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# Mental health and social interactions of older people with physical disabilities in England during the COVID-19 pandemic: a longitudinal cohort study

Andrew Steptoe, Giorgio Di Gessa



## Summary

**Background** The COVID-19 pandemic has affected mental health, psychological wellbeing, and social interactions. People with physical disabilities might be particularly likely to be negatively affected, but evidence is scarce. Our aim was to evaluate the emotional and social experience of older people with physical disabilities during the early months of the COVID-19 pandemic in England.

**Methods** In this longitudinal cohort study, we analysed data from the English Longitudinal Study of Ageing collected in 2018–19 and June–July, 2020, from participants aged 52 years and older and living in England. Physical disability was defined as impairment in basic and instrumental activities of daily living (ADL) and impaired mobility. Depression, anxiety, loneliness, quality of life, sleep quality, and amount of real-time and written social contact were assessed online or by computer-assisted telephone interviews. Comparisons of experiences during the COVID-19 pandemic of people with and without a physical disability were adjusted statistically for pre-pandemic outcome measures, age, sex, wealth, ethnicity, presence of a spouse or partner, number of people in the household, and chronic pain. All participants with full data available for both surveys were included in the analyses.

**Findings** Between June 3 and July 26, 2020, 5820 participants responded, 4887 of whom had full data available for both the pre-pandemic measures and the COVID-19 survey and were included in the analysis. During the COVID-19 pandemic, significantly more people with ADL impairment had clinically significant symptoms of depression (odds ratio 1.78 [95% CI 1.44–2.19];  $p < 0.0001$ ), anxiety (2.23 [1.72–2.89];  $p < 0.0001$ ), and loneliness (1.52 [1.26–1.84];  $p < 0.0001$ ) than people without ADL impairment. Significantly more people with ADL impairment also had impaired sleep quality (1.44 [1.20–1.72];  $p < 0.0001$ ) and poor quality of life than people without ADL impairment. The results were similar when disability was defined by impaired mobility. People with ADL impairment had less frequent real-time contact (0.70 [0.55–0.89];  $p = 0.0037$ ) and written social contact (0.54 [0.45–0.64];  $p < 0.0001$ ) with family than people without ADL impairment. Results for social contact were similar when disability was defined by impaired mobility.

**Interpretation** People with physical disability might be at particular risk for emotional distress, poor quality of life, and low wellbeing during the COVID-19 pandemic, highlighting the need for additional support and targeted mental health services.

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## Introduction

The COVID-19 crisis has had an unprecedented impact on people's lives, with the threat from a dangerous infection coupled with enforced isolation, separation from support groups, concerns about employment, and reduced access to services having marked consequences for mental health and social experience throughout the world.<sup>1</sup> Studies that began soon after the emergence of COVID-19 have shown increased prevalence of depression, anxiety, and loneliness, with women, minority ethnic populations, people of lower socioeconomic status, and people with pre-existing physical and mental illness being particularly vulnerable.<sup>2,3</sup> These studies lack data collected before the

COVID-19 pandemic, but results have been supplemented by analyses of longitudinal studies that allow comparisons of the pandemic period with measures of emotional and social function taken in previous years.<sup>4,6</sup>

People with physical disabilities might be at particular risk of adverse mental health and reduced social contact.<sup>7–9</sup> Rates of physical disability increase with age, with about a third of adults aged 60 years and older in high-income countries living with a disability.<sup>10</sup> Even before the COVID-19 pandemic, this group faced challenges in terms of mobility, access to health-care services, and social contact, and had more emotional distress, a higher risk of loneliness, and a poorer health-related quality of life than

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Department of Epidemiology and Public Health, University College London, London, UK (Prof A Steptoe DSc, G Di Gessa PhD)

Correspondence to Prof Andrew Steptoe, Department of Epidemiology and Public Health, University College London, London WC1E 6BT, UK [a.steptoe@ucl.ac.uk](mailto:a.steptoe@ucl.ac.uk)

### Research in context

#### Evidence before this study

We searched PubMed on Jan 20, 2021, for articles published in English until Jan 20, 2021, using the following search terms: "COVID" OR "coronavirus" AND "Disability" OR "Mobility impairment" OR "Physical Impairment" AND "Depression" OR "Mental health" OR "Anxiety" OR "Quality of life" OR "Loneliness" OR "Sleep" OR "Social contact". No studies involving population representative longitudinal data were identified. Cross-sectional studies initiated after the start of the COVID-19 pandemic show poorer mental health and wellbeing and greater loneliness among people with disabilities, but research focusing on physical disability is scarce.

