

Adverse childhood experiences and COVID-19 in Bolton

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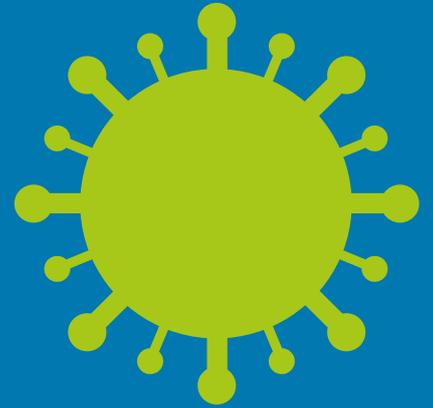
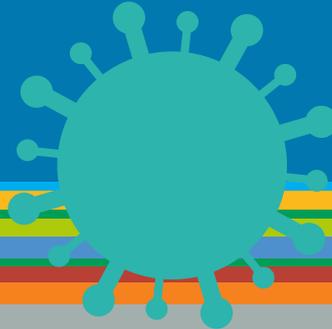
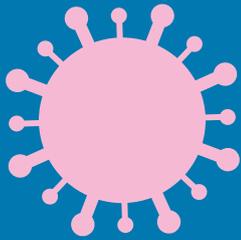
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Adverse childhood experiences and COVID-19 in **Bolton**





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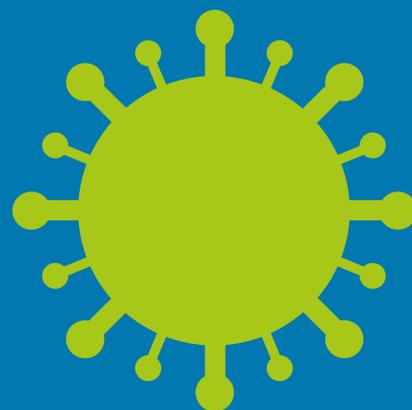
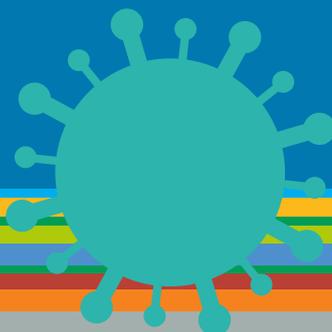
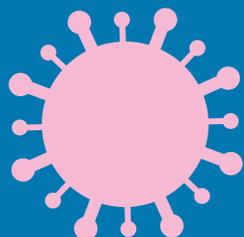
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Adverse childhood experiences and COVID-19 in **Bolton**



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Adverse childhood experiences and COVID-19 in Bolton

The *Childhood Adversity and Health and Wellbeing During COVID-19* study was undertaken in Bolton during COVID-19 restrictions^a. The survey asked adults about exposure to ACEs, COVID-19 infection, trust in NHS COVID-19 information, attitudes towards and compliance with COVID-19 restrictions, and COVID-19 vaccine hesitancy

24% Reported a COVID-19 infection

28% Worried about catching COVID-19



9%
Had **low trust in NHS information**^b



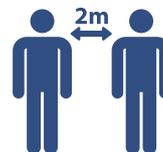
13%
Felt **unfairly restricted by government**^c



