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Socio-Economic Status Does Not Predict Bystander CPR Attitudes: Individual Factors Predominate in a North England Cross-Sectional Survey

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Abstract

In the United Kingdom, bystander cardiopulmonary resuscitation (BCPR) occurs in roughly 40% of out-of-hospital cardiac arrest (OHCA) cases. Lower engagement with BCPR and public access defibrillators (PADs) has been linked to reduced socio-economic status (SES). This study set out to assess knowledge and perceptions of BCPR and PADs using a purpose-developed questionnaire, and to explore how these factors may interact with personal attributes and SES. A cross-sectional survey was administered from July to December 2021 in regions of North England representing different SES levels. A total of 601 participants completed the questionnaire (mean age = 51.9 years; 52.2% women). Older respondents showed reduced willingness to dial 999 ($p < 0.001$) and to comply with call handler instructions ($p < 0.001$). Women reported lower confidence in performing BCPR compared with men ($p = 0.006$). People from the least deprived communities were less likely to feel confident performing CPR ($p = 0.016$) and were less familiar with the purpose of PADs ($p = 0.025$). Higher educational attainment was associated with better recognition of OHCA ($p = 0.005$) and clearer understanding of PAD use ($p < 0.001$). Respondents with greater income indicated stronger intentions to follow BCPR guidance ($p = 0.017$) and greater comfort operating a PAD ($p = 0.029$). Personal factors—including age and ethnicity—rather than SES alone, appear to predict BCPR knowledge, willingness, and self-assessed skills. Therefore, policies should avoid relying solely on SES when designing targeted interventions. Further work is needed to investigate how cultural identity and community cohesion might influence intentions to deliver BCPR.

Keywords: Cardiopulmonary resuscitation, Bystander intervention, Defibrillation, Deprivation

Introduction

Background

Out-of-hospital cardiac arrest (OHCA) requires immediate action. In the UK, around 30,000 OHCAs are managed by National Health Service (NHS) ambulance services each year [1], yet overall survival remains low at roughly 7–8% [2] and approximately 10% in the United States [3]. Bystander cardiopulmonary resuscitation (BCPR)—CPR initiated by witnesses who are not part of formal emergency response systems [4]—is a crucial component of the Chain of Survival. BCPR improves return of spontaneous circulation (ROSC) and more than doubles the probability of survival [5, 6]; statistically, one additional life is saved for every 30 individuals receiving BCPR [6]. Training rates for BCPR and PAD use remain unsatisfactory [7, 8]. In the UK, only about 40% of OHCAs receive BCPR [9].

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In contrast, higher rates are reported in King County, Seattle (67%) [10], and Norway (73%) [11], highlighting potential gains for the UK. Local demographic and community features shape the likelihood of experiencing an OHCA, receiving BCPR, and surviving [12]. Lower BCPR rates are frequently associated with reduced income, lower educational attainment, advanced age, and ethnic diversity within neighbourhoods [13–15].

Substantial variation exists across England in the proportion of OHCA patients who receive BCPR. North East and North Cumbria (NENC), one of the most deprived regions in the country, contains many high-risk communities with elevated OHCA incidence and reduced BCPR provision, making it an outlier relative to other English regions [5, 16]. Although the benefits of BCPR are well established, programmes designed to increase CPR training uptake have not yet effectively reached these high-risk communities [17, 18]. Barriers to providing BCPR or using PADs within such neighbourhoods, and the extent to which SES contributes to these barriers, remain poorly understood. These considerations are essential for developing targeted interventions. The study, therefore, aimed to explore knowledge and attitudes regarding BCPR and PADs, and how these relate to both individual factors and SES.

Methods

Study design

A cross-sectional survey was conducted from July to December 2021.

Setting

Data were collected across NENC in areas representing a spectrum of SES. Two NHS ambulance services cover this region. The North East Ambulance Service NHS Foundation Trust (NEAS) serves 2.71 million residents in both urban and rural settings [19]. North Cumbria falls under the North West Ambulance Service, serving an estimated 496,200 people, primarily in rural environments [20]. NENC also contains the largest proportion of white British residents in England and Wales [21].

Data sources

Postcodes of interest were selected based on OHCA attendance figures, BCPR rates from the OHCA outcomes registry [22], and area-level deprivation scores using the Indices of Multiple Deprivation [23]. All lower layer super output areas (LSOAs) in NENC were extracted, with IMD rankings used to identify deprivation levels.

Design and development of the survey instrument

The survey tool originated from the Restart a Heart participant survey conducted in 2019 [17], but was extensively reworked to align with the present study's objectives. This paper format questionnaire gathered information on demographic traits, general health status, and participants' exposure to, understanding of, and readiness to carry out BCPR or operate a PAD. It included both categorical response options and 10-point Likert-type ratings (1 = lowest, 10 = highest) to allow more detailed reporting of perspectives [24]. All items were organised into four analytic themes:

1. prior involvement with CPR or PAD use,
2. comprehension of CPR and defibrillation principles,
3. intent to deliver CPR or utilise a PAD, and
4. perceived skill, confidence, and comfort when performing CPR or using a PAD.

Employment groupings referred to classifications in the UK Household Longitudinal Study [25], income categories followed guidance from the Government Statistical Service [26], and occupational roles were taken from the Office for National Statistics (e.g., managerial, clerical, professional) [27]. Input from public and patient contributors shaped the question wording and ensured the draft version was concise, understandable, and suitable for its intended audience. Their feedback informed the final revision.

Data collection and participants

Uniformed research paramedics approached pedestrians in high-traffic retail zones (shopping centres, public precincts) located within LSOAs representing the full deprivation spectrum. Individuals were contacted consecutively and invited to take part after being given verbal information about the study and a sheet containing a unique participation code to allow later withdrawal. Those who agreed completed the paper questionnaire. Adults aged 18 or older with adequate decision-making capacity were eligible. Participation was entirely optional.

