively.

As expected, the maximum number of acceptable deaths is lower when moving to more strict (e.g., amber over yellow) and longer lockdowns that postpone routine healthcare procedures. For example, the difference in the acceptable number of deaths between a 4-week red lockdown and a 12-week amber lockdown with healthcare postponement is 0.85 (0.03–1.67) in England and not statistically different from zero in Northern Ireland (X^2=*0.88,* p=0.35), Scotland (X^2=*1.84,* p=0.17), and Wales (X^2=*0.08,* p=0.77). This suggests that respondents in Northern Ireland, Scotland, and Wales are indifferent between continuing with a further 4-week red restriction and easing to a 12-week amber restriction with healthcare postponement.

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Table 1. Characteristics associated with sample by nation.

	England		Northern Ireland		Scotland		Wales	
Sex								
Female	556	50.0%	436	51.4%	592	51.8%	562	51.2%
Male	556	50.0%	412	48.6%	551	48.2%	536	48.8%
Age								
18-34	312	28.1%	242	28.5%	315	27.6%	294	26.8%
35-55	373	33.5%	293	34.6%	375	32.8%	343	31.2%
55+	427	38.4%	313	36.9%	453	39.6%	461	42.0%
Health								
Very good	192	17.3%	140	16.5%	200	17.5%	197	18.0%
Good	542	48.8%	415	49.0%	567	49.6%	505	46.0%
Fair	299	26.9%	217	25.6%	304	26.6%	316	28.8%
Bad	59	5.3%	63	7.4%	65	5.7%	65	6.0%
Very bad	20	1.8%	13	1.5%	7	0.6%	15	1.3%
Shield								
No	831	74.8%	604	71.2%	947	82.9%	823	74.9%
Yes	281	25.2%	244	28.8%	196	17.1%	275	25.1%
Adults in household								
1	273	24.6%	192	22.6%	281	24.6%	249	22.7%
2	614	55.3%	446	52.6%	666	58.3%	657	59.8%
3	136	12.3%	146	17.2%	136	11.9%	133	12.2%
>3	88	7.9%	64	7.6%	60	5.3%	58	5.3%
Children in household								
0	804	72.3%	620	73.1%	861	75.3%	817	74.4%
1	156	14.0%	119	14.0%	163	14.2%	137	12.5%
2	116	10.4%	80	9.4%	99	8.6%	107	9.8%
>2	36	3.2%	29	3.4%	21	1.9%	37	3.3%
Household income								
£0 - £10,400	106	9.5%	112	13.2%	138	12.1%	156	14.2%
£10,400 - £20,800	238	21.4%	185	21.8%	214	18.7%	242	22.0%
£10,400 - £31,200	227	20.4%	204	24.0%	266	23.3%	253	23.0%
£31,200 - £52,000	323	29.0%	221	26.1%	296	25.9%	277	25.2%
£52,000+	218	19.6%	125	14.8%	229	20.0%	170	15.5%
Education								
Less than higher education	695	62.5%	504	59.4%	665	58.2%	679	61.9%
Higher education degree	417	37.5%	343	40.5%	478	41.8%	419	38.2%
Job impact								
No	820	73.7%	650	76.7%	907	79.4%	830	75.6%
Yes	292	26.3%	198	23.3%	236	20.6%	268	24.4%
Caring responsibility								

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No	950	85.4%	692	81.6%	955	83.5%	912	83.1%
Yes	162	14.6%	156	18.4%	188	16.5%	186	16.9%
Affected usual healthcare								
No	654	58.8%	399	47.0%	640	56.0%	579	52.8%
Yes	458	41.2%	449	53.0%	503	44.0%	518	47.2%
Impact on standard of living								
Worsened	332	29.9%	317	37.4%	354	31.0%	352	32.1%
Same or improved	780	70.1%	531	62.6%	789	69.0%	757	69.0%
Total	1112		848		1143		1098	

Note: weighted frequencies.

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Table 2. Characteristics associated with respondents that always minimises excess deaths in the discrete choice experiment tasks

		England			Northern Ireland			Scotland			Wales		
		OR	(95% CI)	p value	OR	(95% CI)	p value	OR	(95% CI)	p value	OR	(95% CI)	p value
Sex													
	Female	1	(ref)		1	(ref)		1	(ref)		1	(ref)	
	Male	0.82	(0.58 – 1.16)	0.27	0.81	(0.55 – 1.18)	0.27	1.04	(0.75 – 1.44)	0.83	1.09	(0.78 – 1.51)	0.62
Age													
	18-34	1	(ref)		1	(ref)		1	(ref)		1	(ref)	
	35-55	1.60	(1.00 – 2.53)	0.05	1.54	(0.93 – 2.56)	0.09	0.93	(0.61 – 1.41)	0.73	0.78	(0.52 – 1.19)	0.25
	55+	1.27	(0.80 – 2.02)	0.32	1.29	(0.75 – 2.23)	0.36	1.33	(0.86 – 2.06)	0.20	**0.63**	**(0.40 – 0.98)**	**0.04**
Health													
	Very good	1	(ref)		1	(ref)		1	(ref)		1	(ref)	
	Good	1.26	(0.77 – 2.04)	0.36	1.07	(0.62 – 1.84)	0.81	1.01	(0.64 – 1.58)	0.97	1.31	(0.84 – 2.03)	0.23
	Fair	1.52	(0.90 – 2.59)	0.12	0.92	(0.50 – 1.71)	0.80	**1.82**	**(1.11 – 2.97)**	**0.02**	0.85	(0.51 – 1.42)	0.53
	Bad	1.36	(0.59 – 3.10)	0.47	1.06	(0.46 – 2.46)	0.89	1.20	(0.53 – 2.72)	0.66	0.79	(0.35 – 1.81)	0.58
	Very bad	2.16	(0.67 – 6.95)	0.20	0.82	(0.19 – 3.63)	0.80	0.28	(0.02 – 3.98)	0.35	1.56	(0.32 – 7.62)	0.58
Shield													
	No	1	(ref)		1	(ref)		1	(ref)		1	(ref)	
	Yes	1.18	(0.80 – 1.74)	0.41	1.07	(0.70 – 1.64)	0.76	0.97	(0.63 – 1.51)	0.91	1.25	(0.85 – 1.85)	0.26
Adults in household													
	1	1	(ref)		1	(ref)		1	(ref)		1	(ref)	
	2	1.09	(0.71 – 1.67)	0.69	1.15	(0.70 – 1.88)	0.58	1.06	(0.72 – 1.57)	0.77	0.75	(0.50 – 1.11)	0.15
	3	1.19	(0.66 – 2.16)	0.56	1.14	(0.61 – 2.13)	0.69	1.03	(0.58 – 1.82)	0.93	0.57	(0.31 – 1.06)	0.08
	>3	1.13	(0.56 – 2.28)	0.74	1.65	(0.77 – 3.55)	0.20	1.43	(0.66 – 3.08)	0.37	1.07	(0.52 – 2.20)	0.86
Children in household													
	0	1	(ref)		1	(ref)		1	(ref)		1	(ref)	
	1	0.90	(0.54 – 1.48)	0.67	0.65	(0.35 – 1.21)	0.17	0.90	(0.55 – 1.47)	0.68	0.97	(0.60 – 1.58)	0.91
	2	0.66	(0.35 – 1.24)	0.20	1.04	(0.55 – 1.94)	0.91	1.21	(0.70 – 2.10)	0.50	0.54	(0.29 – 0.99)	0.05

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	>2	1.61	(0.68 – 3.83)	0.28	2.21	(0.94 – 5.21)	0.07	0.43	(0.09 – 1.97)	0.28	0.66	(0.22 – 1.89)	0.42
Household income													
	£0 - £10,400	1	(ref)		1	(ref)		1	(ref)		1	(ref)	
	£10,400 - £20,800	1.48	(0.76 – 2.92)	0.25	1.51	(0.74 – 3.11)	0.26	0.69	(0.39 – 1.22)	0.20	**0.49**	**(0.29 – 0.83)**	**0.01**
	£20,800 - £31,200	1.48	(0.74 – 2.98)	0.27	1.76	(0.87 – 3.58)	0.12	**0.54**	**(0.31 – 0.95)**	**0.03**	**0.57**	**(0.34 – 0.96)**	**0.04**
	£31,200 - £52,000	1.30	(0.65 – 2.60)	0.46	2.01	(0.98 – 4.11)	0.06	0.68	(0.39 – 1.19)	0.17	0.66	(0.26 – 0.94)	0.57
	£52,000+	1.38	(0.65 – 2.93)	0.40	1.48	(0.63 – 3.47)	0.36	0.88	(0.49 – 1.61)	0.69	**0.49**	**(0.79 – 1.56)**	**0.03**
Education													
	Less than higher education	1	(ref)		1	(ref)		1	(ref)		1	(ref)	
	Higher education degree	1.29	(0.92 – 1.83)	0.142	0.95	(0.64 – 1.42)	0.81	**1.77**	**(1.28 – 2.45)**	**<0.01**	1.11	(0.79 – 1.56)	0.53
Job impact													
	No	1	(ref)		1	(ref)		1	(ref)		1	(ref)	
	Yes	0.80	(0.53 – 1.22)	0.307	**0.58**	**(0.35 – 0.97)**	**0.04**	**0.62**	**(0.40 – 0.95)**	**0.03**	0.93	(0.63 – 1.37)	0.73
Caring responsibility													
	No	1	(ref)		1	(ref)		1	(ref)		1	(ref)	
	Yes	0.81	(0.48 – 1.36)	0.424	1.23	(0.76 – 1.97)	0.40	0.71	(0.45 – 1.13)	0.15	1.33	(0.88 – 1.99)	0.17
Affected usual healthcare													
	No	1	(ref)		1	(ref)		1	(ref)		1	(ref)	
	Yes	1.00	(0.71 – 1.42)	0.987	1.07	(0.73 – 1.57)	0.73	1.05	(0.76 – 1.45)	0.76	0.84	(0.60 – 1.17)	0.29
Impact on standard of living													
	Same or improved	1	(ref)		1	(ref)		1	(ref)		1	(ref)	
	Worsened	0.99	(0.66 – 1.47)	0.949	1.13	(0.74 – 1.73)	0.56	1.16	(0.81 – 1.67)	0.41	0.95	(0.66 – 1.37)	0.78

Note: **bold** indicates significance at the 95% level.

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Table 3. Preferences for lockdown features.

	England					Northern Ireland				
	Parameter estimates			MRS (excess deaths)		Parameter estimates			MRS (excess deaths)	
	Coef.	95% CI	p value	MRS	95% CI	Coef.	95% CI	p value	MRS	95% CI
Alternative Specific Constant	-0.15	(-0.11–-0.20)	<0.01	..	..	-0.16	(-0.21–-0.10)	<0.01	..	..
Green restrictions	0.01	(-0.04–0.06)	0.75	-0.49	(-0.91–-0.07)	0.00	(-0.05–0.06)	0.87	-0.04	(-0.48–0.40)
Yellow restrictions	0.19	(0.14–0.25)	<0.01	-1.63	(-2.09–-1.17)	0.12	(0.05–0.18)	<0.01	-0.91	(-1.38–-0.43)
Amber restrictions	0.05	(-0.00–0.10)	0.07	-0.39	(-0.82–0.03)	0.07	(0-01–0.12)	0.02	-0.51	(-0.94–-0.07)
Red restrictions	-0.25	(-0.20–0.30)	<0.01	2.09	(1.66–2.52)	-0.19	(-0.14–-0.25)	<0.01	1.45	(1.00–1.89)
Length (1 week increase)	-0.02	(-0.02–-0.03)	<0.01	0.20	(0.15–0.26)	-0.03	(-0.03–-0.02)	<0.01	0.19	(0.14–0.25)
All healthcare postponed	-0.03	(-0.07–0.01)	0.16	0.24	(-0.09–0.57)	-0.04	(-0.09-0.00)	0.08	0.31	(-0.03–0.65)
Some healthcare postponed	-0.03	(-0.07–0.01)	0.16	0.24	(-0.09–0.57)	0.00	(-0.05–0.04)	0.85	0.03	(-0.31–0.38)
None healthcare postponed	0.06	(0.02–0.10)	0.01	-0.48	(-0.88–-0.14)	0.05	(-0.00–0.09)	0.06	-0.34	(-0.69–0.01)
Excess deaths (1 out of 10,000 increase)	-0.12	(-0.12–-0.11)	<0.01	-	-	-0.13	(-0.14–-0.14)	<0.01	-	-
Ability to spend (10% decrease)	0.10	(0.08–0.13)	<0.01	-0.88	(-1.11–-0.66)	0.12	(0.09–0.15)	<0.00	0.19	(-1.12–-0.64)
Job loss (1 out of 100 increse)	-0.02	(-0.03–-0.02)	<0.01	0.20	(0.17–0.23)	-0.03	(-0.03–-0.02)	<0.01	1.20	(0.16–0.22)
SD Alternative Specific Constant	0.00	(-0.10–0.10)	1.00	..	..	0.00	(-0.13–0.13)	0.99	..	..
Log likelihood	-5167.934					-3811.386				
Observations	8896					6784				

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Table 3 continued. Preferences for lockdown features.

	Scotland					Wales				
	Parameter estimates			MRS (excess deaths)		Parameter estimates			MRS (excess deaths)	
	Coef.	95% CI	p value	MRS	95% CI	Coef.	95% CI	p value	MRS	95% CI
Alternative Specific Constant	-0.17	(-0.22–-0.12)	<0.01	..	..	-0.21	(-0.26–0.16)	<0.01	..	..
Green restrictions	0.14	(0.08–0.19)	<0.01	-1.15	(-1.64–-0.67)	0.06	(0.01–0.11)	0.03	-0.49	(-0.89–-0.10)
Yellow restrictions	0.13	(0.08–0.19)	<0.01	-0.92	(-1.31–-0.53)	0.06	(0.01–0.11)	0.02	-0.48	(-0.89–-0.06)
Amber restrictions	0.03	(-0.02–-0.08)	0.25	-0.20	(-0.05–0.142)	0.04	(-0.01–0.09)	0.08	-0.33	(-0.71–0.05)
Red restrictions	-0.30	(-0.35–-0.25)	<0.01	2.04	(1.68–2.41)	-0.17	(-0.2–-0.11)	<0.01	1.25	(0.86–1.65)
Length (weeks)	-0.03	(-0.04–-0.03)	<0.01	0.22	(0.18–0.27)	-0.03	(-0.03–-0.02)	<0.01	0.21	(0.17–0.26)
All healthcare postponed	-0.01	(-0.05–0.03)	0.53	0.09	(-0.19–0.37)	-0.03	(-0.07–0.01)	0.17	0.21	(-0.09–0.51)
Some healthcare postponed	-0.02	(-0.06–0.02)	0.27	0.16	(-0.12–0.44)	0.01	(-0.03–0.05)	0.65	-0.07	(-0.38–0.24)
None healthcare postponed	0.04	(-0.00–0.08)	0.09	0.18	(-0.10–0.47)	0.02	(-0.02–0.06)	0.38	-0.14	(-0.46–0.18)
Excess deaths (increase 1 out of 10,000)	-0.15	(-0.15–-0.14)	<0.01	-	-	-0.13	(-0.13–-0.12)	<0.01	-	-
Ability to spend (10% decrease)	0.09	(0.07-0.12)	<0.01	-0.62	(-0.82–-0.42)	0.10	(0.07–0.13)	<0.01	-0.76	(-0.98–-0.54)
Job loss (1 out of 100)	-0.03	(-0.04–-0.03)	<0.01	0.22	(0.20–0.24)	-0.03	(-0.03–-0.02)	<0.01	0.20	(0.18–0.23)
SD Alternative Specific Constant	0.00	(-0.10–0.10)	0.99	..	..	0.00	(-0.10–0.10)	0.99	..	..
Log likelihood	-4890.047					-4925.654				
Observations	9144					8784				

Note: Coef. = mean parameter coefficient estimate. CI = Confidence Interval. SD = Standard Deviation. MRS = Marginal rates of substitution Categorical variables were effects coded to allow for a preference parameter to be estimated for all levels of the feature[29].

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[Figure 3 here]

Discussion

The elicitation of public values and trade-offs for different lockdown features can help guide government policies during a pandemic. We found evidence that four out of five respondents were willing to accept an increase in excess deaths for relaxations in lockdown restrictions. This suggests that as the governments of the devolved nations consider easing lockdown, the public will be willing to accept an increase in excess deaths. We also estimated acceptable excess deaths for such relaxations.

With the roll-out of pharmaceutical interventions and the increase in data available to model the impact of changes in restrictions, our model can help inform policy makers about what lockdown policies are acceptable given the estimated trade-offs. We found that respondents in England are the most averse to the introduction of short *circuit-breaker*-type lockdowns, thus accepting a higher number of excess deaths to avoid them. In contrast, these strict lockdowns were more palatable to respondents in Wales.

Trade-off values can also be interpreted as the number of lives that need to be saved if a less preferred and expectedly stricter lockdown is implemented. Our model can be used to assess whether the expected health benefits in terms of a reduction in the number of excess deaths outweigh costs in terms of increased restrictions. As an example, modelling by Ferguson et al. (2020) contended that a one-week earlier strict lockdown in England during COVID-19's first wave would have saved 20,000 lives.[28] Our findings suggest that the number of acceptable deaths in England for a one-week strict (red level restrictions) lockdown is 2.53 out of 10,000, or 14,170 lives, which is less than the number of lives that would have been saved (see online Supplemental Material p.14 for details). Thus, based on these results, the benefits of introducing an earlier lockdown would have outweighed the costs in terms of lockdown restrictions. These insights can be useful as UK governments consider easing lockdown restrictions or the introduction of new ones if future infection waves occur.

Whilst we limited our analysis to consider acceptable excess deaths, a strength of our model is that it can be used to determine value in terms of other features included, i.e. acceptable reductions in spending or job losses associated with a particular lockdown scenario. We found that respondents in Scotland were less sensitive to losses in their own spending ability compared to other nations. For example, the average acceptable loss in spending ability for a four-week red level lockdown in Scotland is 49%, while in England it is 36%, Northern Ireland it is 29%, and Wales 30%. A detailed calculation of these MRS can be found in the online Supplemental Material (p. 16). Thus, a targeted compensation instrument could target other economic consequences, such as joblessness, in Scotland and consumer spending ability in the other nations.

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Our study is not exempt from limitations. A potential limitation is that individual's preferences regarding the features of lockdown may be evolving. Until March 2020, respondents would not have experienced a lockdown. However, we conducted our survey in October-December 2020, hence all respondents would have experience of the first lockdown. The study was, however, conducted before the second lockdown. The dynamics of preferences and trade-offs for lockdown should be closely monitored. Another possible limitation is that we identified respondents as excess death minimisers if they chose the option with the minimum number of deaths in all eight choice tasks. This response pattern could also represent a decision-heuristic for respondents to complete the tasks. It is also possible that respondents are considering excess deaths, and trading, but the combination of feature levels results in the option with the lowest number of excess deaths. Either way, this suggests our estimate of 80% of respondents being willing to trade would be an underestimate. Further, we estimated trade-offs across the entire sample, allowing for the possibility that such responders were traders. We have not attempted to explain preference heterogeneity across nor within nations. Our study did not look at the relative importance of the different dimensions of lockdown restrictions (shelter, socialising, non-essential trips, schools and youth activities, non-essential businesses and outdoor activities). Future work could use a DCE to explore this; given current discussions around international travel, this dimension could be included. We focused on the preferences of the public; future research could explore the preferences of policy makers and health professionals.

Conclusions

In this study we have provided new insight into preferences for lockdown policies across the four UK nations using a DCE. The majority of respondents from all four devolved nations were willing to accept an increase in excess deaths for relaxation in lockdown restrictions. Respondents from England were more willing to accept an increase in excess deaths, followed by Scotland, Northern Ireland and Wales. Our model can also be used to estimate the reduction in excess deaths required to justify increasing lockdown restrictions. Whilst we focused on excess deaths, trade-offs could also be estimated in terms of acceptable changes in spending power and job losses, as well as combinations of these features. Such analysis will help identify which levers best support lockdown strategies whilst maintaining public confidence and maximising compliance.

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Contributors
MR, VW, MG, RAS & LEL-R conceptualised the study, contributed to the overall design of the survey experiment and contributed to the interpretation of the data. MG and RAS carried out the think-aloud interviews as part of the developmental work. LEL-R undertook the analysis, including the R programming of the statistical models and is the study's guarantor. MR reviewed the statistical model and contributed to the analysis of the data. SP and DP contributed comments to the development of the protocol, and discussion of public health implications and helped shape the overall interpretation. All authors approved the final protocol. All authors had access to all the data, contributed to the writing of the paper and had final responsibility for the decision to submit for publication. The corresponding author attests that all listed authors meet authorship criteria and that no others meeting the criteria have been omitted.

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Declaration of interests
All authors have completed the ICMJE uniform disclosure form at www.icmje.org/coi_disclosure.pdf (available on request from the corresponding author) and declare no support from any organisation for the submitted work; no financial relationships with any organisations that might have an interest in the submitted work in the previous three years; no other relationships or activities that could appear to have influenced the submitted work.

Ethical approval
The study received ethical approval from the University of Aberdeen's College of Life Sciences and Medicine Ethical Review Board (Reference CERB/2020/6/1974). All participants provided informed consent.

Data sharing
Anonymised cross-sectional data from the analysis can be made available by the corresponding author after the authors' review of reasonable requests. The published protocol can be found at: https://bmjopen.bmj.com/content/10/11.

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Dissemination to participants and related patient and public communities

The results have been and will be presented at national and international conferences. Dissemination plans to inform the community of this study's results include social media and University's newsletter. Authors will liaison with the study's Stakeholder Advisory Group to ensure maximum policy impact of the study's findings.

Transparency

The corresponding author affirms that this manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned (and, if relevant, registered) have been explained.

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Figure 1. Description of the colour tier system for restriction levels.

776x529mm (72 x 72 DPI)

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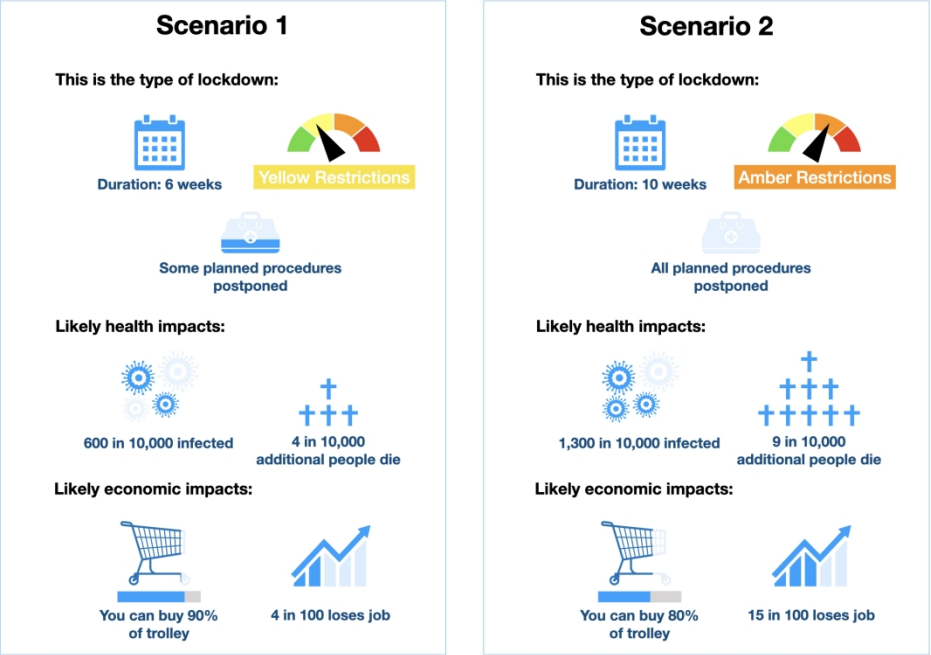

Figure 2. Choice task example used in the discrete choice experiment.