29%
Reported **breaking restrictions**^d



14%
Thought **face coverings should go**^e

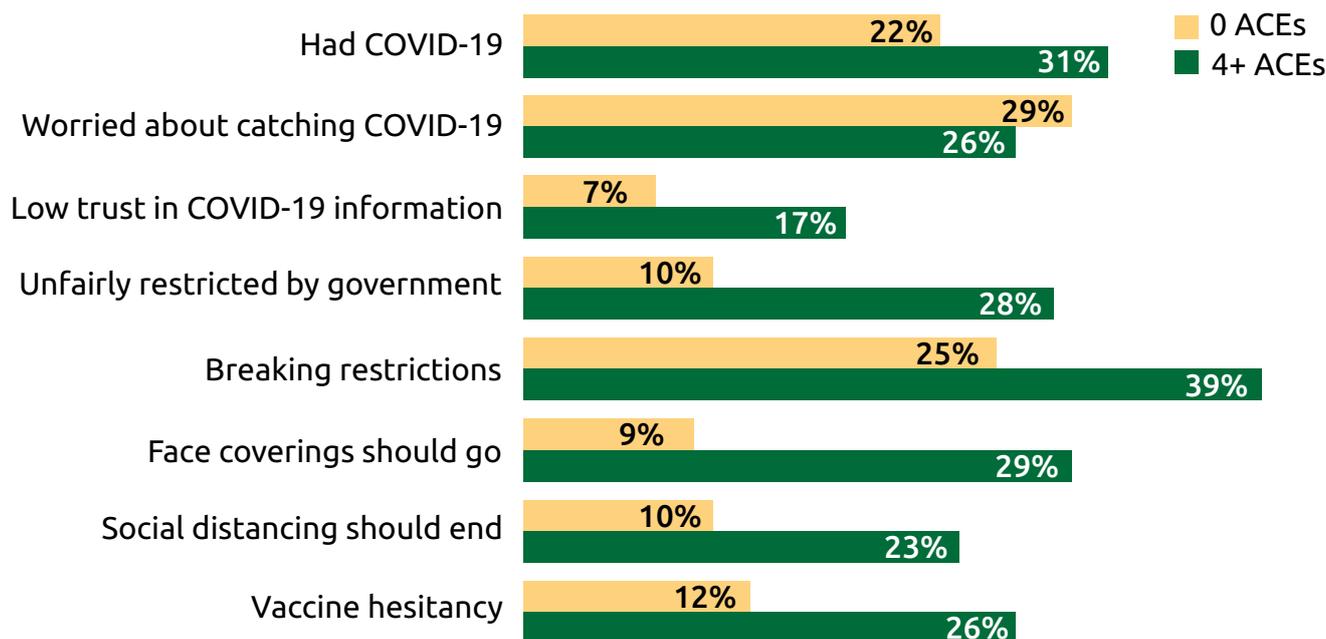


12%
Thought **social distancing should end**^f



15%
Reported **vaccine hesitancy**^g

Adults with 4+ ACEs were more likely to report low trust in NHS COVID-19 information, aversion to restrictions and vaccine hesitancy



Controlling for other factors^h those with 4+ ACEs, compared with people with no ACEs, were **2 X** more likely to report:



feeling unfairly restricted by government



face coverings should go



breaking restrictions



vaccine hesitancy

^aBolton residents (18+) were recruited via telephone (n=1,658), and online (n=237) December 2020 – March 2021. ^bLevel of trust in NHS COVID-19 information rated <6 (0=not at all, 10=completely). ^cFelt they had been unfairly controlled 'a lot' by the national restrictions imposed by the government. ^dDuring national restrictions reported they had 'bent or broken the rules occasionally', or 'largely ignored the rules'. ^eFace coverings in shops should no longer be a legal requirement. ^fTwo metre social distancing should be removed. ^gResponded 'no' or 'unsure' to wanting a COVID-19 vaccination. ^hAnalysis controlled for socio-demographics, COVID-19 infection and having a chronic disease.

1. Background

COVID-19 infection threatens individuals' physical health, in both the short and long-term. The national and regional restrictions implemented in the United Kingdom (UK) to control the spread of COVID-19 have also impacted health and wellbeing [1–3], by restricting social interaction, closing workplaces and non-essential services, and cutting people off from key resilience resources, including social support networks and health services.

The population of Bolton Local Authority has experienced high rates of COVID-19 infection [4] and consequently, the region has faced periods of tightened localised restrictions on movement and socialisation, along with enhanced measures for testing and a drive to encourage vaccination uptake. The success of these restrictions in limiting the spread of the virus is dependent upon public trust in, acceptance of, and adherence to, such control measures [5–7]. As such, it is important to understand what factors may influence individual trust in health messaging and adherence to restrictions. Research in the UK has identified that males, younger individuals, and those from ethnic minority (excluding white minorities) backgrounds were more likely to not adhere to COVID-19 related restrictions [8,9] and that those from ethnic minority backgrounds might be less trusting of COVID-19 government information [10]. However, the role that the experience of childhood adversity might have had on these outcomes is underexplored.

Research has indicated that individuals who have experienced adverse childhood experiences (ACEs; potentially traumatic experiences in childhood, such as maltreatment, witnessing domestic violence and parental substance misuse) are more likely to take risks with their health, suffer from poor mental health and have underlying health conditions [11–13]. Studies have also indicated that individuals who have been exposed to multiple ACEs are less likely to trust information from authorities, including health information [14,15]. Consequently, individuals with ACEs may be at increased risk of both COVID-19 infection and the broader health and social impacts of the pandemic. However, this association remains relatively underexplored.

This report seeks to explore, for the Bolton population, any association between ACE exposure and COVID-19 infection. It will also seek to identify if ACE exposure is associated with: trust in COVID-19 health information; attitudes towards, and compliance with COVID-19 restrictions (e.g. use of face coverings, social distancing); and attitudes towards COVID-19 vaccination. A better understanding of such relationships will help local services understand how they can encourage compliance with public health restrictions and vaccine uptake; information crucial for targeting health messaging and the management of threats to public health, including future pandemics.



2. Methods

This is the second report from *The Childhood Adversity and Health and Wellbeing during COVID-19 Study*. The full methodology and demographic breakdown of participants are detailed in Ford et al, 2021 [16]. The study used a stratified sampling approach (with stratification by age and deprivation) to conduct online and telephone surveys with Bolton Local Authority residents aged 18 years and over. Surveys were conducted between 15th December 2020 and 25th March 2021 by a professional market research company (DJS Research). In total 1,895 residents participated in the study. However, individuals who did not answer all demographic questions, or could not be allocated an ACE count were excluded (n=19). Thus, analyses used a sample of 1,876 (87.5% telephone, 12.5% online). The sample varied from Bolton population demographics by sex, age and deprivation, with more females and individuals from less deprived areas, and fewer individuals in younger age groups participating (e.g. <30 years old; see [13]). However, where appropriate, analysis uses data weighted to the Bolton adult population (see 2.2).

2.1 Study questionnaire

Survey questions analysed here included questions relating to COVID-19 infection and worries about infection; trust in NHS COVID-19 information; feeling unfairly restricted by national government; adherence to, and attitudes towards restrictions; and vaccination hesitancy (see Table 1). Information was also collected on participant demographics (age, sex, ethnicity), chronic diseases and childhood exposure to nine ACE types (measured using an established tool [17]). Postcode of residence was collected by the market research company and converted to Lower Super Output Area for categorisation to an Index of Multiple Deprivation (IMD) quintile [18].