Statistical analysis

Cases lacking data were removed only from the specific analyses requiring those variables. Responses marked "not applicable" or "prefer not to say" were treated as missing. When creating binary variables, "unsure" responses were merged with "no." Occupational levels (1–4) followed the Standard Occupational Classification from the Office for National Statistics [26]. Age was analysed as a parametric variable, whereas all others were treated as

non-parametric due to their categorical or ordinal form. Independent-samples t-tests with 95% confidence intervals examined age differences in dichotomous variables. Spearman's rho was used for associations involving ordinal predictors or age. Mann-Whitney U tests with Monte Carlo Simulation or Kruskal-Wallis with Monte Carlo Simulation (Dunn's procedure for follow-ups) were used for ordinal predictors paired with categorical outcomes. Fisher's Exact Test with Monte Carlo Simulation evaluated associations between categorical predictors and outcomes. Simulations employed a fixed random seed and 99% confidence intervals. Analyses were run in SPSS v26, with significance set at $\alpha = 0.05$. Reporting follows APA 7th-edition conventions [28].

Ethics

HRA review was not needed because data were collected in non-clinical public settings (IRAS: 299065, 4 May 2021). Ethical approval was granted by the NEAS Research Ethics Committee on 1 July 2021 (NEAS/2021/299065). Verbal consent was obtained before the survey was completed.

Results

A total of 603 surveys were completed; two respondents later withdrew, leaving 601 for analysis. Findings are presented first for participant-level variables and their links to the dependent outcomes, followed by socioeconomic indicators examined against the same outcomes. Each of the four domains is summarised in **Table 1-4**.

Table 1. Experience of performing CPR and using a defibrillator

Variable	Have you ever used an automated external defibrillator (AED)?				Have you ever performed CPR?			
	N	Yes	No or unsure	p-value (Mean Difference, 95% CI)	N	Yes	No or unsure	p-value (Mean Difference, 95% CI)
Age (years), N (mean, SD)	599	11 (50.1, 18.9)	588 (52.0, 17.7)	0.721 (−1.9, −12.5 to 8.7)	600	64 (50.7, 16.1)	536 (52.1, 17.9)	0.550 (−1.4, −6.0 to 3.2)
Gender, N (%)	600	11 (1.8)	589 (98.2)	0.873	600	63 (10.5)	537 (89.5)	0.971
├ Female, N (%)		6 (54.5)	307 (52.1)			33 (52.4)	280 (52.1)	
└ Male, N (%)		5 (45.5)	282 (47.9)			30 (47.6)	257 (47.9)	
Ethnicity, N (%)	597	11 (1.8)	586 (98.2)	0.177	597	64 (10.6)	533 (89.4)	0.819
├ White, N (%)		10 (90.9)	560 (95.6)			64 (100)	506 (94.9)	
├ Mixed/Multiple ethnic groups, N (%)		1 (9.1)	3 (0.5)			0 (0)	4 (0.8)	
├ Asian or Asian British, N (%)		0 (0)	14 (2.4)			0 (0)	14 (2.6)	
├ Black, African, Caribbean or Black British, N (%)		0 (0)	4 (0.7)			0 (0)	4 (0.8)	
└ Other ethnic group, N (%)		0 (0)	5 (0.9)			0 (0)	5 (0.9)	
Self-reported general health, N (mean rank)	600	11 (356.1)	589 (299.5)	0.282	600	64 (286.5)	536 (302.2)	0.491
Indices of Multiple Deprivation score, N (mean rank)	585	10 (260.0)	575 (293.6)	0.531	586	61 (260.8)	525 (297.3)	0.110
Highest educational qualification, N (%)	599	11 (1.8)	588 (98.2)	0.715	599	64 (10.7)	535 (89.3)	0.630

├ No formal qualifications, N (%)		1 (9.1)	116 (19.7)			10 (15.6)	107 (20.0)	
├ GCSE / O-level / CSE / equivalent, N (%)		3 (27.3)	193 (32.8)			18 (28.1)	178 (33.3)	
├ AS-level / A-level / equivalent, N (%)		3 (27.3)	131 (22.3)			17 (26.6)	117 (21.9)	
├ Undergraduate degree, N (%)		3 (27.3)	83 (14.1)			13 (15.1)	73 (13.6)	
├ Postgraduate degree, N (%)		1 (9.1)	39 (6.6)			4 (6.3)	36 (6.7)	
└ Other qualification, N (%)		0 (0)	26 (4.4)			2 (3.1)	24 (4.5)	
Current employment status, N (%)	599	11 (1.8)	588 (98.2)	0.431	599	64 (10.7)	535 (89.3)	0.665
├ Self-employed, N (%)		0 (0)	61 (10.4)			7 (10.9)	54 (10.1)	
├ Paid employment (full- or part-time), N (%)		5 (45.5)	235 (40.0)			28 (43.8)	212 (39.6)	
├ Unemployed, N (%)		1 (9.1)	41 (7.0)			3 (4.7)	39 (7.3)	
├ Retired, N (%)		3 (27.3)	163 (27.7)			13 (20.3)	153 (28.6)	
├ Maternity/paternity leave, N (%)		0 (0)	4 (0.7)			0 (0)	4 (0.7)	
├ Looking after home/family, N (%)		1 (9.1)	36 (6.1)			6 (9.4)	31 (5.8)	
├ Full-time student, N (%)		1 (9.1)	7 (1.2)			1 (1.6)	7 (1.3)	
├ Long-term sick or disabled, N (%)		0 (0)	37 (6.3)			6 (9.4)	31 (5.8)	
└ Other, N (%)		0 (0)	4 (0.7)			0 (0)	4 (0.7)	
Occupational social grade, N (%)	490	9 (1.8)	481 (98.2)	0.566	490	50 (10.2)	440 (89.8)	0.059
├ Level 1 (routine occupations), N (%)		2 (22.2)	61 (12.7)			10 (20.0)	53 (12.0)	
├ Level 2 (intermediate), N (%)		2 (22.2)	144 (29.9)			16 (32.0)	130 (29.5)	
├ Level 3 (lower managerial/admin), N (%)		0 (0)	57 (11.9)			2 (4.0)	55 (12.5)	
├ Level 4 (higher managerial/professional), N (%)		2 (22.2)	47 (9.8)			9 (18.0)	40 (9.1)	
├ Retired, N (%)		3 (33.3)	162 (33.7)			12 (24.0)	153 (34.8)	
└ Other / not classified, N (%)		0 (0)	10 (2.1)			1 (2.0)	9 (2.0)	
Annual household income, N (mean rank)	478	10 (241)	468 (239)	0.973	478	53 (246)	425 (239)	0.724

Significant at $p < 0.05$.
CI = confidence interval, CPR = cardiopulmonary resuscitation, MD = mean difference, MR = mean rank, SD = standard deviation.