776x529mm (72 x 72 DPI)

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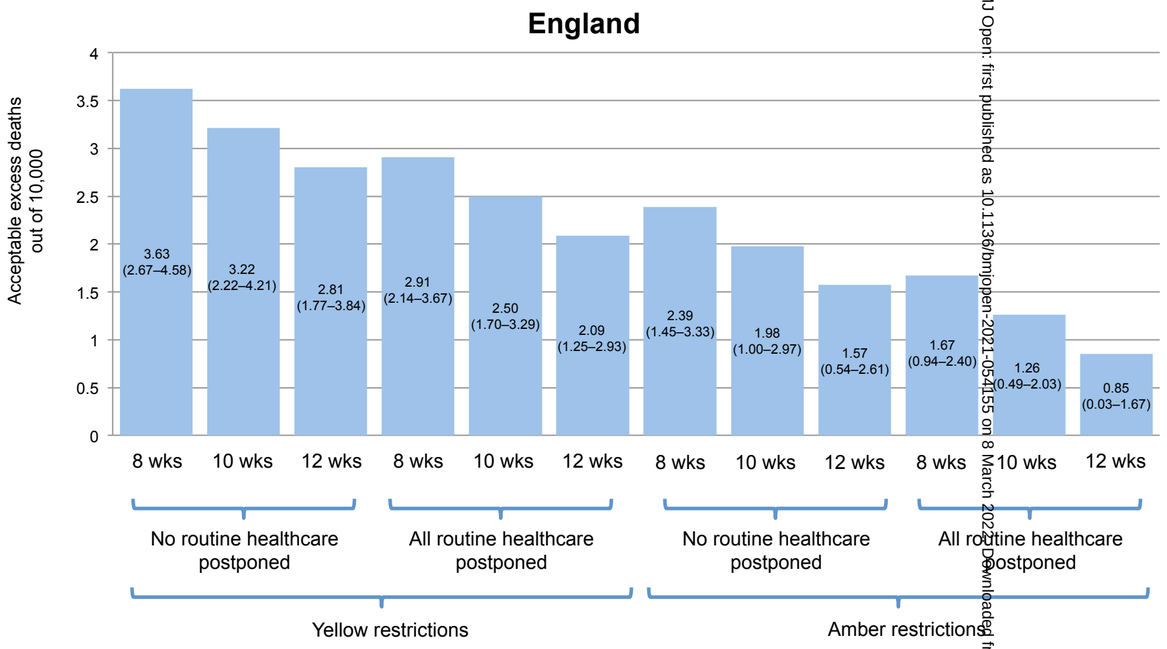

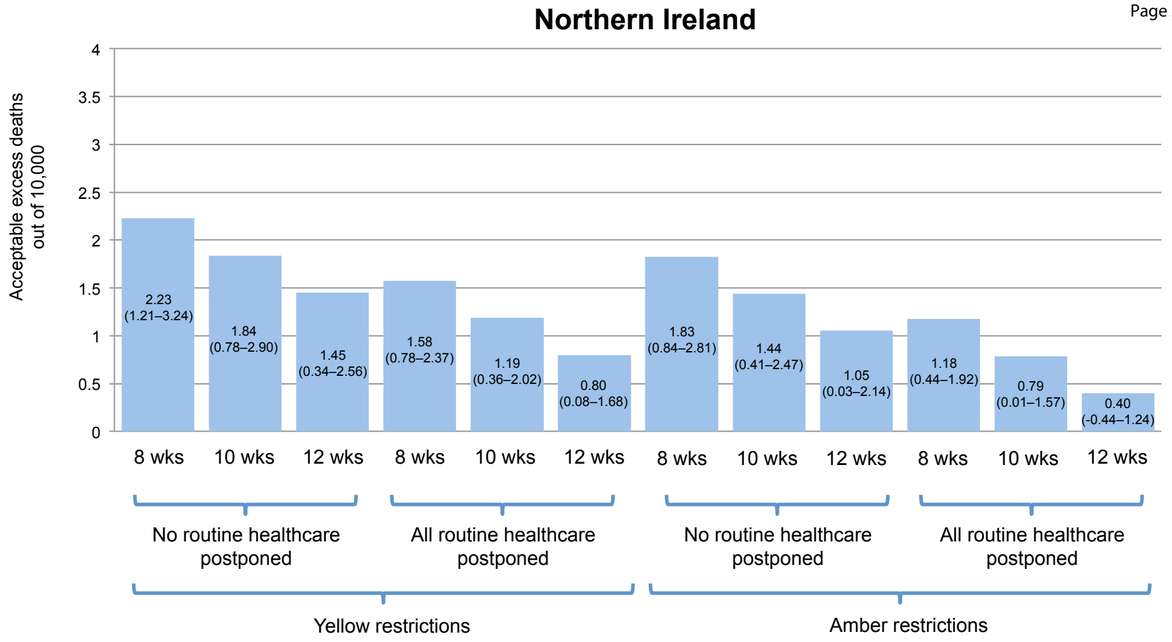

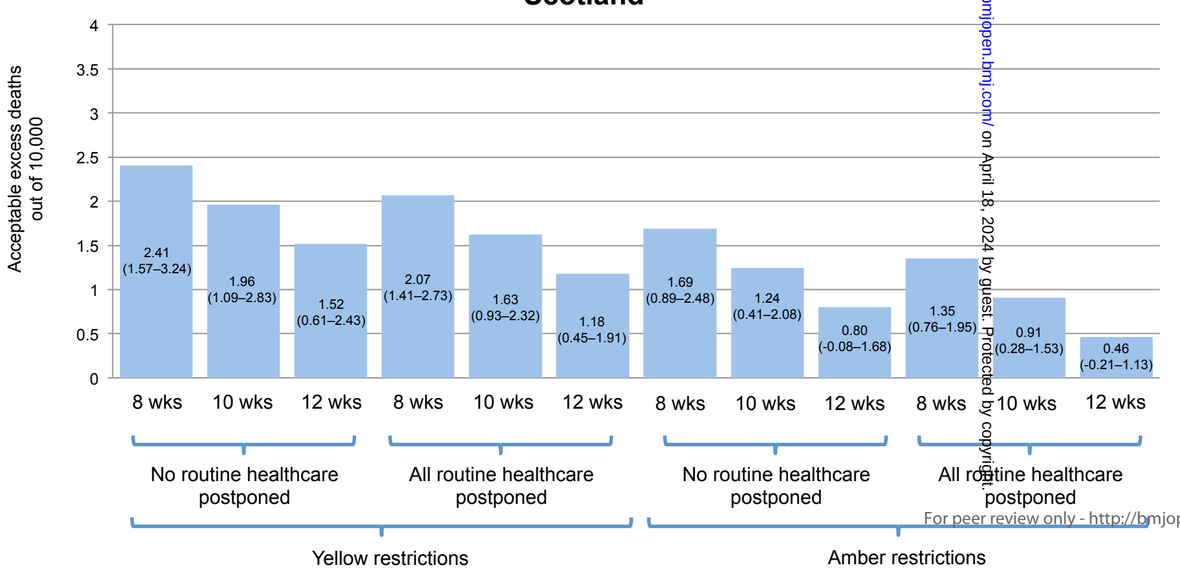

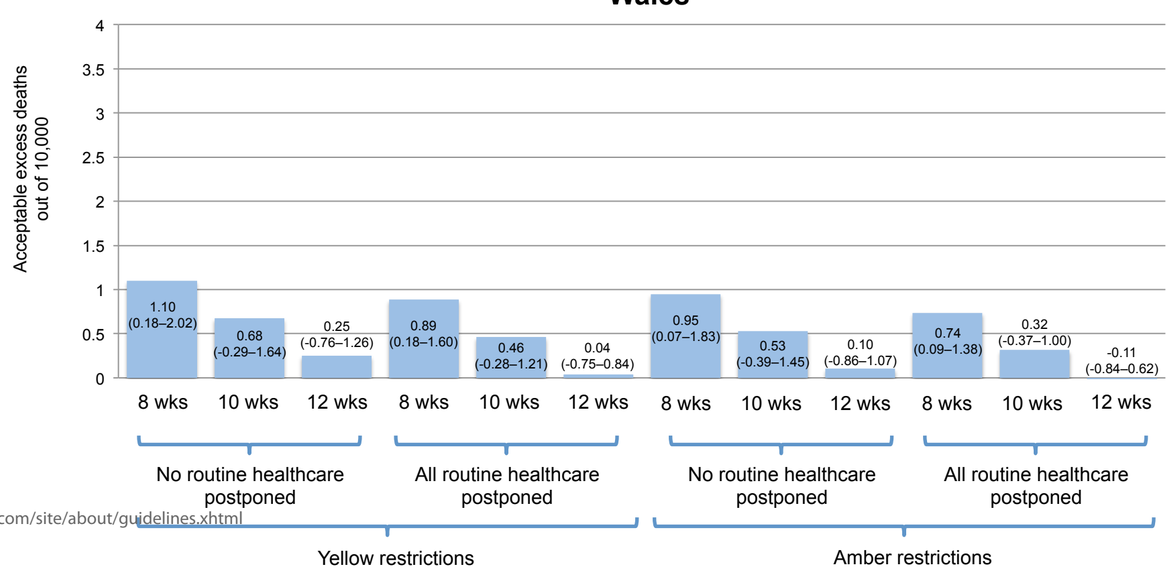

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Online Supplementary Material

Supplemental Table 1. Features and levels used in the discrete choice experiment.

Feature	Description	Levels
Type of Lockdown (Severity of restrictions)	How restrictive the lockdown (based on a colour/tier system).	Green Yellow Amber Red
Length	How long the lockdown is in place.	3 weeks 6 weeks 10 weeks 16 weeks
Postponement of usual non-medical care	Whether non-pandemic medical care is postponed.	No procedures are postponed Some procedures are postponed All procedures are postponed
Excess deaths	Number of excess deaths (expressed as a fraction of 10,000).	1 4 9 13
Infections [a]	Number of infections (expressed as a fraction of 10,000).	100 600 1,300 2,000
Ability to buy things	How much of the goods that respondents are able to buy today will they be able to buy in a year's time.	100% of their shopping trolley 90% of their shopping trolley 80% of their shopping trolley 70% of their shopping trolley
Job losses	How many people lose their job (expressed as a fraction of 100).	0 4 15 25

Note: [a] Number of infections were linked to the excess death feature using an Infection Fatality Rate of 0.7%.

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Discrete choice experiment: think-aloud developmental work.

Virtual think-aloud (TA) interviews were conducted using MS Teams with colleagues from the University of Aberdeen (n=10) and members of our Stakeholder Advisory Group (n=4). Subsequently, we recruited members of the general public to participate in virtual TAs via two Facebook recruitment campaigns. Facebook users, resident in the United Kingdom and over 18 years of age, were shown an advertisement inviting them to participate in a study about COVID-19 lockdowns. Supplemental Figure 1 shows the advertisement for the first campaign.

Supplemental Figure 1. Facebook campaign 1, advertisement appearance.

Upon clicking the advertisement, users were directed to a landing page with more information and were asked to enter their names and email addresses in a web form to indicate their interest in participating in an interview. Supplemental Figure 2 shows the landing page.

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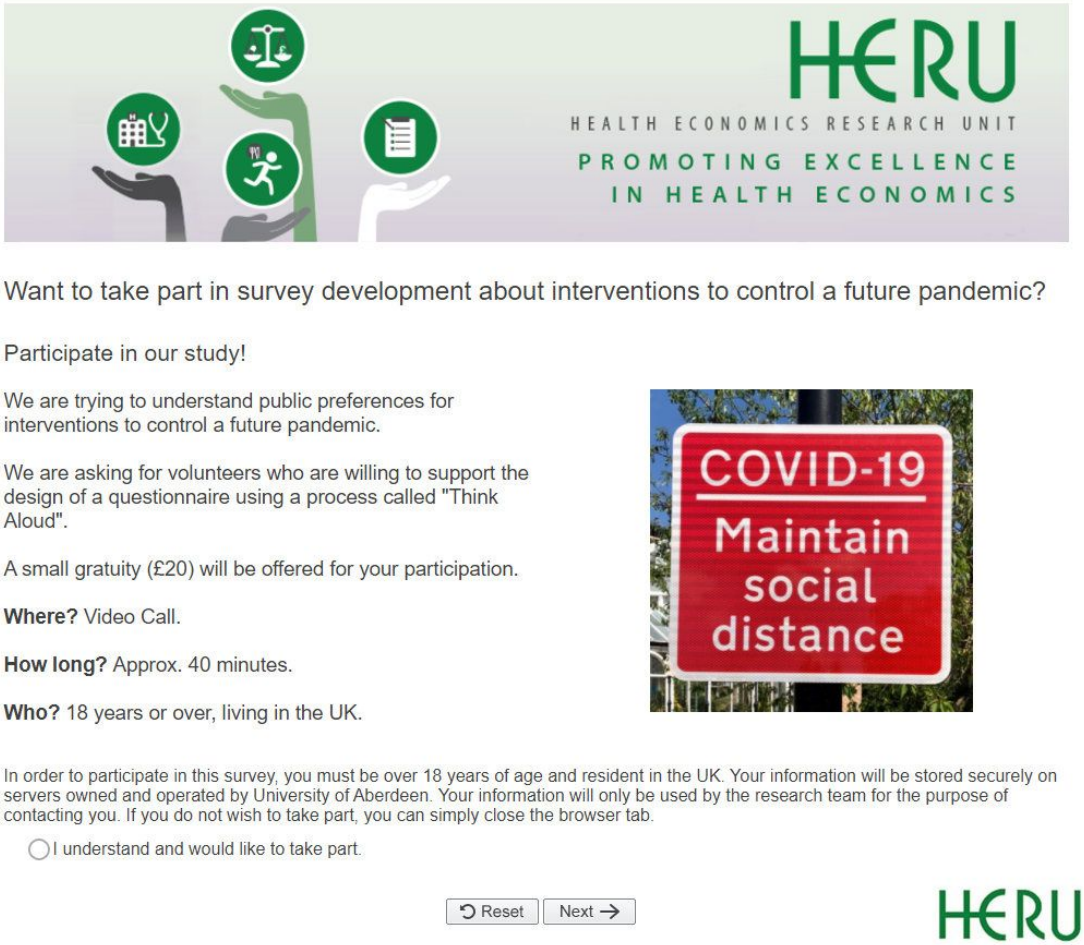

Supplemental Figure 2. Participant Landing page

The first campaign ran from August 8, 2020, until August 14, 2020, was shown to 11,632 users and resulted in 343 clicks on the advert. Whilst 32 respondents indicated interest in participating by submitting their contact information through the landing page, only a limited number responded to contact by the researcher. To improve uptake we modified the Facebook advertisement, including information on the £20 voucher participants would receive for their participation (Supplemental Figure 3). The campaign with the modified text ran from August 25, 2020, until August 31, 2020, was shown to 10,912 and resulted in 291 clicks. 52 respondents indicated an interest for an interview by submitting their contact information through the landing page. Again, not all respondents who indicated an interest in participation via the landing page responded to the researcher's contact. In total 23 interviews were conducted from across the two campaigns.

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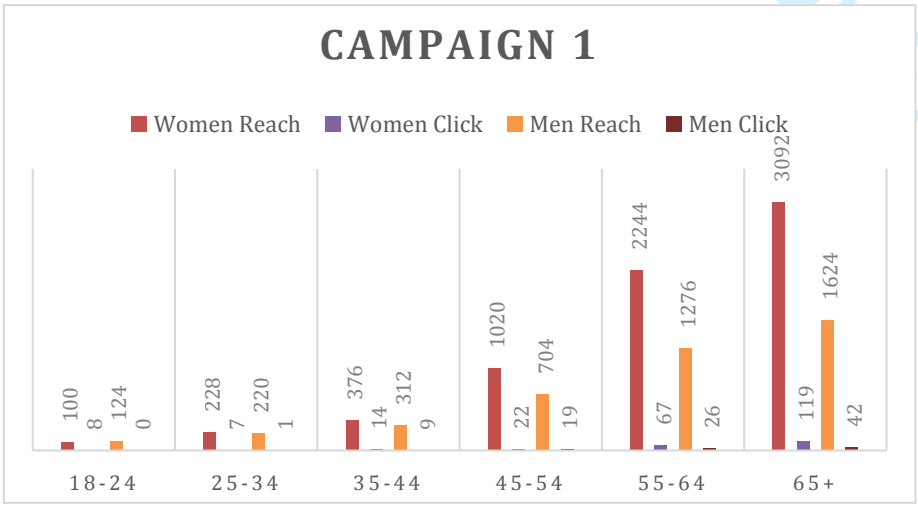
Supplemental Figure 3. Facebook campaign 2, advertisement appearance.

Facebook does not offer control over the demographic composition of users targeted by the ad beyond general inclusion and exclusion criteria. We specified our target group as users resident in the UK over 18 years of age. The demographics of Facebook users that were shown the advertisement skewed older and female. Supplemental Figure 4 shows the demographics for campaign 1, and Supplemental Figure 5 shows the demographics for campaign 2.



Supplemental Figure 4. Campaign 1 demographics

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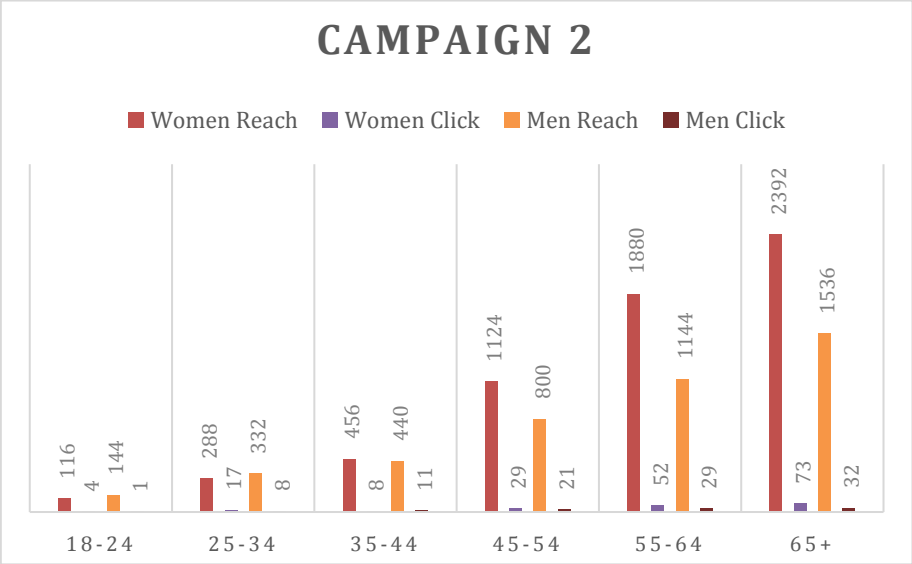

Supplemental Figure 5. Campaign 2 demographics

For all TAs, participants were asked to share their device's screen with the interviewers and verbalise their thought processes whilst responding to the survey. As a warm-up, they were asked to think aloud whilst responding to the question: "*How many windows are there in your house?"* Respondents were told to consider the interviewer as a silent observer of their thought process. Interviewers did, however, encourage respondents to verbalise their thoughts if they were silent for a short period. Respondents were told there were no right or wrong answers. The interviews lasted between 45 and 90 minutes.

A number of changes were made to the DCE survey as a result of participant feedback.

1. Presentation of the excess death, number of infections, and job loss features

In the TA interview used for internal testing, the features for excess death, number of infections, and job losses were presented differently. The number of jobs lost and the number of people infected were presented as fractions of 100. In contrast, the excess death feature was presented as absolute numbers of additional people dying over the expected figure during a normal year. This led to the excess death feature dominating the choices of a considerable number of participants, with some participants stating that they ignored all other features and only considered the number of excess deaths presented in the choice task.

While this might be an expression of a valid preference, the feedback we received included evidence that the presentation of the excess death feature in absolute numbers inflated its importance relative to other features. One participant stated that, while they

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recognised that job loss was presented as fractions, in their mind, they ignored the denominator of the job loss feature and directly compared its numerator to the absolute figures presented for the excess death feature.

We thus changed the presentation of excess deaths and number of infections to be uniform across the choice task. In the final survey, the number of infections and excess deaths are presented as fractions of 10,000.

2. Presentation and placement of lockdown restrictions feature

In the TA interview for internal testing, the colour-coded visual for the lockdown restrictions was prominently presented at the top of each choice option. Some participants interpreted the graphic as a summary of the choice option as a whole rather than as an independent feature.

We thus changed the visual position for the lockdown restrictions to appear next to the visual for the lockdown duration feature.

Another contributing factor was that the lockdown restrictions feature was initially presented to participants as “lockdown type”. The group of features representing policy choices (lockdown severity, lockdown length, and postponed procedures) was described in a very similar way as “type of lockdown”.

We renamed the feature to “lockdown restrictions” and changed all visuals to read “(Colour) restrictions” to differentiate more clearly between the “lockdown restrictions” feature and the “lockdown type” group of features.

3. Visual presentation of the number of infections feature

The TA for internal testing displayed a static visual for the number of infections feature that did not change according to the level presented. Several participants stated that a changing visual would improve the presentation of this feature. We thus changed the visual to change with an increasing number of infections.

4. Presentation of the shopping trolley feature

Initially, the text under the visual for the ‘shopping trolley’ feature read “X% of the trolley.” Some participants interpreted this to mean the economic impact on society rather than the economic impact on themselves. We changed the text to read “You can buy X% of the trolley.”

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5. Explanation of the shopping trolley feature, warm-up questions for the shopping trolley

Some participants were concerned that the initial explanation of the shopping trolley focused on consumption rather than the general cost of living. One participant expressed concerns that this might not accurately reflect the experiences of impoverished respondents. We expanded the explanation of the shopping trolley feature to include housing costs and utility bills.

The initial warm-up questions presented next to the explanation of the shopping trolley feature referred to respondents' income. Some participants were confused by the question as the explanation for the shopping trolley feature presented the impact in terms of how much respondents could afford to buy. As many respondents reduced consumption during the lockdown, they were unsure how to respond to the question.

We removed references to respondent income from the warm-up questions and instead asked respondents about the impact the pandemic and lockdown measures had on their household's standard of living and how concerned they were about how much their household could afford to buy in a year's time.

6. Warm-up questions for the job loss feature

In an earlier version of the survey, the warm-up question attached to the explanation of the job loss feature asked participants about their concerns about losing their jobs. As this feature was meant to elicit respondents' attitudes from a social-inclusive perspective, we changed the question to read "How concerned are you about rising unemployment as a result of the COVID-19 pandemic?"

7. MFQ20: Likert scale anchors

The initial presentation of the MFQ20 presented the anchors for different points on a 6-point Likert scale ("not at all relevant" to "extremely relevant" and "strongly disagree to "strongly agree") at the top of the page. For the selection matrix, points on the scale were labelled with numbers running from 0-5 to mimic the presentation of the paper-based MFQ 20.

We observed that the top of the page was not visible for participants while answering the questions, leading them to spend much time scrolling up and down on the page. We amended the selection matrix to display the anchors next to the numbered points on the Likert scale.

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8. Government performance assessment

Some respondents were confused by the initial wording of the question asking about the performance of the UK government. We changed the question to specify the Westminster government.

9. Thank-you message

One respondent felt that the thank-you message at the end of the survey was not heartfelt enough. We changed the message to acknowledge respondents' efforts and reaffirmed the value of their responses.

