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Training and education

Impact of the COVID-19 pandemic on public attitudes to cardiopulmonary resuscitation and publicly accessible defibrillator use in the UK

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Introduction

Members of the public have an essential role to play in the out-of-hospital cardiac arrest (OHCA) chain of survival by acting to call Emergency Medical Services (EMS), start cardiopulmonary resuscitation (CPR) and use a Public Access Defibrillator (PAD) to help save lives.[1–5] In recent years, there has been a rise in bystander CPR rates across many worldwide EMS systems (Denmark,[6–7] United States,[8] Japan,[9] Canada,[10] South Korea.[11]) In England, the percentage of people sustaining an OHCA that was either unwitnessed or witnessed by a bystander and who received bystander CPR has risen from 55.2% in 2014 to 69.8% in 2019.[12–13] In Scotland, this increased from 39.4% in 2011–2012 to 64.0% in 2018–2019.[14]

In the UK, as in many other countries, there has been a parallel rise in the proportion of people reporting they have trained in resuscitation skills. In 2014, 47% of people reported formal CPR skills training and by 2019 it was 62.2%.[15–16] National initiatives are associated with increases in the numbers of people trained, which in turn is associated with increased bystander CPR rates and improved survival outcomes.[6,17]

The COVID-19 pandemic appears to have increased the incidence of OHCA cases.[18–21] In some places bystander CPR rates also appear to be reduced.[18–19] National and international organisations have developed revised guidelines for performing CPR as safely as possible on OHCA patients during the pandemic to reduce the risk of the rescuer catching COVID-19 during a resuscitation attempt (such as favouring compression-only CPR with a cloth over the patients mouth rather than CPR with rescue breaths).[22–23] However, little is known about the public's knowledge of this guidance, how their attitudes to performing different resuscitation actions may have changed and reasons for any reluctance to do so during the pandemic. Public health messaging on social distancing may have contributed to increased fear about helping OHCA patients.[24]

Research to understand whether concerns about the COVID-19 pandemic have adversely affected gains in bystander CPR rates, including any changes in public attitudes to performing CPR is needed. It will inform stakeholders' strategies to support recovery in the public's confidence and likelihood of helping people who sustain an OHCA.

We conducted 4 short surveys of adults during the first wave of the pandemic in the UK (April – July 2020) and a longer survey in November 2020 to assess the UK public's knowledge of revised resuscitation guidance and the impact of the COVID-19 pandemic on their attitudes to CPR and defibrillator use.

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Methods

Design

We conducted a prospective observational study of attitudes to CPR, collecting data through surveys at several timepoints during the pandemic and compared the results with those from a similar study we conducted before the pandemic in May 2019, and to an earlier study conducted in 2015.

Sample

A sample of around 4,500 UK adults (18 years old and over) for each period was achieved through YouGov's omnibus survey using their non-probabilistic active sampling method from their panel of over 1 million adults registered and incentivised to participate in studies.[25] A different sample was selected for each period. The achieved samples were independently weighted to be representative of UK adults in terms of age, gender, social class, region, and education.[26]

Data collection

YouGov ran the study online in May 2019, April, May, June and July and November 2020. Each data collection period was 2 consecutive working days. Questions were designed by the study team, using some previously reported questions to ensure accurate comparisons. YouGov actively select a sample with the characteristics of the UK adult population from their panel of over 1 million British adults. Weights as described above are applied to ensure the sample is representative.[26.] The sample were emailed a link to the survey. YouGov returned the anonymised dataset to the study team for analysis.

Data analysis

All analyses were performed in StataSE 17.0.

We analysed the sample's characteristics and their responses using descriptive statistics, with YouGov weights applied to ensure the results were representative of the UK adult population.

Logistic regression was used to compare the likelihood of performing different actions upon witnessing an OHCA over time. Time was defined as the months from the reference time point (May 2019) and was treated as categorical variable in the analysis. Each model was adjusted using sampling weights as well as demographic variables (age group, gender, social grade and government region). Post-hoc Wald tests were used to test for linear trends. Bonferroni corrections were applied to account for multiple testing. A significance level of $p < 0.05$ was used.

Taking the same approach as in our previously reported study,[12] a number of variables were dichotomised for analysis: likelihood of performing different actions upon witnessing an OHCA were transformed from a 4-point Likert scale and a 'don't know' option into a 'likely' and 'unlikely' binary form, where 'don't know' was categorised as 'unlikely'.

