

Mental Health During COVID-19 Lockdown in the United Kingdom

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ABSTRACT

Objective: The coronavirus disease (COVID-19) pandemic and related lockdown measures have raised important questions about the impact on mental health. This study evaluated several mental health and well-being indicators in a large sample from the United Kingdom (UK) during the COVID-19 lockdown where the death rate is currently among the highest in Europe.

Methods: A cross-sectional online survey with a study sample that mirrors general population norms according to sex, age, education, and region was launched 4 weeks after lockdown measures were implemented in the UK. Measures included mental health-related quality of life (World Health Organization Quality-of-Life Brief Version psychological domain), well-being (World Health Organization Well-Being Index), depression (Patient Health Questionnaire-9), anxiety (Generalized Anxiety Disorder-7), perceived stress (Perceived Stress Scale-10), and insomnia (Insomnia Severity Index). Analyses of variances, Bonferroni-corrected post hoc tests, and *t* tests were applied to examine mental health indicators across different sociodemographic groups (age, sex, employment, income, physical activity, relationship status).

Results: The sample comprised $n = 1006$ respondents (54% women) from all regions of the UK. Approximately 52% of respondents screened positive for a common mental disorder, and 28% screened positive for clinical insomnia. Mean scores and standard deviations were as follows: Patient Health Questionnaire-9, mean = 9.0 ± 7.7 ; Generalized Anxiety Disorder-7, mean = 8.0 ± 6.5 ; Insomnia Severity Index, mean = 10.4 ± 7.0 ; Perceived Stress Scale-10, mean = 17.7 ± 7.9 ; World Health Organization Quality-of-Life Brief Version, mean = 58.6 ± 21.4 ; and World Health Organization Well-Being Index score, mean = 13.0 ± 6.0 . Statistical analyses consistently indicated more severe mental health problems in adults younger than 35 years, women, people with no work, and people with low income (all *p* values < .05). Mental health indices also varied across UK regions.

Conclusions: The prevalence of depressive, anxiety, and insomnia symptoms is significantly higher in the UK relative to prepandemic epidemiological data. Further studies are needed to clarify the causes for these high rates of mental health symptoms.

Key words: mental health, depression, anxiety, insomnia, UK, COVID-19.

INTRODUCTION

The coronavirus disease 2019 (COVID-19) has spread quickly throughout the world (1). In Europe alone, there are currently (November 5, 2020 at 09:15 Central European Time) around 11.9 million confirmed COVID-19 cases and around 294,622 confirmed deaths (2). In the United Kingdom (UK), data released by the Office for National Statistics showed that 29,648 deaths registered in England and Wales with COVID-19 mentioned on the death certificate by May 2. With the addition of the official death figures for Scotland and Northern Ireland, this was calculated to take the UK's toll to 32,313 (3), a figure viewed as the highest in Europe at that time. The true figure is likely to be significantly higher because of missed cases and a lag in reporting.

As COVID-19 spreads easily between people who are in close contact (1), most governments have implemented restrictions to prevent the uncontrolled spread of the virus. Although social distancing and other measures such as the use of personal protective

equipment could help to contain the uncontrolled spreading of COVID-19 (1), they might negatively affect mental health (4).

There are a rapidly increasing number of publications on mental health during the COVID-19 pandemic. Many of them are commentaries about poor mental health due to COVID-19 (5). It is highly likely that many individuals feel stressed and worried in times of pandemics, with fears of falling ill or dying, being socially excluded in quarantine, or losing their income. Although such reactions may not necessarily impair functioning or general well-being, it is not clear to what extent such circumstances precipitate severe symptoms of mental disorders that warrant clinical care.