10. Ease-of-use updates

To make the survey more engaging, we made various improvements to the interface and presentation formats. This included a progress bar at the top of the screen, mouse-hover explanations for different selection options, and input prompts.

11. Reducing survey completion time

Initially, participants took up to 90 minutes to complete the survey (while verbalising their thoughts). We implemented several improvements to reduce completion time.

We reduced redundant slides reminding participants of the meaning of the feature visuals before starting the DCE. We tested the updated version with TA participants and noticed no adverse effect on participants' ability to understand the task.

An earlier version of the survey featured four warm-up questions attached to the excess death feature. They were presented in two pairs of two 5-point Likert scale questions, asking 1a) how concerned participants were that they could die from COVID-19, 1b) how concerned they were that their loved ones could die from COVID-19, 2a) how concerned they were that they could not access healthcare during the COVID-19 pandemic, and 2b) how concerned they were that their loved ones could not access healthcare during the COVID-19 pandemic. We combined both pairs of questions into two questions asking about participants' concerns about *themselves or loved ones* about 1) the risk of death from COVID-19 and 2) health care access, respectively.

To compensate, we added question asking about the perspective respondents took while completing choice tasks. The question asked whether respondents thought about a) what was best for them, b) what was best for their loved ones, c) what was best for their community, and d) what was best for their country. We conducted a/b testing for two types

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of questions: one ranking question where respondents indicated the order of importance of the four options, and one question where respondents indicated the most important factor out of the four choices. In accordance with the feedback we received from TA participants, we decided to implement a multiple choice question where respondents could select as many options as needed.

We observed participants struggling with the large number of options for the questions assessing participants' willingness to endure different lockdown restriction levels. Especially on mobile devices such as smartphones and tablets, participants spent much time scrolling through options. We reduced the number of available options in the drop-down menu by removing the odd numbers of weeks.

We reduced the word count of the explanatory messages introducing each new section of the survey. In subsequent TAs, we closely monitored whether this would decrease participants' ability to understand and complete the survey and observed no difference.

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Supplemental Table 2. Response pattern when minimising excess deaths.

Choice Task	Scenario	Type of Lockdown	Duration (weeks)	Healthcare procedures	Excess deaths (per 10,000)	Ability to buy (%)	Job losses (per 100)	Choice if minimises excess deaths
1	**1**	**3**	**16**	**2**	**4**	**100**	**15**	√
1	2	2	3	3	13	90	0	
2	**1**	**3**	**10**	**1**	**4**	**90**	**25**	√
2	2	4	6	2	9	70	15	
3	**1**	**2**	**3**	**1**	**4**	**100**	**0**	√
3	2	1	10	3	13	90	15	
4	1	4	10	3	4	90	0	
4	**2**	**3**	**3**	**2**	**1**	**70**	**4**	√
5	**1**	**2**	**6**	**3**	**1**	**100**	**4**	√
5	2	3	10	1	9	80	0	
6	1	1	3	1	13	70	4	
6	**2**	**3**	**10**	**3**	**1**	**100**	**25**	√
7	1	4	6	2	4	80	25	
7	**2**	**2**	**10**	**1**	**1**	**100**	**15**	√
8	1	1	10	2	13	70	25	
8	**2**	**3**	**16**	**3**	**9**	**90**	**4**	√
9	1	4	3	3	9	100	25	
9	**2**	**2**	**16**	**1**	**4**	**70**	**0**	√
10	**1**	**4**	**10**	**1**	**9**	**80**	**15**	√
10	2	3	16	2	13	90	25	
11	1	2	16	2	9	80	4	
11	**2**	**1**	**6**	**1**	**4**	**70**	**15**	√
12	**1**	**1**	**10**	**2**	**1**	**70**	**4**	√

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12	2	2	6	1	13	100	25	
13	**1**	**1**	**16**	**3**	**1**	**100**	**0**	√
13	2	2	10	2	9	70	25	
14	1	2	16	3	13	80	15	
14	**2**	**4**	**3**	**2**	**1**	**90**	**0**	√
15	1	3	6	1	13	70	0	
15	**2**	**2**	**3**	**2**	**4**	**90**	**15**	√
16	1	3	3	3	4	70	15	
16	**2**	**1**	**6**	**1**	**1**	**80**	**4**	√
17	1	3	6	3	9	90	0	
17	**2**	**4**	**16**	**1**	**1**	**80**	**25**	√
18	**1**	**3**	**3**	**1**	**1**	**80**	**4**	√
18	2	1	16	2	9	100	0	
19	**1**	**2**	**6**	**2**	**1**	**80**	**0**	√
19	2	4	16	1	13	100	4	
20	**1**	**1**	**6**	**1**	**9**	**90**	**25**	√
20	2	4	3	3	13	80	0	
21	1	2	16	3	9	70	25	
21	**2**	**3**	**6**	**2**	**4**	**80**	**15**	√
22	**1**	**4**	**16**	**1**	**1**	**90**	**15**	√
22	2	1	10	3	4	100	4	
23	1	4	10	2	13	90	4	
23	**2**	**1**	**3**	**3**	**9**	**80**	**25**	√
24	1	1	3	2	13	100	15	
24	**2**	**4**	**6**	**3**	**4**	**70**	**4**	√

Notes:
Type of lockdown: 1= Green, 2= Yellow, 3= Amber, 4= Red.
Healthcare burden: 1= All procedures postponed, 2= Some procedures postponed, 3= None postponed.
√**:** option chosen within choice task

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Supplemental Table 3. Univariate analysis of respondents who minimised excess deaths.

	England			Northern Ireland			Scotland			Wales		
	Entire Sample	Non-minimised deaths	Minimised deaths	Entire Sample	Non-minimised deaths	Minimised deaths	Entire Sample	Non-minimised deaths	Minimised deaths	Entire Sample	Non-minimised deaths	Minimised deaths
Sex												
Female	50.0%	52.8%	49.3%	51.4%	51.0%	52.9%	51.8%	52.2%	50.6%	51.2%	50.9%	52.1%
Male	50.0%	47.2%	50.7%	48.6%	49.0%	47.1%	48.2%	47.8%	49.4%	48.8%	49.1%	47.9%
Age												
18-34	28.1%	29.1%	24.3%	28.5%	29.3%	25.8%	27.6%	28.4%	24.8%	26.8%	25.9%	29.8%
35-55	33.5%	33.0%	35.9%	34.6%	33.3%	39.2%	32.8%	33.6%	30.1%	31.2%	31.6%	29.8%
55+	38.4%	38.0%	39.9%	36.9%	37.5%	35.0%	39.6%	37.9%	45.0%	42.0%	42.5%	40.4%
Health												
Very good	17.3%	17.9%	14.9%	16.5%	16.6%	16.2%	17.5%	18.6%	13.8%	18.0%	18.5%	16.3%
Good	48.8%	49.1%	47.5%	49.0%	48.3%	51.3%	49.6%	51.2%	44.5%	46.0%	43.8%	53.0%
Fair	26.9%	26.3%	29.0%	25.6%	26.0%	24.2%	26.6%	24.1%	34.9%	28.8%	30.0%	24.6%
Bad	5.3%	5.1%	5.8%	7.4%	7.6%	6.8%	5.7%	5.4%	6.6%	6.0%	6.4%	4.6%
Very bad	1.8%	1.6%	2.7%	1.5%	1.5%	1.5%	0.6%	0.7%	0.2%	1.3%	1.3%	1.5%
Shield												
No	74.8%	75.4%	72.5%	71.2%	71.4%	70.4%	82.9%	83.4%	81.1%	74.9%	74.9%	75.0%
Yes	25.2%	24.7%	27.5%	28.8%	28.6%	29.6%	17.1%	16.6%	18.9%	25.1%	25.1%	25.0%
Adults in household												
1	24.6%	24.8%	23.6%	22.6%	24.6%	19.4%	24.6%	24.4%	25.5%	22.7%	21.6%	26.4%
2	55.3%	55.2%	55.6%	52.6%	52.5%	53.0%	58.3%	58.4%	57.7%	59.8%	60.7%	57.0%
3	12.3%	12.4%	11.8%	17.2%	16.8%	18.4%	11.9%	11.8%	12.1%	12.2%	12.9%	9.5%
>3	7.9%	7.7%	8.9%	7.6%	7.1%	9.3%	5.3%	5.4%	4.7%	5.3%	4.8%	7.1%
Children in household												

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0	72.3%	71.7%	74.5%	73.1%	73.5%	72.1%	75.3%	74.4%	78.2%	74.4%	73.3%	77.9%
1	14.0%	14.3%	13.1%	14.0%	14.9%	11.2%	14.2%	14.8%	12.4%	12.5%	12.1%	13.7%
2	10.4%	11.1%	7.8%	9.4%	9.0%	10.8%	8.6%	8.7%	8.3%	9.8%	10.8%	6.3%
>2	3.2%	2.9%	4.6%	3.4%	2.7%	6.0%	1.9%	2.1%	1.1%	3.3%	3.7%	2.1%
Household income												
£0 - £10,400	9.5%	10.0%	7.6%	13.2%	14.4%	9.2%	12.1%	11.2%	14.8%	14.2%	12.2%	20.7%
£10,400 - £20,800	21.4%	21.1%	22.5%	21.8%	22.3%	20.4%	18.7%	19.6%	15.9%	22.0%	23.6%	16.8%
£10,400 - £31,200	20.4%	20.1%	21.9%	24.0%	23.5%	25.9%	23.3%	24.4%	19.7%	23.0%	24.0%	19.7%
£31,200 - £52,000	29.0%	29.4%	27.5%	26.1%	24.8%	30.6%	25.9%	26.2%	25.0%	25.2%	23.6%	30.3%
£52,000+	19.6%	19.4%	20.5%	14.8%	15.0%	13.9%	20.0%	18.6%	24.7%	15.5%	16.5%	12.5%
Education												
Less than higher education	62.5%	63.8%	57.5%	59.4%	59.0%	60.9%	58.2%	60.7%	50.0%	61.9%	62.5%	59.6%
Higher education degree	37.5%	36.2%	42.5%	40.5%	41.0%	39.1%	41.8%	39.3%	50.0%	38.2%	37.5%	40.4%
Job impact												
No	73.7%	72.7%	77.4%	76.7%	75.1%	82.1%	79.4%	77.7%	84.9%	75.6%	75.6%	75.6%
Yes	26.3%	27.3%	22.6%	23.3%	24.9%	17.9%	20.6%	22.3%	15.1%	24.4%	24.4%	24.4%
Caring responsibility												
No	85.4%	84.8%	87.8%	81.6%	82.2%	79.6%	83.5%	82.6%	86.4%	83.1%	83.7%	80.8%
Yes	14.6%	15.2%	12.2%	18.4%	17.8%	20.4%	16.5%	17.4%	13.6%	16.9%	16.3%	19.2%
Affected usual healthcare												
No	58.8%	58.5%	60.1%	47.0%	53.4%	51.5%	56.0%	56.6%	54.2%	52.8%	51.3%	57.7%
Yes	41.2%	41.6%	39.9%	53.0%	46.6%	48.5%	44.0%	43.4%	45.8%	47.2%	48.7%	42.3%
Impact on standard of living												
Worsened	29.9%	30.1%	39.3%	37.4%	37.3%	37.7%	31.0%	31.7%	28.8%	32.1%	32.0%	32.1%
Same or improved	70.1%	69.9%	70.7%	62.6%	62.7%	62.3%	69.0%	68.3%	71.2%	69.0%	68.0%	67.9%

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Estimation of lockdown scenario trade-offs using marginal rates of substitution for excess deaths

The calculation for the marginal rate of substitution (MRS) for introducing a 1-week red restriction lockdown where all routine non-COVID healthcare procedures are postponed is the addition of the MRS for the features that describe the scenario, such that:

$$\frac{\beta_{red\_restrictions}}{-\beta_{excess\_deaths}} + \frac{\beta_{length} \times X_{weeks}}{-\beta_{excess\_deaths}} + \frac{\beta_{all\_health\_postponed}}{-\beta_{excess\_deaths}} \quad (1)$$

This can be simplified as:

$$\frac{\beta_{red\_restrictions} + \beta_{length} \times X_{weeks} + \beta_{all\_health\_postponed}}{-\beta_{excess\_deaths}} \quad (2)$$

Following (2), the MRS for the scenario described above are:

England:

$$\frac{-0.246 + (-0.024 \times 1) + (-0.028)}{-0.118} = -2.53$$

Northern Ireland:

$$\frac{-0.192 + (-0.026 \times 1) + (-0.041)}{-0.133} = -1.95$$

Scotland:

$$\frac{-0.298 + (-0.032 \times 1) + (-0.013)}{-0.146} = -2.35$$

Wales:

$$\frac{-0.165 + (-0.028 \times 1) + (-0.028)}{-0.132} = -1.67$$

Standard errors and 95% Confidence Intervals (CI) are calculated using the delta method and are shown below.

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Nation	MRS (absolute)	Standard Error	Lower Confidence Interval	Upper Confidence Interval
England	2.53	0.27	2.00	3.06
Northern Ireland	1.95	0.28	1.39	2.50
Scotland	2.35	0.23	1.89	2.81
Wales	1.67	0.26	1.17	2.18

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Estimation of lockdown scenario trade-offs using marginal rates of substitution for decreases in the ability to buy things

The calculation for the marginal rate of substitution (MRS) for introducing a 2-week red restriction lockdown where all routine non-COVID healthcare procedures are postponed in terms of changes (decreases) in the ability to spend are:

England:

$$\frac{-0.246 + (-0.024 \times 4) + (-0.028)}{-0.104} = -3.57$$

Northern Ireland:

$$\frac{-0.192 + (-0.026 \times 4) + (-0.041)}{-0.117} = -2.88$$

Scotland:

$$\frac{-0.298 + (-0.032 \times 4) + (-0.013)}{-0.091} = -4.87$$

Wales:

$$\frac{-0.165 + (-0.028 \times 4) + (-0.028)}{-0.100} = -3.03$$

The standard errors and 95% CI are calculated using the delta method and are as follows:

Nation	MRS (absolute)	Standard Error	Lower Confidence Interval	Upper Confidence Interval
England	3.57	0.59	2.41	4.73
Northern Ireland	2.88	0.55	1.80	3.96
Scotland	4.87	0.93	3.04	6.70
Wales	3.03	0.59	1.88	4.18

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STROBE Statement—Checklist of items that should be included in reports of ***cross-sectional studies***

	Item No	Recommendation	Page No
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	3
Objectives	3	State specific objectives, including any prespecified hypotheses	4
Methods			
Study design	4	Present key elements of study design early in the paper	4-6
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	4
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	4
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	5-6
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	4
Bias	9	Describe any efforts to address potential sources of bias	5
Study size	10	Explain how the study size was arrived at	5
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	5
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	5
		(*b*) Describe any methods used to examine subgroups and interactions	5-6
		(*c*) Explain how missing data were addressed	n/a
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	5-6
		(*e*) Describe any sensitivity analyses	n/a
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	6
		(b) Give reasons for non-participation at each stage	n/a
		(c) Consider use of a flow diagram	n/a
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	6
		(b) Indicate number of participants with missing data for each variable of interest	n/a
Outcome data	15*	Report numbers of outcome events or summary measures	6-7
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	6-7

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		(*b*) Report category boundaries when continuous variables were categorized	6-7
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	n/a
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	n/a
Discussion			
Key results	18	Summarise key results with reference to study objectives	14
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	14
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	14-15
Generalisability	21	Discuss the generalisability (external validity) of the study results	14-15
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	16

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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Public acceptability of non-pharmaceutical interventions to control a pandemic in the United Kingdom: a discrete choice experiment

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Abstract

Objective

To understand how individuals trade-off between features of non-pharmaceutical interventions (e.g. lockdowns) to control a pandemic across the four nations of the United Kingdom.

Design

A survey that included a Discrete Choice Experiment (DCE). The survey design was informed using policy documents, social media analysis, and input from remote think aloud interviews with members of the public (n=23).

Setting

A nation-wide survey across the four nations of the United Kingdom using an online panel between 29th October and 12th December 2020.

Participants

Individuals who are over 18 years old. A total of 4120 adults completed the survey (1112 in England, 848 in Northern Ireland, 1143 in Scotland and 1098 in Wales).

Primary outcome measure

Adult's preferences for, and trade-offs between, type of lockdown restrictions, length of lockdown, postponement of routine healthcare, excess deaths, impact on the ability to buy things and unemployment.

Results

The majority of adults are willing to accept higher excess deaths if this means lockdowns that are less strict, shorter, and do not postpone routine healthcare. On average, respondents in England were willing to accept a higher increase in excess deaths to have less strict lockdown restrictions introduced compared to Scotland, Northern Ireland, and Wales, respectively. In all four countries, one out of five respondents were willing to reduce excess deaths at all costs.

Conclusions

The majority of the UK population is willing to accept the increase in excess deaths associated with introducing less strict lockdown restrictions. The acceptability of different restriction scenarios varies according to the features of the lockdown and across countries. Governments can use information about trade-off preferences to inform the introduction of different lockdown restriction levels and design compensation policies that maximise societal welfare.

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Strengths and limitations of this study

- This study provides a clear understanding of the trade-offs between restrictions and impacts of lockdowns on society, unlike existing data from opinion polls and citizens' panels.
- The results take into account the heterogeneity of UK nations and can be used to inform the introduction of different levels of lockdown restrictions in each nation.
- Given preferences are likely evolving, the dynamics of trade-offs for lockdown should be closely monitored.
- We cannot disentangle between specific dimensions of lockdown restrictions that may affect preferences (e.g., social activities, non-essential trips, school attendance and youth activities, non-essential businesses and outdoor activities).

Introduction

The COVID-19 pandemic has required countries worldwide to introduce non-pharmaceutical interventions to protect the health and wellbeing of their citizens.[1] The majority of European and high-income nations have focused on reducing the reproduction number (R) to less than one, thereby curtailing the epidemic spread of the virus and reducing the strain put on health systems.[2,3] This strategy requires a number of non-pharmaceutical interventions such as enforced social distancing across all age groups, closing schools and non-essential businesses, and a range of other social restrictions.[4] This has led to local and nationwide lockdowns and other restrictions to control infection rates and excess deaths within geographically defined populations.[5-7]

Lockdowns have wider indirect impacts on health and well-being. Lockdown decisions require a careful balancing of the direct impacts on mortality caused by COVID-19 with the indirect wider health, social, and economic impacts.[8-11] Lockdown compliance will determine its effectiveness. Compliance is more likely to happen if policies are accepted by the public. Policies are more likely to be acceptable if the public's preferences are understood and the diversity of views is recognised. The World Health Organization criteria for deciding whether to lift lockdown restrictions includes the need for *"Communities are fully educated, engaged and empowered to adjust to the "new norm" of everyday life*.[12] This criterion requires a better understanding of how the public responds to and values the trade-offs faced during and post-pandemic. For example, is the public willing to accept a certain number of excess deaths to have restrictions eased?

Prior to the COVID-19 pandemic, there was limited evidence on how people think of lockdown policies in the UK.[13] During the pandemic, public attitudes to government responses to the pandemic have been explored using opinion polls and qualitative studies.[14-16] The Scottish Government and Bank of England established citizen's panels.[17,18] These instruments offer insight into the views and concerns of the population. However, they provide no understanding of the trade-offs that individuals are willing to make. For example, the Scottish citizen's panel recommended that the Scottish Government should implement an elimination strategy, and where this is not feasible,

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should aim for maximum suppression of the virus, but did not the state the cost of the restrictions that was acceptable to achieve this. Thus, we use a preference elicitation instrument tailored to quantify preferences, a discrete choice experiment (DCE), to provide new evidence on the acceptable number of excess deaths to the UK public when easing or tightening restrictions.

Methods

Study Sample

We conducted a cross-sectional survey among a sample of adults aged over 18 from across the four nations of the United Kingdom. The survey was implemented between 29th October and 12th December 2020. Respondents were recruited using an online survey research panel maintained by the company Qualtrics. The survey was piloted in early October 2020 (n=50 per nation). Respondents were screened by the recruiting company using sex and age using quotas with the aim of achieving representativeness in each nation. The research company excluded respondents that completed the survey in less than half the median time of completion of the pilot stage of the survey (14 minutes).

Discrete Choice Experiment

Respondents self-completed an online survey that asked about the individual's experience during the COVID-19 pandemic, lockdowns that had occurred, any impacts on their healthcare, their spending ability and employment. The survey included a discrete choice experiment (DCE), a choice-based survey that quantifies preferences for attributes (or features) of goods, services or policies. The DCE has its theoretical roots in Lancaster's theory of value and consumer theory [19]. It assumes that goods or services (in this case, pandemic responses) can be described by attributes and the levels of these attributes. Each respondent faces a series of hypothetical scenarios (choice sets) composed of two or more alternatives. In each choice set, respondents are asked to choose their preferred scenario. The DCE assumes individuals consider all the information presented and make trade-offs.

Respondents completed a series of eight choice tasks based on the features of government restrictions. The hypothetical choice tasks focussed on six features of government restrictions that describe different types of lockdown and their likely health and economic consequences. Features used to describe the *type of lockdown* were: restriction severity using a colour-based tier system (Figure 1), length in weeks, and postponement of routine healthcare procedures. *Health consequences* also included the number of excess deaths (we also report infection numbers as a complement based on the infection rate).[20] We included two *economic consequences:* respondent's household's ability to buy things (personal impact) and the number of job losses (societal impact). See Supplementary Material 1 (Table 1) for the features and associated levels. The features and levels were informed by policy documents,[12] impacts of interventions that were

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implemented in response to COVID-19,[4] literature on preferences for lockdown measures from previous pandemics,[21,22] and a social media analysis. A more detailed description of the development stage can be found in the study's published protocol.[23]

[Figure 1 here]

Lockdown features and levels were combined into pairwise choice tasks using a D-efficient design.[24,25] The design results in 24 tasks. Respondents were allocated randomly to one of the three survey versions, each with eight tasks. Respondents were asked to choose between two lockdown descriptions (Figure 2). The order of the eight tasks was randomised for each respondent to minimise ordering effects.[26]

[Figure 2 here]

Patient and Public Involvement

Adult members of the public were invited, using two targeted social media campaigns, to take part in the study development stage (see Supplementary Material 1, Figures 1–5). These engagements were used to create the survey's content and format, and to construct the framing of the Discrete Choice Experiment's features and levels (see Supplementary Material 1 and 2). Twenty-three think-aloud interviews were carried out between the months of June and August 2020. The outcome of each interview was used iteratively until saturation was achieved to make edits to the survey to ensure it captured the intended preferences, was understandable, and minimised respondent burden. The study results will be disseminated to the wider public, with the help of the Stakeholder Advisory Group (SAG), using layperson summaries and multimedia content through mass media. Furthermore, the study's SAG, which includes a member of Scotland's Chief Scientist Office's Public Engagement Group, has been involved since its conception and provided insight into the research questions, overall design and dissemination strategy. Because of the study's ethical approvals, it is not possible for us to contact the members of the public who took part in the survey development stage, nor respondents of the main survey, to disseminate results individually.

Statistical Analysis

The devolved governments of the UK set their own lockdown policies; therefore, statistical analysis was conducted separately for each of the four devolved nations of the UK. The minimal sample size for the DCE given the eight tasks per respondent, a baseline choice probability of 50% (given there were two options in each choice set), an accuracy level of 90% and a confidence level of 95%, using Louviere´s formula for choice proportions, was 49 respondents.[25] Given that we aimed to estimate preferences using flexible logit models, we aimed for a conservative size of 1000 per nation in the UK.