Ethical considerations

The University of Warwick's Biomedical and Scientific Research Ethics Committee approved the study (ref REGO-2016–1906). Consent was presumed in those who chose to complete the questions, having read the introductory information on its content and purpose.

Results

Demographic characteristics

The sample characteristics are presented in Table 1. Over half of respondents were female (51.5%), 57% were from higher social grades (ABC1). Over 90% (93.1%) reported they were from White ethnic backgrounds, 1.6% Mixed, 2.8% East and South Asian and 1.0% African-Caribbean ethnic backgrounds (July and November surveys only).

Changes to bystander-reported responses to cardiac arrest

The percentage of respondents likely to perform different actions upon witnessing someone having a cardiac arrest are presented in Fig. 1. A summary of the logistic regression models and post-hoc analyses is presented in Tables 2 and 3.

The likelihood of bystanders calling the EMS upon witnessing someone having an OHCA did not significantly change between May 2019 and November 2020 (Odds Ratio (OR) = 0.82, 95% Confidence Interval (CI) = 0.64–1.04, p = 0.11). In spite of a temporary reduction in likelihood in April 2020 (OR = 0.72, 95%CI = 0.58–0.90, $p < 0.05$) (Table 2), there was no significant linear trend for likelihood to call the EMS between the May 2019 to November 2020 period ($\chi^2 = 3.64$, p = 0.057) (Table 3).

There was a significant linear trend in the likelihood of bystanders performing any type of CPR over time ($\chi^2 = 23.00$, p = 0.001) (Table 3). In addition, there was a significant increase between May 2019 and April 2020 (OR = 1.42, 95%CI = 1.29–1.57, $p < 0.001$) (Table 2), which was sustained through to November 2020 (Table 3). There was however a significant linear decrease in the likelihood of performing CPR with rescue breaths over time ($\chi^2 = 183.81$, $p < 0.001$), with a particularly marked drop between July and November 2020 (0.55; 95%CI = 0.49–0.62, $p < 0.001$) (Table 3). In contrast, there was a significant positive linear trend for the likelihood of performing COCPR (with or without a cloth covering the person's mouth) between May 2019 and November 2020 ($\chi 2 = 31.10$, $p < 0.001$), with again a significant increase between July and November 2020 (1.43, 95%CI = 1.27–1.62, $p < 0.001$) (Table 3).

The likelihood of a bystander who witnessed an OHCA going to get or use a PAD followed similar patterns. Both followed a statistically significant if modest positive linear trend during the study period (get a PAD: $\chi^2 = 41.62$, $p < 0.001$; use a PAD: $\chi^2 = 45.95$, $p < 0.001$) (Table 3).

Barriers to CPR

In November 2020, only one in three (31.7%) respondents were aware of modifications to guidance for performing CPR during the COVID-19 pandemic. Few (14.7%) were aware of advice to put a cloth or a towel over the person's mouth whilst performing chest compressions.

Overall, 30.1% said they were likely or very likely to train for the first time or take a refresher course in resuscitation skills over the next 6 months (i.e. between November and April 2021, during the second wave of the pandemic in the UK). Almost 80% (77.9%) of those said they were likely or very likely to use online resources; 45.6% percent said they would attend a face-to-face class with social distancing, and 40.5% said they would attend an online class.

Table 1 – Demographic characteristics (weighted).

	May 2019	Apr 2020	May 2020	Jun 2020	Jul 2020	Nov 2020
Total respondents	4,516	4,884	4,362	4,250	4,429	4,418
Sex (%)						
Male	48.5	48.5	48.5	48.5	48.5	48.5
Female	51.5	51.5	51.5	51.5	51.5	51.5
Age group (%)						
18–24	11.1	11.1	11.1	11.1	11.1	11.1
25–34	14.8	16.8	15.4	15.5	14.9	15.9
35–44	18.4	16.4	17.6	17.2	17.9	17.5
45–54	16.5	15.8	15.8	17.2	17.0	16.2
55+	39.3	40.0	40.1	39.0	39.1	39.3
Social grade (%)*						
ABC1	57.0	57.0	57.0	57.0	57.0	57.0
C2DE	43.0	43.0	43.0	43.0	43.0	43.0
Government region (%)						
North East	3.8	4.0	4.6	4.3	4.1	4.1
North West	10.5	11.3	10.6	9.9	11.0	10.5
Yorkshire and the Humber	9.0	8.0	8.1	9.1	8.2	8.7
East Midlands	8.0	8.0	7.9	7.8	8.2	7.0
West Midlands	8.1	8.1	8.2	8.3	7.9	9.1
East of England	9.2	8.7	8.6	9.5	7.9	9.0
London	13.1	13.1	13.1	13.1	13.1	13.1
South East	12.7	13.5	13.3	13.2	14.0	13.8
South West	9.7	9.5	9.7	9.2	9.7	8.8
Wales	4.8	4.8	4.8	4.8	4.8	4.8
Scotland	8.4	8.4	8.4	8.4	8.4	8.4
Northern Ireland	2.7	2.7	2.7	2.7	2.7	2.7