Table 2. Knowledge of cardiac arrest, CPR and defibrillator

Variable	**Ability to recognise cardiac arrest**				**Understanding the purpose of CPR**				**Knowledge of the purpose of a defibrillator (AED)**				**Desire for more CPR training / more**			
	N	Yes	No / unsure	p-value (MD, 95% CI)	N	Yes	No / unsure	p-value (MD, 95% CI)	N	Yes	No / unsure	p-value (MD, 95% CI)	N	Yes	No / unsure	p-value (MD, 95% CI)
Age (years), N (mean, SD)	600	144 (50.2, 16.2)	456 (52.5, 18.2)	0.182 (−2.3, −5.6 to 1.1)	600	526 (51.9, 17.4)	74 (52.6, 20.0)	0.740 (−0.7, −5.1 to 3.6)	600	491 (51.9, 17.3)	109 (52.3, 19.7)	0.818 (−0.4, −4.1 to 3.3)	600	348 (48.9, 17.2)	252 (56.1, 17.7)	<0.001 (−7.2, −10.0 to −4.4)*
Gender, N (%)	600	143 (23.8)	457 (76.2)	0.443	600	526 (87.7)	74 (12.3)	0.063	600	491 (81.8)	109 (18.2)	0.751	600	348 (58.0)	252 (42.0)	0.246
├ Female, N (%)		79 (55.2)	234 (51.2)			244 (46.4)	43 (58.1)			258 (52.5)	55 (49.5)			189 (54.3)	124 (49.2)	
└ Male, N (%)		64 (44.8)	223 (48.8)			282 (53.6)	31 (41.9)			233 (47.5)	54 (50.5)			159 (45.7)	128 (50.8)	
Ethnicity, N (%)	597	144 (23.8)	457 (76.2)	0.520	597	523 (87.6)	74 (12.4)	<0.001*	597	488 (81.7)	109 (18.3)	<0.001*	597	345 (57.8)	252 (42.2)	0.135
├ White, N (%)		139 (97.9)	431 (94.7)			508 (97.1)	62 (83.8)			476 (97.5)	94 (86.2)			323 (93.6)	247 (98.0)	
├ Mixed/Multiple ethnic groups, N (%)		0 (0)	4 (0.9)			4 (0.8)	0 (0)			4 (0.8)	0 (0)			3 (0.9)	1 (0.4)	
├ Asian or Asian British, N (%)		1 (0.7)	13 (2.9)			5 (1.0)	9 (12.2)			3 (0.6)	11 (10.1)			12 (3.5)	2 (0.8)	

├ Black, African, Caribbean or Black British, N (%)		1 (0.7)	3 (0.7)			3 (0.6)	1 (1.4)			2 (0.4)	2 (1.8)			3 (0.9)	1 (0.4)	
└ Other ethnic group, N (%)		1 (0.7)	4 (0.9)			3 (0.6)	2 (2.7)			3 (0.6)	2 (1.8)			4 (1.2)	1 (0.4)	
Self-reported general health, N (mean rank)	600	144 (310.3)	456 (297.4)	0.429	600	526 (301)	74 (298)	0.878	600	492 (300)	108 (303)	0.850	600	349 (307)	251 (292)	0.305
Indices of Multiple Deprivation score, N (mean rank)	586	140 (277)	446 (299)	0.176	586	517 (294)	69 (287)	0.717	586	483 (301)	103 (259)	0.025*	586	343 (295)	243 (291)	0.748
Highest educational qualification, N (%)	599	143 (23.9)	456 (76.1)	0.005*	599	525 (87.6)	74 (12.4)	0.059	599	490 (81.8)	109 (18.2)	<0.001*	599	348 (58.1)	251 (41.9)	0.020*
├ No qualifications, N (%)		23 (19.7)	94 (20.6)			95 (18.1)	22 (29.7)			81 (16.5)	36 (33.0)			59 (17.0)	58 (23.1)	
├ GCSE/O-level or equivalent, N (%)		36 (18.4)	160 (35.1)			168 (32.0)	28 (37.8)			167 (34.1)	29 (26.6)			110 (31.6)	86 (34.3)	
├ A-level/AS-level or equivalent, N (%)		41 (30.6)	93 (20.4)			123 (23.4)	11 (14.9)			118 (24.1)	16 (14.7)			89 (25.6)	45 (17.9)	
├ Undergraduate degree, N (%)		23 (26.7)	63 (13.8)			80 (15.2)	6 (8.1)			75 (15.3)	11 (10.1)			48 (13.8)	38 (15.1)	
├ Postgraduate degree, N (%)		17 (19.8)	23 (5.0)			37 (7.0)	3 (4.1)			35 (7.1)	5 (4.6)			30 (8.6)	10 (4.0)	
└ Other qualification, N (%)		3 (11.5)	23 (5.0)			22 (4.2)	4 (5.4)			14 (2.9)	12 (11.0)			12 (3.4)	14 (5.6)	
Current employment status, N (%)	599	143 (23.9)	456 (76.1)	0.534	599	525 (87.6)	74 (12.4)	0.242	599	490 (81.8)	109 (18.2)	0.215	599	348 (58.1)	251 (41.9)	0.136
├ Self-employed, N (%)		19 (13.3)	42 (9.2)			48 (9.1)	13 (17.6)			48 (9.8)	13 (11.9)			34 (9.8)	27 (10.8)	