We focus on the trade-offs respondents were willing to make between the level of restriction and excess deaths. We first test if any respondents were unwilling to accept an

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increase in excess deaths for improvements in other features. This was defined as respondents who always chose the description with the lowest number of excess deaths. The response pattern for these respondents is shown in Supplementary Material 1 (Table 2). We estimated a logit regression model to understand the characteristics of this group for each nation. Predictors included: sex, age, self-perceived health, number of children in household, household income quintile, whether they were asked to shield during previous lockdowns, had their main job impacted (furloughed, reduced hours or made redundant), had caring responsibilities and if they had seen their standard of living worsened during the COVID-19 pandemic.

We then analysed the choice tasks using an errors-component logit model, allowing for the panel structure of the data.[27] Parameter estimates represented the effect of each feature on preferences. The ratio of estimates represents the trade-off between two features. Further, trade-offs between different features, when elicited in terms of a common denominator, can be added to estimate the overall trade-off for a particular lockdown scenario. When elicited in terms of excess deaths, these trade-offs indicate the maximum number of lives that need to be saved to introduce a hypothetical lockdown scenario. For example, how many excess deaths would need to be saved when introducing a four-week strict lockdown that cancels all non-COVID-19 healthcare procedures?

The difference in trade-offs between two lockdown scenarios can be interpreted as the maximum number of excess deaths that would be accepted if the more preferred scenario were introduced. To illustrate how these differences can inform policy, we assume that each nation faces a four-week red level (see Figure 1) restriction lockdown that postpones all non-COVID-19 healthcare procedures, and estimate the acceptable number of excess deaths to have this eased to less strict lockdown scenarios. Specifically, we compare easing to 12 different lockdowns made up of combinations of amber and yellow restrictions (Figure 1) that vary in length between 8,10 and 12 weeks, and in whether they postpone healthcare services.

All logit models were estimated using maximum likelihood techniques using the statistical software R (version 3.6.3). Standard errors and confidence intervals (CIs) were computed using the delta method.

Results

Respondents were not representative of the age and sex distributions of the four devolved nations; the response data was thus weighted using iterative proportional fitting.[28] We also used matching to make our sample representative and found robust results[1]. 4120 respondents completed the survey: 1112 in England, 848 in Northern Ireland, 1143 in

[1] Unweighted parameter estimate results are available in Supplementary Material 1 (p.14). Confirmatory results using matching are available from the authors.

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Scotland, and 1098 in Wales. Table 1 shows the sample descriptive characteristics across nations after weighting.

The number of respondents who consistently chose the alternative with the least excess deaths was 225 (20.2%) in England, 193 (22.8%) in Northern Ireland, 262 (22.9%) in Scotland, and 247 (22.5%) in Wales. Results from the logit model are shown in Table 2. In England, none of the considered variables were associated with respondents always choosing the lowest number of excess deaths. In Northern Ireland, this response pattern was negatively associated with respondents who experienced an impact on employment (adjusted odds ratio [OR] 0.58 [95% CI 0.35–0.97], p=0.04). In Scotland, this response pattern was also negatively associated with respondents who experienced an impact on employment (0.62 [0.40–0.95], p=0.03), and household income of £20,800-£31,200 compared to the reference level of £0-£10,400 (0.54 [0.31–0.95], p=0.03). Furthermore, this response pattern was positively associated with having a higher education degree (compared to less than higher education) (1.77 [1.28–2.45], p<0.01) and fair self-reported health compared to very good (1.82 [1.11–2.97], p=0.02). In Wales, this response pattern was negatively associated with age over 55 compared to 18-34 (0.63 [0.40–0.98], p=0.04), household incomes of £10,400-£20,800 (0.49 [0.29–0.83], p=0.01), £20,800-£31,200 (0.57 [0.34–0.96], p=0.04) and over £52,000 (0.49 [0.79–1.56], p=0.03) compared to £0-£10,400. Univariate analyses for each factor are shown in Supplemental Material 1 (Table 3).

The preference parameter estimates and corresponding trade-offs in terms of excess deaths based on responses to the choice tasks are shown in Table 3. Across the four nations, respondents prefer lockdowns with less strict restrictions (i.e., green and yellow level) to strict ones (i.e., amber and red level), shorter lockdowns, fewer excess deaths, fewer job losses, and less impact on their ability to buy goods. In England, Northern Ireland and Scotland, respondents prefer no postponement of routine healthcare procedures (at the 10% level). The maximum number of lives (out of 10,000) that need to be saved to accept a change in each of the lockdown features and consequences is shown in the marginal rates of substitution (MRS) column for each nation. Each MRS is calculated as the ratio of the parameter being valued to the negative of the parameter for excess deaths. For example, respondents in England would require a reduction in excess deaths of 2.08 lives per 10,000 to accept a red lockdown (-0.25/0.12) or alternatively they would be willing to accept 2.08 excess deaths per 10,000 of the population to avoid a red lockdown.

Figure 3 shows the acceptable maximum excess deaths for easing restrictions from a further 4-week red lockdown to the less strict lockdowns. The highest aversion to strict lockdowns is found in England, followed by Scotland, Northern Ireland and Wales, as seen by the higher number of acceptable excess deaths for lockdown easing. For example, the maximum number of acceptable deaths when easing to an 8-week yellow restriction with no healthcare postponement is 3.62 (95% CI 2.67–4.58) in England, 2.22 (1.21–3.24) in Northern Ireland, 2.41 (1.57–3.24) in Scotland, and 1.10 (0.18–2.02) in Wales. These rates equal 18958, 361, 1265, and 323 excess deaths for each nation, respectively.

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As expected, the maximum number of acceptable deaths is lower when moving to stricter (e.g., amber over yellow) and longer lockdowns that postpone routine healthcare procedures. For example, the difference in the acceptable number of deaths between a 4-week red lockdown and a 12-week amber lockdown with healthcare postponement is 0.85 (0.03–1.67) in England and not statistically different from zero in Northern Ireland (X^2=*0.88,* p=0.35), Scotland (X^2=*1.84,* p=0.17), and Wales (X^2=*0.08,* p=0.77). This suggests that respondents in Northern Ireland, Scotland, and Wales are indifferent between continuing with a further 4-week red restriction and easing to a 12-week amber restriction with healthcare postponement.

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Table 1. Characteristics associated with sample by nation.*

	England		Northern Ireland		Scotland		Wales	
Sex								
Female	556	50.0%	436	51.4%	592	51.8%	562	51.2%
Male	556	50.0%	412	48.6%	551	48.2%	536	48.8%
Age								
18-34	312	28.1%	242	28.5%	315	27.6%	294	26.8%
35-55	373	33.5%	293	34.6%	375	32.8%	343	31.2%
55+	427	38.4%	313	36.9%	453	39.6%	461	42.0%
Health								
Very good	192	17.3%	140	16.5%	200	17.5%	197	18.0%
Good	542	48.8%	415	49.0%	567	49.6%	505	46.0%
Fair	299	26.9%	217	25.6%	304	26.6%	316	28.8%
Bad	59	5.3%	63	7.4%	65	5.7%	65	6.0%
Very bad	20	1.8%	13	1.5%	7	0.6%	15	1.3%
Shield								
No	831	74.8%	604	71.2%	947	82.9%	823	74.9%
Yes	281	25.2%	244	28.8%	196	17.1%	275	25.1%
Adults in household								
1	273	24.6%	192	22.6%	281	24.6%	249	22.7%
2	614	55.3%	446	52.6%	666	58.3%	657	59.8%
3	136	12.3%	146	17.2%	136	11.9%	133	12.2%
>3	88	7.9%	64	7.6%	60	5.3%	58	5.3%
Children in household								
0	804	72.3%	620	73.1%	861	75.3%	817	74.4%
1	156	14.0%	119	14.0%	163	14.2%	137	12.5%
2	116	10.4%	80	9.4%	99	8.6%	107	9.8%
>2	36	3.2%	29	3.4%	21	1.9%	37	3.3%
Household income								
£0 - £10,400	106	9.5%	112	13.2%	138	12.1%	156	14.2%
£10,400 - £20,800	238	21.4%	185	21.8%	214	18.7%	242	22.0%
£10,400 - £31,200	227	20.4%	204	24.0%	266	23.3%	253	23.0%
£31,200 - £52,000	323	29.0%	221	26.1%	296	25.9%	277	25.2%
£52,000+	218	19.6%	125	14.8%	229	20.0%	170	15.5%
Education								
Less than higher education	695	62.5%	504	59.4%	665	58.2%	679	61.9%
Higher education degree	417	37.5%	343	40.5%	478	41.8%	419	38.2%
Job impact								
No	820	73.7%	650	76.7%	907	79.4%	830	75.6%
Yes	292	26.3%	198	23.3%	236	20.6%	268	24.4%

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Caring responsibility								
No	950	85.4%	692	81.6%	955	83.5%	912	83.1%
Yes	162	14.6%	156	18.4%	188	16.5%	186	16.9%
Affected usual healthcare								
No	654	58.8%	399	47.0%	640	56.0%	579	52.8%
Yes	458	41.2%	449	53.0%	503	44.0%	518	47.2%
Impact on standard of living								
Worsened	332	29.9%	317	37.4%	354	31.0%	352	32.1%
Same or improved	780	70.1%	531	62.6%	789	69.0%	757	69.0%
Total	1112		848		1143		1098	

*Weighted frequencies.

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Table 2. Characteristics associated with respondents that always minimises excess deaths in the discrete choice experiment tasks

		England			Northern Ireland			Scotland			Wales		
		OR	(95% CI)	p value	OR	(95% CI)	p value	OR	(95% CI)	p value	OR	(95% CI)	p value
Sex													
	Female	1	(ref)		1	(ref)		1	(ref)		1	(ref)	
	Male	0.82	(0.58 – 1.16)	0.27	0.81	(0.55 – 1.18)	0.27	1.04	(0.75 – 1.44)	0.83	1.09	(0.78 – 1.51)	0.62
Age													
	18-34	1	(ref)		1	(ref)		1	(ref)		1	(ref)	
	35-55	1.60	(1.00 – 2.53)	0.05	1.54	(0.93 – 2.56)	0.09	0.93	(0.61 – 1.41)	0.73	0.78	(0.52 – 1.19)	0.25
	55+	1.27	(0.80 – 2.02)	0.32	1.29	(0.75 – 2.23)	0.36	1.33	(0.86 – 2.06)	0.20	**0.63**	**(0.40 – 0.98)**	**0.04**
Health													
	Very good	1	(ref)		1	(ref)		1	(ref)		1	(ref)	
	Good	1.26	(0.77 – 2.04)	0.36	1.07	(0.62 – 1.84)	0.81	1.01	(0.64 – 1.58)	0.97	1.31	(0.84 – 2.03)	0.23
	Fair	1.52	(0.90 – 2.59)	0.12	0.92	(0.50 – 1.71)	0.80	**1.82**	**(1.11 – 2.97)**	**0.02**	0.85	(0.51 – 1.42)	0.53
	Bad	1.36	(0.59 – 3.10)	0.47	1.06	(0.46 – 2.46)	0.89	1.20	(0.53 – 2.72)	0.66	0.79	(0.35 – 1.81)	0.58
	Very bad	2.16	(0.67 – 6.95)	0.20	0.82	(0.19 – 3.63)	0.80	0.28	(0.02 – 3.98)	0.35	1.56	(0.32 – 7.62)	0.58
Shield													
	No	1	(ref)		1	(ref)		1	(ref)		1	(ref)	
	Yes	1.18	(0.80 – 1.74)	0.41	1.07	(0.70 – 1.64)	0.76	0.97	(0.63 – 1.51)	0.91	1.25	(0.85 – 1.85)	0.26
Adults in household													
	1	1	(ref)		1	(ref)		1	(ref)		1	(ref)	
	2	1.09	(0.71 – 1.67)	0.69	1.15	(0.70 – 1.88)	0.58	1.06	(0.72 – 1.57)	0.77	0.75	(0.50 – 1.11)	0.15
	3	1.19	(0.66 – 2.16)	0.56	1.14	(0.61 – 2.13)	0.69	1.03	(0.58 – 1.82)	0.93	0.57	(0.31 – 1.06)	0.08
	>3	1.13	(0.56 – 2.28)	0.74	1.65	(0.77 – 3.55)	0.20	1.43	(0.66 – 3.08)	0.37	1.07	(0.52 – 2.20)	0.86
Children in household													
	0	1	(ref)		1	(ref)		1	(ref)		1	(ref)	
	1	0.90	(0.54 – 1.48)	0.67	0.65	(0.35 – 1.21)	0.17	0.90	(0.55 – 1.47)	0.68	0.97	(0.60 – 1.58)	0.91

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	2	0.66	(0.35 – 1.24)	0.20	1.04	(0.55 – 1.94)	0.91	1.21	(0.70 – 2.10)	0.50	0.54	(0.29 – 0.99)	0.05
	>2	1.61	(0.68 – 3.83)	0.28	2.21	(0.94 – 5.21)	0.07	0.43	(0.09 – 1.97)	0.28	0.65	(0.22 – 1.89)	0.42
Household income													
	£0 - £10,400	1	(ref)		1	(ref)		1	(ref)		1	(ref)	
	£10,400 - £20,800	1.48	(0.76 – 2.92)	0.25	1.51	(0.74 – 3.11)	0.26	0.69	(0.39 – 1.22)	0.20	**0.49**	**(0.29 – 0.83)**	**0.01**
	£20,800 - £31,200	1.48	(0.74 – 2.98)	0.27	1.76	(0.87 – 3.58)	0.12	**0.54**	**(0.31 – 0.95)**	**0.03**	**0.57**	**(0.34 – 0.96)**	**0.04**
	£31,200 - £52,000	1.30	(0.65 – 2.60)	0.46	2.01	(0.98 – 4.11)	0.06	0.68	(0.39 – 1.19)	0.17	0.86	(0.26 – 0.94)	0.57
	£52,000+	1.38	(0.65 – 2.93)	0.40	1.48	(0.63 – 3.47)	0.36	0.88	(0.49 – 1.61)	0.69	**0.49**	**(0.79 – 1.56)**	**0.03**
Education													
	Less than higher education	1	(ref)		1	(ref)		1	(ref)		1	(ref)	
	Higher education degree	1.29	(0.92 – 1.83)	0.142	0.95	(0.64 – 1.42)	0.81	**1.77**	**(1.28 – 2.45)**	**0.01**	1.11	(0.79 – 1.56)	0.53
Job impact													
	No	1	(ref)		1	(ref)		1	(ref)		1	(ref)	
	Yes	0.80	(0.53 – 1.22)	0.307	**0.58**	**(0.35 – 0.97)**	**0.04**	**0.62**	**(0.40 – 0.95)**	**0.03**	0.93	(0.63 – 1.37)	0.73
Caring responsibility													
	No	1	(ref)		1	(ref)		1	(ref)		1	(ref)	
	Yes	0.81	(0.48 – 1.36)	0.424	1.23	(0.76 – 1.97)	0.40	0.71	(0.45 – 1.13)	0.15	1.33	(0.88 – 1.99)	0.17
Affected usual healthcare													
	No	1	(ref)		1	(ref)		1	(ref)		1	(ref)	
	Yes	1.00	(0.71 – 1.42)	0.987	1.07	(0.73 – 1.57)	0.73	1.05	(0.76 – 1.45)	0.76	0.84	(0.60 – 1.17)	0.29
Impact on standard of living													
	Same or improved	1	(ref)		1	(ref)		1	(ref)		1	(ref)	
	Worsened	0.99	(0.66 – 1.47)	0.949	1.13	(0.74 – 1.73)	0.56	1.16	(0.81 – 1.67)	0.41	0.95	(0.66 – 1.37)	0.78

Note: **bold** indicates significance at the 95% level.

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Table 3. Preferences for lockdown features.

	England					Northern Ireland				
	Parameter estimates			MRS (excess deaths)		Parameter estimates			MRS (excess deaths)	
	Coef.	95% CI	p value	MRS	95% CI	Coef.	95% CI	p value	MRS	95% CI
Alternative Specific Constant	-0.15	(-0.20–-0.11)	<0.01	..	..	-0.16	(-0.21–-0.10)	<0.01	..	..
Green restrictions	0.01	(-0.04–0.06)	0.75	0.07	(-0.35–0.49)	0.00	(-0.05–0.06)	0.87	0.04	(-0.84–0.41)
Yellow restrictions	0.19	(0.14–0.25)	<0.01	1.63	(1.17–2.09)	0.12	(0.06–0.18)	<0.01	0.91	(0.43–1.38)
Amber restrictions	0.05	(-0.00–0.10)	0.07	0.39	(-0.03–0.82)	0.07	(0-01–0.12)	0.02	0.51	(0.07–0.94)
Red restrictions	-0.25	(-0.20–0.30)	<0.01	-2.09	(-2.53–-1.66)	-0.19	(-0.25–-0.14)	<0.01	-1.45	(-1.88–-1.01)
Length (1 week increase)	-0.02	(-0.03–-0.02)	<0.01	-0.20	(-0.26–-0.15)	-0.03	(-0.03–-0.02)	<0.01	-0.19	(-0.25–-0.14)
All healthcare postponed	-0.03	(-0.07–0.01)	0.16	-0.24	(-0.57–0.09)	-0.04	(-0.09-0.00)	0.08	-0.31	(-0.65–0.03)
Some healthcare postponed	-0.03	(-0.07–0.01)	0.16	-0.24	(-0.57–0.09)	0.00	(-0.05–0.04)	0.85	-0.03	(-0.38–0.31)
None healthcare postponed	0.06	(0.02–0.10)	0.01	0.48	(0.14–0.82)	0.05	(-0.00–0.09)	0.06	0.34	(-0.01–0.70)
Excess deaths (1 out of 10,000 increase)	-0.12	(-0.12–-0.11)	<0.01	-	-	-0.13	(-0.14–-0.12)	<0.01	-	-
Ability to spend (10% decrease)	0.10	(0.08–0.13)	<0.01	0.88	(0.65–1.11)	0.12	(0.09–0.15)	0.00	0.88	(0.64–1.12)
Job loss (1 out of 100 increase)	-0.02	(-0.03–-0.02)	<0.01	-0.20	(-0.23–-0.17)	-0.03	(-0.03–-0.02)	<0.01	-0.19	(-0.22–-0.16)
SD Alternative Specific Constant	0.00	(-0.10–0.10)	0.99	..	..	0.00	(-0.13–0.13)	0.99	..	..
Log likelihood					-5167.934					-3811.386
Observations					8896					6784

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Table 3 continued. Preferences for lockdown features.

	Scotland					Wales				
	Parameter estimates			MRS (excess deaths)		Parameter estimates			MRS (excess deaths)	
	Coef.	95% CI	p value	MRS	95% CI	Coef.	95% CI	p value	MRS	95% CI
Alternative Specific Constant	-0.17	(-0.22–-0.12)	<0.01	..	..	-0.21	(-0.26–0.16)	<0.01	..	..
Green restrictions	0.14	(0.08–0.19)	<0.01	0.92	(0.56–1.29)	0.06	(0.01–0.11)	0.03	0.44	(0.04–0.83)
Yellow restrictions	0.13	(0.08–0.19)	<0.01	0.92	(0.52–1.31)	0.06	(0.01–0.12)	0.02	0.48	(0.06–0.90)
Amber restrictions	0.03	(-0.02–-0.08)	0.25	0.20	(-0.14–0.54)	0.04	(-0.01–0.09)	0.08	0.33	(-0.05–0.71)
Red restrictions	-0.30	(-0.35–-0.25)	<0.01	-2.04	(-2.41–-1.68)	-0.17	(-0.22--0.11)	<0.01	-1.25	(-1.65–-0.86)
Length (weeks)	-0.03	(-0.04–-0.03)	<0.01	-0.22	(-0.27–-0.18)	-0.03	(-0.03–-0.02)	<0.01	-0.21	(-0.26–-0.16)
All healthcare postponed	-0.01	(-0.05–0.03)	0.53	-0.09	(-0.37–0.19)	-0.03	(-0.07–0.01)	0.17	-0.21	(-0.51–0.09)
Some healthcare postponed	-0.02	(-0.06–0.02)	0.27	-0.16	(-0.44–0.12)	0.01	(-0.03–0.05)	0.65	0.07	(-0.24–0.38)
None healthcare postponed	0.04	(-0.01–0.08)	0.09	0.25	(-0.04–0.54)	0.02	(-0.02–0.06)	0.38	0.14	(-0.18–0.46)
Excess deaths (1 out of 10,000 increase)	-0.15	(-0.15–-0.14)	<0.01	-	-	-0.13	(-0.14–-0.12)	<0.01	-	-
Ability to spend (10% decrease)	0.09	(0.06-0.12)	<0.01	0.62	(0.42–0.82)	0.10	(0.07–0.13)	<0.01	0.76	(0.54–0.98)
Job loss (1 out of 100 increase)	-0.03	(-0.04–-0.03)	<0.01	-0.22	(-0.24–-0.20)	-0.03	(-0.03–-0.02)	<0.01	-0.20	(-0.23–-0.18)
SD Alternative Specific Constant	0.00	(-0.10–0.10)	0.99	..	..	0.00	(-0.10–0.10)	0.99	..	..
Log likelihood					-4890.047					-4925.654
Observations					9144					8784

Note: Coef. = mean parameter coefficient estimate. CI = Confidence Interval. SD = Standard Deviation. MRS = Marginal rates of substitution. Categorical variables were effects coded to allow for a preference parameter to be estimated for all levels of the feature.[29]

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[Figure 3 here]

Discussion

The elicitation of public values and trade-offs for different lockdown features can help guide government policies during a pandemic. We found evidence that four out of five respondents were willing to accept an increase in excess deaths for relaxations in lockdown restrictions. With the roll-out of pharmaceutical interventions and the increase in data available to model the impact of changes in restrictions, our results can help inform policy makers about what lockdown policies are acceptable given the estimated trade-offs. We found that respondents in England are the most averse to the introduction of short *circuit-breaker*-type lockdowns, thus accepting a higher number of excess deaths to avoid them. In contrast, these strict lockdowns were more palatable to respondents in Wales.

These insights are useful as UK governments consider the introduction of new restrictions in response to increased infections. More specifically, our model can be used to assess whether the expected health benefits in terms of a reduction in the number of excess deaths outweigh costs in terms of increased restrictions. As an example, modelling by Ferguson et al. (2020) contended that a one-week earlier strict lockdown in England during COVID-19's first wave would have saved 20,000 lives.[30] Our findings suggest that the number of acceptable deaths in England for a one-week strict (red level restrictions) lockdown is 2.53 out of 10,000, or 14,170 lives, which is less than the number of lives that would have been saved (see Supplementary Material 1 p.16 for details). Thus, based on these results, the public's perception of the benefits of introducing an earlier lockdown would have outweighed the costs in terms of lockdown restrictions.

Whilst we limited our analysis to consider acceptable excess deaths, a strength of our model is that it can be used to determine value in terms of other features included, i.e. acceptable reductions in spending or job losses associated with a particular lockdown scenario. We found that respondents in Scotland were less sensitive to losses in their own spending ability compared to other nations. For example, the average acceptable loss in spending ability for a four-week red level lockdown in Scotland is 49%, while in England it is 36%, Northern Ireland it is 29%, and Wales 30%. A detailed calculation of these trade-offs can be found in Supplementary Material 1 (p. 18). Thus, a targeted compensation instrument could target other economic consequences, such as joblessness, in Scotland and consumer spending ability in the other nations.