*Social grade: A: high managerial, administrative, or professional (4% of the population January – December 2016); B: intermediate managerial, administrative, or professional (23%); C1: supervisory, clerical, and junior managerial, administrative, or professional (28%); C2: skilled manual worker (20%); D: semi-skilled and unskilled manual worker (15%); E: state pensioner casual or lowest grade worker, unemployed with state benefits only (10%).[27]

Fig. 2 presents information about perceived barriers to performing CPR. Data are included from a survey completed in 2015 for comparison with the rates reported through the pandemic period. The most striking changes between October 2015 and November 2020 are an increased reluctance to perform mouth-to-mouth ventilation (10.1 percentage points) and concerns about catching an infection (15.4 percentage points). Overall, all reasons for reluctance to perform CPR have increased since 2015. The leading reasons for reluctance in November 2020 remained fear of causing more harm than good (52.4%), lacking the knowledge and skills to perform CPR (42.9%), and being unsure that the person concerned definitely needs CPR (40.0%).

Discussion

Summary of key findings

Many (but not all) members of the UK public remain likely to activate the EMS and to commence COCPR if faced with someone who has sustained an OHCA. By contrast, the likelihood of performing mouth-to-mouth ventilation has fallen since the onset of the COVID-19 pandemic. This is mirrored by concerns about the safety of mouth-to-mouth ventilation and the risks of contracting illness following a resuscitation attempt. The likelihood of going to get or use a PAD remained relatively stable but remains sub-optimal (with only about 50% expressing a likelihood of using this technology). There seems to have been limited penetration of guidance suggesting how resuscitation techniques should be modified during the COVID-19 pandemic.

Concerns over people's attitudes to CPR being affected by the pandemic seem to be borne out in our study in part. In contrast to some other reports,[28] we found the overall likelihood of people performing any kind of CPR had actually increased since 2019. However, two distinct trends emerge when looking at CPR with rescue breaths and compression-only CPR separately.

People's likelihood of performing CPR with rescue breaths had decreased since the onset of the pandemic, with a particularly marked drop in November 2020, coinciding with the onset of a second wave of infections in the UK. Within the same timeframe, the likelihood of performing COCPR increased to the highest levels ever reported in similar studies.[29–30] Therefore, our study suggests that the decrease in likelihood of using CPR with rescue breaths has been compensated for by the increase in likelihood of performing COCPR with or without a cloth covering the person's mouth. Although analysis of national data for bystander CPR is not yet available, data from the London Ambulance Service early in the pandemic reported that bystander CPR rates had increased.[20]

Our study shows that being put off by performing mouth-to-mouth resuscitation and fear of catching an illness are increasingly cited as reasons for reluctance to perform CPR. It is plausible that changes in preferred CPR techniques have been driven by the pandemic and perceived increased contamination risk by providing CPR with rescue breaths compared to COCPR. Another explanation – not necessarily mutually exclusive with the first – is that changes in international resuscitation guidelines (set in motion prior to the pandemic)[31] and recommendations that untrained bystanders favour COCPR over CPR with rescue breaths have reached a large part of the general public.[32]