Table 1: Questions and qualifying responses for outcome measures

Outcome	Question asked (<i>response options</i>)	Qualifying response
<i>Had COVID-19</i>	Do you think you have had coronavirus? (or currently have it) (<i>yes; no; don't know</i>)	Yes
<i>Worried about catching coronavirus</i>	In general, throughout the coronavirus pandemic, how worried have you been about catching coronavirus? (<i>not at all worried; a little worried; moderately worried; very worried; extremely worried</i>)	Very or extremely
<i>Low trust in NHS COVID-19 information</i>	On a scale of 0 to 10 where 0 is not at all and 10 is completely, how much would you trust information about coronavirus from the NHS? (<i>0-10</i>)	0 to 5
<i>Unfairly restricted a lot by government</i>	During the coronavirus pandemic do you feel you have been unfairly controlled by – the national restrictions imposed by the government? (<i>no; yes, a little; yes, a lot</i>)	Yes – a lot
<i>Break restrictions at least occasionally</i>	During lockdown or local restrictions have you....? (<i>always followed the advice; bent or broken the rules occasionally; largely ignored the rules</i>)	Occasionally bent or broken or largely ignored the rules
<i>Mandatory face coverings should go</i>	Do you think that wearing face coverings in shops should continue to be a legal requirement? (<i>no; yes</i>)	No
<i>Social distancing should end</i>	Social distancing is currently set at 2 metres. Do you think social distancing should remain in place or be removed? (<i>remain in place; be removed</i>)	Be removed
<i>Vaccine hesitancy</i>	If you were offered a coronavirus vaccination, would you want to be vaccinated? (<i>yes; already been vaccinated; no; unsure</i>)	No or unsure

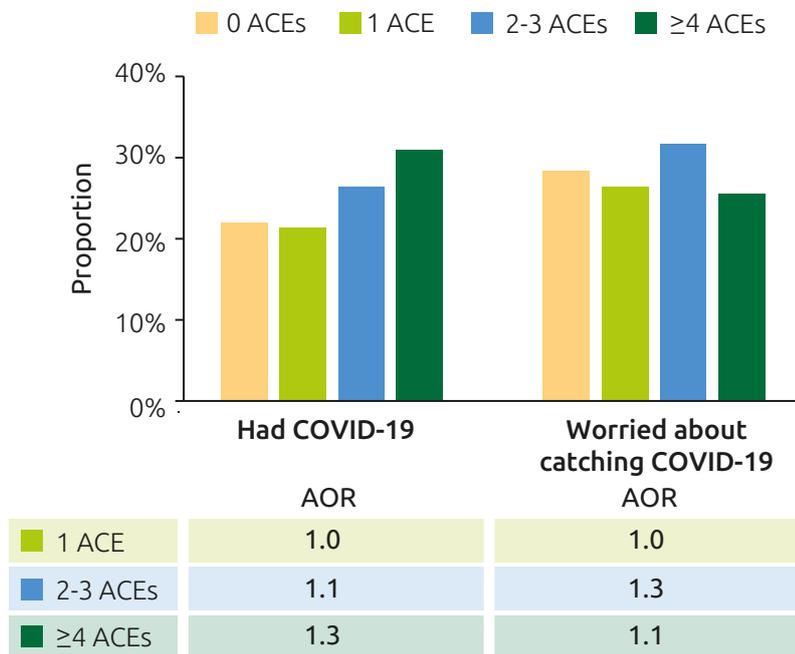


2.2. Data analysis

Estimates of all outcomes of interest and the prevalence of outcomes within ACE categories use data weighted to reflect the Bolton adult population (using mid-2019 population estimates by age, sex, and IMD quintile). Logistic regression analyses (using unweighted data) are then used to explore independent relationships between ACEs and all outcomes of interest, controlling for socio-demographics (age, sex, ethnicity, and IMD quintile), COVID-19 infection, chronic disease and survey type (online or telephone). For the outcome of having had COVID-19, logistic regression analyses did not include having had COVID-19 or chronic disease as confounders in the model. However, these covariates are included in all other models as it was hypothesised that both may have a relationship with attitudes towards COVID restrictions (e.g. having a chronic disease might increase vulnerability to severe COVID-19 infection and consequently lead to stricter adherence to guidelines).

3. ACEs and COVID-19

Figure 1. Proportion of adults reporting COVID-19 infection and worry about catching COVID-19 by ACE count^a and adjusted odds ratios for individuals with ACEs (compared with those with no ACEs)



^aWeighted data; AOR = adjusted odds ratio. All AORs not significant at <0.05.

Having had COVID-19

Participants were asked if they have had or currently have COVID-19¹

24%
of adults reported
having had COVID-19

Over one in five adults (23.6%) reported having had COVID-19. Prevalence increased from 21.7% of those with 1 ACE to 31.0% of those with ≥4 ACEs (Figure 1). In logistic regression analysis controlling for demographic confounding, there was no significant relationship between ACE count and having had COVID-19. Having had COVID-19 was significantly associated with younger age and having completed the survey online (Appendix Table A1).