We identified 20% of respondents as *excess death minimisers*, always choosing the option with the minimum number of deaths. This finding suggests that such respondents would accept any lockdown and economic costs to save lives. We found that no socio-economic factors could consistently explain these findings. It is possible that respondents are trading, but the strong preference to minimise excess deaths results in the option with the lowest number of excess deaths being preferred. Another explanation is that this response pattern represents a decision-heuristic for

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respondents to complete the tasks. We generated our choice sets using a D-efficient design, meaning that attribute levels were orthogonal and there was minimal overlap in choice sets. Whilst increasing a design's statistical efficiency enable individual main effects to be estimated, there is a trade-off with cognitive efficiency since it also makes it more difficult for respondents to answer, potentially causing respondents to use heuristics.[31] We note however that our design underwent extensive pretesting to ensure the tasks were not overly cognitively burdensome and enabled respondents to trade-off across all attributes. Alternatively, the identified response pattern may relate to Tetlock's sacred values protection model, where sacred values are defined as any "that a moral community implicitly or explicitly treats as possessing infinite or transcendental significance that precludes comparisons, trade-offs".[32,33]

Whilst we considered non-trading with respect to excess deaths, it is possible that respondents exhibited non-trading behaviour with respect to other attributes. During the pandemic, discussions have taken place around whether the policy response should minimise job losses (which is likely less of a taboo trade-off), individual versus collective decision-making (e.g. focusing on own ability to spend versus societal job losses) and the importance of individual freedoms and civil liberties versus economic and health factors (e.g. focusing on less restrictive lockdowns).[34-38] Future research could investigate non-trading preference responses for all attributes, linking with socio-economic characteristics and moral attitudes.

A potential limitation of our study is that individuals' preferences regarding the features of lockdowns may be evolving. Until March 2020, respondents would not have experienced a lockdown. We conducted our survey in October-December 2020, hence all respondents would have experience of the first lockdown. The study was, however, conducted before the second lockdown. The dynamics of preferences and trade-offs for lockdown should be closely monitored. A further limitation is that the results are not necessarily transferable to other nations, although the methodology can be adapted for use in different populations. Recent DCE studies have also found the general public in Australia [39], the Netherlands [40], the United States [41] and France [42] are willing to trade-off specific health and non-health outcomes of lockdown interventions.

Our study did not look at the relative importance of the different dimensions of lockdown restrictions (shelter, socialising, non-essential trips, school and youth activities, non-essential businesses and outdoor activities). Future work could use a DCE to explore this; given current discussions around international travel, this dimension could be included. We focused on the public's preferences; future research could explore the preferences of policy makers, health professionals, and groups especially affected by lockdown restrictions.

Conclusions

We have provided new insight into preferences for lockdown policies across the four UK nations using a DCE. The majority of respondents from all four devolved nations were willing to accept an increase in excess deaths for relaxation in lockdown restrictions. Respondents from England were more willing to accept an increase in

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excess deaths, followed by Scotland, Northern Ireland and Wales. Our model can also be used to estimate the reduction in excess deaths required to justify increasing lockdown restrictions. Whilst we focused on excess deaths, trade-offs could also be estimated in terms of acceptable changes in spending power and job losses, as well as combinations of these features. Such analysis will help identify which levers best support lockdown strategies whilst maintaining public confidence and maximising compliance.

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Contributors
MR, VW, MG, RAS & LEL-R conceptualised the study, contributed to the overall design of the survey experiment and contributed to the interpretation of the data. MG and RAS carried out the think-aloud interviews as part of the developmental work. LEL-R undertook the analysis, including the R programming of the statistical models and is the study's guarantor. MR reviewed the statistical model and contributed to the analysis of the data. SP and DP contributed comments to the development of the protocol, and discussion of public health implications and helped shape the overall interpretation. All authors approved the final protocol. All authors had access to all the data, contributed to the writing of the paper and had final responsibility for the decision to submit for publication. The corresponding author attests that all listed authors meet authorship criteria and that no others meeting the criteria have been omitted.

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Declaration of interests
All authors have completed the ICMJE uniform disclosure form at www.icmje.org/coi_disclosure.pdf (available on request from the corresponding author) and declare no support from any organisation for the submitted work; no financial relationships with any organisations that might have an interest in the submitted work in the previous three years; no other relationships or activities that could appear to have influenced the submitted work.

Ethical approval
The study received ethical approval from the University of Aberdeen's College of Life Sciences and Medicine Ethical Review Board (Reference CERB/2020/6/1974). All participants provided informed consent.

Data sharing
Anonymised cross-sectional data from the analysis can be made available by the corresponding author after the authors' review of reasonable requests. The published protocol can be found at: https://bmjopen.bmj.com/content/10/11.

Dissemination to participants and related patient and public communities
The results have been and will be presented at national and international conferences. Dissemination plans to inform the community of this study's results include social

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media and University's newsletter. Authors will liaison with the study's Stakeholder Advisory Group to ensure maximum policy impact of the study's findings.

Transparency

The corresponding author affirms that this manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned (and, if relevant, registered) have been explained.

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Figure Captions:

Figure 1: Lockdown levels for the 'type of lockdown' attribute.

Figure 2: Example choice task as shown to respondent.

Figure 3: Acceptable maximum excess deaths for easing restrictions from a further 4-week red lockdown to different less strict lockdown scenarios.

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Figure 1. Description of the colour tier system for restriction levels.

776x529mm (72 x 72 DPI)

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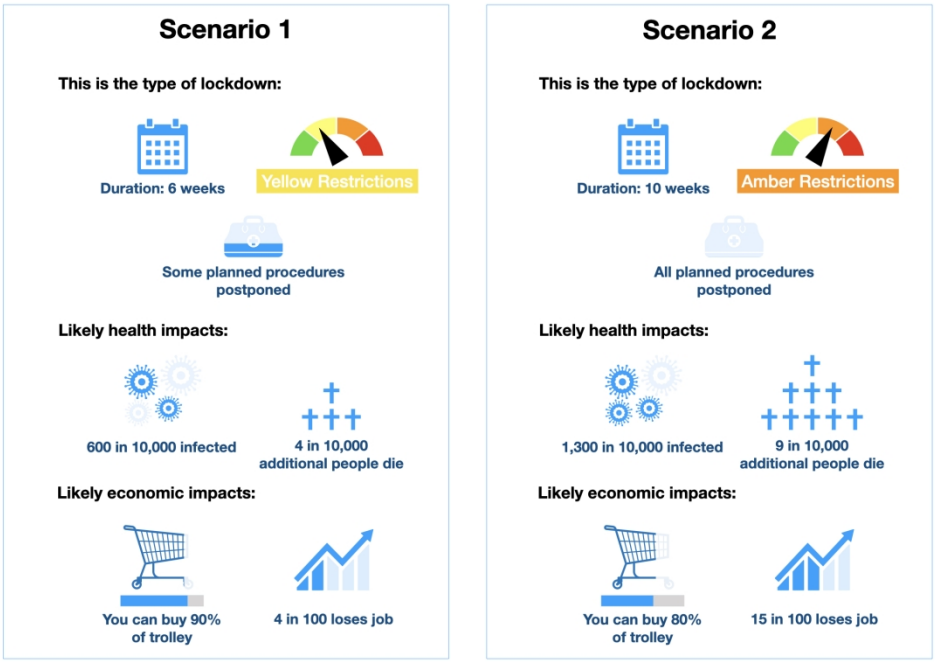

Figure 2. Choice task example used in the discrete choice experiment.

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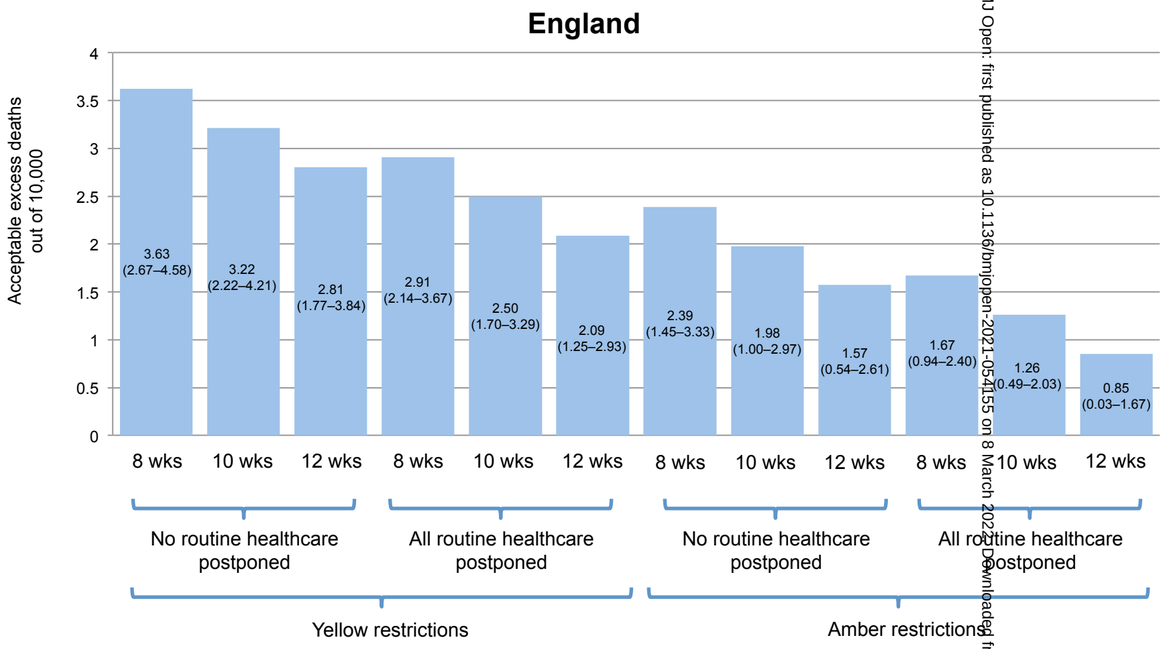

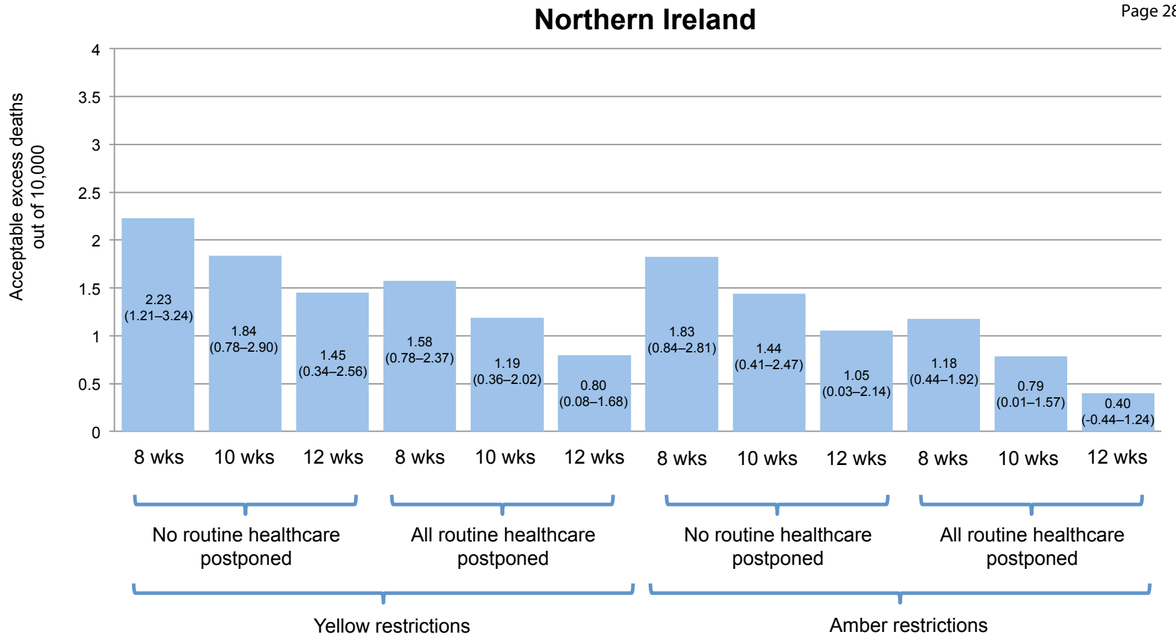

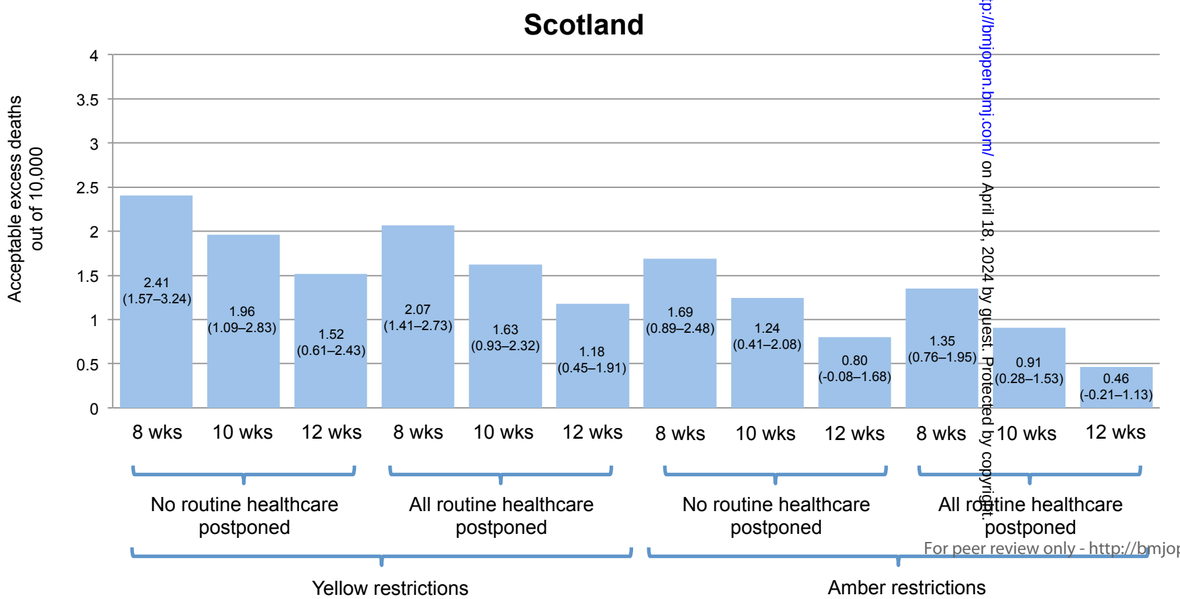

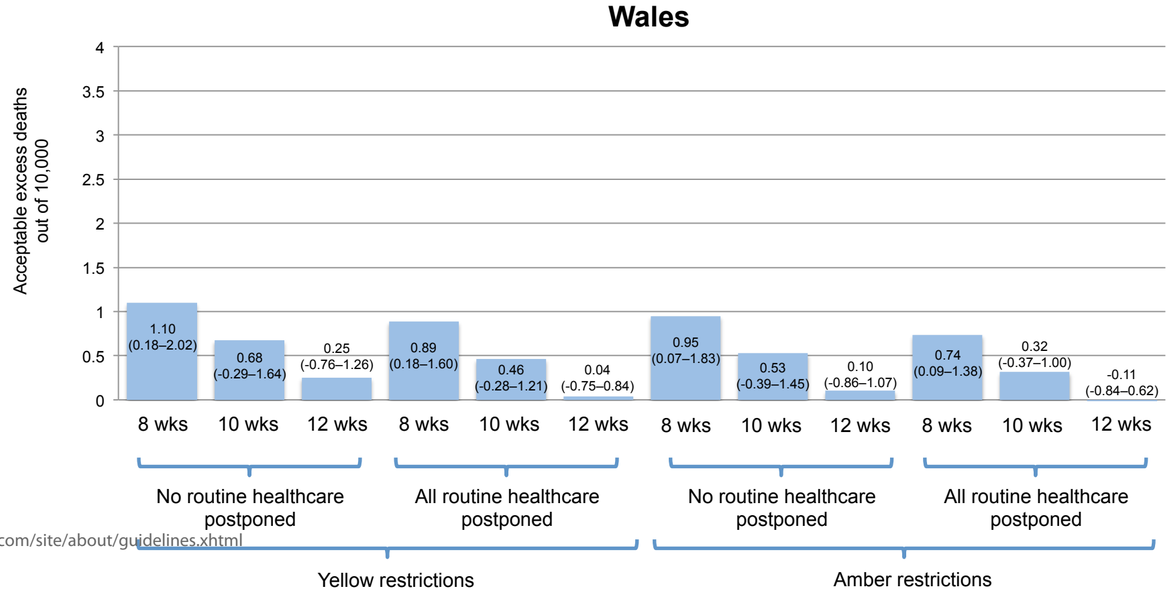

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Supplementary Material 1

Supplemental Table 1. Features and levels used in the discrete choice experiment.

Feature	Description	Levels
Type of Lockdown (Severity of restrictions)	How restrictive the lockdown (based on a colour/tier system).	Green Yellow Amber Red
Length	How long the lockdown is in place.	3 weeks 6 weeks 10 weeks 16 weeks
Postponement of usual non-medical care	Whether non-pandemic medical care is postponed.	No procedures are postponed Some procedures are postponed All procedures are postponed
Excess deaths	Number of excess deaths (expressed as a fraction of 10,000).	1 4 9 13
Infections [a]	Number of infections (expressed as a fraction of 10,000).	100 600 1,300 2,000
Ability to buy things	How much of the goods that respondents are able to buy today will they be able to buy in a year's time.	100% of their shopping trolley 90% of their shopping trolley 80% of their shopping trolley 70% of their shopping trolley
Job losses	How many people lose their job (expressed as a fraction of 100).	0 4 15 25

Note: [a]Number of infections were linked to the excess death feature using an Infection Fatality Rate of 0.7%.

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Discrete choice experiment: think-aloud developmental work.

Virtual think-aloud (TA) interviews were conducted using MS Teams with colleagues from the University of Aberdeen (n=10) and members of our Stakeholder Advisory Group (n=4). Subsequently, we recruited members of the general public to participate in virtual TAs via two Facebook recruitment campaigns. Facebook users, resident in the United Kingdom and over 18 years of age, were shown an advertisement inviting them to participate in a study about COVID-19 lockdowns. Supplemental Figure 1 shows the advertisement for the first campaign.

Supplemental Figure 1. Facebook campaign 1, advertisement appearance.

Upon clicking the advertisement, users were directed to a landing page with more information and were asked to enter their names and email addresses in a web form to indicate their interest in participating in an interview. Supplemental Figure 2 shows the landing page.

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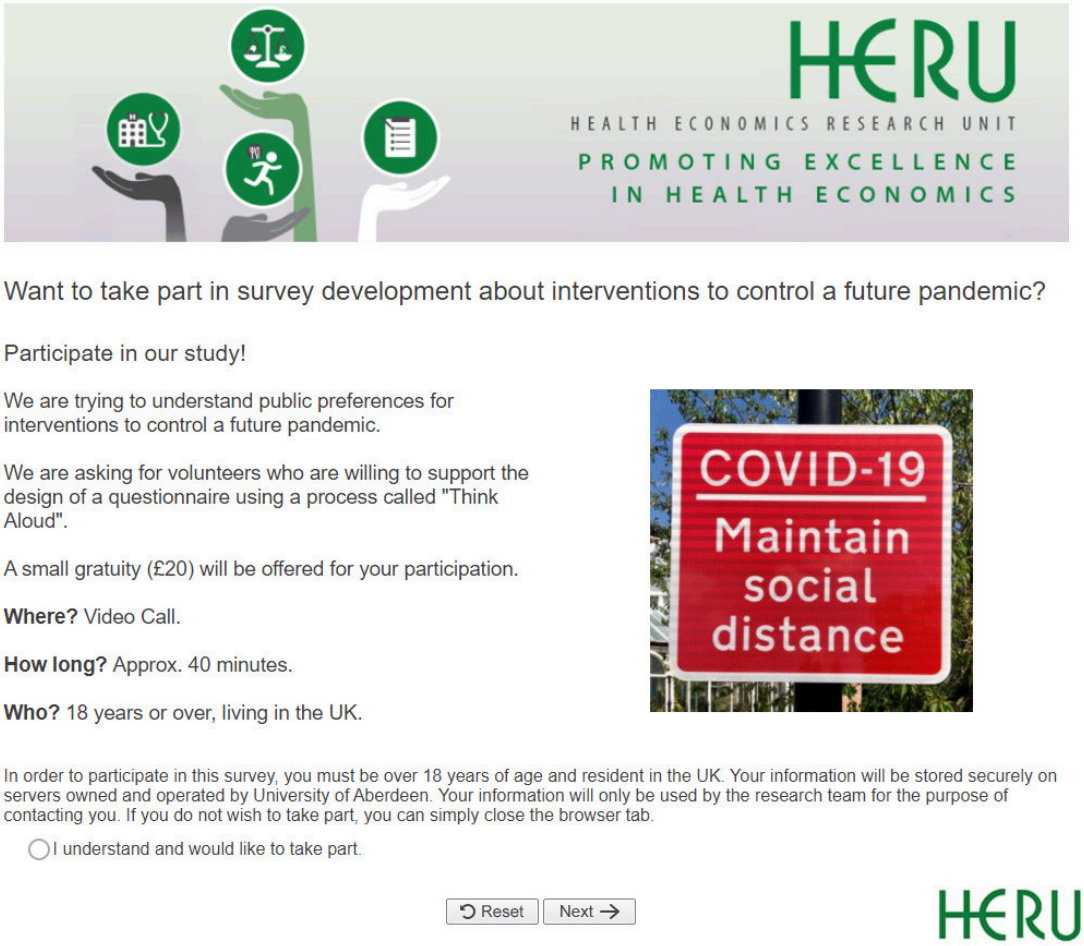

Supplemental Figure 2. Participant Landing page

The first campaign ran from August 8, 2020, until August 14, 2020, was shown to 11,632 users and resulted in 343 clicks on the advert. Whilst 32 respondents indicated interest in participating by submitting their contact information through the landing page, only a limited number responded to contact by the researcher. To improve uptake we modified the Facebook advertisement, including information on the £20 voucher participants would receive for their participation (Supplemental Figure 3). The campaign with the modified text ran from August 25, 2020, until August 31, 2020, was shown to 10,912 and resulted in 291 clicks. 52 respondents indicated an interest for an interview by submitting their contact information through the landing page. Again, not all respondents who indicated an interest in participation via the landing page responded to the researcher's contact. In total 23 interviews were conducted from across the two campaigns.

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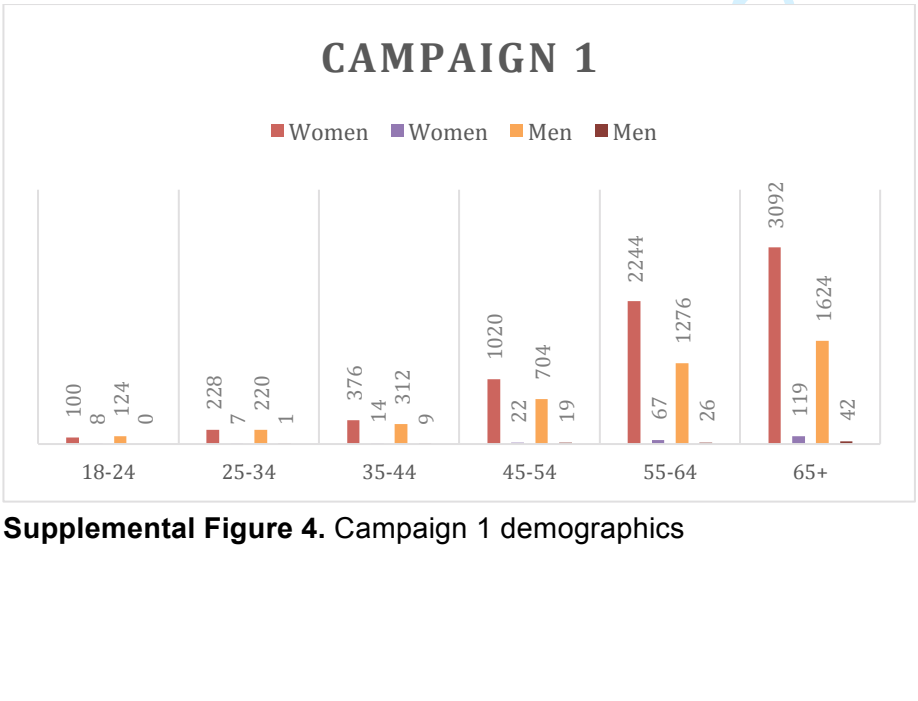
Supplemental Figure 3. Facebook campaign 2, advertisement appearance.