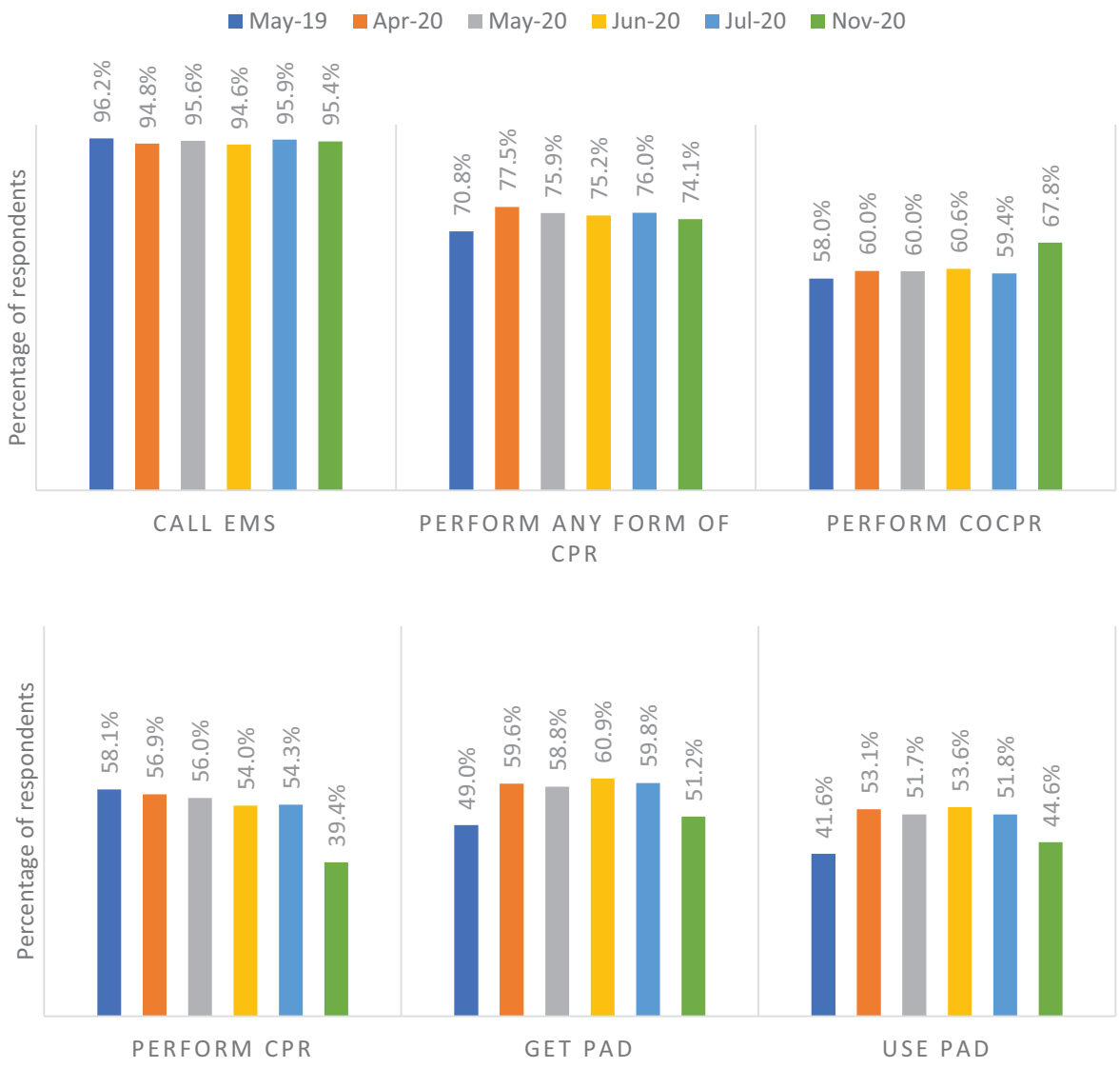

Fig. 1 – Likelihood of acting in different ways upon witnessing a cardiac arrest (weighted data). Key: EMS: Emergency Medical Services; CPR: Cardiopulmonary Resuscitation; COCPR: Compression-Only Cardiopulmonary Resuscitation; PAD: Public Access Defibrillator.

Elements of our study evaluating penetration of resuscitation recommendations, showed that knowledge about safe CPR practice during the pandemic — namely advice for COCPR with a cloth or towel covering the person's face[22] — was poor and a worrying proportion of people reported they were likely or very likely to still perform CPR with rescue breaths (39.4% in November 2020).

Lack of knowledge about CPR continues to be one of the leading reasons for reluctance to perform CPR. Further work to increase the public's awareness of safe resuscitation practice and sustained efforts to provide training are still needed in the UK. Although the pandemic is quickly evolving and many of the UK adult public are now vaccinated (which was not the case when the data for this study was collected),[33] attention should be paid in planning for training provision to shifting preferences in accessing CPR training: our study showed that the majority of people intending to undertake training in the near future would prefer to use asynchronous online resources, as opposed to 'traditional' face-to-face training. However, the effects of high vaccination uptake in the UK on training preferences should continue to be monitored.