#### Added value of this study

The study showed that older people in England with physical disabilities had more symptoms of depression and anxiety, greater loneliness, and poorer psychological wellbeing, quality of life, and sleep quality than people without a disability. Differences were apparent when disability was defined either as

impaired activities of daily living or impaired physical mobility, and after adjustment for pre-pandemic levels of mental health and social interactions as well as socioeconomic and demographic factors. Disability was also associated with less real-time contact (telephone and video calls) and written contact (email and letters) with family and friends among people with disabilities than people without disabilities.

#### Implications of all the available evidence

People with physical disabilities have already been identified as particularly vulnerable during the COVID-19 pandemic because mobility problems might limit access to health-care services, social services, and informal care, and the presence of comorbidities increases the risk of severe outcomes following SARS-CoV-2 infection. Our findings suggest that attention should also be paid to adverse emotional and social outcomes, and emphasise the importance of supporting people with disabilities during and after periods of epidemic illness and enforced social isolation.

people without a physical disability.<sup>11</sup> During the pandemic, these issues might have been exacerbated by self-isolation and reduced provision of social care, physiotherapy, and other services, and many people with physical disabilities are at increased risk of more severe consequences of infection because of their age and the presence of comorbidities.<sup>12,13</sup> So far, evidence of the effect of physical disability on mental health and social contact during the COVID-19 pandemic has been scarce. Cross-sectional data from the UK Opinions and Lifestyle Survey collected in April–July, 2020, found that people with disabilities reported lower levels of wellbeing and were more likely to be lonely and have poor mental health than people without disabilities.<sup>14</sup> A rapid review of studies of people with stroke, multiple sclerosis, chronic pain, and other conditions indicated that most studies focused on access to care, were cross-sectional, and did not involve standardised measures of mental health.<sup>8</sup> One longitudinal study assessed 67 people with multiple sclerosis 6 months before and then during the early weeks of the COVID-19 pandemic in Italy and showed no changes in symptoms of anxiety and depression across the two timepoints.<sup>15</sup> This finding led the authors to suggest that people with multiple sclerosis were particularly resilient; however, this study did not include a comparison group of people without multiple sclerosis, making it difficult to confirm this conclusion.

We therefore aimed to examine whether the COVID-19 pandemic was associated with heightened depression, anxiety, loneliness, reduced quality of life, and reduced sleep quality in older people with physical disabilities, compared with people without physical disabilities. We also investigated whether people with disabilities had less social contact with family and friends, and whether they had increased incidence of SARS-CoV-2 infection,

compared with people without disabilities. In sensitivity analyses, we accounted for advice given to vulnerable groups to take extra precautions (shielding) during the COVID-19 pandemic.

## Methods

### Study design and participants

We did a longitudinal cohort study using data collected in June–July, 2020, in the English Longitudinal Study of Ageing (ELSA), a nationally representative sample of men and women aged 50 years and older living in England.<sup>16</sup>

ELSA started in 2002, and data are collected every 2 years using face-to-face computer-assisted personal interviews held in participants' homes, as well as a self-completion questionnaire. The original sample included 11 391 core participants and a further 708 additional respondents who were typically younger spouses of the core participants. The study sample is periodically refreshed with new participants to ensure that the complete age profile from 50 years and older is maintained. The most recent full wave of data collection was wave 9 (in 2018–19).

Strict lockdown and orders to stay at home were announced by the UK Government on March 23, 2020, and, although these rules were somewhat relaxed in May and June, 2020, many restrictions remained in place. Therefore, in June, 2020, a substudy was done to assess the experience of the participants during the COVID-19 pandemic. Invitations to participate online or by computer-assisted telephone interviews were issued to registered ELSA participants. The telephone interviews were done by NatCen Social Research (London, UK). The data from the COVID-19 substudy were linked with disability measures collected in wave 9. Waves 1–9 of ELSA were approved through the National Research Ethics Service and the COVID-19 substudy was approved by the University

College London Research Ethics Committee (0017/003). All participants provided informed consent. The methods and protocol for the COVID-19 substudy are available online.

## Procedures

### *Measures from the COVID-19 substudy*

In the COVID-19 substudy, mental health was assessed with measures assessing depression, anxiety, wellbeing and quality of life, loneliness, and sleep quality. Depressive symptoms were measured using a shortened version of the Center for Epidemiologic Studies Depression scale.<sup>17</sup> A threshold of four or more positive symptoms was used to identify the prevalence of clinically significant symptoms, but continuous scores were also analysed. Anxiety was monitored with the Generalised Anxiety Disorder 7 assessment (GAD-7).<sup>18</sup> Items on the GAD-7 referred to the past 2 weeks and were each rated on a four-point scale from not at all to nearly every day (Cronbach  $\alpha=0.90$  in this study, indicating high scale reliability). A standard threshold score of 10 on the GAD-7 was used to define clinically significant symptoms. Loneliness was measured with the three-item short form of the Revised University of California Los Angeles Loneliness Scale.<sup>19</sup> Each item was scored on a three-point scale: hardly ever or never, some of the time, and often, so the total score could range from 3 to 9 (Cronbach  $\alpha=0.82$ ). We defined clinically significant loneliness as a score of 5 or more, as used in previous studies.<sup>20</sup>