Facebook does not offer control over the demographic composition of users targeted by the ad beyond general inclusion and exclusion criteria. We specified our target group as users resident in the UK over 18 years of age. The demographics of Facebook users that were shown the advertisement skewed older and female. Supplemental Figure 4 shows the demographics for campaign 1, and Supplemental Figure 5 shows the demographics for campaign 2.



Supplemental Figure 4. Campaign 1 demographics

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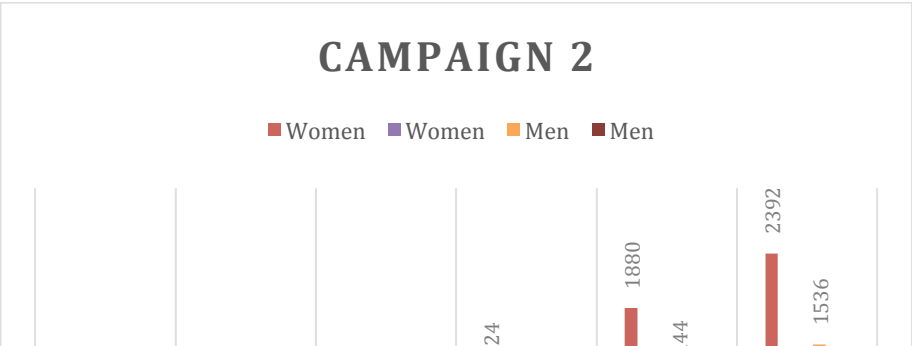

Supplemental Figure 5. Campaign 2 demographics

For all TAs, participants were asked to share their device's screen with the interviewers and verbalise their thought processes whilst responding to the survey. As a warm-up, they were asked to think aloud whilst responding to the question: "*How many windows are there in your house?"* Respondents were told to consider the interviewer as a silent observer of their thought process. Interviewers did, however, encourage respondents to verbalise their thoughts if they were silent for a short period. Respondents were told there were no right or wrong answers. The interviews lasted between 45 and 90 minutes.

A number of changes were made to the DCE survey as a result of participant feedback.

1. Presentation of the excess death, number of infections, and job loss features

In the TA interview used for internal testing, the features for excess death, number of infections, and job losses were presented differently. The number of jobs lost and the number of people infected were presented as fractions of 100. In contrast, the excess death feature was presented as absolute numbers of additional people dying over the expected figure during a normal year. This led to the excess death feature dominating the choices of a considerable number of participants, with some participants stating that they ignored all other features and only considered the number of excess deaths presented in the choice task.

While this might be an expression of a valid preference, the feedback we received included evidence that the presentation of the excess death feature in absolute numbers inflated its importance relative to other features. One participant stated that, while they recognised that job loss was presented as fractions, in their mind, they ignored the denominator of the job loss feature and directly compared its numerator to the absolute figures presented for the excess death feature.

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We thus changed the presentation of excess deaths and number of infections to be uniform across the choice task. In the final survey, the number of infections and excess deaths are presented as fractions of 10,000.

2. Presentation and placement of lockdown restrictions feature

In the TA interview for internal testing, the colour-coded visual for the lockdown restrictions was prominently presented at the top of each choice option. Some participants interpreted the graphic as a summary of the choice option as a whole rather than as an independent feature.

We thus changed the visual position for the lockdown restrictions to appear next to the visual for the lockdown duration feature.

Another contributing factor was that the lockdown restrictions feature was initially presented to participants as “lockdown type”. The group of features representing policy choices (lockdown severity, lockdown length, and postponed procedures) was described in a very similar way as “type of lockdown”.

We renamed the feature to “lockdown restrictions” and changed all visuals to read “(Colour) restrictions” to differentiate more clearly between the “lockdown restrictions” feature and the “lockdown type” group of features.

3. Visual presentation of the number of infections feature

The TA for internal testing displayed a static visual for the number of infections feature that did not change according to the level presented. Several participants stated that a changing visual would improve the presentation of this feature. We thus changed the visual to change with an increasing number of infections.

4. Presentation of the shopping trolley feature

Initially, the text under the visual for the ‘shopping trolley’ feature read “X% of the trolley.” Some participants interpreted this to mean the economic impact on society rather than the economic impact on themselves. We changed the text to read “You can buy X% of the trolley.”

5. Explanation of the shopping trolley feature, warm-up questions for the shopping trolley

Some participants were concerned that the initial explanation of the shopping trolley focused on consumption rather than the general cost of living. One participant expressed concerns that this might not accurately reflect the experiences of

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impoverished respondents. We expanded the explanation of the shopping trolley feature to include housing costs and utility bills.

The initial warm-up questions presented next to the explanation of the shopping trolley feature referred to respondents' income. Some participants were confused by the question as the explanation for the shopping trolley feature presented the impact in terms of how much respondents could afford to buy. As many respondents reduced consumption during the lockdown, they were unsure how to respond to the question.

We removed references to respondent income from the warm-up questions and instead asked respondents about the impact the pandemic and lockdown measures had on their household's standard of living and how concerned they were about how much their household could afford to buy in a year's time.

6. Warm-up questions for the job loss feature

In an earlier version of the survey, the warm-up question attached to the explanation of the job loss feature asked participants about their concerns about losing their jobs. As this feature was meant to elicit respondents' attitudes from a social-inclusive perspective, we changed the question to read "How concerned are you about rising unemployment as a result of the COVID-19 pandemic?"

7. MFQ20: Likert scale anchors

The initial presentation of the MFQ20 presented the anchors for different points on a 6-point Likert scale ("not at all relevant" to "extremely relevant" and "strongly disagree to "strongly agree") at the top of the page. For the selection matrix, points on the scale were labelled with numbers running from 0-5 to mimic the presentation of the paper-based MFQ 20.

We observed that the top of the page was not visible for participants while answering the questions, leading them to spend much time scrolling up and down on the page. We amended the selection matrix to display the anchors next to the numbered points on the Likert scale.

8. Government performance assessment

Some respondents were confused by the initial wording of the question asking about the performance of the UK government. We changed the question to specify the Westminster government.

9. Thank-you message

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One respondent felt that the thank-you message at the end of the survey was not heartfelt enough. We changed the message to acknowledge respondents' efforts and reaffirmed the value of their responses.

10. Ease-of-use updates

To make the survey more engaging, we made various improvements to the interface and presentation formats. This included a progress bar at the top of the screen, mouse-hover explanations for different selection options, and input prompts.

11. Reducing survey completion time

Initially, participants took up to 90 minutes to complete the survey (while verbalising their thoughts). We implemented several improvements to reduce completion time.

We reduced redundant slides reminding participants of the meaning of the feature visuals before starting the DCE. We tested the updated version with TA participants and noticed no adverse effect on participants' ability to understand the task.

An earlier version of the survey featured four warm-up questions attached to the excess death feature. They were presented in two pairs of two 5-point Likert scale questions, asking 1a) how concerned participants were that they could die from COVID-19, 1b) how concerned they were that their loved ones could die from COVID-19, 2a) how concerned they were that they could not access healthcare during the COVID-19 pandemic, and 2b) how concerned they were that their loved ones could not access healthcare during the COVID-19 pandemic. We combined both pairs of questions into two questions asking about participants' concerns about *themselves or loved ones* about 1) the risk of death from COVID-19 and 2) health care access, respectively.

To compensate, we added question asking about the perspective respondents took while completing choice tasks. The question asked whether respondents thought about a) what was best for them, b) what was best for their loved ones, c) what was best for their community, and d) what was best for their country. We conducted a/b testing for two types of questions: one ranking question where respondents indicated the order of importance of the four options, and one question where respondents indicated the most important factor out of the four choices. In accordance with the feedback we received from TA participants, we decided to implement a multiple choice question where respondents could select as many options as needed.

We observed participants struggling with the large number of options for the questions assessing participants' willingness to endure different lockdown restriction levels. Especially on mobile devices such as smartphones and tablets, participants spent much time scrolling through options. We reduced the number of available options in the drop-down menu by removing the odd numbers of weeks.

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We reduced the word count of the explanatory messages introducing each new section of the survey. In subsequent TAs, we closely monitored whether this would decrease participants' ability to understand and complete the survey and observed no difference.

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Supplemental Table 2. Response pattern when minimising excess deaths.

Choice Task	Scenario	Type of Lockdown	Duration (weeks)	Healthcare procedures	Excess deaths (per 10,000)	Ability to buy (%)	Job losses (per 100)	Choice if minimises excess deaths
1	**1**	**3**	**16**	**2**	**4**	**100**	**15**	√
1	2	2	3	3	13	90	0	
2	**1**	**3**	**10**	**1**	**4**	**90**	**25**	√
2	2	4	6	2	9	70	15	
3	**1**	**2**	**3**	**1**	**4**	**100**	**0**	√
3	2	1	10	3	13	90	15	
4	1	4	10	3	4	90	0	
4	**2**	**3**	**3**	**2**	**1**	**70**	**4**	√
5	**1**	**2**	**6**	**3**	**1**	**100**	**4**	√
5	2	3	10	1	9	80	0	
6	1	1	3	1	13	70	4	
6	**2**	**3**	**10**	**3**	**1**	**100**	**25**	√
7	1	4	6	2	4	80	25	
7	**2**	**2**	**10**	**1**	**1**	**100**	**15**	√
8	1	1	10	2	13	70	25	
8	**2**	**3**	**16**	**3**	**9**	**90**	**4**	√
9	1	4	3	3	9	100	25	
9	**2**	**2**	**16**	**1**	**4**	**70**	**0**	√
10	**1**	**4**	**10**	**1**	**9**	**80**	**15**	√
10	2	3	16	2	13	90	25	
11	1	2	16	2	9	80	4	

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13	**1**	**1**	**16**	**3**	**1**	**100**	**0**	√
13	2	2	10	2	9	70	25	
14	1	2	16	3	13	80	15	
14	**2**	**4**	**3**	**2**	**1**	**90**	**0**	√
15	1	3	6	1	13	70	0	
15	**2**	**2**	**3**	**2**	**4**	**90**	**15**	√
16	1	3	3	3	4	70	15	
16	**2**	**1**	**6**	**1**	**1**	**80**	**4**	√
17	1	3	6	3	9	90	0	
17	**2**	**4**	**16**	**1**	**1**	**80**	**25**	√
18	**1**	**3**	**3**	**1**	**1**	**80**	**4**	√
18	2	1	16	2	9	100	0	
19	**1**	**2**	**6**	**2**	**1**	**80**	**0**	√
19	2	4	16	1	13	100	4	
20	**1**	**1**	**6**	**1**	**9**	**90**	**25**	√
20	2	4	3	3	13	80	0	
21	1	2	16	3	9	70	25	
21	**2**	**3**	**6**	**2**	**4**	**80**	**15**	√
22	**1**	**4**	**16**	**1**	**1**	**90**	**15**	√
22	2	1	10	3	4	100	4	
23	1	4	10	2	13	90	4	
23	**2**	**1**	**3**	**3**	**9**	**80**	**25**	√
24	1	1	3	2	13	100	15	
24	**2**	**4**	**6**	**3**	**4**	**70**	**4**	√

Notes:
Type of lockdown: 1=Green, 2=Yellow, 3=Amber, 4=Red.
Healthcare burden: 1=All procedures postponed, 2=Some procedures postponed, 3=None postponed.
√: option chosen within choice task

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Supplemental Table 3. Univariate analysis of respondents who minimised excess deaths.

	England			Northern Ireland			Scotland			Wales		
	Entire Sample	Non-minimised deaths	Minimised deaths	Entire Sample	Non-minimised deaths	Minimised deaths	Entire Sample	Non-minimised deaths	Minimised deaths	Entire Sample	Non-minimised deaths	Minimised deaths
Sex												
Female	50.0%	52.8%	49.3%	51.4%	51.0%	52.9%	51.8%	52.2%	50.6%	51.2%	50.9%	52.1%
Male	50.0%	47.2%	50.7%	48.6%	49.0%	47.1%	48.2%	47.8%	49.4%	48.8%	49.1%	47.9%
Age												
18-34	28.1%	29.1%	24.3%	28.5%	29.3%	25.8%	27.6%	28.4%	24.8%	26.8%	25.9%	29.8%
35-55	33.5%	33.0%	35.9%	34.6%	33.3%	39.2%	32.8%	33.6%	30.1%	31.2%	31.6%	29.8%
55+	38.4%	38.0%	39.9%	36.9%	37.5%	35.0%	39.6%	37.9%	45.0%	42.0%	42.5%	40.4%
Health												
Very good	17.3%	17.9%	14.9%	16.5%	16.6%	16.2%	17.5%	18.6%	13.8%	18.0%	18.5%	16.3%
Good	48.8%	49.1%	47.5%	49.0%	48.3%	51.3%	49.6%	51.2%	44.5%	46.0%	43.8%	53.0%
Fair	26.9%	26.3%	29.0%	25.6%	26.0%	24.2%	26.6%	24.1%	34.9%	28.8%	30.0%	24.6%
Bad	5.3%	5.1%	5.8%	7.4%	7.6%	6.8%	5.7%	5.4%	6.6%	6.0%	6.4%	4.6%
Very bad	1.8%	1.6%	2.7%	1.5%	1.5%	1.5%	0.6%	0.7%	0.2%	1.3%	1.3%	1.5%
Shield												
No	74.8%	75.4%	72.5%	71.2%	71.4%	70.4%	82.9%	83.4%	81.1%	74.9%	74.9%	75.0%
Yes	25.2%	24.7%	27.5%	28.8%	28.6%	29.6%	17.1%	16.6%	18.9%	25.1%	25.1%	25.0%
Adults in household												
1	24.6%	24.8%	23.6%	22.6%	24.6%	19.4%	24.6%	24.4%	25.5%	22.7%	21.6%	26.4%
2	55.3%	55.2%	55.6%	52.6%	52.5%	53.0%	58.3%	58.4%	57.7%	59.8%	60.7%	57.0%
3	12.3%	12.4%	11.8%	17.2%	16.8%	18.4%	11.9%	11.8%	12.1%	12.2%	12.9%	9.5%
>3	7.9%	7.7%	8.9%	7.6%	7.1%	9.3%	5.3%	5.4%	4.7%	5.3%	4.8%	7.1%
Children in household												

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0	72.3%	71.7%	74.5%	73.1%	73.5%	72.1%	75.3%	74.4%	78.2%	74.4%	73.3%	77.9%
1	14.0%	14.3%	13.1%	14.0%	14.9%	11.2%	14.2%	14.8%	12.4%	12.5%	12.1%	13.7%
2	10.4%	11.1%	7.8%	9.4%	9.0%	10.8%	8.6%	8.7%	8.3%	9.8%	10.8%	6.3%
>2	3.2%	2.9%	4.6%	3.4%	2.7%	6.0%	1.9%	2.1%	1.1%	3.3%	3.7%	2.1%
Household income												
£0 - £10,400	9.5%	10.0%	7.6%	13.2%	14.4%	9.2%	12.1%	11.2%	14.8%	14.2%	12.2%	20.7%
£10,400 - £20,800	21.4%	21.1%	22.5%	21.8%	22.3%	20.4%	18.7%	19.6%	15.9%	22.0%	23.6%	16.8%
£10,400 - £31,200	20.4%	20.1%	21.9%	24.0%	23.5%	25.9%	23.3%	24.4%	19.7%	23.0%	24.0%	19.7%
£31,200 - £52,000	29.0%	29.4%	27.5%	26.1%	24.8%	30.6%	25.9%	26.2%	25.0%	25.2%	23.6%	30.3%
£52,000+	19.6%	19.4%	20.5%	14.8%	15.0%	13.9%	20.0%	18.6%	24.7%	15.5%	16.5%	12.5%
Education												
Less than higher education	62.5%	63.8%	57.5%	59.4%	59.0%	60.9%	58.2%	60.7%	50.0%	61.9%	62.5%	59.6%
Higher education degree	37.5%	36.2%	42.5%	40.5%	41.0%	39.1%	41.8%	39.3%	50.0%	38.2%	37.5%	40.4%
Job impact												
No	73.7%	72.7%	77.4%	76.7%	75.1%	82.1%	79.4%	77.7%	84.9%	75.6%	75.6%	75.6%
Yes	26.3%	27.3%	22.6%	23.3%	24.9%	17.9%	20.6%	22.3%	15.1%	24.4%	24.4%	24.4%
Caring responsibility												
No	85.4%	84.8%	87.8%	81.6%	82.2%	79.6%	83.5%	82.6%	86.4%	83.1%	83.7%	80.8%
Yes	14.6%	15.2%	12.2%	18.4%	17.8%	20.4%	16.5%	17.4%	13.6%	16.9%	16.3%	19.2%
Affected usual healthcare												
No	58.8%	58.5%	60.1%	47.0%	53.4%	51.5%	56.0%	56.6%	54.2%	52.8%	51.3%	57.7%
Yes	41.2%	41.6%	39.9%	53.0%	46.6%	48.5%	44.0%	43.4%	45.8%	47.2%	48.7%	42.3%
Impact on standard of living												
Worsened	29.9%	30.1%	39.3%	37.4%	37.3%	37.7%	31.0%	31.7%	28.8%	32.1%	32.0%	32.1%
Same or improved	70.1%	69.9%	70.7%	62.6%	62.7%	62.3%	69.0%	68.3%	71.2%	69.0%	68.0%	67.9%

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Supplemental Table 4. Unweighted preferences for lockdown features.

	England					Northern Ireland				
	Parameter estimates			MRS (excess deaths)		Parameter estimates			MRS (excess deaths)	
	Coef.	95% CI	p value	MRS	95% CI	Coef.	95% CI	p value	MRS	95% CI
Alternative Specific Constant	-0.15	(-0.11–-0.20)	<0.01	..	..	-0.16	(-0.21–-0.10)	<0.01	..	..
Green restrictions	0.02	(-0.03–0.07)	0.50	0.15	(-0.28–0.58)	0.01	(-0.05–0.06)	0.72	0.08	(-0.36–0.52)
Yellow restrictions	0.19	(0.14–0.25)	<0.01	1.67	(1.21–2.14)	0.12	(0.06–0.18)	<0.01	0.91	(0.44–1.39)
Amber restrictions	0.05	(0.00–0.10)	0.04	0.46	(0.03–0.89)	0.06	(0.01–0.12)	0.03	0.47	(0.03–0.90)
Red restrictions	-0.26	(-0.21–0.31)	<0.01	-2.28	(-2.73–1.84)	-0.20	(-0.14–-0.25)	<0.01	-1.46	(-1.89–1.02)
Length (weeks)	-0.02	(-0.02–-0.03)	<0.01	-0.20	(-0.25–-0.14)	-0.03	(-0.03–-0.02)	<0.01	-0.19	(-0.24–-0.13)
All healthcare postponed	-0.02	(-0.06–0.01)	0.21	-0.22	(-0.56–0.12)	-0.04	(-0.09–0.00)	0.06	-0.33	(-0.67–0.01)
Some healthcare postponed	-0.02	(-0.06–0.01)	0.21	-0.22	(-0.55–0.12)	0.00	(-0.05–0.04)	0.86	-0.03	(-0.37–0.31)
None healthcare postponed	0.05	(0.01–0.09)	0.01	0.43	(0.09–0.78)	0.05	(0.00–0.09)	0.04	0.36	(0.01–0.71)
Excess deaths (increase 1 out of 10,000)	-0.11	(-0.12–-0.11)	<0.01	-	-	-0.13	(-0.14–-0.12)	<0.01	-	-
Ability to spend (10% decrease)	0.10	(0.08–0.13)	<0.01	0.89	(0.65–1.12)	0.11	(0.09–0.15)	<0.01	0.85	(0.61–1.09)
Job loss (1 out of 100)	-0.02	(-0.03–-0.02)	<0.01	-0.20	(-0.23–-0.17)	-0.03	(-0.03–-0.02)	<0.01	-0.19	(-0.22–-0.16)
SD Alternative Specific Constant	0.00	(-0.11–0.11)	0.99	..	..	0.00	(-0.13–0.13)	0.99	..	..
Loglikelihood					-5201.4					-3805.7
Observations					8896					6784

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	Scotland					Wales				
	Parameter estimates			MRS (excess deaths)		Parameter estimates			MRS (excess deaths)	
	Coef.	95% CI	p value	MRS	95% CI	Coef.	95% CI	p value	MRS	95% CI
Alternative Specific Constant	-0.17	(-0.22–-0.12)	<0.01	..	..	-0.21	(-0.26–-0.16)	<0.01	..	..
Green restrictions	0.17	(0.12–0.22)	<0.01	1.15	(-1.64–-0.66)	0.04	(-0.01–0.10)	0.10	0.33	(-0.06–0.72)
Yellow restrictions	0.14	(0.08–0.19)	<0.01	0.94	(0.54–1.33)	0.07	(0.01–0.12)	0.01	0.53	(0.11–0.94)
Amber restrictions	0.01	(-0.02–0.08)	0.83	0.04	(-0.30–0.37)	0.04	(-0.01–0.09)	0.08	0.33	(-0.05–0.70)
Red restrictions	-0.31	(-0.35–-0.25)	<0.01	-2.12	(-2.49–-1.76)	-0.16	(-0.22–-0.11)	<0.01	-1.19	(-1.80–-1.57)
Length (weeks)	-0.03	(-0.04–-0.03)	<0.01	-0.22	(-0.27–-0.18)	-0.03	(-0.03–-0.02)	<0.01	-0.22	(-0.27–-0.17)
All healthcare postponed	-0.02	(-0.05–0.03)	0.35	-0.13	(-0.41–0.15)	-0.05	(-0.07–-0.01)	0.02	-0.35	(-0.65–-0.05)
Some healthcare postponed	-0.03	(-0.06–0.02)	0.19	-0.19	(-0.46–0.09)	0.01	(-0.03–0.05)	0.78	0.04	(-0.26–0.35)
None healthcare postponed	0.05	(0.00–0.09)	0.03	0.32	(0.03–0.61)	0.04	(-0.00–0.08)	0.06	0.31	(-0.01–0.62)
Excess deaths (increase 1 out of 10,000)	-0.15	(-0.15–-0.14)	<0.01	-	-	-0.13	(-0.14–-0.13)	<0.01	-	-
Ability to spend (10% decrease)	0.09	(0.06-0.12)	<0.01	0.59	(0.39–0.79)	0.10	(0.07–0.13)	<0.01	0.78	(0.57–0.99)
Job loss (1 out of 100)	-0.03	(-0.04–-0.03)	<0.01	-0.22	(-0.25–-0.20)	-0.03	(-0.03–-0.02)	<0.01	-0.20	(-0.23–-0.18)
SD Alternative Specific Constant	0.00	(-0.10–0.10)	0.99	..	..	0.00	(-0.10–0.10)	0.99	..	..
Loglikelihood					-4884.8					-4905.7
Observations					9114					8784

Note: Coef.=Mean parameter coefficient estimate. CI=Confidence Interval. SD=Standard Deviation. MRS=Marginal rates of substitution. Categorical variables were effects coded to allow for a preference parameter to be estimated for all levels of the feature.