Worried about catching COVID-19

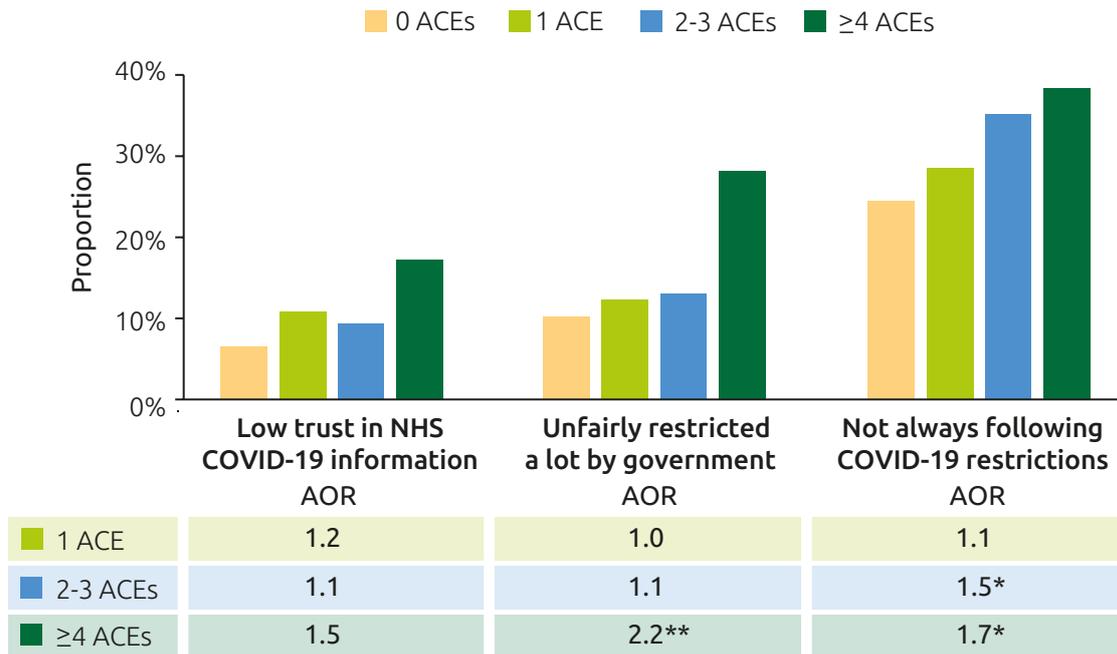
Participants were asked how worried they had been about catching coronavirus during the pandemic. Those responding 'very' or 'extremely' were coded as being worried about catching COVID-19

28%
of adults reported
being worried about
catching COVID-19

Almost three in 10 adults (28.3%) reported that they were very/extremely worried about catching COVID-19. Prevalence ranged from 25.5% of those with ≥4 ACEs to 31.8% of those with 2-3 ACEs (Figure 1). In logistic regression analysis controlling for demographic confounding, there was no significant relationship between ACE count and being worried about catching COVID-19. Being worried about catching COVID-19 was significantly associated with ethnic minority groups, being female, being aged 60-69 (compared with those aged 70+) and having a chronic disease (Appendix Table A1).

¹Those responding 'don't know' were coded as not having had coronavirus (see Table 1).

Figure 2. Proportion of adults reporting low trust in NHS COVID-19 information, feeling unfairly restricted and not always following restrictions by ACE count,^a and adjusted odds ratios for individuals with ACEs (compared with no ACEs)



^aWeighted data; AOR = adjusted odds ratio; *P<0.05, **P<0.001.

Low trust in NHS COVID-19 information

Participants were asked to rate how much they trust information about coronavirus from the NHS using a scale of 0 (not at all) to 10 (completely). Those who reported scores of 0-5 were coded as having low trust in NHS COVID-19 information

9%
of adults reported
**low trust in NHS
COVID-19 information**

Less than one in 10 adults (9.2%) reported low trust in NHS COVID-19 information. Prevalence increased from 6.5% of those with 0 ACEs to 17.2% of those with ≥4 ACEs (Figure 2). In logistic regression analysis controlling for demographic confounding, there was no significant relationship between ACE count and low trust in NHS COVID-19 information. Low trust in NHS COVID-19 information was increased in 30-59 year olds (compared with those aged 70+) and those that completed the survey online (Appendix Table A2).

Unfairly restricted a lot by government

Participants were asked if during the COVID-19 pandemic they felt they had been unfairly controlled by the government restrictions

Around one in eight adults (13.1%) reported they felt unfairly restricted a lot by government. Prevalence increased with ACE count, from 10.1% of those with 0 ACEs to 28.1% of those with ≥4 ACEs (Figure 2).

After controlling for demographic confounding, individuals with ≥4 ACEs were 2.2 times more likely to report feeling unfairly restricted a lot by government (compared with those with 0 ACEs). There was no significant increase in risk in those with 1 ACE or 2-3 ACEs. Those aged 30-49 were more likely to report feeling unfairly restricted a lot by government (compared to those aged 70+; Appendix Table A2).

13%
of adults reported
**feeling unfairly restricted
a lot by government**

Those with ≥4 ACEs were
2.2 times
more likely to report
feeling unfairly
restricted a lot by
government than
those with 0 ACEs[#]

[#]after controlling for demographic confounding.