While we did not observe any decline in people's reported likelihood of using a PAD, it remains below 50%. There is significant room for training more people in this skill as early defibrillation is known to increase survival from OHCA.[34–35]

Public awareness of cardiac arrest and the importance of early action by bystanders, may have been raised by the arrest sustained by Christian Eriksen during a recent televised match in the Union of European Football Associations 2020 Championship (played in June 2021). As campaigns and training evolve in response to the pandemic and high-profile cardiac arrests suck as Eriksen's, studies will be needed to monitor and assess resulting changes in attitudes to CPR, including knowledge of safe practice and uptake of training.

Table 2 – Logistic regression models for changes in bystander response to OHCA over time.

	Call EMS			Overall p	Perform any type of CPR			Overall p	Perform CPR			Overall p
	OR	95 %CI	p		OR	95 %CI	p		OR	95 %CI	p	
May 2019	1			0.04	1			<0.001	1			<0.001
Apr 2020	0.72	0.58–0.90	0.003		1.42	1.29–1.57	<0.001		0.95	0.88–1.04	0.280	
May 2020	0.85	0.68–1.07	0.171		1.30	1.18–1.43	<0.001		0.92	0.84–1.00	0.056	
Jun 2020	0.68	0.55–0.85	0.001		1.25	1.13–1.38	<0.001		0.84	0.77–0.92	<0.001	
Jul 2020	0.91	0.73–1.15	0.438		1.30	1.18–1.44	<0.001		0.85	0.78–0.93	<0.001	
Nov 2020	0.82	0.64–1.04	0.105		1.19	1.07–1.31	0.001		0.47	0.43–0.51	<0.001	

	Perform COCPR			Overall p	Get PAD			Overall p	Use PAD			Overall p
	OR	95%CI	p		OR	95%CI	p		OR	95%CI	p	
May 2019	1			<0.001	1			<0.001	1			<0.001
Apr 2020	1.09	1.00–1.19	0.043		1.55	1.43–1.69	<0.001		1.61	1.48–1.75	<0.001	
May 2020	1.09	1.00–1.19	0.063		1.50	1.38–1.64	<0.001		1.52	1.39–1.66	<0.001	
Jun 2020	1.12	1.02–1.22	0.016		1.64	1.50–1.79	<0.001		1.64	1.50–1.79	<0.001	
Jul 2020	1.06	0.97–1.16	0.183		1.56	1.43–1.70	<0.001		1.51	1.39–1.65	<0.001	
Nov 2020	1.36	1.24–1.49	<0.001		1.10	1.00–1.20	0.039		1.14	1.04–1.24	0.004	

Key: May 2019 is the reference group; EMS – Emergency Medical Services; CPR: cardiopulmonary resuscitation; COCPR: compression-only CPR; PAD: Public Access Defibrillator; CI: Confidence Interval.

Table 3 – Post-Hoc analysis: contrasts of marginal linear predictions.

	Call EMS			Perform any type of CPR			Perform CPR		
	OR	95% CI	p	OR	95% CI	p	OR	95% CI	p
Apr 2020 vs May 2019	0.72	0.58–0.90	0.017	1.42	1.25–1.6	<0.001	0.95	0.85–1.06	1.000
May 2020 vs Apr 2020	1.18	0.96–1.54	0.627	0.91	0.8–1.04	0.384	0.96	0.86–1.07	1.000
Jun 2020 vs May 2020	0.80	0.65–0.99	0.188	0.96	0.84–1.11	1.000	0.92	0.82–1.04	0.343
Jul 2020 vs Jun 2020	1.34	1.09–1.66	0.029	1.04	0.91–1.2	1.000	1.01	0.9–1.14	1.000
Nov 2020 vs Jul 2020	0.90	0.71–1.13	1.000	0.90	0.79–1.03	0.311	0.55	0.49–0.62	<0.001
Linear trend	χ^2 = 3.64, p = 0.057			χ^2 = 23.00, p < 0.001			χ^2 = 183.81, p < 0.001		
	Perform COCPR			Get PAD			Use PAD		
	OR	95% CI	p	OR	95% CI	p	OR	95% CI	p
Apr 2020 vs May 2019	1.09	0.97–1.22	0.216	1.54	1.38–1.72	<0.001	1.58	1.42–1.77	<0.001
May 2020 vs Apr 2020	1.00	0.89–1.12	1.000	0.97	0.86–1.08	1.000	0.95	0.84–1.06	0.985
Jun 2020 vs May 2020	1.03	0.91–1.15	1.000	1.09	0.97–1.23	0.321	1.08	0.96–1.21	0.470
Jul 2020 vs Jun 2020	0.95	0.84–1.07	1.000	0.95	0.85–1.07	1.000	0.93	0.83–1.04	0.365
Nov 2020 vs Jul 2020	1.43	1.27–1.62	<0.001	0.70	0.63–0.79	<0.001	0.75	0.67–0.84	<0.001
Linear trend	χ^2 = 31.10, p < 0.001			χ^2 = 41.62, p<0.001			χ^2 = 45.95, p < 0.001		