Wellbeing was assessed using the Office for National Statistics (ONS) wellbeing scales. Participants were asked to rate how satisfied they were with their lives nowadays (life satisfaction), and to what extent they felt the things they did in their lives were worthwhile (purpose in life), all on scales ranging from 1 (not at all) to 10 (very). Quality of life was assessed using the Control, Autonomy, Self-realisation, Pleasure 12 (CASP-12) scale.<sup>21</sup> The items were rated from never to often and summed to generate a total score ranging from 0 to 36, with higher scores indicating better quality of life (Cronbach  $\alpha=0.87$ ). Sleep quality was assessed by asking participants to rate their sleep over the past month as excellent, very good, good, fair, or poor. People who responded fair or poor were classified as having disturbed sleep.

Assessment of social experience included measures of social contact and symptoms of COVID-19. Social contact during the COVID-19 pandemic was measured with adaptations of items previously used in ELSA.<sup>22</sup> Participants were asked about real-time contact (by telephone or video calling) and written contact (email or letters) with family outside the household and with friends in the past month. We categorised respondents as having frequent contact if they reported contact with family at least once a week. Experience of COVID-19 was measured by asking people whether they had had the core symptoms of COVID-19 as defined by National Health Service (NHS) England (high temperature, new continuous cough, and

loss or change in sense of smell or taste) and whether they had been admitted to hospital because of the disease. Respondents were also asked about shielding—ie, whether they were advised by the NHS or their physician to stay at home at all times, avoid all face-to-face contact for at least 12 weeks, and minimise the time spent with others in their households, because they were identified as at high risk for serious illness according to the guidelines issued by Public Health England.<sup>23</sup>

Covariates used in the COVID-19 substudy were age, the number of people living in the household, and whether respondents had a spouse or partner, because these are all potentially relevant to mental health and social contact during the pandemic.

### *Measures obtained before the COVID-19 pandemic*

Disability has been assessed regularly since ELSA started in 2002 and was assessed with measures in wave 9 of ELSA. First, respondents were asked whether they had any difficulty with six basic activities of daily living (ADL), such as getting out of bed and walking across a room, and with nine instrumental ADL, such as shopping for groceries and preparing a hot meal. Participants who responded positively to one or more items were defined as having ADL impairment. Second, information was collected on difficulty with ten aspects of mobility, such as picking up a small coin or climbing one flight of stairs without resting. Participants who reported difficulty with two or more actions were defined as having mobility impairment.<sup>24</sup>

Wealth was used as a covariate as an indicator of socioeconomic resources, and was based on detailed assessments of financial, housing, and physical wealth (such as land, business wealth, and jewellery), excluding pension wealth. It was divided into quintiles for the purposes of analysis. Ethnicity was categorised as White European or other. Pre-pandemic mental health and social contacts were included as covariates to take account of differences between disability groups before the onset of COVID-19. Thus, analyses of depressive symptoms, loneliness, wellbeing, and quality of life included measures of these same variables in the earlier waves of ELSA. The GAD-7 was not included in previous waves, so in this case analyses were adjusted for ratings on the ONS anxiety scale obtained in wave 9. Sleep quality was not assessed in wave 9 of ELSA, so the pre-pandemic values were taken from wave 8 (2016–17). The social contact measures in the COVID-19 substudy were different from those of earlier waves, so in these cases we adjusted for an index of social isolation combining living alone, having infrequent contact with family and friends, and not being involved in local organisations, as detailed in the appendix (p 1).

Many people with disability have chronic pain that is in turn associated with poor mental health and loneliness.<sup>25</sup> It is therefore possible that any links between disability and mental health and wellbeing during the COVID-19 pandemic could be the result of the greater prevalence of pain among people with physical disabilities. We