There are an increasing number of studies examining the effect of the COVID-19 pandemic on mental health, initially from Asian

CMD = common mental disorder, **COVID-19** = coronavirus disease 2019, **GAD-7** = Generalized Anxiety Disorder-7, **PHQ-9** = Patient Health Questionnaire-9, **WHO-5** = World Health Organization Well-Being Index, **WHOQOL-BREF** = World Health Organization Quality-of-Life Brief Version

SDC Supplemental Digital Content

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and European countries, and now also from other regions worldwide. Some of these have been published in scientific journals, and some have not been peer reviewed. Four observational studies on mental health in China have been reviewed recently, and results showed anxiety and depression symptoms (16%–28%) as well as stress levels (8%) being common mental health problems during the COVID-19 pandemic (6). In Japan, a representative population survey reported poorer mental health indicators in young and middle-aged individuals (relative to older people), as well as in unemployed individuals (7). In India, high scores for depression, anxiety, and stress were also found, especially in younger adults (8).

Findings from European countries seem to be generally consistent in identifying sociodemographic and life-style-related risk factors. An Italian survey found that poor mental health indicators were particularly acute in women and younger people (9). A Portuguese study examining protective life-style factors indicated that people who were able to work, those who exercised frequently, and those without previous psychological or physical health problems had relatively better well-being indicators (10). Cross-sectional surveys conducted in the UK in the early phase of the lockdown indicate that quarantine measures were associated with poor mental health, well-being, and quality of life, especially in younger people, those with children at home, and those with preexisting health problems (11,12).

According to the World Health Organization (WHO) COVID-19 official information, the UK is among the most affected countries in Europe (2). The aim of the current study was to evaluate a broad set of mental health and well-being indicators in a representative UK adult sample, measured during the acute phase of the pandemic and 4 weeks after the imposition of lockdown (quarantine) measures. Relevant sociodemographic confounders were also measured, such as sex, age, job situation, income, physical activity, and relationship status.

METHODS

Study Design

A cross-sectional online survey was designed to recruit a UK study sample that mirrored general population norms according to sex, age, education, and region. The survey was launched using the Qualtrics population survey platform, measuring several mental health and well-being indicators during the COVID-19 lockdown. Data collection started 4 weeks after quarantine measures were implemented in the UK, and data were collected until the point where a sample was obtained with a minimum sample size of $n = 1000$, which was specified a priori. Participants were contacted by the project team who organized and coordinated data collection. As part of the scoping process, Qualtrics implemented age, sex, educational, and regional quotas based on UK population census data. Overall, the target sample was attained within 10 days, after which the survey closed. COVID-19 lockdown was officially implemented in the UK on March 24, 2020, and the survey started on April 21, 2020.

Ethical Considerations

This study was conducted in accordance with the Declaration of Helsinki and approved by the Ethics Committee of the Danube University Krems (approval code: EK GZ 26/2018-2021). All participants gave electronic informed consent for participation and before completing the questionnaires. Data were collected anonymously without IP addresses or GPS tracking, and this procedure was approved by the data protection officer of the Danube-University Krems, Austria.

Governmental Restrictions During the Survey

In the UK, COVID-19 social distancing measures became obligatory on March 24, 2020. The UK population was required to adhere to quarantine with only the following exceptions justifying leaving the house: shopping for food and other necessities, exercising alone or with someone from the same household, for medical reasons including providing care to others, and traveling to and from work.

Study Sample

In total, we collected data for $n = 1006$ participants across all regions of the UK, yielding a study sample that reflected general population norms according to sex, age, education, and region, as described previously. Demographic characteristics of the study sample are presented in Table 1.

TABLE 1. Study Sample Characteristics ($n = 1006$)

Variable	<i>n</i>	%
Sex		
Women	544	54.1
Men	462	45.9
Age		
18–24	98	9.7
25–34	203	20.2
35–44	190	18.9
45–54	194	19.3
55–64	173	17.2
65+	148	14.7
Region		
North East	43	4.3
North West	115	11.4
Yorkshire & Humber	84	8.3
East Midlands	76	7.6
West Midlands	92	9.1
East of England	87	8.6
London	114	11.3
South East	144	14.3
South West	88	8.7
Wales	48	4.8
Scotland	89	8.8
Northern Ireland	26	2.6
Education		
Below high school		
No school	16	1.6
Elementary school	35	3.5
Trade/technical/vocational training	143	14.2
High school	405	40.3
Above high school		
College	129	12.8
Bachelor's degree	163	16.2
Master's degree	90	8.9
Doctoral degree	13	1.3
Professional degree (MD, JD, etc.)	12	1.2

n = frequencies; % = percent.