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Estimation of lockdown scenario trade-offs using marginal rates of substitution for excess deaths

The calculation for the marginal rate of substitution (MRS) for introducing a 1-week red restriction lockdown where all routine non-COVID healthcare procedures are postponed is the addition of the MRS for the features that describe the scenario, such that:

$$\frac{\beta_{red\_restrictions}}{-\beta_{excess\_deaths}} + \frac{\beta_{length} \times X_{weeks}}{-\beta_{excess\_deaths}} + \frac{\beta_{all\_health\_postponed}}{-\beta_{excess\_deaths}} \quad (1)$$

This can be simplified as:

$$\frac{\beta_{red\_restrictions} + \beta_{length} \times X_{weeks} + \beta_{all\_health\_postponed}}{-\beta_{excess\_deaths}} \quad (2)$$

Following (2), the MRS for the scenario described above are:

England:

$$\frac{-0.25 + (-0.02 \times 1) + (-0.03)}{0.12} = -2.53$$

Northern Ireland:

$$\frac{-0.19 + (-0.03 \times 1) + (-0.04)}{0.13} = -1.95$$

Scotland:

$$\frac{-0.30 + (-0.03 \times 1) + (-0.01)}{0.15} = -2.35$$

Wales:

$$\frac{-0.17 + (-0.03 \times 1) + (-0.03)}{0.13} = -1.67$$

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Standard errors and 95% Confidence Intervals (CI) are calculated using the delta method and are shown below.

Nation	MRS (absolute)	Standard Error	Lower Confidence Interval	Upper Confidence Interval
England	2.53	0.27	2.00	3.06
Northern Ireland	1.95	0.28	1.39	2.50
Scotland	2.35	0.23	1.89	2.81
Wales	1.67	0.26	1.17	2.18

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Estimation of lockdown scenario trade-offs using marginal rates of substitution for decreases in the ability to buy things

The calculation for the marginal rate of substitution (MRS) for introducing a 4-week red restriction lockdown where all routine non-COVID healthcare procedures are postponed in terms of changes (expressed as 10% intervals) in the ability to spend are:

England:

$$\frac{-0.25 + (-0.02 \times 4\ ) + (-0.03)}{0.10} = -3.57$$

Northern Ireland:

$$\frac{-0.19 + (-0.03 \times 4) + (-0.04)}{0.12} = -2.88$$

Scotland:

$$\frac{-0.30 + (-0.03 \times 4) + (-0.01)}{0.09} = -4.87$$

Wales:

$$\frac{-0.17 + (-0.03 \times 4) + (-0.03)}{0.10} = -3.03$$

The standard errors and 95% CI are calculated using the delta method and are as follows:

Nation	MRS (absolute)	Standard Error	Lower Confidence Interval	Upper Confidence Interval
England	3.57	0.59	2.41	4.73
Northern Ireland	2.88	0.55	1.80	3.96
Scotland	4.87	0.93	3.04	6.70
Wales	3.03	0.59	1.88	4.18

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Welcome to Survey

Lives and Livelihoods in a Pandemic:

Your views on lockdown measures and their impact on your lives.

Thank you for agreeing to complete this survey.

We would like to understand what you think about the different policies that can be used to slow down the spread of pandemics.

In this survey we will ask you about your experience of the COVID-19 pandemic over the past few months. We will also ask you about your views on how the government should respond to similar pandemics in the future.

This survey will take approximately 20-30 minutes to complete.

Please click **Next** below to start the survey.

Before we start, we want to tell you that your answers will be used as part of a research study. We want to assure you that your answers will be kept strictly confidential and used for research purposes only. It will not be possible to identify any individual when reporting results. You are free to withdraw from the survey at any point. We will only use responses from people who complete the entire survey. We will not use your data to contact

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you.

For more information about we will use your data, please visit:
https://www.abdn.ac.uk/about/privacy/research-participants-938.php

Do you agree to take part?

Yes ○ No ○

Screening

First, we want to ask you a few questions about yourself...

Please enter your age:

What is your sex?

Male ○ Female ○

Where in the United Kingdom do you live?

England ○

Northern Ireland ○

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Scotland Wales

Intro questions

Section 1:
Your views on the COVID-19 pandemic and how it has affected your life

These questions are interested in your opinion about the COVID-19 pandemic even if you were never ill or never caught the virus.

On a scale of 1 to 5, where 1 is not at all and 5 is a lot, how much has COVID-19 changed your daily routine?

Not at all
1

2 3

4 A lot
5

How good or poor a job has the **UK (Westminster) Government** been doing to handle the pandemic?

Very poor job Poor job Good job Very good job
Don't know

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How good or poor a job has the **Scottish Government** been doing to handle the pandemic?

- ○ Very poor job
- ○ Poor job
- ○ Good
- ○ Very good job
- ○ Don't know
- ○ Not Applicable

How good or poor a job has the **Welsh Government** been doing to handle the pandemic?

- ○ Very poor job
- ○ Poor job
- ○ Good
- ○ Very good job
- ○ Don't know
- ○ Not Applicable

How good or poor a job has the **Northern Ireland Assembly** been doing to handle the pandemic?

- ○ Very poor job
- ○ Poor job
- ○ Good
- ○ Very good job
- ○ Don't know
- ○ Not Applicable

Q about attributes

Section 2:
Your views on policies to control future pandemics

Governments introduce policies to help slow the spread of pandemics. In the case of COVID-19, these policies were mainly focused on lockdown measures.

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We are interested in your views on the possible government responses to a pandemic and how this will affect your daily life.

Next, we will describe and ask you a series of questions on different types of lockdowns and the impacts they may have on you and society.

A lockdown scenario can be described in terms of:

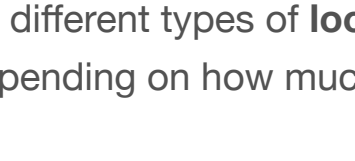
1. **The type of lockdown**.
2. **The health impacts**.
3. **The economic impacts**.

You will notice some animated icons. These will be used later in the survey.

1. The type of lockdown:

Across the world, countries have put in place different types of lockdowns. In some countries, lockdowns have placed a lot of restrictions to daily life, while in others they have been less restrictive.

Next, we will show you four different types of **lockdown restrictions**. These follow a colour code depending on how much they restrict daily life.



Green Restrictions

GREEN is the less restrictive and RED the most restrictive.

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These are the GREEN RESTRICTIONS:

Green Restrictions

Shelter: everyone can interact with others.
Socialising: gatherings of up to 100 people.
Non-essential trips: are allowed.
Schools and youth activities: are open.
Non-essential businesses: operate under limited social distancing.
Outdoor leisure activities: are allowed.

These are the YELLOW RESTRICTIONS:

Yellow Restrictions

Shelter: vulnerable people should stay at home.
Socialising: gatherings of up to 50 people.
Non-essential trips: are allowed.
Schools and youth activities: are open.
Non-essential businesses: operate under moderate social distancing.
Outdoor leisure activities: are allowed.

These are the AMBER RESTRICTIONS:

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Amber Restrictions

Shelter: vulnerable people stay at home with no visitors.
Socialising: gatherings of up to 10 people.
Non-essential trips: should be minimised.
Schools and youth activities: are closed.
Non-essential businesses: operate under strict distancing with limited capacity.
Outdoor leisure activities: are allowed.

These are the RED RESTRICTIONS:

Red Restrictions

Shelter: everyone should stay at home with no visitors.
Socialising: no gatherings beyond your own household.
Non-essential trips: not allowed.
Schools and youth activities: are closed.
Non-essential businesses: remain closed.
Outdoor leisure activities: are not allowed.

For the questions below, if you are completing this survey on a desktop or laptop computer, you can hover your mouse pointer over the answers to get a reminder of what the restrictions are for each colour.

Out of the four lockdown restrictions we presented to you, which one do you think:

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Would be best to slow down the spread of a pandemic disease like COVID-19?

- Green restrictions
- Yellow restrictions
- Amber restrictions
- Red restrictions

Would have the worst impact on businesses and the economy?

- Green restrictions
- Yellow restrictions
- Amber restrictions
- Red restrictions

Which restriction would have the biggest impact on your life?

Please select one.

- Shelter in place / stay at home
- Socialising
- Non-essential trips
- Schools and nursery
- Non-essential businesses
- Outdoor leisure activities.

The type of lockdown also depends on the **lockdown length.**

Lockdown measures can be in place for different lengths of time. This time is often measured in number of weeks.

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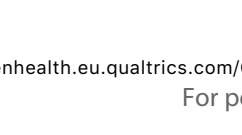
Imagine we face a new pandemic of a disease like COVID-19 and the government is looking to impose a lockdown to slow the spread of the disease.

What is the maximum number of weeks **you would be willing to be** in each of the different types of lockdown we presented to you before?

Select the maximum number of weeks from the drop-down box for each type of lockdown:

If you are completing this survey on a desktop or laptop computer, you can hover your mouse pointer over the answers to get a reminder of what the restrictions are for each colour.



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The type of lockdown also depends on the **impact on health care services**:

In order to cope with the expected rise in patients from a pandemic, health services like the NHS (in Great Britain) or HSC (in Northern Ireland) may be forced to delay or postpone certain treatments.

No planned procedures postponed

In some cases **some planned procedures are delayed or postponed.** This might include delaying cancer screening tests and minor surgery.

In other cases, when the health services need more help to cope, **all planned procedures are delayed or postponed.** This might include delaying surgery to remove cancer, chemotherapy or hip replacements.

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Have the COVID-19 lockdown measures affected the healthcare you or your loved ones normally receive?

Yes ○ No ○

2. The health impacts:

Lockdown measures are mainly focused on reducing the health impacts of a pandemic disease.

These health impacts can be measured in terms of:

1. Number of people infected.
2. Number of excess deaths.

We will now look at these health impacts...

A lockdown might help slow down the spread of a disease, but people will still catch the disease. One way to know the number of people who get the disease is to measure how many people out of 10,000 people are infected.

100 in 10,000 people infected

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Imagine a new disease like COVID-19 was just discovered in your community. In which of the two situations below would it be more likely that you get the disease?

100 in 10,000 people infected

○

2,000 in 10,000 people infected

○

In a normal year, about 600,000 people die in the UK. More people will die in a year with a pandemic disease like COVID-19 than in a normal year. People might die because they get the disease, but people might also die because they are not able to get the medical care they normally would.

The number of extra people that die in a year is called Excess Deaths.

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1 in 10,000 additional people die

It is estimated that so far COVID-19 has resulted in at least 65,000 excess deaths across the UK. This is approximately an extra 10 in 10,000 people.

How concerned are you that **you** or **a loved one** could die from COVID-19?

- Not at all concerned
- Slightly concerned
- Moderately concerned
- Very concerned
- Extremely concerned

How concerned are you that **you** or **a loved one** could die because you **could not access healthcare during the COVID-19 pandemic?**

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Not at all concerned

Slightly concerned

Moderately concerned

Very concerned

Extremely concerned

3. The economic impacts:

Lockdowns also have an impact on people's lives and livelihoods.

The economic impact of a lockdown can be measured in terms of:

1. How your ability to buy things in the future changes.
2. The number of jobs lost from the pandemic and lockdown measures.

We will now look at these economic impacts...

How much **you** can afford to buy:

As businesses close and public services adjust to the lockdown measures, the way you spend money may have changed. The lockdown measures may

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affect how much your household can afford to buy in two ways: you may earn less money because of wage cuts or business closures and the prices of things you want to buy might have gone up.

It is expected that many people will be able to afford fewer things than they could at the start of the year. The shopping trolley below shows how much **you can afford to buy** in one year compared to what you could afford to buy before the pandemic. This includes your usual shopping, housing costs and bills.

What impact has the COVID-19 pandemic and lockdown measures had on **your household's standard of living**?

Worsened

Slightly worsened

Stay the same

Slightly improved

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Improved

How concerned are you that the lockdown is going to affect how much **your household** can afford to buy in a year's time?

Not at all concerned

Slightly concerned

Moderately concerned

Very concerned

Extremely concerned

Job losses:

The pandemic will affect the economy and businesses. Some business will not reopen after the lockdown and other businesses will have fewer customers and need less staff.

In some areas of the country and in some types of businesses, for every 100 people who had a job before the lockdown, up to 25 people will lose their job and be unemployed.

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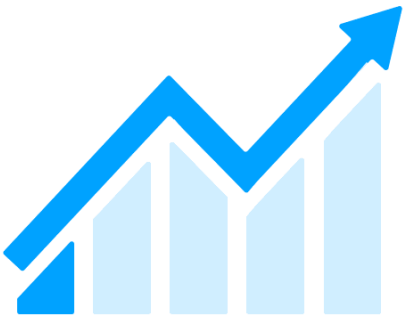

0 in 100 loses job

How concerned are you about rising unemployment as a result of the COVID-19 pandemic?

- Not at all concerned
- Slightly concerned
- Moderately concerned
- Very concerned
- Extremely concerned

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Section 3:
Choosing between measures to control future pandemics

In this section we will ask you to choose between different scenarios that could be used to slow down the spread of a future pandemic.

Imagine we face a new pandemic of a disease like COVID-19. The government is looking to impose a lockdown to slow the spread of the disease. This lockdown will be in place for a set amount of time and may involve postponing certain non-pandemic medical treatments.

We will show you two different types of lockdown and their consequences, and ask you to choose the scenario that you would prefer to happen.

In every case, the scenario you choose will be followed by **green restrictions for an additional 3 more weeks.**

The image below is an example of how a scenario looks. Click **Next** to see what each question will look like.

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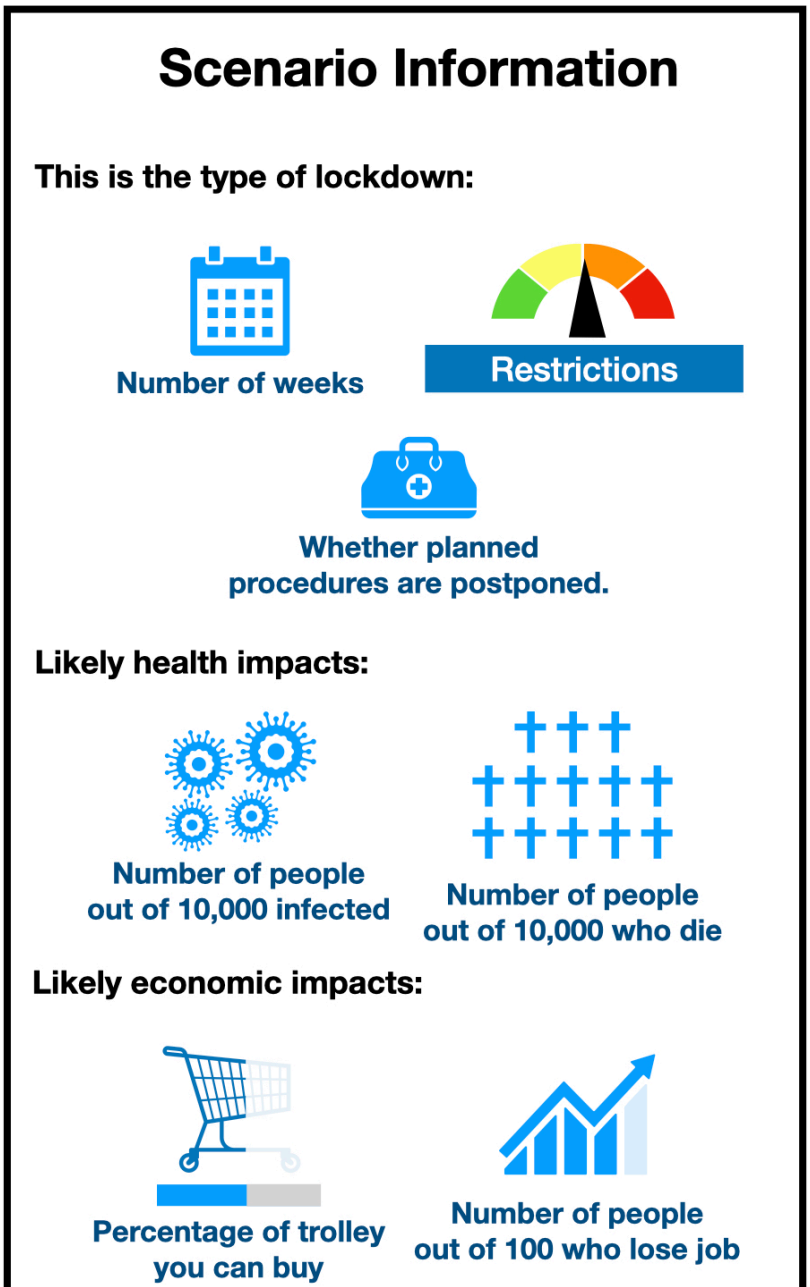


In each question, you will choose between two different scenarios as below. We will ask you 9 of these choice questions.

You choose a scenario by clicking on it. You can practice this now with the example below. Click **Next** to start the choice questions.

If you are completing this survey on a desktop or laptop computer, you can hover your mouse pointer over the answers to get a reminder of what the restrictions are for each colour.

Scenario 1

This is the type of lockdown:

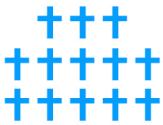
Duration: 3 weeks

Green Restrictions

No planned procedures postponed

Likely health consequences:

2,000 in 10,000 infected



13 in 10,000 additional people die

Likely economic consequences:

You can buy 100% of trolley

0 in 100 loses job

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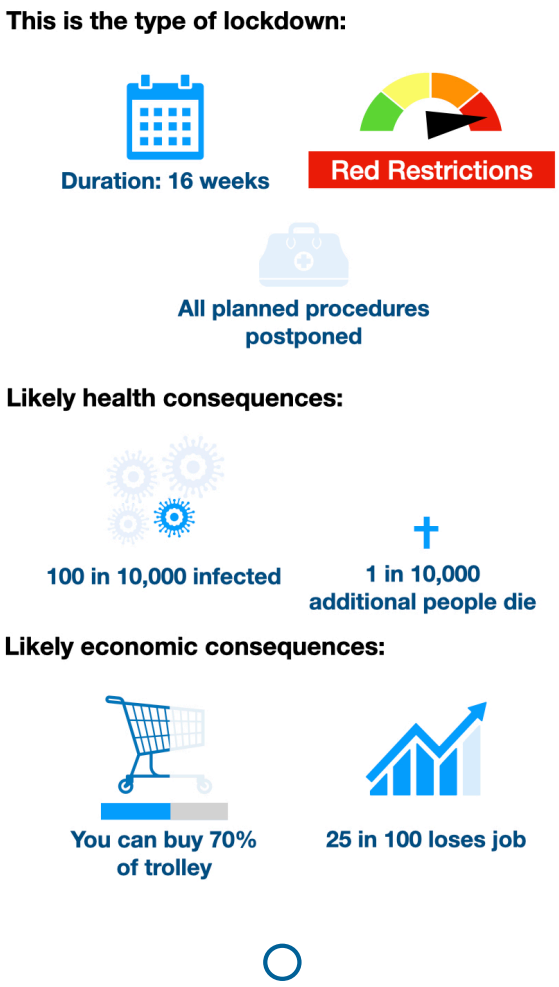

Before we start: as you move through the nine questions, at first glance the scenarios may appear the same, but you will notice they change slightly across the questions.

Some scenarios might seem unrealistic at first, but please remember that future pandemics are uncertain and could produce scenarios that appear unlikely to you now.

We understand that some of the choices will be difficult to make. There are no right or wrong answers. Your personal opinion is what matters. Your answers will allow us to work out the things people prefer about different lockdown strategies.

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Please click **Next** to start the choice questions.

Block 1

Which scenario would you choose?

Scenario 1

This is the type of lockdown:

Duration: 16 weeks

Some planned procedures postponed

Likely health consequences:

600 in 10,000 infected

4 in 10,000 additional people die

Likely economic consequences:

You can buy 100% of trolley

15 in 100 loses job

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Scenario 2

This is the type of lockdown:

Duration: 3 weeks

Yellow Restrictions

No planned procedures postponed

Likely health consequences:

2,000 in 10,000 infected

13 in 10,000 additional people die

Likely economic consequences:

You can buy 90% of trolley

0 in 100 loses job

Which scenario would you choose?

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Scenario 1

This is the type of lockdown:

Duration: 10 weeks

Amber Restrictions

All planned procedures postponed

Likely health consequences:

600 in 10,000 infected

4 in 10,000 additional people die

Likely economic consequences:

You can buy 90% of trolley

25 in 100 loses job

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Scenario 2

This is the type of lockdown:

Duration: 6 weeks

Red Restrictions

Some planned procedures postponed

Likely health consequences:

1,300 in 10,000 infected

9 in 10,000 additional people die

Likely economic consequences:

You can buy 70% of trolley

15 in 100 loses job

Which scenario would you choose?

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Likely economic consequences:

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0 in 100 loses job

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Likely economic consequences:

You can buy 90% of trolley

15 in 100 loses job

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Likely economic consequences:

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0 in 100 loses job

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Scenario 2

This is the type of lockdown:

Duration: 3 weeks

Amber Restrictions

Some planned procedures postponed

Likely health consequences:

100 in 10,000 infected

\+

1 in 10,000 additional people die

Likely economic consequences:

You can buy 70% of trolley

4 in 100 loses job

○

Which scenario would you choose?

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Likely economic consequences:

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Likely economic consequences:

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Scenario 2

This is the type of lockdown:

Duration: 10 weeks

Amber Restrictions

No planned procedures postponed

Likely health consequences:

100 in 10,000 infected

\+

1 in 10,000 additional people die

Likely economic consequences:

You can buy 100% of trolley

25 in 100 loses job

Which scenario would you choose?

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This is the type of lockdown:

Duration: 10 weeks

Yellow Restrictions

All planned procedures postponed

Likely health consequences:

100 in 10,000 infected

\+

1 in 10,000 additional people die

Likely economic consequences:

You can buy 100% of trolley

15 in 100 loses job

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Likely economic consequences:

You can buy 70% of trolley

25 in 100 loses job

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Scenario 2

This is the type of lockdown:

Duration: 16 weeks

Amber Restrictions

No planned procedures postponed

Likely health consequences:

1,300 in 10,000 infected

9 in 10,000 additional people die

Likely economic consequences:

You can buy 90% of trolley

4 in 100 loses job

Block 2

Which scenario would you choose?

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Scenario 1

This is the type of lockdown:

Duration: 3 weeks

Red Restrictions

No planned procedures postponed

Likely health consequences:

1,300 in 10,000 infected

9 in 10,000 additional people die

Likely economic consequences:

You can buy 100% of trolley

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Likely economic consequences:

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You can buy 80% of trolley

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This is the type of lockdown:

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Amber Restrictions

Some planned procedures postponed

Likely health consequences:

2,000 in 10,000 infected

13 in 10,000 additional people die

Likely economic consequences:

You can buy 90% of trolley

25 in 100 loses job

Which scenario would you choose?

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Scenario 1

This is the type of lockdown:

Duration: 16 weeks

Yellow Restrictions

Some planned procedures postponed

Likely health consequences:

1,300 in 10,000 infected

9 in 10,000 additional people die

Likely economic consequences:

You can buy 80% of trolley

4 in 100 loses job

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Scenario 2

This is the type of lockdown:

Duration: 6 weeks

Green Restrictions

All planned procedures postponed

Likely health consequences:

600 in 10,000 infected

4 in 10,000 additional people die

Likely economic consequences:

You can buy 70% of trolley

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Which scenario would you choose?