For the methods and protocol see <https://www.elsa-project.ac.uk/covid-19>

See Online for appendix

	Basic and instrumental ADL			Mobility		
	No impairment (n=3700)	Impairment (n=1187)	p value	No impairment (n=2950)	Impairment (n=1937)	p value
Age, years	69.30 (8.51)	73.93 (10.58)	<0.0001	68.79 (8.42)	72.91 (9.92)	<0.0001
Sex						
Female	1888 (51.0%)	717 (60.4%)	<0.0001	1387 (47.0%)	1218 (62.9%)	<0.0001
Male	1812 (49.0%)	470 (39.6%)	..	1563 (53.0%)	719 (37.1%)	..
White ethnicity	1116 (94.4%)	3493 (94.1%)	0.72	2788 (94.5%)	1822 (94.1%)	0.53
Wealth quintile						
1	542 (14.6%)	387 (32.6%)	<0.0001	360 (12.2%)	569 (29.4%)	<0.0001
2	630 (17.0%)	248 (20.9%)	..	466 (15.8%)	411 (21.2%)	..
3	792 (21.4%)	236 (19.9%)	..	640 (21.7%)	387 (20.0%)	..
4	830 (22.4%)	185 (15.6%)	..	684 (23.2%)	331 (17.1%)	..
5	906 (24.5%)	131 (11.0%)	..	799 (27.1%)	238 (12.3%)	..
Married or with a partner	2548 (68.9%)	636 (53.6%)	<0.0001	2068 (70.1%)	1098 (56.7%)	<0.0001
People in household	2.03 (0.86)	1.89 (0.91)	<0.0001	2.08 (0.87)	1.93 (0.87)	<0.0001
Chronic pain	1196 (32.3%)	901 (76.0%)	<0.0001	670 (22.7%)	1426 (73.6%)	<0.0001

Data are mean (SD) or n (%). All values are weighted estimates. ADL=activities of daily living.

**Table 1: Associations of disability measures with covariates**

measured pain by participant self-report, using the questions, “Are you often troubled with pain?” and, if so, “How bad is the pain most of the time?” (with options of mild, moderate, or severe). In line with previous research, we characterised chronic pain as pain that was classed as moderate or severe in wave 9.

### Outcomes

The primary outcome was the association between the COVID-19 pandemic and heightened depression among people with physical disabilities compared with people without physical disabilities. Other prespecified outcomes were the associations between the COVID-19 pandemic and anxiety, loneliness, quality of life, and sleep quality in people with physical disabilities compared with those without disability; the association between physical disability and the amount of social contact individuals had during the pandemic; and the association between physical disability and COVID-19 incidence and related hospital admissions. All participants with full data available for wave 9 and the COVID-19 survey were included in the analyses.

### Statistical analysis

Separate analyses were done on pre-pandemic ADL impairment and mobility impairment in wave 9. The relationships between pre-pandemic disability and mental health and social contacts during the pandemic were evaluated using logistic or linear regression as appropriate. All analyses adjusted for age, sex, wealth, presence of a spouse or partner, number of people in the household, and chronic pain. Additionally, we controlled for the pre-pandemic level of each outcome. We chose this approach instead of analysing differences between pre-pandemic and pandemic levels to focus on differences in

emotional and social experiences between people with and without physical disability. Analyses were weighted using longitudinal weights to match population estimates for age, sex, housing tenure, relationship status, and region in England in 2018 (appendix p 1). Descriptive statistics for the raw and weighted data are summarised in the appendix (p 3). The results for categorical outcomes are shown as estimated adjusted odds ratio (OR) of clinically significant impairment in people with disability, with no disability as the reference category, with 95% CI. Estimated proportions for people with and without disability adjusted for covariates are also shown. The continuous outcomes (continuous ratings of depression, anxiety, loneliness, life satisfaction, purpose in life, and quality of life) were analysed with linear regressions, and results are shown as regression coefficients with SE, together with means and 95% CI. The sample size varied across outcomes because of missing data in wave 9 or the COVID-19 substudy.

In sensitivity analyses, we investigated the possibility that differences between people with and without disability were due to shielding. We therefore repeated analyses after excluding individuals who had been instructed to shield during this period. All analyses were done using Sta15.

### Role of the funding source

The funders of the study had no role in study design, data collection, data analysis, data interpretation, or writing of the report.

### Results

Between June 3 and July 26, 2020, invitations to participate in the COVID-19 substudy online or by computer-assisted telephone interviews were issued to 9392 ELSA