Measures

Quality of Life

The WHO Quality-of-Life Brief Version (WHOQOL-BREF) provides a reliable, valid, and brief assessment of quality of life (13). The 26-item self-rating questionnaire measures physical health, psychological health, social relationships, and environment during the past 2 weeks. Only the psychological domain (six items) was used in the present study as an indicator of mental quality of life. The general population norm for the WHOQOL-BREF psychological domain has been reported to be 70.6 (14.0) (14). Cronbach α for the psychological domain was .88 in the current sample.

Well-Being

Well-being was measured with the WHO Well-Being Index (WHO-5), which measures subjective psychological well-being within the last 2 weeks, using five self-rating items on 6-point Likert scales; a higher score indicates better well-being (example item: "I have felt active and vigorous"). The WHO-5 has well-established reliability and validity (15). The raw score can range from 0 (absence of well-being) to 25 (maximal well-being). Cronbach α was .91 in the current sample.

Perceived Stress

Perceived stress (i.e., the subjective perception of the stress level) was measured with the Perceived Stress Scale-10, which includes 10 items on a 5-point scale ranging from 0 to 4 (16). Participants are asked to rate their stress level over the last month (example item: "In the last month, how often have you felt nervous and 'stressed'"). The Perceived Stress Scale is a reliable and valid tool that measures stress level. Cronbach α was .88 in the current sample.

Depressive Symptoms

Depressive symptoms were measured with the depression module of the Patient Health Questionnaire, the PHQ-9 (17). This validated screening tool for depression has nine self-rating items on a 4-point scale, scored from 0 to 3, which yields a total severity score between 0 and 27. Clinical cutoff points are 5 for mild depression, 10 for moderate depression, and at least 15 for moderate to severe depression. The 10-point cutoff score was used in the present study to define clinically relevant depressive symptoms. Cronbach α was .94 in the current sample.

Anxiety Symptoms

Anxiety symptoms were measured with the Generalized Anxiety Disorder-7 (GAD-7) (18). This validated screening tool for anxiety has seven self-rating items on a 4-point scale, from 0 to 3, yielding a total anxiety severity score between 0 and 21. Clinical cutoff points are 5 for mild, 10 for moderate, and 15 for severe anxiety symptom levels. The 10-point cutoff score was used in the present study to define clinically relevant anxiety. Cronbach α was .95 in the current sample.

Insomnia

The Insomnia Severity Index is a validated seven-item self-report scale with a 5-point scale (from 0 to 4) measuring sleep quality and insomnia (19). Symptom severity categories are as follows: no clinically significant insomnia (0–7 points), subthreshold insomnia (8–14 points), clinical insomnia (moderate severity; 15–21 points), and clinical insomnia (severe; 22–28 points). The cutoff score of ≥ 15 was used to define moderate (i. e., clinically relevant) insomnia in this study. Cronbach α was .91 in the current sample.

Sex, Age Group, Employment, Income, Relationship Status, and Region

Participants had to self-report their sex, age group (18–24, 25–34, 35–44, 45–54, 55–64, 65+ years), if they were in paid employment during the lockdown restrictions (no, and did not before the lockdown either; no, but before the lockdown I did; yes, in home office; yes, as before at my workplace [not in my home office]; yes, but I've been put on reduced hours; I am retired), the net monthly income in their household (<GBP 900, GBP 900–1800, GBP 1800–2700, GBP 2700–3600, >GBP 3600), physical activity in the last 7 days (0, 1, 2, 3, 4 or more days), relationship status (category 1 including being single, separated, divorced, and widowed; category 2 including married and living as married), and region (North East; North West; Yorkshire & Humber; East Midlands; West Midlands; East of England; London; South East; South West; Wales, Scotland; Northern Ireland).