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This is the type of lockdown:

Duration: 10 weeks

Green Restrictions

Some planned procedures postponed

Likely health consequences:

100 in 10,000 infected

\+

1 in 10,000 additional people die

Likely economic consequences:

You can buy 70% of trolley

4 in 100 loses job

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Scenario 2

This is the type of lockdown:

Duration: 6 weeks

Yellow Restrictions

All planned procedures postponed

Likely health consequences:

2,000 in 10,000 infected

13 in 10,000 additional people die

Likely economic consequences:

You can buy 100% of trolley

25 in 100 loses job

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Some planned procedures postponed

Likely health consequences:

1,300 in 10,000 infected

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Likely economic consequences:

You can buy 70% of trolley

25 in 100 loses job

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No planned procedures postponed

Likely health consequences:

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13 in 10,000 additional people die

Likely economic consequences:

You can buy 80% of trolley

15 in 100 loses job

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Scenario 2

This is the type of lockdown:

Duration: 3 weeks

Red Restrictions

Some planned procedures postponed

Likely health consequences:

100 in 10,000 infected

\+

1 in 10,000 additional people die

Likely economic consequences:

You can buy 90% of trolley

0 in 100 loses job

Which scenario would you choose?

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You can buy 70% of trolley

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Scenario 2

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Duration: 3 weeks

Yellow Restrictions

Some planned procedures postponed

Likely health consequences:

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4 in 10,000 additional people die

Likely economic consequences:

You can buy 90% of trolley

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Scenario 1

This is the type of lockdown:

Duration: 3 weeks

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Likely health consequences:

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4 in 10,000 additional people die

Likely economic consequences:

You can buy 70% of trolley

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Scenario 2

This is the type of lockdown:

Duration: 6 weeks

Green Restrictions

All planned procedures postponed

Likely health consequences:

100 in 10,000 infected

\+

1 in 10,000 additional people die

Likely economic consequences:

You can buy 80% of trolley

4 in 100 loses job

○

Block 3

Which scenario would you choose?

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Scenario 1

This is the type of lockdown:

Duration: 6 weeks

Amber Restrictions

No planned procedures postponed

Likely health impacts:

1,300 in 10,000 infected

9 in 10,000 additional people die

Likely economic impacts:

You can buy 90% of trolley

0 in 100 loses job

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Scenario 2

This is the type of lockdown:

Duration: 16 weeks

Red Restrictions

All planned procedures postponed

Likely health impacts:

100 in 10,000 infected

\+

1 in 10,000 additional people die

Likely economic impacts:

You can buy 80% of trolley

25 in 100 loses job

Which scenario would you choose?

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Scenario 1

This is the type of lockdown:

Duration: 3 weeks

Amber Restrictions

All planned procedures postponed

Likely health impacts:

100 in 10,000 infected

\+

1 in 10,000 additional people die

Likely economic impacts:

You can buy 80% of trolley

4 in 100 loses job

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Scenario 2

This is the type of lockdown:

Duration: 16 weeks

Green Restrictions

Some planned procedures postponed

Likely health impacts:

1,300 in 10,000 infected

9 in 10,000 additional people die

Likely economic impacts:

You can buy 100% of trolley

0 in 100 loses job

Which scenario would you choose?

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Scenario 1

This is the type of lockdown:

Duration: 6 weeks

Yellow Restrictions

Some planned procedures postponed

Likely health impacts:

100 in 10,000 infected

1 in 10,000 additional people die

Likely economic impacts:

You can buy 80% of trolley

0 in 100 loses job

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Scenario 2

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Duration: 16 weeks

Red Restrictions

All planned procedures postponed

Likely health consequences:

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13 in 10,000 additional people die

Likely economic consequences:

You can buy 100% of trolley

4 in 100 loses job

Which scenario would you choose?

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This is the type of lockdown:

Duration: 6 weeks

Green Restrictions

All planned procedures postponed

Likely health impacts:

1,300 in 10,000 infected

9 in 10,000 additional people die

Likely economic impacts:

You can buy 90% of trolley

25 in 100 loses job

For peer review only - http://bmjopen.bmj.com/site/about/guidelines.xhtml

Scenario 2

This is the type of lockdown:

Duration: 3 weeks

Red Restrictions

No planned procedures postponed

Likely health impacts:

2,000 in 10,000 infected

13 in 10,000 additional people die

Likely economic impacts:

You can buy 80% of trolley

0 in 100 loses job

Which scenario would you choose?

For peer review only - http://bmjopen.bmj.com/site/about/guidelines.xhtml

Scenario 1

This is the type of lockdown:

Duration: 16 weeks

Yellow Restrictions

No planned procedures postponed

Likely health impacts:

1,300 in 10,000 infected

9 in 10,000 additional people die

Likely economic impacts:

You can buy 70% of trolley

25 in 100 loses job

For peer review only - http://bmjopen.bmj.com/site/about/guidelines.xhtml

Scenario 2

This is the type of lockdown:

Duration: 6 weeks

Amber Restrictions

Some planned procedures postponed

Likely health impacts:

600 in 10,000 infected

4 in 10,000 additional people die

Likely economic impacts:

You can buy 80% of trolley

15 in 100 loses job

Which scenario would you choose?

For peer review only - http://bmjopen.bmj.com/site/about/guidelines.xhtml

Scenario 1

This is the type of lockdown:

Duration: 16 weeks

Red Restrictions

All planned procedures postponed

Likely health impacts:

100 in 10,000 infected

\+

1 in 10,000 additional people die

Likely economic impacts:

You can buy 90% of trolley

15 in 100 loses job

For peer review only - http://bmjopen.bmj.com/site/about/guidelines.xhtml

Scenario 2

This is the type of lockdown:

Duration: 10 weeks

Green Restrictions

No planned procedures postponed

Likely health impacts:

600 in 10,000 infected

4 in 10,000 additional people die

Likely economic impacts:

You can buy 100% of trolley

4 in 100 loses job

Which scenario would you choose?

For peer review only - http://bmjopen.bmj.com/site/about/guidelines.xhtml

Scenario 1

This is the type of lockdown:

Duration: 10 weeks

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Some planned procedures postponed

Likely health impacts:

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13 in 10,000 additional people die

Likely economic impacts:

You can buy 90% of trolley

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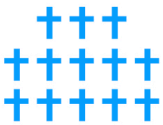

13 in 10,000 additional people die

Likely economic impacts:

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15 in 100 loses job

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Likely health consequences:

600 in 10,000 infected

4 in 10,000 additional people die

Likely economic consequences:

You can buy 70% of trolley

4 in 100 loses job

Block 1check

Which scenario would you choose?

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Likely economic consequences:

You can buy 90% of trolley

0 in 100 loses job

Now for this last question, we also want to ask you how likely or unlikely you are to comply with the lockdown measure you **have just chosen above**?

Very unlikely

Unlikely

Neutral

For peer review only - http://bmjopen.bmj.com/site/about/guidelines.xhtml

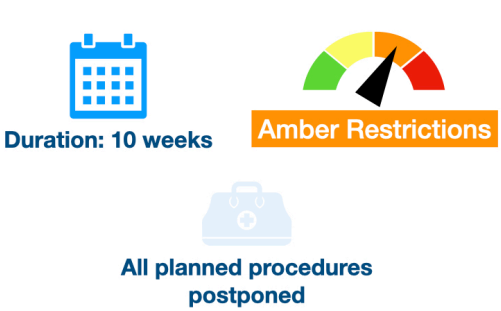
Likely

Very likely

Which scenario would you choose?

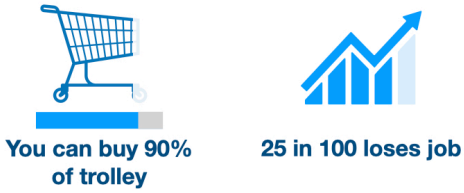
Scenario 1

This is the type of lockdown:



Likely health consequences:

Likely economic consequences:



For peer review only - http://bmjopen.bmj.com/site/about/guidelines.xhtml

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Duration: 10 weeks

Green Restrictions

No planned procedures postponed

Likely health consequences:

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This is the type of lockdown:

Duration: 10 weeks

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Scenario 2

This is the type of lockdown:

Duration: 16 weeks

Amber Restrictions

No planned procedures postponed

Likely health consequences:

1,300 in 10,000 infected

9 in 10,000 additional people die

Likely economic consequences:

You can buy 90% of trolley

4 in 100 loses job

Block 2check

Which scenario would you choose?

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Scenario 1

This is the type of lockdown:

Duration: 3 weeks

Red Restrictions

No planned procedures postponed

Likely health consequences:

1,300 in 10,000 infected

9 in 10,000 additional people die

Likely economic consequences:

You can buy 100% of trolley

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This is the type of lockdown:

Duration: 16 weeks

Yellow Restrictions

All planned procedures postponed

Likely health consequences:

600 in 10,000 infected

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Likely economic consequences:

You can buy 70% of trolley

0 in 100 loses job

Now for this last question, we also want to ask you how likely or unlikely you are to comply with the lockdown measure you **have just chosen above**?

Very unlikely

Unlikely

Neutral

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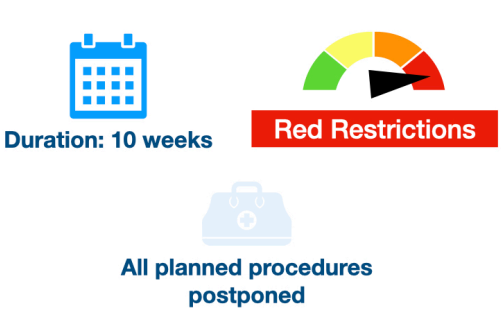
Likely

Very likely

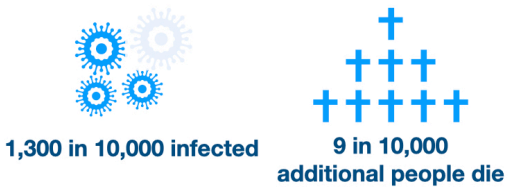
Which scenario would you choose?

Scenario 1

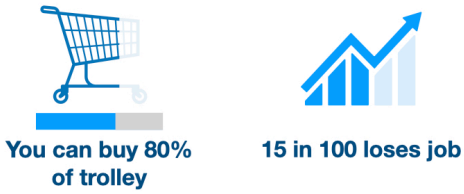
This is the type of lockdown:



Likely health consequences:



Likely economic consequences:



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Scenario 2

This is the type of lockdown:

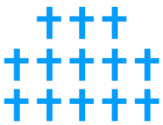
Duration: 16 weeks

Amber Restrictions

Some planned procedures postponed

Likely health consequences:

2,000 in 10,000 infected



13 in 10,000 additional people die

Likely economic consequences:

You can buy 90% of trolley

25 in 100 loses job

Which scenario would you choose?

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You can buy 80% of trolley

4 in 100 loses job

For peer review only - http://bmjopen.bmj.com/site/about/guidelines.xhtml

Scenario 2

This is the type of lockdown:

Duration: 6 weeks

Green Restrictions

All planned procedures postponed

Likely health consequences:

600 in 10,000 infected

4 in 10,000 additional people die

Likely economic consequences:

You can buy 70% of trolley

15 in 100 loses job

Which scenario would you choose?

For peer review only - http://bmjopen.bmj.com/site/about/guidelines.xhtml

Scenario 1

This is the type of lockdown:

Duration: 10 weeks

Green Restrictions

Some planned procedures postponed

Likely health consequences:

100 in 10,000 infected

+

1 in 10,000 additional people die

Likely economic consequences:

You can buy 70% of trolley

4 in 100 loses job

For peer review only - http://bmjopen.bmj.com/site/about/guidelines.xhtml

Scenario 2

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Duration: 6 weeks

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Likely health consequences:

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Duration: 16 weeks

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No planned procedures postponed

Likely health consequences:

100 in 10,000 infected

1 in 10,000 additional people die

Likely economic consequences:

You can buy 100% of trolley

0 in 100 loses job

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Scenario 2

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Duration: 10 weeks

Yellow Restrictions

Some planned procedures postponed

Likely health consequences:

1,300 in 10,000 infected

9 in 10,000 additional people die

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You can buy 80% of trolley

15 in 100 loses job

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Scenario 2

This is the type of lockdown:

Duration: 3 weeks

Red Restrictions

Some planned procedures postponed

Likely health consequences:

100 in 10,000 infected

\+

1 in 10,000 additional people die

Likely economic consequences:

You can buy 90% of trolley

0 in 100 loses job

○

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Duration: 6 weeks

Green Restrictions

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Likely health consequences:

100 in 10,000 infected

\+

1 in 10,000 additional people die

Likely economic consequences:

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Block 3check

Which scenario would you choose?

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Scenario 2

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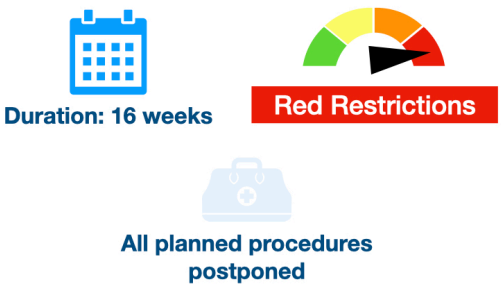

Likely health impacts:

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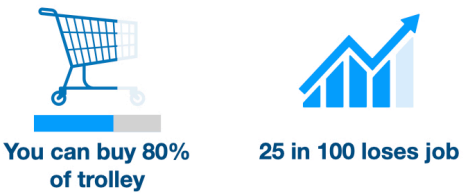


Now for this last question, we also want to ask you how likely or unlikely you are to comply with the lockdown measure you **have just chosen above**?

Very unlikely

Unlikely

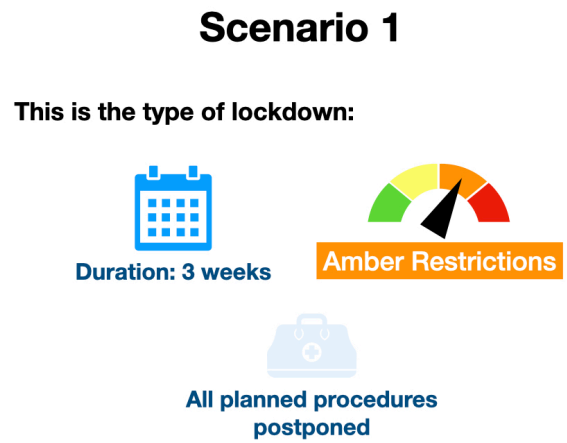
Neutral

For peer review only - http://bmjopen.bmj.com/site/about/guidelines.xhtml

Likely

Very likely

Which scenario would you choose?



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Debrief

Thinking of how you answered the last 9 choice questions, could you tell us which of the following was important to you?

Please select all that apply.

- [ ] What is best for me
- [ ] What is best for my community
- [ ] What is best for my loved ones
- [ ] What is best for my country

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When in a public indoor space, do you feel more comfortable, less comfortable, or indifferent if people are wearing masks?

- ○ More comfortable
- ○ Less comfortable
- ○ Indifferent

MFQ

Section 4:
How you think about morality in general

Thinking about what kind of lockdown should be implemented sometimes means making difficult moral choices. In this section we are interested in what aspects of morality are most important to you.

Please note these next questions are not about a future pandemic or related to the choice questions before, but about how you think in general. Your answers are not being assessed as right or wrong, and all answers are valid. We are interested in your honest opinion.

Part 1.

Using this scale:
0 = not at all relevant (this consideration has nothing to do with my judgement of right and wrong)
1 = not very relevant
2 = slightly relevant
3 = somewhat relevant
4 = very relevant
5 = extremely relevant (this is one of the most important factors when I judge

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what is right and wrong).

When you decide whether something is right or wrong, to what extent are the following considerations relevant to your thinking?

	Not at all relevant (0)	Not very relevant (1)	Slightly relevant (2)	Somewhat relevant (3)	Very relevant (4)	Extremely relevant (5)
Whether or not someone suffered emotionally	○	○	○	○	○	○
Whether or not some people were treated differently than others	○	○	○	○	○	○
Whether or not someone's actions showed love for his or her country	○	○	○	○	○	○
Whether or not someone showed a lack of respect for authority	○	○	○	○	○	○
Whether or not someone violated standards of purity and decency	○	○	○	○	○	○

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Whether or not someone was good at maths	○	○	○	○	○	○
Whether or not someone cared for someone weak or vulnerable	○	○	○	○	○	○
Whether or not someone acted unfairly	○	○	○	○	○	○
Whether or not someone did something to betray his or her group	○	○	○	○	○	○
Whether or not someone conformed to traditions of society	○	○	○	○	○	○
Whether or not someone did something disgusting	○	○	○	○	○	○

Part 2.

Using this scale:

0 = strongly disagree

1 = Moderately disagree

2 = Slightly disagree

3 = Slightly agree

4 = Moderately agree

5 = Strongly agree

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Please read the following sentences and indicate your agreement or disagreement.

	Strongly disagree (0)	Moderately disagree (1)	Slightly disagree (2)	Slightly agree (3)	Moderately agree (4)	Strongly agree (5)
Compassion for those who are suffering is the most crucial virtue	○	○	○	○	○	○
When the government makes laws, the number one principle should be ensuring that everyone is treated fairly	○	○	○	○	○	○
I am proud of my country's history	○	○	○	○	○	○
Respect for authority is something all children need to learn	○	○	○	○	○	○

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People should not do things that are disgusting, even if no one is harmed	○	○	○	○	○	○
It is better to do good than to do bad	○	○	○	○	○	○
One of the worst things a person could do is hurt a defenseless animal	○	○	○	○	○	○
Justice is the most important requirement for a society	○	○	○	○	○	○
People should be loyal to their family members, even when they have done something wrong	○	○	○	○	○	○
Men and women each have different roles to play in society	○	○	○	○	○	○

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I would call some acts wrong on the grounds that they are unnatural	○	○	○	○	○	○

Socio block

Section 5: About you

Finally, to help us understand your answers to the previous questions, we would like to ask you a few questions about yourself.

How good is your health in general?

- ○ Very good
- ○ Good
- ○ Fair
- ○ Bad
- ○ Very bad

During the COVID-19 pandemic, did you choose to shield or were you ever told to shield because you have underlying health conditions?

- ○ Yes

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- ○ No

Do you think that you have had or currently have COVID-19?

- ○ Yes, confirmed by a positive test
- ○ Yes, suspected COVID-19 but not tested
- ○ No
- ○ Don't know

If yes, were you admitted to hospital because of COVID-19?

Yes	No
○	○

Which of these qualifications do you have?

Please select all that apply.

- ☐ 1-4 O levels / CSEs / GCSEs / Standard Grades (any grades), Entry Level, Foundation Diploma, Access 3 Cluster, Intermediate 1 or 2, Senior Certificate or equivalent
- ☐ NVQ / SVQ Level 1 or 2, Foundation or Intermediate GNVQ, Basic Skills, SCOTVEC Module, General Diploma, RSA Diploma, City and Guilds Craft or equivalent
- ☐ 5+ O levels (passes) / CSEs (grade1) / GCSEs (grades A*-C) / Standard Grades (grades 1-3), School Certificate, Intermediate 1 or 2, 1 A level / 2-3 AS levels / VCEs, Higher Diploma or equivalent
- ☐ Apprenticeship
- ☐ 2+ A levels / VCES, 4+ AS Levels, Scottish Higher or SYS, Higher School Certificate, Progression / Advanced Diploma or equivalent
- ☐ NVQ / SVQ Level 3, Advanced GNVQ, City and Guilds Advanced Craft, ONC, OND, BTEC national, SCOTVEC National diploma, RSA Advanced Diploma or equivalent

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- [ ] Degree (for example BA, BSc), Higher degree (for example MA, PhD, PGCE), NVQ / SVQ Level 4-5, HNC, HND, RSA Higher Diploma, BTEC Higher Level or equivalent
- [ ] Professional qualifications (for example teaching, nursing, accountancy)
- [ ] Other vocational / work-related qualifications
- [ ] Foreign qualifications
- [ ] No qualifications
- [ ] Prefer not to say

In January 2020 (before the COVID-19 lockdown), were you...

Please include any work, including casual or temporary, even if only for one hour. Please select all that apply.

- [ ] Working as an employee?
- [ ] Self-employed or freelance?
- [ ] On a Government sponsored training scheme?
- [ ] Working paid or unpaid for your own or your family's business?
- [ ] Away from work ill, maternity leave, on holiday or temporarily laid off?
- [ ] Doing any other kind of paid work?
- [ ] Actively looking for a job?
- [ ] Unemployed?
- [ ] Retired (whether receiving pension or not)?
- [ ] A student?
- [ ] Looking after home or family?
- [ ] Long-term sick or disabled?
- [ ] Other? (Please select and write in below)

What impact has COVID-19 and its restrictions had on your employment?

Please select all that apply.

- [ ] I have lost my job/made redundant
- [ ] I have been furloughed

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- [ ] I have seen my working hours reduced
- [ ] I have seen my working hours increased
- [ ] I am now working from home
- [ ] No impact
- [ ] Other (Please select and write in below)

How concerned are you about the impact of COVID-19 on your employment in the future?

Not at all concerned ○

Slightly concerned ○

Moderately concerned ○

Very concerned ○

Extremely concerned ○

Including yourself, how many adults live in your household?

How many children (under 18) live in your household?

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Do you have caring responsibilities for other people other than your children?

- Yes
- No

What is your ethnic group?

- White
- Mixed / Multiple Ethnic Groups
- Asian / Asian British
- African
- Black / Caribbean / Black British
- Other Ethnic Group

Which group represents your total household income including any benefits received and before any deductions?

Please select either weekly or annual income.

- Up to £99 weekly
- £100 and up to £199 weekly
- £200 and up to £299 weekly
- £300 and up to £399 weekly
- £400 and up to £499 weekly
- £500 and up to £599 weekly
- £600 and up to £699 weekly
- £700 and up to £999 weekly
- £1000 and above weekly
- Prefer not to say
- Up to £5,199 annual
- £5,200 and up to £10,399 annual
- £10,400 and up to £15,599 annual
- £15,600 and up to £20,799 annual
- £20,800 and up to £25,999 annual
- £26,000 and up to £31,199 annual
- £31,200 and up to £36,399 annual
- £36,400 and up to £51,999 annual
- £52,000 and above annual

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What is the **first half** of your post code?

The first half is the part before the space. For example:

Please enter the first four digits for post codes with 7 characters (AB10 XXX)
Please enter the first three digits for post codes with 6 characters (AB1 XXX)
Please enter the first two digits for post codes with 5 characters (A1 XXX)

Prefer not to say

Can you tell us which type of device did you use to complete this survey?

Mobile phone

Tablet or iPad

Laptop computer

Desktop computer

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Other (please give details)

Do you have any comments about this survey or things you might want to add that were not covered in the questions?

Thank you for taking the time to complete this survey.

Your answers are very useful for informing future pandemic responses.

Please click **Next** to submit your answers to us.

University of Aberdeen

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STROBE Statement—Checklist of items that should be included in reports of ***cross-sectional studies***

	Item No	Recommendation	Page No
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	3
Objectives	3	State specific objectives, including any prespecified hypotheses	4
Methods			
Study design	4	Present key elements of study design early in the paper	4-6
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	4
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	4
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	5-6
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	4
Bias	9	Describe any efforts to address potential sources of bias	5
Study size	10	Explain how the study size was arrived at	5
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	5
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	5
		(*b*) Describe any methods used to examine subgroups and interactions	5-6
		(*c*) Explain how missing data were addressed	n/a
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	5-6
		(*e*) Describe any sensitivity analyses	n/a
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	6
		(b) Give reasons for non-participation at each stage	n/a
		(c) Consider use of a flow diagram	n/a
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	6
		(b) Indicate number of participants with missing data for each variable of interest	n/a
Outcome data	15*	Report numbers of outcome events or summary measures	6-7
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	6-7

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		(*b*) Report category boundaries when continuous variables were categorized	6-7
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	n/a
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	n/a
Discussion			
Key results	18	Summarise key results with reference to study objectives	14
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	14
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	14-15
Generalisability	21	Discuss the generalisability (external validity) of the study results	14-15
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	16

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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