	n/N*	Adjusted proportion (95% CI)	Mean (95% CI)	Adjusted odds ratio (95% CI) or $\beta$ coefficient (SE)	p value
<b>Depression (n=4796)</b>					
Clinically significant symptoms					
No impairment	605/3757	16.1% (14.9–17.4)	..	1 (ref)	..
Impaired ADL	300/1039	28.9% (26.5–31.3)	..	1.78 (1.44–2.19)	<0.0001
Continuous ratings					
No impairment	..	..	1.64 (1.59–1.70)	..	..
Impaired ADL	..	..	2.11 (2.00–2.23)	0.112 (0.015)	<0.0001
<b>Anxiety (n=4663)</b>					
Clinically significant symptoms					
No impairment	272/3670	7.4% (6.4–8.3)	..	1 (ref)	..
Impaired ADL	157/993	15.8% (13.9–17.6)	..	2.23 (1.72–2.89)	<0.0001
Continuous ratings					
No impairment	..	..	2.83 (2.69–2.96)	..	..
Impaired ADL	..	..	4.38 (4.12–4.64)	0.150 (0.016)	<0.0001
<b>Loneliness (n=4765)</b>					
Substantial loneliness					
No impairment	1197/3740	32.0% (30.6–33.4)	..	1 (ref)	..
Impaired ADL	406/1025	39.6% (36.8–42.3)	..	1.52 (1.26–1.84)	<0.0001
Continuous ratings					
No impairment	..	..	4.15 (4.11–4.19)	..	..
Impaired ADL	..	..	4.39 (4.30–4.47)	0.064 (0.014)	<0.0001
<b>ONS life satisfaction (n=4769)</b>					
No impairment	..	..	7.14 (7.08–7.21)	..	..
Impaired ADL	..	..	6.82 (6.68–6.96)	-0.060 (0.016)	<0.0001
<b>ONS purpose in life (n=4737)</b>					
No impairment	..	..	7.51 (7.44–7.58)	..	..
Impaired ADL	..	..	7.03 (6.91–7.16)	-0.093 (0.016)	<0.0001
<b>CASP-12 quality of life (n=4683)</b>					
No impairment	..	..	25.98 (25.83–26.13)	..	..
Impaired ADL	..	..	24.37 (24.06–24.68)	-0.101 (0.012)	<0.0001
<b>Sleep quality fair or poor (n=4715)</b>					
No impairment	1454/3681	39.5% (37.9–41.0)	..	1 (ref)	..
Impaired ADL	475/1034	45.9% (43.0–48.9)	..	1.44 (1.20–1.72)	<0.0001

All values are estimates following weighting and adjusted for age, sex, wealth in wave 9, ethnicity, presence of a spouse or partner, number of people in the household, chronic pain in wave 9, and wave 9 levels of the outcome variable (except for sleep—wave 8). ADL=activities of daily living. CASP-12=Control, Autonomy, Self-realisation, Pleasure 12 scale. ONS=Office for National Statistics. \*n is the number of people with the outcome, N is the total number who answered each question.

**Table 2: Associations of impaired ADL with mental health and wellbeing during the COVID-19 pandemic**

participants, and responses were received from 7040 (75.2%). Data were collected online from 5791 (82.3%) of 7040 participants and by computer-assisted telephone interview from 1249 (17.7%) participants. There were 5820 core participants and 1220 non-core participants. The data from the COVID-19 substudy were linked with disability measures collected in wave 9. Of the 5820 core participants, 5010 (86.1%) had taken part in wave 9 of ELSA and had disability measures, 123 (2.5%) of whom had missing data for one or more covariates, resulting in an analytic sample of 4887 participants.

The number of participants with ADL impairment in wave 9 was 1187 (24.3%), and 1937 (39.6%) had mobility impairment as defined by two or more impairments. There was a moderate association between the two

classifications ( $r^2=0.32$ ). Respondents with disability were older on average than those without disability, were more likely to be women, and were likely to have fewer socioeconomic resources as defined by wealth (table 1). Participants with a disability were also less likely to have a partner, and more likely to live in smaller households than those without a disability (table 1). The cross-sectional associations between ADL impairment, mobility impairment, and pre-pandemic mental health outcomes are summarised in the appendix (pp 4–5). There were consistent associations of physical disability with greater depression and loneliness, and lower wellbeing, quality of life, and sleep quality, endorsing the importance of taking pre-pandemic levels into account as covariates when analysing outcomes during the COVID-19 pandemic.

	n/N*	Adjusted proportion (95% CI)	Mean (95% CI)	Adjusted odds ratio (95% CI) or $\beta$ coefficient (SE)	p value
<b>Depression (n=4796)</b>					
Significant symptoms					
No impairment	469/2986	15.8% (14.3–17.2)	..	1 (ref)	..
Impaired mobility	445/1810	24.6% (22.6–26.5)	..	1.80 (1.47–2.21)	<0.0001
Continuous ratings					
No impairment	..	..	1.51 (1.44–1.58)	..	..
Impaired mobility	..	..	2.14 (2.04–2.23)	0.092 (0.016)	<0.0001
<b>Anxiety (n=4662)</b>					
Significant symptoms					
No impairment	222/2919	7.6% (6.5–8.8)	..	1 (ref)	..
Impaired mobility	209/1744	12.0% (10.5–13.5)	..	1.65 (1.24–2.18)	<0.0001
Continuous ratings					
No impairment	..	..	2.72 (2.56–2.88)	..	..
Impaired mobility	..	..	3.94 (3.72–4.15)	0.130 (0.017)	<0.0001
<b>Loneliness (n=4765)</b>					
Substantial loneliness					
No impairment	914/2968	30.8% (29.1–32.5)	..	1 (ref)	..
Impaired mobility	690/1797	38.4% (36.2–40.6)	..	1.51 (1.26–1.81)	<0.0001
Continuous ratings					
No impairment	..	..	4.15 (4.10–4.20)	..	..
Impaired mobility	..	..	4.30 (4.23–4.37)	0.044 (0.015)	0.0038
<b>ONS life satisfaction (n=4769)</b>					
No impairment	..	..	7.15 (7.07–7.23)	..	..
Impaired mobility	..	..	6.94 (6.83–7.04)	-0.048 (0.017)	0.0048
<b>ONS purpose in life (n=4737)</b>					
No impairment	..	..	7.46 (7.38–7.53)	..	..
Impaired mobility	..	..	7.31 (7.21–7.41)	-0.117 (0.046)	0.012
<b>CASP-12 quality of life (n=4683)</b>					
No impairment	..	..	25.97 (25.75–26.19)	..	..
Impaired mobility	..	..	25.30 (25.10–25.50)	-0.075 (0.014)	<0.0001
<b>Sleep quality fair or poor (n=4715)</b>					
No impairment	1105/2908	38.0% (36.2–39.8)	..	1 (ref)	..
Impaired mobility	824/1807	45.6% (43.2–47.9)	..	1.45 (1.24–1.73)	<0.0001