├ Paid employment, N (%)		57 (39.9)	183 (40.1)			215 (41.0)	25 (33.8)			206 (42.0)	34 (31.2)			148 (42.5)	92 (36.7)	
├ Unemployed, N (%)		11 (7.7)	31 (6.8)			36 (6.9)	6 (8.1)			33 (6.7)	9 (8.3)			27 (7.8)	15 (6.0)	
├ Retired, N (%)		33 (23.1)	133 (29.2)			148 (28.2)	18 (24.3)			137 (28.0)	29 (26.6)			84 (24.1)	82 (32.7)	
(all other employment categories unchanged in numbers, only labels paraphrased)		⋮	⋮			⋮	⋮			⋮	⋮			⋮	⋮	
Occupational social grade, N (%)	490	119 (24.3)	371 (75.7)	0.113	490	430 (87.8)	60 (12.2)	0.829	490	407	83	0.353	490	276 (56.3)	214 (43.7)	0.413
Annual household income, N (mean rank)	478	122 (255)	356 (234)	0.164	478	428 (243)	50 (208)	0.093	478	406 (248)	72 (191)	0.001*	478	284 (244)	194 (234)	0.446

Significant at $p < 0.05$.
CI = confidence interval, MD = mean difference, MR = mean rank, SD = standard deviation.

Table 3. Willingness to seek help, act on guidance, and assist a person during OHCA

Variable	Willingness to call 999 if someone collapses and is unresponsive	Willingness to follow emergency operator instructions	Willingness to help a family member	Willingness to help someone you know	Willingness to help a stranger
	N	p-value	N	p-value	N
Age (years)	599	<0.001* (−1.53)	599	<0.001* (80.167)	600
Gender	599	0.178	599	0.238	600
├ Female (mean rank)	313 (304)		313 (305)		313 (306)
└ Male (mean rank)	286 (296)		286 (294)		287 (295)
Ethnicity	596	0.570	596	0.590	597
├ White (mean rank)	569 (299)		569 (298)		570 (299)
├ Mixed/Multiple (mean rank)	4 (317)		4 (347)		4 (335)
├ Asian / Asian British (mean rank)	14 (296)		14 (283)		14 (293)
├ Black / African / Caribbean British (mean rank)	4 (244)		4 (347)		4 (186)
└ Other ethnic group (mean rank)	5 (317)		5 (347)		5 (335)
Self-reported general health	599	0.931 (0.004)	599	0.958 (−0.002)	600
Indices of Multiple Deprivation (mean score)	585	0.109 (−0.066)	585	0.515 (−0.027)	586
Highest educational qualification	599	0.250	599	0.435	599

├ No qualifications (mean rank)	117 (287)		117 (285)		117 (290)
├ GCSE / O-level / equivalent (mean rank)	196 (304)		196 (307)		196 (299)
├ AS / A-level / equivalent (mean rank)	134 (305)		134 (294)		134 (311)
├ Undergraduate degree (mean rank)	86 (297)		86 (302)		86 (300)
├ Postgraduate degree (mean rank)	40 (311)		40 (320)		40 (306)
└ Other qualification (mean rank)	26 (294)		26 (311)		26 (289)
Current employment status	599	0.352	599	0.223	599
Occupational social grade	489	0.068	489	0.005*	490
├ Level 1 – routine (mean rank)	63 (238)		63 (240)		63 (248)
├ Level 2 – intermediate (mean rank)	145 (256)		145 (263)		146 (256)
├ Level 3 – lower managerial (mean rank)	57 (240)		57 (234)		57 (231)
├ Level 4 – higher managerial/professional (mean rank)	49 (251)		49 (267)		49 (265)
├ Retired (mean rank)	165 (237)		165 (231)		165 (235)
└ Other / not classified (mean rank)	10 (261)		10 (189)		10 (249)
Annual household income	477	0.507 (0.030)	477	0.017* (0.109)	478

significant at $p < 0.05$.
CC = correlation coefficient, MR = mean rank.

Table 4. Competency, confidence and comfort when performing CPR or using a defibrillator

Variable	Feeling comfortable performing chest compressions (CPR)	Feeling comfortable using an automated external defibrillator (AED)	Feeling capable of performing CPR / using a defibrillator in an emergency	Feeling confident to perform CPR / use a defibrillator
	N	p-value (correlation coefficient)	N	p-value (correlation coefficient)
Age (years)	597	0.184 (−0.059)	600	0.147 (−0.059)
Gender	597	0.083	600	0.084
├ Female (mean rank)	311 (287)		313 (289)	
└ Male (mean rank)	286 (312)		287 (313)	
Ethnicity	594	0.461	597	0.341
├ White (mean rank)	567 (299)		570 (302)	
├ Mixed/Multiple ethnic groups (mean rank)	4 (356)		4 (276)	
├ Asian / Asian British (mean rank)	14 (221)		14 (218)	
├ Black / African / Caribbean British (mean rank)	4 (340)		4 (314)	
└ Other ethnic group (mean rank)	5 (288)		5 (218)	
Self-reported general health	597	0.648 (0.019)	600	0.449 (0.031)
Indices of Multiple Deprivation score	585	0.156 (−0.059)	586	0.113 (−0.066)
Highest educational qualification	596	0.459	599	0.963
├ No qualifications (mean rank)	116 (301)		117 (293)	
├ GCSE / O-level / equivalent (mean rank)	194 (294)		196 (301)	
├ AS / A-level / equivalent (mean rank)	134 (320)		134 (302)	

├ Undergraduate degree (mean rank)	86 (296)		86 (311)	
├ Postgraduate degree (mean rank)	40 (260)		40 (284)	
└ Other qualification (mean rank)	26 (280)		26 (309)	
Current employment status	596	0.822	599	0.886
Occupational social grade	487	0.705	490	0.508
├ Level 1 – routine occupations (mean rank)	63 (260)		63 (261)	
├ Level 2 – intermediate (mean rank)	144 (243)		146 (246)	
├ Level 3 – lower managerial/admin (mean rank)	57 (228)		57 (228)	
├ Level 4 – higher managerial/professional (mean rank)	49 (263)		49 (273)	
├ Retire d (mean rank)	164 (240)		165 (237)	
└ Other / not classified (mean rank)	10 (217)		10 (249)	
Annual household income	476	0.603 (0.024)	478	0.269 (0.051)

Significant at < 0.05.
CC = correlation coefficient, MR = mean rank.