Key: EMS – Emergency Medical Services; CPR: cardiopulmonary resuscitation; COCPR: compression-only CPR; PAD: Public Access Defibrillator; CI: Confidence Interval.

Limitations

The limitations of using non-probabilistic sampling are reported elsewhere.[12] We provide unweighted demographic data in the supplementary tables for comparison with weighted data reported in the main text.

Our sample did not include sufficient numbers or representative proportions of respondents from minority ethnic groups to conduct a robust analysis to assess differences between the majority and minority groups in the UK. YouGov weighting methodology does not account for ethnicity,[26] therefore it is not surprising that our sample did not reflect the proportions in the 2011 census (where the percentage of the population from all non-mixed White ethnic backgrounds was 87.2%,[36] resulting in an overrepresentation of White British respondents. Further studies designed to include larger numbers of people from minority ethnic groups should be conducted in future.

Our study questions generally differentiated between CPR with rescue breaths and COCPR. In order to facilitate comparison with earlier data, we used the same question in May 2019 through to November 2020 as was used in October 2015, and which did not enquire about CPR with rescue breaths and COCPR separately. Considering the differences in the likelihood of performing CPR with rescue breaths and COCPR, future studies should examine reasons for reluctance to perform CPR with rescue breaths and COCPR separately. In addition, we only had access to aggregated data for the October 2015 study, and so we were unable to test differences between 2015 and data from April – November 2020 for statistical significance.