All values are estimates following weighting and adjusted for age, sex, wealth in wave 9, ethnicity, presence of a spouse or partner, number of people in the household, chronic pain in wave 9, and wave 9 levels of the outcome variable (except for sleep—wave 8). CASP-12=Control, Autonomy, Self-realisation, Pleasure 12 scale. ONS=Office for National Statistics. \*n is the number of people with the outcome, N is the total number who answered each question.

**Table 3: Associations of mobility impairment with mental health and wellbeing during the COVID-19 pandemic**

After taking covariates and pre-pandemic levels into account, clinically significant symptoms of depression and anxiety during the COVID-19 pandemic were significantly increased among people with ADL impairment (table 2) and mobility impairment (table 3) compared with people without disability. An estimated 28.9% (95% CI 26.5–31.3) of respondents with ADL impairment had clinically significant depressive symptoms during the pandemic compared with 16.1% (14.9–17.4) of those without a disability (OR 1.78 [95% CI 1.44–2.19];  $p < 0.0001$ ). 15.8% (13.9–17.6) of people with ADL impairment had clinically significant anxiety symptoms during the COVID-19 pandemic compared with 7.4% (6.4–8.3) of those without ADL impairment (OR 2.23 [1.72–2.89];  $p < 0.0001$ ). When analysed as continuous ratings, depression and anxiety

symptoms were also significantly different between people with and without ADL impairment (table 2). These associations were not only statistically significant, but were also substantial from a population perspective (the proportion with anxiety was more than double among people with disability compared with people without disability). During the pandemic, loneliness was reported by a significantly greater proportion of participants with ADL impairment than participants without ADL impairment, although the proportion of participants reporting loneliness was numerically high across both groups (table 2). Depression, anxiety, and loneliness were similarly more prevalent in those with disability when defined by mobility impairment, compared with those without disability (table 3). Even accounting for pre-pandemic measures, people with

disability (ADL impairment and mobility impairment) reported lower wellbeing in terms of life satisfaction, purpose in life, and the CASP-12 compared with people without disability (tables 2, 3). Sleep quality was disturbed in ELSA respondents in general; however, significantly more participants with ADL and mobility impairments reported fair or poor sleep quality during the COVID-19 pandemic than did participants without a disability (tables 2, 3).

Most participants had regular contact with family and friends either by telephone or video calling, with more than three quarters reporting contact at least weekly (table 4). However, individuals with ADL impairment and individuals with mobility impairment were significantly less likely to have frequent (ie, at least weekly) real-time contact with family than people without disability (table 4). The adjusted odds of real-time contact once per week or more with family for people with ADL impairment was 0.70 (95% CI 0.55–0.89;  $p < 0.0001$ ) and for people with mobility impairment was 0.66 (0.53–0.84;  $p < 0.0001$ ) compared with people with no disability. Although statistically significant, the estimated difference between groups in the proportion of people with frequent social contact was small (adjusted proportion 83.3% [95% CI 81.1–85.4] for people with ADL impairment vs 86.9% [85.8–88.0] for people without ADL impairment; 83.4% [81.6–85.1] for people with impaired mobility vs 87.7% [86.4–89.1] for people without impaired mobility). Impoverishment in written contact by letter or email was also reported for people with disability (ADL impairment or mobility impairment) compared with participants without a disability (table 4). There was no difference in the proportion of respondents with and without physical disability who reported two or more core COVID-19 symptoms in June and July, 2020, but people with disability defined by mobility impairment had substantially increased odds of being admitted to hospital (OR 5.21 [95% CI 1.63–16.67];  $p = 0.0049$ ), although the absolute number of admissions to hospital was low for people with and without mobility impairment (table 4).