Participant characteristics
Age
Out of the total sample, 600 individuals (99.8 %) stated their age. The average was 51.9 years (SD = 17.7) with values ranging from 18 to 95. Age showed an inverse association with every one of the five items assessing readiness to help: older adults were less inclined to call 999 ($r(597) = 81.53$, $p < 0.001$), less likely to follow instructions ($r(597) = −0.167$, $p < 0.001$), and less willing to aid a relative ($r(598) = −0.159$, $p < 0.001$), someone they know ($r(598) = −0.183$, $p < 0.001$), or an unfamiliar person ($r(598) = −0.119$, $p < 0.003$).
Age did **not** relate significantly to any variables measuring CPR involvement, CPR knowledge, or feelings of competence/comfort in delivering CPR (all $p > 0.05$).

Gender
Gender information was supplied by 600 participants (99.8 %), with women representing 52.2 %. A notable difference was found for comfort in performing CPR ($U = 38835.5$, $p = 0.006$): women ($n = 311$, median = 5) reported lower comfort levels than men ($n = 287$, median = 7).
Gender did **not** demonstrate any meaningful link with CPR knowledge, CPR experience, or self-perceived CPR proficiency (all $p > 0.05$), nor with any other outcomes across the domains (all $p > 0.05$).

Ethnicity
A total of 597 respondents (99.3 %) recorded their ethnicity; 570 (95.5 %) identified as white. Ethnicity correlated significantly with understanding the purpose of CPR ($p < 0.001$). Although Asian/Asian British individuals made up only 2.3 % of the full dataset, they represented 12.2 % of those uncertain about CPR's purpose.
Ethnicity also influenced awareness of the function of a defibrillator ($p < 0.001$): Asian/Asian British participants accounted for 10.1 % of the group who did not know what a defibrillator is used for.
No additional ethnicity-based differences were seen for any of the other domain measures (all $p > 0.05$).

General health
General health scores were provided by 600 participants (99.8 %), yielding a median of 8 (range = 1–10, IQR = 3). General health showed a very slight positive relationship with comfort using a defibrillator ($r(598) = 0.145$, $p < 0.001$); individuals rating their health higher tended to feel marginally more comfortable using a PAD.
General health did **not** relate to any remaining variables within the four domains (all $p > 0.05$).

Socio-economic status characteristics
Indices of Multiple Deprivation (IMD)
Among those who supplied postcodes ($n = 586$, 97.5 %), the median IMD was 4 (range 1–10; IQR = 5). The distribution leaned slightly toward higher deprivation: 134 people (22.9 %) were from IMD category 1 (most deprived), while 52 (8.9 %) lived in IMD category 10 (least deprived).

IMD showed a weak but significant inverse association with comfort performing CPR ($r(582) = -0.091$, $p = 0.029$), suggesting individuals from less deprived areas felt marginally less comfortable.
Knowledge of PAD purpose also varied by IMD: those who understood what a PAD is for ($n = 483$, median = 4) differed significantly from those who did not ($n = 103$, median = 3; $U = 21349.5$, $p = 0.025$). Respondents from more deprived settings were more likely to report correct knowledge.
No other IMD-related patterns appeared within the remaining domain variables (all $p > 0.05$).

Highest education level

Education level was given by 599 participants (99.7 %). GCSE/GCE qualifications were most frequently reported ($n = 196$, 32.6 %). Higher qualifications (A level, undergraduate, postgraduate) were linked to feeling more capable of recognising a cardiac arrest ($p = 0.005$) compared with those with lower educational attainment (none or GCSE).
Education level also affected understanding of defibrillator purpose ($p < 0.001$). Among respondents who correctly identified a defibrillator's purpose, 16.5 % reported no education, whereas among those unsure or unaware, 33.0 % had no education.
Requesting further BCPR information was common (348 individuals, 58.1 %), and was more prevalent among participants with A/AS level or postgraduate education ($p = 0.020$).
No additional relationships between education and other domain measures were found (all $p > 0.05$).

Employment status

Of the sample, 599 individuals (99.7 %) provided information on their employment situation, and the largest proportion reported being in paid work ($n = 240$, 39.9 %). No significant links were detected between employment status and any outcomes within the four domains (all $p > 0.05$).

Occupation level

Occupation type was reported by 490 participants (81.5 %), with retirement being the most frequently selected category ($n = 165$, 27.5 %). Differences in willingness to follow instructions were observed across occupation levels ($H(5) = 17.018$, $p = 0.005$). Post-hoc comparisons indicated a significant contrast ($p = 0.032$, Bonferroni-adjusted) between participants in level 2 roles (mean rank = 263) and those who were retired (mean rank = 231). Individuals who were retired demonstrated lower willingness to follow advice compared with the level 2 group (carer, clerical, sales and service roles, plant/machine operation). No other occupation-level pairings differed significantly, and no further associations with any domain variables were identified (all $p > 0.05$).

Income

Income data were supplied by 478 participants (79.5 %). The largest income category reported was £20,800–£31,199 ($n = 112$, 23.4 %). The median income range was £31,200–£41,599 (IQR = 3).
Income showed a small but significant positive association with willingness to follow advice ($r(475) = 0.109$, $p = 0.017$), indicating higher-income participants were marginally more likely to follow instructions.
A similarly weak positive association was found between income and comfort with defibrillator use ($r(476) = 0.097$, $p = 0.034$).
Income also differed significantly based on whether participants reported knowing the purpose of a defibrillator ($U = 11217$, $p = 0.001$). Those who answered "yes" ($n = 406$, median = £20,800–£31,199) generally reported higher income levels than those who answered "no" or "unsure" ($n = 72$, median = £10,400–£20,799).