Statistical Analysis

Descriptive statistics were computed for the demographic characteristics and mental health scales. Based on the literature, we applied the cutoff ≥ 10 to examine the proportion of cases with clinically relevant depression (PHQ-9) and anxiety (GAD-7) symptoms. In addition, to aid comparability

TABLE 2. Number of Participants Exceeding the Cutoff Score for Clinically Relevant Depression/Anxiety/Insomnia, Measures of Psychological Health, Well-Being, and Stress by Sex

	Sex		Total	Statistic
	Male	Female		
PHQ-9 ≥ 10 , <i>n</i> (%)	160 (34.6)	254 (46.7)	414 (41.2)	$\chi^2(1) = 15.00$; $p < .001$
GAD-7 ≥ 10 , <i>n</i> (%)	144 (31.2)	248 (45.6)	392 (39.0)	$\chi^2(1) = 21.84$; $p < .001$
ISI ≥ 15 , <i>n</i> (%)	116 (25.1)	167 (30.7)	283 (28.1)	$\chi^2(5) = 3.86$; $p = .049$
CMD, <i>n</i> (%)	199 (43.1)	328 (60.3)	527 (52.4)	$\chi^2(5) = 29.70$; $p < .001$
PHQ-9, <i>M</i> (SD)	7.60 (7.52)	10.09 (7.65)	8.95 (7.69)	$t(1004) = -5.19$; $p < .001$; $g = .33$
GAD-7, <i>M</i> (SD)	6.56 (6.32)	9.28 (6.42)	8.03 (6.52)	$t(1004) = -6.74$; $p < .001$; $g = .43$
ISI, <i>M</i> (SD)	9.66 (7.09)	11.08 (6.95)	10.43 (7.04)	$t(1004) = -3.21$; $p = .001$; $g = .20$
WHOQOL BREF psychological domain, <i>M</i> (SD)	62.67 (21.34)	55.16 (20.83)	58.61 (21.39)	$t(1004) = 5.63$; $p < .001$; $g = .36$
WHO-5, <i>M</i> (SD)	14.03 (6.22)	12.05 (5.62)	12.96 (5.98)	$t(1004) = 5.29$; $p < .001$; $g = .33$
PSS-10, <i>M</i> (SD)	15.66 (8.11)	19.45 (7.37)	17.71 (7.94)	$t(1004) = -7.77$; $p < .001$; $g = .49$

PHQ-9 = Patient Health Questionnaire-9 scale; *n* = frequencies; p = *p* values (two-tailed); GAD-7 = Generalized Anxiety Disorder-7 scale; ISI = Insomnia Severity Index; CMD = common mental disorder (yes if PHQ-9 ≥ 10 and/or GAD-7 ≥ 8 versus no if PHQ-9 < 10 and GAD-7 < 8); *M* = mean score; SD = standard deviation; WHOQOL BREF: Quality of Life questionnaire of the World Health Organization; WHO-5: Well-Being Questionnaire of the World Health Organization; PSS-10 = Perceived Stress Scale-10.