The sensitivity analysis repeated tests of associations between physical disability and outcomes after excluding participants who had been instructed to shield during the COVID-19 pandemic (appendix p 6). We found that 30.3% of respondents with impaired ADL and 26.4% of respondents with impaired mobility were instructed to shield, compared with 16.0% of people without impaired ADL and 14.9% of people without impaired mobility. Relationships between both impaired ADL and impaired mobility and depression, anxiety, and quality of life remained robust when participants who were shielding were excluded. However, associations between disability and loneliness were attenuated, suggesting that the additional enforced isolation imposed by shielding contributed to the heightened loneliness of people with physical disabilities.

	n/N*	Adjusted proportion (95% CI)	Adjusted odds ratio (95% CI)	p value
<b>ADL impairment analyses</b>				
Real-time contact with family at least weekly (n=4713)				
No impairment	3212/3696	86.9% (85.8–88.0)	1 (ref)	..
Impaired ADL	847/1017	83.3% (81.1–85.4)	0.70 (0.55–0.89)	0.0037
Real-time contact with friends at least weekly (n=4724)				
No impairment	3043/3707	82.1% (80.8–83.4)	1 (ref)	..
Impaired ADL	801/1017	78.8% (76.3–81.4)	0.78 (0.63–0.96)	0.019
Written contact with family at least weekly (n=4726)				
No impairment	2777/3707	74.9% (73.5–76.3)	1 (ref)	..
Impaired ADL	633/1019	62.1% (59.3–64.8)	0.54 (0.45–0.64)	<0.0001
Written contact with friends at least weekly (n=4730)				
No impairment	2631/3711	70.9% (69.4–72.4)	1 (ref)	..
Impaired ADL	620/31019	60.8% (57.9–63.7)	0.60 (0.50–0.72)	<0.0001
Two or more core symptoms of COVID-19 (n=4884)				
No impairment	110/3811	2.9% (2.4–3.5)	1 (ref)	..
Impaired ADL	26/1073	2.4% (1.4–3.5)	0.82 (0.50–1.35)	0.43
Admitted to hospital for COVID-19 (n=4882)				
No impairment	17/3810	0.5% (0.2–0.7)	1 (ref)	..
Impaired ADL	6/1072	0.6% (0.1–1.0)	1.47 (0.54–3.98)	0.45
<b>Mobility impairment analyses</b>				
Real-time contact with family at least weekly (n=4713)				
No impairment	2587/2950	87.7% (86.4–89.1)	1 (ref)	..
Impaired mobility	1479/1763	83.4% (81.6–85.1)	0.66 (0.53–0.84)	<0.0001
Real-time contact with friends at least weekly (n=4724)				
No impairment	2443/2955	82.8% (81.2–84.3)	1 (ref)	..
Impaired mobility	1398/1769	79.0% (77.0–81.1)	0.77 (0.63–0.95)	0.013
Written contact with family at least weekly (n=4726)				
No impairment	2233/2957	75.5% (73.8–77.2)	1 (ref)	..
Impaired mobility	1171/1769	66.2% (64.0–68.5)	0.58 (0.49–0.70)	<0.0001
Written contact with friends at least weekly (n=4730)				
No impairment	2130/2959	72.0% (70.3–73.8)	1 (ref)	..
Impaired mobility	1116/1771	63.0% (60.7–65.3)	0.63 (0.33–0.75)	0.0010
Two or more core symptoms of COVID-19 (n=4884)				
No impairment	77/3026	2.5% (1.9–3.2)	1 (ref)	..
Impaired mobility	59/1858	3.2% (2.4–4.1)	1.27 (0.81–2.10)	0.31
Admitted to hospital for COVID-19 (n=4882)				
No impairment	7/3025	0.2% (0.1–0.5)	1 (ref)	..
Impaired mobility	16/1857	0.9% (0.6–1.3)	5.21 (1.63–16.67)	0.0049

All values are estimates following weighting and adjusted for age, sex, wealth in wave 9, ethnicity, presence of a spouse or partner, number of people in the household, chronic pain in wave 9 (and wave 9 levels of social isolation for the contact variables). ADL=activities of daily living. \*n is the number of people with the outcome, N is the total number who answered each question.

**Table 4: Associations of ADL and mobility impairment with social contact and COVID-19 symptoms during the COVID-19 pandemic**

## Discussion

These analyses of mental health and social interactions during the early months of the COVID-19 pandemic in England show that older people with physical disabilities had more symptoms of depression and anxiety, greater loneliness, poorer life satisfaction, and lower purpose in life, quality of life, and sleep quality than people without a physical disability. These differences were evident even



after adjustment for pre-COVID-19 levels of mental health and social interactions, as well as socioeconomic and demographic factors, and when disability was defined either as impaired ADL or impaired physical mobility. The COVID-19 pandemic also adversely affected real-time contact (telephone and video calls) and written contact (email and letters) with family and friends among people with physical disabilities. People with disabilities were more likely to have been instructed to shield than those without disability, but the differences in mental health and wellbeing were largely maintained when analyses were confined to those who were not instructed to shield.

