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The growing burden of long COVID in the United Kingdom - insights from the UK Coronavirus Infection Survey

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Running header

United Kingdom long COVID insights

28 **Keywords**

29 COVID-19, Olfaction Disorders, Taste Disorders

30

31 **Word count** (not including title, acknowledgment, references, footnotes, tables and figure
32 legends): 899

33

34 **Ethical approval**

35 The CIS was given ethical approval by South Central – Berkshire B Research Ethics
36 Committee (20/SC/0195).

37

38 **Financial disclosures and conflicts of interest**

39 None declared.

40

41 **Funding**

42 The CIS was funded by the UK Department of Health and Social Care. The authors of this
43 report received no specific grant from any funding agency in the public, commercial or not-
44 for-profit sectors.

45

46 **Introduction**

47 “Long COVID” is defined as symptoms that persist 12 weeks beyond the acute phase of
48 coronavirus (COVID-19) infection and is estimated to affect 3.0-11.7% of the UK population.
49 Symptoms include headache, myalgia, fatigue and loss of taste and smell.¹ Parosmia can
50 persist for months after initial infection² alongside brain fog and memory loss.³

51

52 The UK Office for National Statistics (ONS) Coronavirus Infection Survey (CIS) measures
53 the number of people in England, Wales, Northern Ireland, and Scotland who test positive
54 for a COVID-19 to provide national data to help government decision making and inform the
55 public and media. The aim of this study was to report the prevalence of ENT related
56 symptoms of long COVID and the population groups at greatest risk of long COVID from the
57 CIS.

58

59 **Methods**

60 Data was drawn from the ongoing UK CIS which involves longitudinal follow-up of patients
61 identified through repeated cross-sectional national surveys.^{4,5} The primary objectives are to
62 estimate prevalence of symptomatic and asymptomatic COVID-19 infection in the general
63 population, and the prevalence of long COVID.

64

65 Participants were volunteers aged 2 years or older (no upper age limit), resident in private
66 households randomly selected from national address lists. Parents and carers responded for
67 children <12 years old. An analysis of responses from 6th March 2022 to 3rd April 2022 was
68 performed. COVID-19 positivity was identified through nose and throat swabs and blood
69 samples. Participants who identified themselves as suffering from long COVID were asked
70 about the presence of 23 individual symptoms and the impact of long COVID on their day-to-
71 day activities.⁶ Self-reported long COVID was defined as symptoms persisting for >four weeks
72 after the first suspected coronavirus infection but not explained by another condition.

73

74 UK population estimates were derived using a Bayesian multi-level regression post-
75 stratification model with adjustments for age, sex, and region.⁴

76

77 **Results**

78 Over 362,771 responses were received, of which 10,431 participants self-reported long
79 COVID (an estimated 8 million people or 2.8% of the population).⁵ A total of 7,464 (72%)
80 respondents with long COVID had a previous positive COVID test and the remainder were
81 self-reported. Almost twelve percent of respondents were aged <17 and 58.0% >50 years.
82 46.2% were male and 92.9% were of 'white' ethnicity. An estimated 1.3 million people (73%)
83 reported long COVID symptoms >12 weeks after COVID infection.

84

85 The duration of symptoms from confirmed or suspected COVID infection was categorised as:
86 21.3% <12 weeks, 18.0% 12 to <26 weeks, 9.3% 26 to <39 weeks, 1.4% 39 to <52 weeks,
87 18.9% 52 to <78 weeks, 12.0% 78 to <104 weeks, 13.1% \geq 104 weeks, 5.8% unknown
88 duration. Of the estimated people with long COVID, 556,000 (31%) first reported confirmed or
89 suspected COVID prior to the Alpha variant, 249,000 (14%) in the Alpha period, 446,000
90 (25%) in the Delta period, and 438,000 (24%) in the Omicron period.

91

92 Table 1 illustrates the prevalence of long COVID symptoms. Fatigue was the most common,
93 whilst ENT-related symptoms included dyspnoea, loss of smell, loss of taste, vertigo, sore
94 throat, wheezing, rhinorrhoea and sneezing. UK population estimates for the presence of
95 long COVID are demonstrated in Figure 1. Adults aged 35-49 years had the highest
96 estimated prevalence of self-reported long COVID (4.13% [95% CI 3.96-4.30]). The
97 estimated percentage of women with long COVID (3.20% [95% CI 3.11-3.30]) was higher
98 than men (2.34% [95% CI 2.25-2.42]).