Not always following COVID-19 restrictions

Participants were asked if they always followed the advice and rules during lockdowns or local restrictions. Those who responded that they had 'bent or broken the rules occasionally' or 'largely ignored the rules' were coded as not always following COVID-19 restrictions

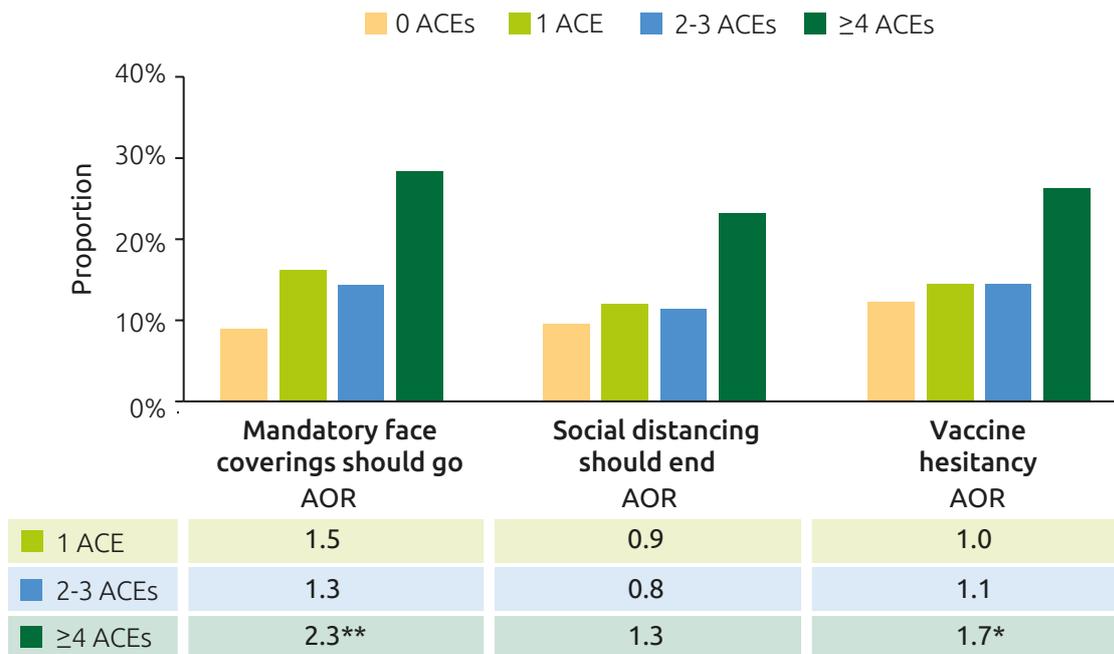
Almost three in 10 adults (29.0%) reported they had not always followed the COVID-19 restrictions. Prevalence increased with ACE count, from 24.5% of those with 0 ACEs to 38.7% of those with ≥4 ACEs (Figure 2).

After controlling for demographic confounding, individuals with 2-3 ACEs were 1.5 times more likely to report not always following the restrictions, and those with ≥4 ACEs were 1.7 times more likely (compared with those with 0 ACEs). There was no significant increase in risk with 1 ACE. Not always following restrictions was also associated with younger age, white ethnicity and not having a chronic disease (Appendix Table A2).

29%
of adults reported
**not always following
COVID-19 restrictions**

Those with ≥4 ACEs were
1.7 times
more likely to report
not always following
COVID-19 restrictions
than those with 0 ACEs#

Figure 3. Proportion of adults thinking restrictions should end and vaccine hesitancy by ACE count,^a and adjusted odds ratios for individuals with ACEs (compared with no ACEs)



^aWeighted data; AOR = adjusted odds ratio; *P<0.05, **P<0.001.

#after controlling for demographic confounding.

Mandatory face coverings should go

Participants were asked if they thought face coverings should continue to be a legal requirement

Around one in eight adults (13.7%) thought that mandatory face coverings should go. Prevalence increased from 9.0% of those with 0 ACEs to 28.6% of those with ≥ 4 ACEs (Figure 3).

After controlling for demographic confounding, individuals with ≥ 4 ACEs were 2.3 times more likely to report mandatory face coverings should go (compared with individuals with 0 ACEs). However, the increases in risk in those with 1 ACE or 2-3 ACEs did not reach statistical significance. Reporting mandatory face coverings should go was also associated with younger age and having completed the survey online (Appendix Table A3).

14%
of adults reported
**mandatory face
coverings should go**

Those with ≥ 4 ACEs were
2.3 times
more likely to report
mandatory face
coverings should go
than those with 0 ACEs#

Social distancing should end

Participants were asked if they thought 2-metre social distancing should remain in place or be removed

Around one in eight adults (12.0%) thought social distancing should end. Prevalence increased from 9.6% of those with 0 ACEs to 23.2% of those with ≥ 4 ACEs (Figure 3). In logistic regression analysis controlling for demographic confounding, there was no significant relationship between ACE count and thinking that social distancing should end. Thinking that social distancing should end was significantly associated with younger age, living in the most deprived residential areas, white ethnicity, having had COVID-19 and completing the survey online (Appendix Table A3).