TABLE 4. Number of Participants Exceeding the Cutoff Score for Clinically Relevant Depression/Anxiety/Insomnia, Measures of Psychological Health, Well-Being, and Stress by Work

	Work						Statistic
	No, and Did Not Before the Lockdown either	NO, BUT BEFORE the Lockdown I Did	Yes, in Home Office	Yes, as Before at My Workplace (Not in My Home Office)	Yes, But I've Been Put on Reduced Hours	I Am Retired	
PHQ-9 ≥ 10 , <i>n</i> (%)	124 (51.0)	110 (46.8)	68 (38.6)	59 (44.4)	34 (43.6)	19 (13.5)	$\chi^2(5) = 58.71; p < .001$
GAD-7 ≥ 10	113 (46.5)	108 (46.0)	65 (36.9)	54 (40.6)	29 (37.2)	23 (16.3)	$\chi^2(5) = 41.62; p < .001$
ISI ≥ 15 , <i>n</i> (%)	85 (35.0)	71 (30.2)	40 (22.7)	40 (30.1)	27 (34.6)	20 (14.2)	$\chi^2(5) = 24.12; p < .001$
CMD, <i>n</i> (%)	152 (62.6)	140 (59.6)	83 (47.2)	78 (58.6)	41 (52.6)	33 (23.4)	$\chi^2(5) = 66.44; p < .001$
PHQ-9, <i>M</i> (SD)	10.73 (8.12)	9.72 (7.20)	8.82 (7.89)	9.47 (7.52)	9.06 (7.49)	4.18 (5.62)	$F(5, 1005) = 15.033; p < .001; \eta^2 = 0.070$
GAD-7, <i>M</i> (SD)	9.21 (6.70)	9.05 (6.41)	7.64 (6.32)	8.42 (6.48)	8.08 (6.43)	4.38 (5.33)	$F(5, 1005) = 12.52; p < .001; \eta^2 = 0.059$
ISI, <i>M</i> (SD)	11.47 (7.26)	11.16 (6.68)	9.65 (6.94)	11.08 (6.93)	10.85 (7.28)	7.55 (6.60)	$F(5, 1005) = 7.20; p < .001; \eta^2 = 0.035$
WHOQOL BREF psychological domain, <i>M</i> (SD)	52.93 (23.30)	54.86 (20.64)	61.17 (19.83)	58.27 (20.43)	61.43 (20.34)	70.21 (17.12)	$F(5, 1008) = 14.92; p < .001; \eta^2 = 0.069$
WHO-5, <i>M</i> (SD)	11.31 (6.29)	12.19 (5.57)	13.99 (5.71)	13.15 (5.93)	14.18 (5.81)	14.95 (5.64)	$F(5, 1005) = 9.73; p < .001; \eta^2 = 0.046$
PSS-10, <i>M</i> (SD)	19.09 (8.24)	18.93 (7.34)	17.30 (7.65)	18.43 (7.72)	18.46 (6.97)	12.72 (7.59)	$F(5, 1005) = 15.12; p < .001; \eta^2 = 0.059$

PHQ-9 = Patient Health Questionnaire-9 scale; *n* = frequencies; *p* = *p* values (two-tailed); GAD-7 = Generalized Anxiety Disorder-7 scale; ISI = Insomnia Severity Index; CMD = common mental disorder (yes if PHQ-9 ≥ 10 and/or GAD-7 ≥ 8 versus no if PHQ-9 < 10 and GAD-7 < 8); *M* = mean score; SD = standard deviation; *F* = *F* test; WHOQOL BREF = Quality of Life questionnaire of the World Health Organization; WHO-5 = Well-Being Questionnaire of the World Health Organization; PSS-10 = Perceived Stress Scale-10.

TABLE 5. Number of Participants Exceeding the Cutoff Score for Clinically Relevant Depression/Anxiety/Insomnia, Measures of Psychological Health, Well-Being, and Stress By Income