99

100 Those of White ethnic origin had higher estimated prevalence rates of long COVID (2.85%
101 [95% CI 2.78-2.92]) compared to those of Asian (2.03% [95% CI 1.74-2.33]) or Black

102 (1.59% [95% CI 1.09-2.08]) ethnicity. Those in the most deprived Index of Multiple
103 Deprivation quintile group experienced the highest estimated prevalence of long COVID
104 (3.58 [95% CI 3.35-3.80]). Individuals who had pre-existing health conditions and
105 disabilities which limit their activity by a little (5.97% [95% CI 5.60-6.34]) or by a lot (6.85%
106 [95% CI 6.41-7.29]) had a higher estimated prevalence of long COVID compared to those
107 with no other health conditions (2.25% [95% CI 2.19-2.32]).

108

109 **Discussion**

110 This study identifies ENT related long COVID symptoms including dyspnoea, anosmia,
111 ageusia, vertigo, and sore throat. Groups at increased risk of long COVID include women,
112 those aged 35-49, of 'white' ethnic origin or with disabilities.

113

114 The analysis is strengthened by a large, weighted sample with longitudinal follow-up of
115 participants. However, results can be confounded by non-response or drop-out relating to
116 the presence or absence of long COVID. The majority of respondents were of 'white'
117 ethnicity which limits the generalisability of results to other population groups.

118

119 The inclusion of symptoms at four weeks following COVID infection may overestimate the
120 prevalence of post COVID syndrome. This study therefore reports separate data for symptom
121 prevalence at >12 weeks and >4 weeks onset. Furthermore, the survey relies on self-reporting
122 despite a known mismatch between subjective reporting and psychophysical testing of
123 symptoms.⁷ Finally, the presence of symptoms such as rhinorrhoea, sneezing and wheezing
124 could relate to individual variants of COVID but specific data on this was not available.

125

126 This study confirms previous findings on long COVID symptoms including that individuals with
127 disabilities are at higher risk.^{3,8} Future policies should focus on assisting the most vulnerable
128 groups by widening access to chemosensory disorder and long COVID clinics in the UK.⁹ A
129 recent James Lind Alliance Priority Setting Partnership has confirmed that there is still demand

130 for high quality clinical trials in the management of chemosensory disorders and long COVID.¹⁰
131 Future researchers should draw upon data in this study to identify the most affected population
132 groups.

133
134 **Acknowledgements**

135 N/A

136

137 **Data Access, Responsibility, and Analysis**

138 SG had full access to all the data in the study and takes responsibility for the integrity of the
139 data and the accuracy of the data analysis. Data was drawn from the publicly available UK
140 CIS.

141

142 **Patient and Public Involvement statement**

143 This report was prepared following consultation with patient groups including the charity
144 'Fifth Sense' for people affected by smell and taste disorders. Advice from members of the
145 charity was taken at all stages and guided the reported outcomes to extend beyond purely
146 anosmia to other chemosensory symptoms.

147

148 **Data sharing statement**

149 All data used in this article is publicly available from the UK CIS

150 ([https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/conditionsand](https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/conditionsanddiseases/bulletins/prevalenceofongoingsymptomsfollowingcoronaviruscovid19infectionintheuk/6may2022#main-points)
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152 [k/6may2022#main-points](https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/conditionsanddiseases/bulletins/prevalenceofongoingsymptomsfollowingcoronaviruscovid19infectionintheuk/6may2022#main-points)).