12%
of adults reported
**social distancing should
end**

Vaccine hesitancy

Participants were asked, if they were offered a coronavirus vaccination, would they want to be vaccinated. Those responding 'no' or 'unsure' were coded as being vaccine hesitant

One in seven adults (14.7%) reported COVID-19 vaccine hesitancy. Prevalence increased with ACE count from 12.1% of those with 0 ACEs to 26.2% of those with ≥ 4 ACEs (Figure 3).

After controlling for demographic confounding, individuals with ≥ 4 ACEs were 1.7 times more likely to report vaccine hesitancy (compared with individuals with 0 ACEs). However, there was no increase in risk in those with 1 ACE or 2-3 ACEs. Vaccine hesitancy was significantly associated with younger age and being resident in more deprived areas (Appendix Table A3).

15%
of adults reported
vaccine hesitancy

Those with ≥ 4 ACEs were
1.7 times
more likely to report
vaccine hesitancy than
those with 0 ACEs#

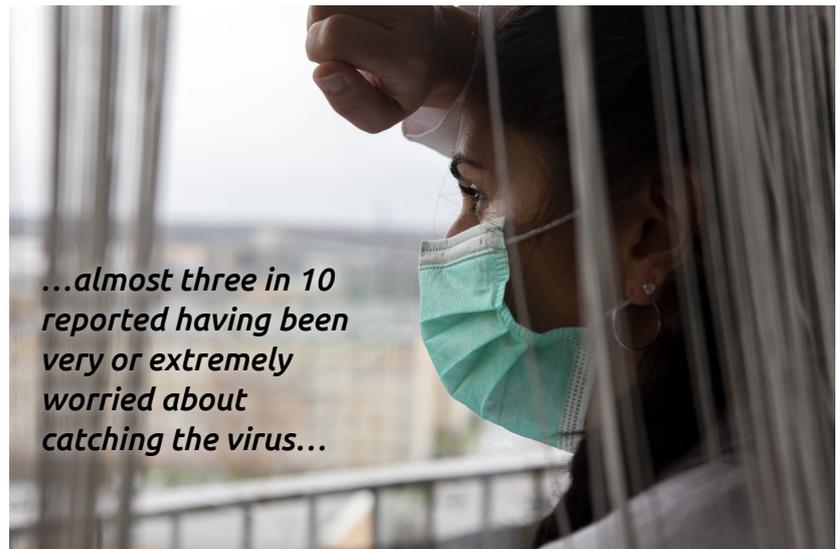
4. Discussion

The *Childhood Adversity and Health and Wellbeing during COVID-19 Study* has provided a unique opportunity to explore associations between ACE exposure and COVID-19 infection and the population response to the measures put in place to limit the spread of the virus. A quarter of adults in Bolton thought they had had COVID-19 and almost three in 10 reported having been very or extremely worried about catching the virus. While individuals with multiple ACEs reported a higher prevalence of having had COVID-19, there was no significant increase in risk associated with ACEs. There was also no significant association between ACE exposure and having been very or extremely worried about catching COVID-19. COVID-19 infection was found to be associated with younger age and worries about COVID-19 infection were associated with ethnic minority groups, chronic disease and older age – factors which may increase risk of COVID-19 morbidity or mortality.

Research has suggested that ACE exposure can be associated with lower trust in authority [14,15]. However, evidence in this area is generally scant. The current study found no significant association between ACE exposure and low trust in NHS COVID-19 information. Furthermore, in contrast to other UK studies [10] we did not identify an association between ethnic minority groups and having lower levels of trust in COVID-19 information. Adults aged 30-59 were more likely to report low trust in NHS COVID-19 information than those aged 70 or over.



Younger individuals and those with ≥ 4 ACEs were more likely to report feeling unfairly restricted a lot by government, and compared to those with no ACEs, those with ≥ 4 ACEs were 2.3 times more likely to think that mandatory face coverings should go. However, no significant relationships were identified between reporting social distancing should end and ACE count. Adherence with restrictions has played an essential role in reducing COVID-19 transmission. Despite the deterrent threat of fines for those who break the rules, adherence to restrictions has been predominantly reliant upon individual compliance. Although our findings demonstrated that the majority of participants, including those with ACEs, reported following guidelines, the experience of childhood adversity was found to be independently related to the rejection of some COVID-19 related regulations, with the prevalence of breaking COVID-19 regulations at least occasionally increasing with ACE count. In line with other research in the UK [8], younger individuals were also more likely to report not always following COVID-related restrictions.



...almost three in 10 reported having been very or extremely worried about catching the virus...



Vaccine hesitancy was strongly associated with socio-demographics, being highest in younger age groups and those living in more deprived areas. However, having multiple ACEs was also found to be a key risk factor. Overall 15% of participants reported vaccine hesitancy with prevalence more than doubling from 12% of those with 0 ACEs to 26% of those with ≥ 4 ACEs. Compared to those with no ACEs, individuals with ≥ 4 ACEs were 1.7 times more likely to report both not following the restrictions and vaccine hesitancy. ACEs are associated with health-harming behaviours and chronic disease [11,19] - factors that may make those who have experienced ACEs more susceptible to complications and ill-health from COVID-19. Consequently, increased vaccine hesitancy among individuals who have experienced ACEs may be an important public health issue worthy of further examination. These findings are of relevance for future vaccination programmes and the direction of adequate resourcing in areas that can promote vaccination in these groups, such as school vaccination programmes. ACEs are relatively common, and the ACE prevalence identified in Bolton is similar to national ACE estimates in England (Bolton, 48.3% 0 ACEs, 23.2% 1 ACE, 17.7% 2-3 ACEs, 10.8% ≥ 4 ACEs; England, 56.2% 0 ACEs, 20.1% 1 ACE, 15.4% 2-3 ACEs, 8.4% ≥ 4 ACEs [20]). As vaccination is a key mechanism to reduce viral transmission, trauma-informed approaches may be useful in helping support vaccination uptake and compliance with restrictions for those who have experienced ACEs.