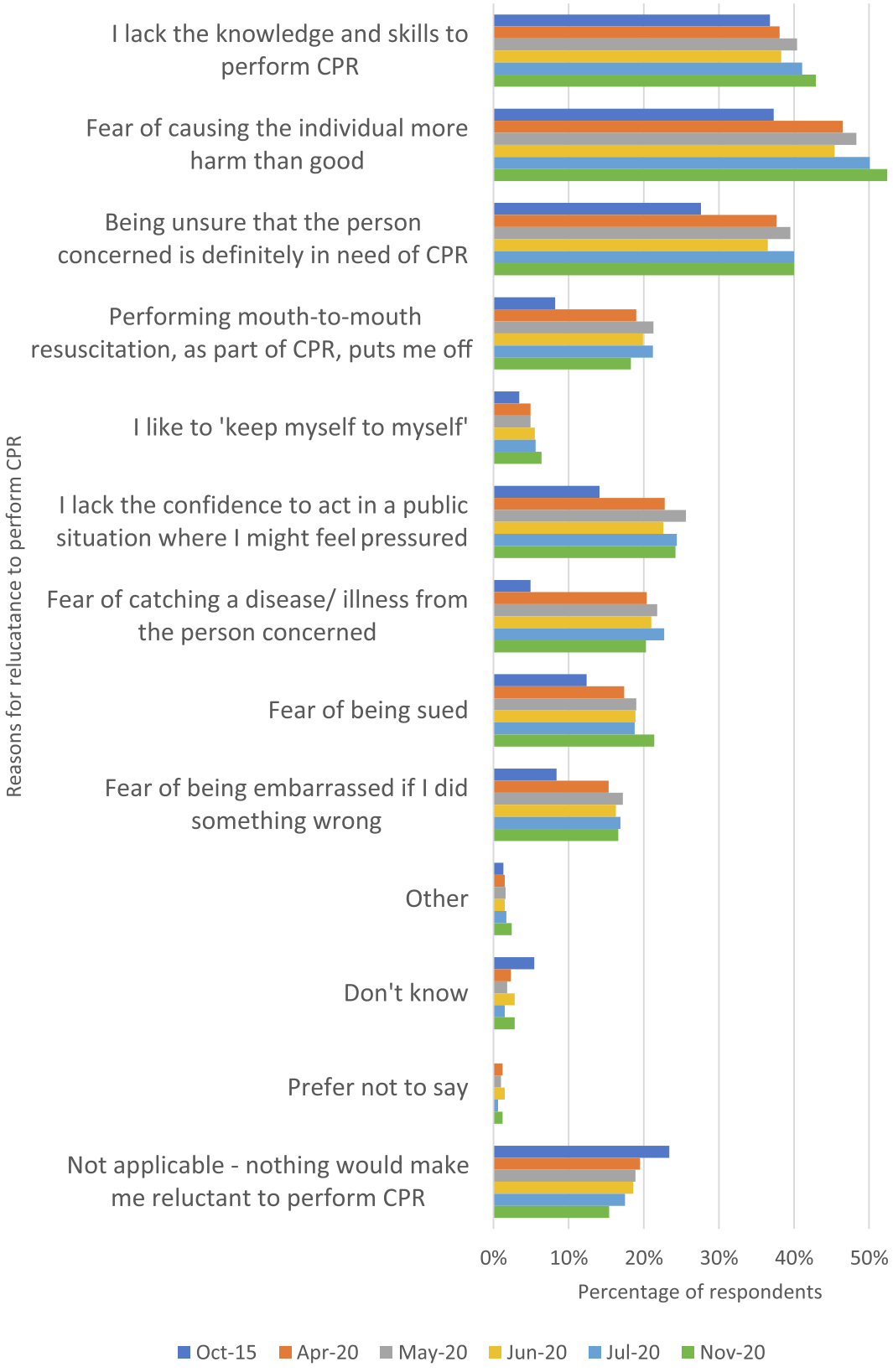

Fig. 2 – Reasons for reluctance to perform CPR (October 2015, April – July 2020, November 2020, weighted data). Key: CPR: Cardiopulmonary Resuscitation.

Conclusions

The UK public's reported likelihood of helping someone sustaining an OHCAO has remained stable. Whether this is borne out in actual bystander actions remains to be seen. Initiatives are still needed to further increase the proportion of people with resuscitation skills and to reduce the proportions reporting a lack of knowledge as a key concern. More needs to be done to ensure members of the public know how to minimise the risk of virus transmission during a resuscitation attempt.

CRediT authorship contribution statement

Claire A. Hawkes: Conceptualization, Methodology, Investigation, Writing – original draft, Validation, Visualization, Supervision, Project administration, Funding acquisition. **Inès Kander:** Conceptualization, Methodology, Investigation, Data curation, Formal analysis, Writing – original draft, Visualization. **Abraham Contreras:** Methodology, Formal analysis, Writing – review & editing, Validation. **Chen Ji:** Methodology, Formal analysis, Writing – review & editing, Validation. **Terry P. Brown:** Conceptualization, Methodology, Investigation, Formal analysis, Writing – review & editing, Validation, Funding acquisition. **Scott Booth:** Conceptualization, Methodology, Investigation, Writing – review & editing, Funding acquisition. **A. Niroshan Siriwardena:** Conceptualization, Methodology, Investigation, Writing – review & editing. **Rachael T. Fothergill:** Conceptualization, Methodology, Investigation, Writing – review & editing, Funding acquisition. **Julia Williams:** Conceptualization, Methodology, Investigation, Writing – review & editing. **Nigel Rees:** Conceptualization, Methodology, Investigation, Writing – review & editing. **Estelle Stephenson:** Methodology, Validation, Writing – review & editing. **Gavin D. Perkins:** Conceptualization, Methodology, Investigation, Writing – review & editing, Validation, Visualization, Supervision, Funding acquisition.

Declaration of Competing Interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: Claire A. Hawkes, Inès Kander, Terry P. Brown, Scott Booth, Abraham Contreras and Chen Ji, and Gavin D. Perkins are employed by the University of Warwick, which receives grants from the British Heart Foundation (BHF) and the Resuscitation Council (UK) for the conduct of the Out-of-Hospital Cardiac Arrest outcomes project.

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Estelle Stephenson is employed by the British Hearth Foundation.

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The remaining authors have no disclosures to report.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.resplu.2022.100256.

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