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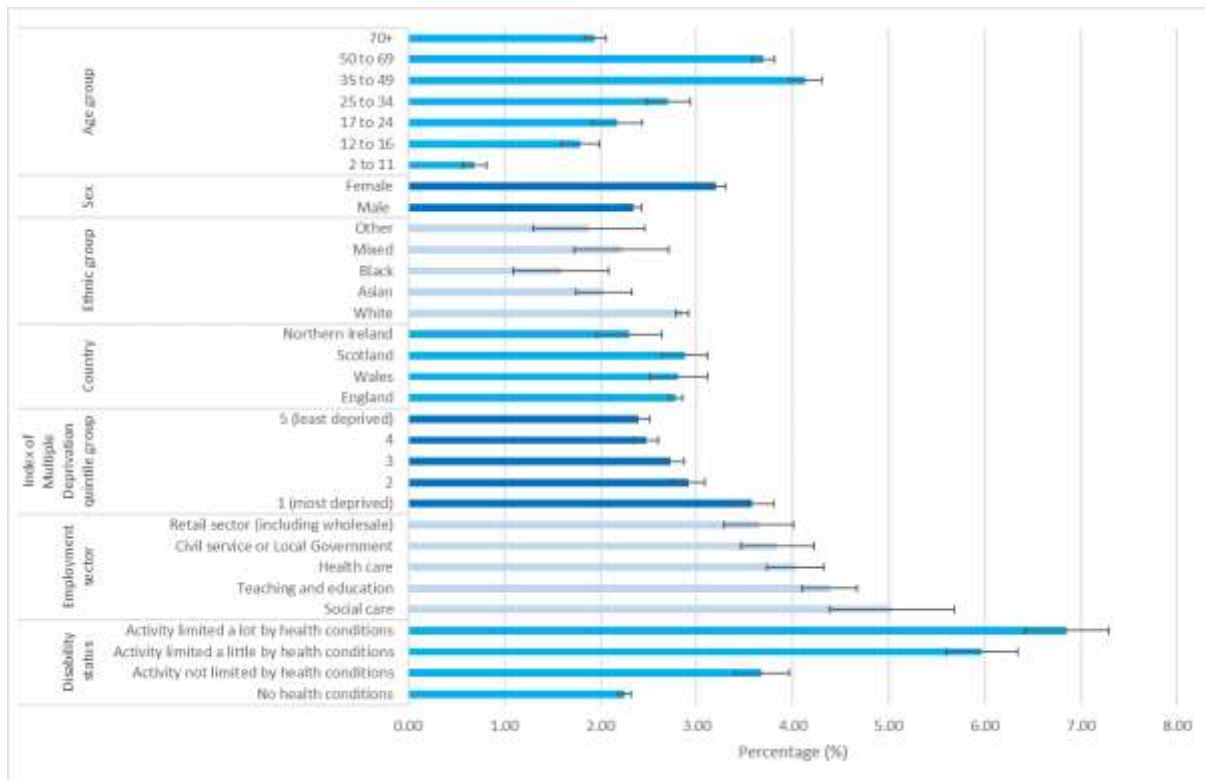
193 **Table 1: Prevalence of symptoms of long COVID**

194

Long COVID symptom	Prevalence (% [95% CI])	Prevalence (% [95% CI])
	after >12 weeks COVID	after >4 weeks COVID [†]
Weakness or tiredness (fatigue)	50.3 [48.4 - 52.3]	51.2 [49.5 - 52.9]
Shortness of breath	33.5 [31.9 - 35.0]	32.9 [31.6 - 34.3]
Loss of smell	31.4 [29.8 - 33.0]	26.4 [25.2 - 27.6]
Difficulty concentrating	25.2 [23.9 - 26.5]	23.4 [22.3 - 24.5]
Muscle ache	23.8 [22.5 - 25.0]	22.7 [21.6 - 23.8]
Headache	21.6 [20.3 - 22.9]	21.7 [20.7 - 22.8]
Cough	17.4 [16.2 - 18.4]	20.7 [19.6 - 21.7]
Loss of taste	23.8 [22.5 - 25.2]	20.6 [19.4 - 21.6]
Memory loss or confusion	20.1 [18.9 - 21.3]	18.7 [17.7 - 19.6]
Trouble sleeping	18.5 [17.4 - 19.6]	17.5 [16.5 - 18.4]
Worry or anxiety	17.2 [16.1 - 18.3]	16.0 [15.1 - 17.0]
Low mood	16.9 [15.8 - 18.0]	15.9 [15.0 - 16.8]
Vertigo or dizziness	13.2 [12.2 - 14.2]	12.6 [11.9 - 13.5]
Chest pain	12.3 [11.3 - 13.3]	11.8 [11.0 - 12.6]
Runny nose or sneezing	10.6 [9.7 - 11.5]	11.1 [10.4 - 11.9]
Noisy breathing (wheezy)	10.8 [9.9 - 11.6]	10.8 [10.0 - 11.5]
Palpitations	10.4 [9.6 - 11.3]	9.6 [8.9 - 10.4]
Sore throat	9.3 [8.4 - 10.2]	9.6 [8.9 - 10.3]
Loss of appetite	8.4 [7.6 - 9.2]	8.0 [7.4 - 8.7]
Abdominal pain	7.3 [6.5 - 8.0]	6.6 [6.0 - 7.2]
Nausea or vomiting	5.4 [4.7 - 6.0]	5.5 [4.9 - 6.1]
Diarrhoea	4.4 [3.7 - 4.9]	4.3 [3.8 - 4.8]
Fever	2.8 [2.3 - 3.2]	2.6 [2.3 - 3.0]

195 † also includes respondents with unknown duration from COVID infection (5.8%).

196 **Figure 1: Estimated percentage of people living in private households with self-**
 197 **reported long COVID of any duration**
 198 UK CIS: four-week period ending 3 April 2022.⁵
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