The findings from this study are important for understanding how we can support individuals who have experienced ACEs to look after their health. However, a number of study limitations should be acknowledged. Participation was voluntary, and therefore we cannot identify bias related to non-participation. All data were self-reported and for the ACE measures, retrospective, thus, are subject to accurate reporting, recall and willingness to disclose. Individuals who completed the survey online, compared to those on the telephone, were more likely to report COVID-19 infection, low trust in NHS COVID-19 information and that face covering and social distancing restrictions should end. Such findings indicate a potential bias in response for online or telephone methodologies. Although not generalisable (see Ford et al, 2021 for sample characteristics; [16]), these findings are of interest both locally within Bolton, and nationally as they further our understanding of how childhood trauma can impact upon health and wellbeing across the life-course.

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Appendix: Data Tables

Table A1: Adjusted odds ratios for COVID-19 infection and worries about infection in demographic and ACE count groups

	Had COVID-19 [~]			Worried about catching COVID-19		
	AOR	95% CIs	P	AOR	95% CIs	P
Sex						
Male	1.237	0.975-1.569	0.080	0.631	0.509-0.782	<0.001
Age group						
18-29	5.065	3.070-8.357	<0.001	0.519	0.308-0.875	0.014
30-39	4.158	2.596-6.662	<0.001	1.084	0.709-1.657	0.711
40-49	3.296	2.186-4.969	<0.001	0.873	0.612-1.247	0.456
50-59	3.840	2.597-5.676	<0.001	1.305	0.950-1.793	0.101
60-69	1.367	0.876-2.133	0.169	1.684	1.244-2.280	0.001
70+	Ref		<0.001	Ref		<0.001
Deprivation quintile						
1 (most deprived)	1.082	0.746-1.569	0.677	1.185	0.863-1.627	0.293
2	1.220	0.803-1.853	0.352	0.997	0.690-1.442	0.988
3	1.237	0.789-1.941	0.354	1.131	0.764-1.674	0.538
4	1.360	0.891-2.077	0.155	1.234	0.857-1.776	0.259
5 (least deprived)	Ref		0.581	Ref		0.637
Ethnicity						
White	0.807	0.566-1.151	0.236	0.449	0.318-0.636	<0.001
ACE count						
0	Ref		0.582	Ref		0.317
1	0.984	0.729-1.328	0.915	0.977	0.752-1.268	0.860
2-3	1.138	0.828-1.563	0.426	1.283	0.967-1.704	0.084
≥4	1.264	0.851-1.877	0.246	1.088	0.747-1.584	0.661
Had COVID-19*						
Yes				1.244	0.965-1.603	0.093
Chronic disease**						
Yes				1.789	1.434-2.232	<0.001
Survey type						
Telephone	1.759	1.203-2.572	0.004	1.060	0.749-1.499	0.744

AOR= Adjusted Odds Ratio; 95% CIs = 95% confidence intervals; Ref = Reference category. *Having had COVID-19 was self-reported.

**Chronic diseases included diagnosis of: cancer, type II diabetes, heart disease and respiratory diseases. ~Had COVID-19 and chronic disease were not included in this model. Reference categories for sex, ethnicity, had COVID-19, chronic disease and survey type are female, ethnic minority groups, not had COVID-19, not had a chronic disease and online sample respectively.

Table A2: Adjusted odds ratios for trust in health systems and restriction adherence in demographic and ACE count groups