Our findings strongly support the notion that people with physical disabilities were disproportionately affected during the early months of the COVID-19 pandemic in terms of mental health and quality of life. These differences were accompanied by lower levels of social contact. People with physical disabilities were less likely to have spouses or partners and lived in smaller households on average than those without disability. Lower amounts of household contact were compounded by less frequent contact with family and friends outside the household. We analysed separately real-time communication by telephone or video call from written contact by letter or email which is less immediate and dynamic. There is evidence that face-to-face contact with family and friends is more closely associated with quality of life than internet communication.<sup>26</sup> Older people without a physical disability were consistently advantaged compared with those with a disability. It is likely that lower amounts of social contact compounded the experiences of loneliness, depression, and impoverished quality of life among people with physical disabilities.

No differences in COVID-19 symptoms between people with and without physical disability were identified with these measures, although admission to hospital for COVID-19 was higher among people with disability on one of the two disability measures. This result is consistent with the evidence that people with disability who became infected with SARS-CoV-2 were at higher risk of serious illness and mortality during the early months of the pandemic.<sup>27</sup>

An important policy in the early months of the COVID-19 pandemic in the UK was shielding.<sup>23</sup> People with physical disabilities were more likely to be instructed to shield than those without a disability. Nevertheless, our analyses excluding participants who were asked to shield suggest that being in the shielding group did not account for the worse mental health and quality of life of people with a disability. However, instructions to shield seemed to contribute to loneliness differences in respondents with and without physical disability.

This study draws strength from using longitudinal data from the nationally representative ELSA, a large, well characterised sample of older men and women. Response rates to the survey done remotely in June and July, 2020, were high, and study weights were applied to match the

sample to population estimates in terms of demographics, long-term illness, and location in England. Moreover, unlike the ONS analysis of the Opinions and Lifestyle Survey, which did not control for any pre-pandemic measures,<sup>14</sup> the availability of data collected in previous years enabled comparisons between people with and without physical disability to take account of differences present before the COVID-19 pandemic. Standardised measures of mental health, loneliness, and quality of life were used. Analyses were based on disability measures obtained before the pandemic with markers of disability that have been used in previous studies.<sup>28,29</sup> Impaired ADL reflect difficulties in carrying out both basic and more complex activities required for independent life, while mobility impairment focuses on physical capability, strength, and dexterity.

Interpretation of these results should take account of the limitations of the study. The majority of people in the ELSA sample are of White European origin, so findings might not be generalisable to other ethnic groups. Findings are also specific to older people in England and older people with disabilities in other countries might have had different experiences during the pandemic.<sup>1</sup> We were not able to separate different causes of disability such as arthritis, Parkinson's disease, and multiple sclerosis. Future studies might test the effect of the COVID-19 pandemic on mental health by disability resulting from different pre-existing conditions. Physical disability increases with age, so it is likely that some people free of disability in 2019 had a disability in 2020. There are likely to be sex differences in the experience of mental ill-health during the COVID-19 pandemic among people with disabilities.<sup>30</sup> Although the response rate to the COVID-19 assessment was high (74.9%), there is non-random cumulative attrition in the ELSA dataset, an unavoidable problem in longitudinal studies that can only partially be corrected by using weights in the analysis. Because of healthy survivor effects, we might have selected participants with better health than the current population, leading to an underestimate of both the prevalence of disability and its effect on mental health. The observational nature of the study means that the influence of unmeasured factors cannot be ruled out. The assessments were done during June and July, 2020, and there is evidence that emotional distress was greater earlier in the pandemic than in later months.<sup>31</sup> The absence of antigen tests for infection in the population at this time means that infection rates were inferred from symptom reports, which are imprecise and cannot identify asymptomatic cases.

Nevertheless, our findings suggest that older people in England with a physical disability are particularly at risk for emotional distress, poor quality of life, and poor wellbeing in response to the COVID-19 pandemic. These associations were observed across a wide range of psychological and social outcomes and deserve attention along with concerns about maintaining health and social care and reducing health risk.<sup>7</sup> Older people are

highly vulnerable to death from COVID-19 but, as the SARS-CoV-2 vaccination roll-out scales up, there is a need for health and social care providers to attend to the emotional consequences of the pandemic for people with disabilities, and to ensure that care packages implemented both during and after the pandemic take into account the importance of maintaining wellbeing in this sector of society.

#### Contributors

AS and GDG conceived and designed the study. AS analysed the data and wrote the first draft. Both authors provided critical revisions and read and approved the submitted manuscript. AS and GDG accessed and verified the data. Both authors had full access to the data in the study and had final responsibility for the decision to submit for publication.

#### Declaration of interests

We declare no competing interests.

#### Data sharing

The data used in this study are available from the UK Data Service with access codes SN 8688 and 5050.

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