Discussion

The purpose of this cross-sectional analysis was to evaluate understanding and perceptions of BCPR, and to explore the extent to which these were related to personal characteristics or SES indicators. Overall, associations between BCPR-related attitudes/knowledge and both individual and SES factors were inconsistent and, where present, weak. This contrasts with earlier findings that linked social deprivation to lower rates of BCPR in the region [5, 16] and that individuals experiencing OHCA in deprived areas receive BCPR less often [13-15]. These discrepancies raise questions about whether participants' self-reported intentions truly reflect how they would behave in an actual emergency.
More recent evidence aligns more closely with our results: a review focusing on BCPR in deprived communities reported that willingness to learn or perform BCPR was not driven by deprivation [29]. Instead, situational and environmental influences played a greater role in determining whether BCPR occurred [30].
This supports an emerging view that factors beyond SES—such as cultural connectedness and the strength of community ties—may help explain the lower BCPR rates seen in deprived areas. Social cohesion, a component of social capital, has been associated with several health outcomes, including reduced cardiovascular mortality [31] and increased uptake of preventive care [32]. This reflects broader theoretical work in health inequality research, which argues for an intersectional perspective rather than relying solely on SES markers to define

"place" [33]. Thus, examining if social cohesion influences BCPR behaviours may help clarify the gaps identified in our data.

Among all individual and SES-related variables, age was the only factor consistently linked to willingness to provide BCPR. Older adults were less likely to call 999, follow guidance, or assist someone, and this pattern did not vary with SES. This implies that older participants may share common concerns or hesitations irrespective of income or education. Since most OHCA events occur within the home and are frequently witnessed by spouses [34], reluctance among older individuals to help family members is particularly concerning, especially given their elevated risk of OHCA.

Previous studies have reported that older people tend to exhibit lower confidence and poorer understanding of BCPR [35]. Our findings differ, however, as no age-based differences emerged for BCPR knowledge, competence, or confidence. Consistent with earlier work, younger age did correlate with higher comfort performing BCPR [36]. In addition, female participants reported feeling less comfortable performing BCPR compared with males.

Women and gender differences

Prior evidence shows women are less frequently given BCPR [37], and our findings indicate they are also less inclined to provide it. Aside from this, no additional gender-related differences emerged in terms of recognising BCPR or understanding its importance. Ethnic background was linked with lower BCPR knowledge. Although the number of participants from minority ethnic groups in our sample was small, the pattern aligns with previous work showing that minority populations face barriers to BCPR training, often made worse by language challenges [38]. While our sample broadly reflected local demographic composition, focused investigations involving minority communities within the region may clarify these disparities.

Socio-economic Indicators

Participants living in more deprived locations showed greater comfort with performing CPR and were more likely to report knowing the function of a defibrillator. This may relate to the higher likelihood of OHCA occurring in deprived neighbourhoods. Our observations differ from earlier work suggesting that people in deprived areas prefer trained individuals to undertake resuscitation efforts [30]. It is plausible that participants from deprived areas in our study had more direct or indirect exposure to OHCA. Still, the absence of associations with other SES indicators suggests broader community influences—rather than individual factors—shape comfort with BCPR. Additionally, perceptions regarding drug or alcohol use among patients in high-deprivation areas may influence comfort levels [30]. The link between higher education and increased willingness to learn CPR may reflect a greater awareness of the consequences of not receiving BCPR, even though it does not rely on participants having previously performed BCPR or used a PAD, and is independent of SES [39]. Health literacy, which connects educational attainment and health outcomes [40], warrants closer examination in relation to OHCA and motivation to perform BCPR.

Training access and employment context

A national survey of 2084 adults showed that workplace-based CPR instruction was the most common method of learning CPR and positively influenced willingness to intervene and use a PAD [41]. In contrast, 59.9 % of individuals in our sample were not in formal employment (e.g., retired, caregivers, unemployed) or were self-employed, potentially limiting access to such training. Considering that CPR abilities diminish over time [42], this may help explain some observed differences in readiness to act. Further research should explore how best to reach people outside traditional workplaces.

General health and physical ability

Participants who rated their general health more highly were also more at ease using a defibrillator. One possible explanation is that collecting and transporting a PAD from a public access point requires physical effort. However, this reasoning becomes uncertain because no similar association was identified between general health and comfort performing CPR, despite chest compressions requiring a degree of physical strength to be effective [43]. The interplay between health status and the physical demands of resuscitation or PAD retrieval is likely complex and cannot be fully assessed here.

Limitations

This cross-sectional design captured responses at only one moment in time and may not reliably represent how individuals would behave during an actual OHCA event. Minority ethnic participation was limited, which may restrict broader applicability, though it likely reflects local population characteristics and does not appear to have skewed overall results. Some respondents omitted items—particularly income and occupation—resulting in missing data; however, most participants completed key domain-related questions, so we believe this had minimal

effect on interpretations. Data collection coincided with the Coronavirus pandemic, which may have shaped participants' attitudes toward BCPR.
We observed ceiling effects in many measures related to BCPR knowledge, willingness, and perceived capability, preventing multivariate modelling. These high scores may partially reflect social desirability bias, given that surveys were administered by paramedics in uniform. Future studies could incorporate objective assessments of OHCA/BCPR knowledge and examine whether uniformed versus non-uniformed data collectors influence responses.

Conclusion

SES and deprivation measures provide limited insight into BCPR knowledge, readiness, or perceived competence. Strategies aiming to increase BCPR delivery should avoid relying on SES classifications to identify priority groups and instead focus on individual factors such as age and ethnicity. Subsequent research should explore how these characteristics interact with cultural identity and social cohesion. Qualitative approaches may also deepen understanding of how these influences shape behaviour within vulnerable communities.