	Low trust in NHS COVID-19 information			Unfairly restricted a lot by government			Not always following COVID-19 restrictions		
	AOR	95% CIs	P	AOR	95% CIs	P	AOR	95% CIs	P
Sex									
Male	1.100	0.772-1.566	0.599	1.295	0.966-1.737	0.084	1.111	0.892-1.384	0.347
Age group									
18-29	1.627	0.731-3.623	0.233	1.266	0.644-2.489	0.494	3.355	2.103-5.353	<0.001
30-39	2.462	1.222-4.959	0.012	2.009	1.132-3.567	0.017	2.266	1.478-3.474	<0.001
40-49	2.047	1.092-3.838	0.025	1.874	1.140-3.083	0.013	1.478	1.026-2.130	0.036
50-59	1.910	1.038-3.513	0.037	1.424	0.871-2.327	0.159	1.473	1.047-2.073	0.026
60-69	1.364	0.717-2.595	0.343	1.194	0.721-1.975	0.491	1.098	0.775-1.556	0.598
70+	Ref		0.137	Ref		0.094	Ref		<0.001
Deprivation quintile									
1 (most deprived)	1.371	0.793-2.369	0.259	1.134	0.728-1.767	0.577	0.759	0.550-1.048	0.094
2	1.147	0.612-2.151	0.668	1.134	0.686-1.876	0.624	0.834	0.576-1.207	0.335
3	0.951	0.468-1.934	0.890	0.738	0.407-1.342	0.320	0.850	0.569-1.270	0.427
4	0.773	0.382-1.564	0.475	0.736	0.422-1.286	0.282	0.995	0.689-1.436	0.977
5 (least deprived)	Ref		0.321	Ref		0.247	Ref		0.373
Ethnicity									
White	0.999	0.590-1.693	0.998	0.979	0.621-1.541	0.926	2.360	1.579-3.527	<0.001
ACE count									
0	Ref		0.510	Ref		0.002	Ref		0.003
1	1.222	0.791-1.890	0.366	0.971	0.662-1.424	0.879	1.099	0.835-1.446	0.502
2-3	1.097	0.675-1.783	0.710	1.075	0.715-1.616	0.729	1.534	1.148-2.051	0.004
≥4	1.501	0.859-2.624	0.154	2.236	1.438-3.477	<0.001	1.737	1.201-2.515	0.003
Had COVID-19*									
Yes	1.211	0.809-1.813	0.351	1.250	0.889-1.757	0.199	1.202	0.927-1.558	0.165
Chronic disease**									
Yes	0.818	0.545-1.228	0.333	0.898	0.644-1.252	0.527	0.746	0.584-0.953	0.019
Survey type									
Telephone	0.598	0.375-0.955	0.031	0.795	0.518-1.219	0.293	1.002	0.714-1.407	0.989

AOR= Adjusted Odds Ratio; 95% CIs = 95% confidence intervals; Ref = Reference category. *Having had COVID-19 was self-reported.

**Chronic diseases included diagnosis of: cancer, type II diabetes, heart disease and respiratory diseases. Reference categories for sex, ethnicity, had COVID-19, chronic disease and survey type are female, ethnic minority groups, not had COVID-19, not had a chronic disease and online sample respectively.

Table A3: Adjusted odds ratios for attitudes to restrictions and vaccine hesitancy in demographic and ACE count groups

	Mandatory face coverings should go			Social distancing should end			Vaccine hesitancy		
	AOR	95% CIs	P	AOR	95% CIs	P	AOR	95% CIs	P
Sex									
Male	1.125	0.814-1.554	0.477	1.215	0.862-1.714	0.266	1.219	0.884-1.683	0.227
Age group									
18-29	4.595	2.197-9.611	<0.001	6.809	3.188-14.546	<0.001	16.416	7.274-37.045	<0.001
30-39	4.555	2.255-9.200	<0.001	3.630	1.695-7.772	0.001	12.298	5.578-27.114	<0.001
40-49	4.380	2.301-8.335	<0.001	4.740	2.417-9.297	<0.001	7.094	3.310-15.204	<0.001
50-59	2.762	1.442-5.290	0.002	2.499	1.251-4.993	0.009	6.197	2.918-13.159	<0.001
60-69	1.264	0.603-2.649	0.536	1.351	0.628-2.908	0.441	2.189	0.942-5.084	0.068
70+	Ref		<0.001	Ref		<0.001	Ref		<0.001
Deprivation quintile									
1 (most deprived)	1.241	0.748-2.058	0.404	2.259	1.241-4.112	0.008	2.297	1.277-4.130	0.005
2	1.190	0.675-2.098	0.548	1.600	0.814-3.145	0.173	2.154	1.137-4.080	0.019
3	1.017	0.539-1.920	0.958	1.727	0.840-3.548	0.137	1.151	0.540-2.452	0.716
4	0.668	0.345-1.292	0.230	1.017	0.480-2.156	0.964	1.372	0.680-2.768	0.377
5 (least deprived)	Ref		0.259	Ref		0.015	Ref		0.009
Ethnicity									
White	1.243	0.785-1.968	0.353	1.907	1.143-3.183	0.013	0.924	0.604-1.413	0.715
ACE count									
0	Ref		0.007	Ref		0.396	Ref		0.125
1	1.464	0.978-2.190	0.064	0.862	0.557-1.335	0.506	1.017	0.674-1.535	0.935
2-3	1.317	0.853-2.035	0.214	0.781	0.486-1.256	0.308	1.105	0.718-1.701	0.650
≥4	2.301	1.422-3.724	0.001	1.263	0.750-2.126	0.380	1.746	1.084-2.812	0.022
Had COVID-19*									
Yes	1.413	0.994-2.011	0.054	1.916	1.331-2.758	<0.001	1.005	0.701-1.440	0.979
Chronic disease**									
Yes	0.761	0.517-1.122	0.168	0.855	0.568-1.288	0.454	0.997	0.685-1.449	0.986
Survey type									
Telephone	0.309	0.211-0.452	<0.001	0.333	0.222-0.501	<0.001	0.961	0.627-1.473	0.855

AOR= Adjusted Odds Ratio; 95% CIs = 95% confidence intervals; Ref = Reference category. *Having had COVID-19 was self-reported.

**Chronic diseases included diagnosis of: cancer, type II diabetes, heart disease and respiratory diseases. Reference categories for sex, ethnicity, had COVID-19, chronic disease and survey type are female, ethnic minority groups, not had COVID-19, not had a chronic disease and online sample respectively.



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