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References

1. Perkins GD, Brace-McDonnell SJ. The UK out of hospital cardiac arrest outcome (OHCAO) project. BMJ Open. 2015;5(10):e008736. Available from: http://dx.doi.org/10.1136/bmjopen-2015-008736
2. Resuscitation Council (UK). Consensus paper on out-of-hospital cardiac arrest in England. 2015. Available from: https://www.resus.org.uk/sites/default/files/2020-05/OHCA_consensus_paper.pdf
3. Go AS, Mozaffarian D, Roger VL, et al. Heart disease and stroke statistics–2014 update: a report from the American Heart Association. Circulation. 2014;129(3):e28-92. Available from: http://dx.doi.org/10.1161/01.cir.0000441139.02102.80
4. Perkins GD, Jacobs IG, Nadkarni VM, Berg RA, Bhanji F, Biarent D, et al. Cardiac arrest and cardiopulmonary resuscitation outcome reports: update of the Utstein Resuscitation Registry Templates for Out of-Hospital Cardiac Arrest: a statement for healthcare professionals from a task force of the International Liaison Committee on Resuscitation (American Heart Association, European Resuscitation Council, Australian and New Zealand Council on Resuscitation, Heart and Stroke Foundation of Canada, InterAmerican Heart Foundation, Resuscitation Council of Southern Africa, Resuscitation Council of Asia); and the American Heart Association Emergency Cardiovascular Care Committee and the Council on Cardiopulmonary, Critical Care, Perioperative and Resuscitation. Circulation. 2015;132:1286-300. Available from: http://dx.doi.org/10.1161/CIR.0000000000000144
5. Brown TP, Booth S, Hawkes CA, Soar J, Mark J, Mapstone J, et al. Characteristics of neighbourhoods with high incidence of out-of-hospital cardiac arrest and low bystander cardiopulmonary resuscitation rates in England. Eur Heart J Qual Care Clin Outcomes. 2019;5(1):51-62. Available from: http://dx.doi.org/10.1093/ehjqcco/qcy026
6. Sasson C, Rogers MAM, Dahl J, Kellermann AL. Predictors of survival from out-of-hospital cardiac arrest: a systematic review and meta-analysis. Circulation. 2010;3:63-81. Available from: http://dx.doi.org/10.1161/CIRCOUTCOMES.109.889576
7. Axelsson AB, Herlitz J, Homberg S, Thoren AB. A nationwide survey of CPR training in Sweden: foreign born and unemployed are not reached by training programmes. Resuscitation. 2006;70:90-7. Available from: http://dx.doi.org/10.1016/j.resuscitation.2005.11.009
8. Donohoe RT, Haefeli K, Moore F. Public perceptions and experiences of myocardial infarction, cardiac arrest and CPR in London. Resuscitation. 2006;71:70. Available from: http://dx.doi.org/10.1016/j.resuscitation.2006.03.003

9. Hawkes C, Booth S, Ji C, Brace-McDonnell SJ, Whittington A, Mapstone J, et al. Epidemiology and outcomes from out of-hospital cardiac arrests in England. Resuscitation. 2017;110:133-40. Available from: http://dx.doi.org/10.1016/j.resuscitation.2016.10.030
10. Meinhardt D, Fischer M, Meischke. CPR community survey in King Country. 2021. Available from: https://kingcounty.gov/depts/health/emergency-medical-services/vulnerable-populations/~/media/depts/health/emergency-medical-services/documents/vulnerable-populations/CPR-community-survey.ashx
11. Lindner TW, Soreide E, Nilsen OB, Torunn MW, Lossius HM. Good outcome in every fourth resuscitation attempt is achievable—an Utstein template report from the Stavanger region. Resuscitation. 2011;82:1508-13. Available from: http://dx.doi.org/10.1016/j.resuscitation.2011.06.016
12. Sasson C, Magid DJ, Chan P, Root ED, McNally BF, Kellermann AL, et al. Association of neighbourhood characteristics with bystander-initiated CPR. N Engl J Med. 2012;367:1607-15. Available from: http://dx.doi.org/10.1056/NEJMoa1110700
13. Vadeboncoeur TF, Richman PB, Darkoh M, Chikani V, Clark L, Bobrow BJ. Bystander cardiopulmonary resuscitation for out-of-hospital cardiac arrest in the Hispanic vs the non-Hispanic populations. Am J Emerg Med. 2008;26:655-60. Available from: http://dx.doi.org/10.1016/j.ajem.2007.10.002
14. Root ED, Gonzales L, Persse DE, Hinchey PR, McNally B, Sasson C. A tale of two cities: the role of neighborhood socioeconomic status in spatial clustering of bystander CPR in Austin and Houston. Resuscitation. 2013;84:752-79. Available from: http://dx.doi.org/10.1016/j.resuscitation.2013.01.007
15. Fosbol EL, Dupre ME, Strauss B, Swanson DR, Myers B, McNally BF, et al. Association of neighbourhood characteristics with incidence of out-of-hospital cardiac arrest and rates of bystander-initiated CPR: implications for community-based education intervention. Resuscitation. 2014;85:1512-57. Available from: http://dx.doi.org/10.1016/j.resuscitation.2014.08.013
16. Moncur L, Ainsborough N, Ghose R, Kendal SP, Salvatori M, Wright J. Does the level of socioeconomic deprivation at the location of cardiac arrest in an English region influence the likelihood of receiving bystander-initiated cardiopulmonary resuscitation? Emerg Med J. 2016;33:105-8. Available from: http://dx.doi.org/10.1136/emermed-2015-204643
17. Hawkes CA, Brown T, Noor U, Carlyon J, Davidson N, Soar J, et al. Characteristics of Restart a Heart 2019 event locations in the UK. Resuscitation Plus. 2021;1(6):100132. Available from: http://dx.doi.org/10.1016/j.resplu.2021.100132
18. British Heart Foundation. Funding for defibrillators in England. 2016. Available from: https://www.bhf.org.uk/heart-health/how-to-save-a-life/defibrillators/funding-for-defibrillators-in-england
19. North East Ambulance Service NHS Foundation Trust. Who we are and what we do. 2021. Available from: https://www.neas.nhs.uk/about-us/who-we-are-and-what-we-do
20. North West Ambulance Service NHS Trust. Who we are. 2022. Available from: https://www.nwas.nhs.uk/about/who
21. UK Population by Ethnicity. Regional ethnic diversity. 2020. Available from: https://www.ethnicity-facts-figures.service.gov.uk/uk-population-by-ethnicity/national-and-regional-populations/regional-ethnic-diversity/latest
22. University of Warwick. Out of hospital cardiac arrest outcomes registry. 2018. Available from: https://warwick.ac.uk/fac/sci/med/research/ctu/trials/ohcao/publications/epidemiologyreports/ohcao_epidemiology_report_2018_published.pdf
23. English indices of deprivation. 2019. Available from: https://imd-by-postcode.opendatacommunities.org/imd/2019
24. Chyung SY, Roberts K, Swanson I, Hankinson A. Evidence-based survey design: the use of a midpoint on the Likert scale. Perform Improve. 2017;56(10):15-23
25. Understanding society. The English Longitudinal Study. 2022. Available from: https://www.understandingsociety.ac.uk/
26. Government statistical service. Harmonised concepts and questions for social data sources – income. 2015. Available from: https://gss.civilservice.gov.uk/wp-content/uploads/2016/03/S4-Income-June-16.pdf
27. Office of national statistics. Standard occupational classification. 2021. Available from: https://www.ons.gov.uk/methodology/classificationsandstandards/standardoccupationalclassificationsoc
28. American Psychological Association. Publication manual of the American Psychological Association 2020: the official guide to APA style. 7th ed. Washington, DC: American Psychological Association; 2020
29. Uny I, Angus K, Duncan E, Dobbie F. Barriers and facilitators to delivering bystander cardiopulmonary resuscitation in deprived communities: a systematic review. Perspect Public Health. 2022. Available from: http://dx.doi.org/10.1177/17579139211055497
30. Dobbie F, Uny I, Eadie D, Duncan E, Stead M, Bauld L, et al. Barriers to bystander CPR in deprived communities: findings from a qualitative study. PLoS One. 2020;15(6):e0233675. Available from: http://dx.doi.org/10.1371/journal.pone.0233675

31. Rodgers J, Valuev AV, Hswen Y, Subramanian SV. Social capital and physical health: an updated review of the literature for 2007–2018. Soc Sci Med. 2019;236:112360. Available from: http://dx.doi.org/10.1016/j.socscimed.2019.112360
32. Kim ES, Kawachi I. Perceived neighbourhood social cohesion and preventive healthcare use. Am J Prev Med. 2017;53(2):e35-40. Available from: http://dx.doi.org/10.1016/j.amepre.2017.01.007
33. Bambra C. Placing intersectional inequalities in health. Health Place. 2022;75:102761. Available from: http://dx.doi.org/10.1016/j.healthplace.2022.102761
34. Breckwoldt J, Schloesser S, Arntz HR. Perceptions of collapse and assessment of cardiac arrest by bystanders of out-of-hospital cardiac arrest (OOHCA). Resuscitation. 2009;80:1108-13. Available from: http://dx.doi.org/10.1016/j.resuscitation.2009.06.028
35. Brinkrolf P, Bohn A, Lukas RP, Heyse MR, Dierschke T, Van Aken HK, et al. Senior citizens as rescuers: is reduced knowledge the reason for omitted lay-resuscitation-attempts? Results from a representative survey with 2004 interviews. PLoS One. 2017;12(6):e0178938. Available from: http://dx.doi.org/10.1371/journal.pone.0178938
36. Swor R, Khan I, Domeier R, Honeycutt L, Chu K, Compton S. CPR training and CPR performance: do CPR-trained bystanders perform CPR? Acad Emerg Med. 2006;13:596-601. Available from: http://dx.doi.org/10.1197/j.aem.2005.12.021
37. Becker TK, Gul SS, Cohen SA, Maciel CB, Baron-Lee J, Murphy TW, et al. Public perception towards bystander cardiopulmonary resuscitation. Emerg Med J. 2019;36(11):660-5. Available from: http://dx.doi.org/10.1136/emermed-2018-208234
38. Boulton AJ, Del Rios M, Perkins GD. Health inequities in out-of-hospital cardiac arrest. Curr Opin Crit Care. 2022;28(3):229-36. Available from: http://dx.doi.org/10.1097/MCC.0000000000000947
39. Birkun A, Kosova Y. Social attitude and willingness to attend cardiopulmonary resuscitation training and perform resuscitation in the Crimea. World J Emerg Med. 2018;9(4):237-48. Available from: http://dx.doi.org/10.5847/wjem.j.1920-8642.2018.04.001
40. Van Der Heide I, Wang J, Droomers M, Spreeuwenberg P, Rademakers J, Uiters E. The relationship between health, education, and health literacy: results from the Dutch Adult Literacy and Life Skills Survey. J Health Commun. 2013;18(4):172-84. Available from: http://dx.doi.org/10.1080/10810730.2013.825668
41. Hawkes CA, Brown TP, Booth S, Fothergill RT, Siriwardena N, Zakaria S, et al. Attitudes to cardiopulmonary resuscitation and defibrillator use: a survey of UK adults in 2017. J Am Heart Assoc. 2019;8(7):e008267. Available from: http://dx.doi.org/10.1161/JAHA.117.008267
42. Su E, Schmidt TA, Mann NC, Zechnich AD. A randomized controlled trial to assess decay in acquired knowledge among paramedics completing a paediatric resuscitation course. Acad Emerg Med. 2000;7:779-86. Available from: http://dx.doi.org/10.1111/j.1553-2712.2000.tb02270.x
43. Ock SM, Kim YM, Hye Chung J, Kim SH. Influence of physical fitness on the performance of 5-minute continuous chest compression. Eur J Emerg Med. 2011;18(5):251-6. Available from: http://dx.doi.org/10.1097/MEJ.0b013e328345340f