	Net Income						Statistic
	<GBP 900,—	GBP 900,— to GBP 1800,—	GBP 1800,— to GBP 2700,—	GBP 2700,— to GBP 3600,—	>GBP 3600,—	Total	
PHQ-9 ≥10, <i>n</i> (%)	65 (47.1)	137 (39.9)	114 (44.5)	56 (38.1)	42 (34.4)	414.8 (41.2)	$\chi^2(4) = 6.28; p = .179$
GAD-7 ≥10, <i>n</i> (%)	64 (46.4)	129 (37.6)	107 (41.8)	49 (33.3)	43 (35.2)	392 (39.0)	$\chi^2(4) = 6.99; p = .137$
ISI ≥15, <i>n</i> (%)	43 (31.2)	99 (28.9)	85 (33.2)	27 (18.4)	29 (23.8)	283 (28.1)	$\chi^2(4) = 12.05; p = .017$
CMD, <i>n</i> (%)	80 (58.0)	184 (53.6)	141 (55.1)	68 (46.3)	54 (44.3)	527 (52.4)	$\chi^2(4) = 8.13; p = .087$
PHQ-9, <i>M</i> (SD)	9.95 (8.01)	9.03 (7.61)	9.50 (7.72)	7.77 (7.37)	7.85 (7.65)	8.95 (7.69)	$F(4,1005) = 2.42; p = .047; \eta^2 = 0.010$
GAD-7, <i>M</i> (SD)	9.01 (6.91)	8.08 (6.48)	8.46 (6.41)	6.86 (6.29)	7.28 (6.47)	8.03 (6.52)	$F(4,1005) = 2.68; p = .031; \eta^2 = 0.011$
ISI, <i>M</i> (SD)	10.95 (7.42)	10.76 (7.07)	11.29 (7.07)	8.89 (6.08)	8.93 (7.15)	10.43 (7.04)	$F(4,1005) = 4.53; p = .001; \eta^2 = 0.018$
WHOQOL BREF psychological domain, <i>M</i> (SD)	52.17 (23.03)	57.99 (21.58)	58.19 (20.92)	62.39 (19.66)	63.97 (19.99)	58.61 (21.39)	$F(4,1005) = 6.42; p < .001; \eta^2 = 0.025$
WHO-5, <i>M</i> (SD)	11.75 (6.26)	12.31 (6.03)	12.88 (5.90)	14.19 (5.45)	14.84 (5.67)	12.96 (5.98)	$F(4,1005) = 7.19; p < .001; \eta^2 = 0.028$
PSS-10, <i>M</i> (SD)	19.46 (8.61)	17.71 (8.17)	18.44 (7.42)	15.92 (7.51)	16.34 (7.56)	17.71 (7.94)	$F(4,1005) = 5.06; p < .001; \eta^2 = 0.020$

PHQ-9 = Patient Health Questionnaire-9 scale; n = frequencies; p = p values (two-tailed); GAD-7 = Generalized Anxiety Disorder-7 scale; ISI = Insomnia Severity Index; CMD = common mental disorder (yes if PHQ-9 ≥ 10 and/or GAD-7 ≥ 8 versus no if PHQ-9 < 10 and GAD-7 < 8); M = mean score; SD = standard deviation; F = F test; WHOQOL BREF = Quality of Life questionnaire of the World Health Organization; WHO-5 = Well-Being Questionnaire of the World Health Organization; PSS-10 = Perceived Stress Scale-10.

TABLE 6. Number of Participants Exceeding the Cutoff Score for Clinically Relevant Depression/Anxiety/Insomnia, Measures of Psychological Health, Well-Being, and Stress by Physical Activity

	Days of Physical Activity in the Last 7 d					Total	Statistic
	0	1	2	3	≥4		
PHQ-9 ≥10, n (%)	98 (41.7)	50 (47.6)	84 (52.2)	62 (42.2)	120 (33.5)	414 (41.2)	$\chi^2(4) = 18.59; p < .001$
GAD-7 ≥10, n (%)	87 (37.0)	45 (42.9)	79 (49.1)	59 (40.1)	122 (34.1)	392 (39.0)	$\chi^2(4) = 11.63; p = .020$
ISI ≥15, n (%)	69 (29.4)	37 (35.2)	54 (33.5)	47 (32.0)	76 (21.2)	283 (28.1)	$\chi^2(4) = 14.64; p = .006$
CMD, n (%)	120 (51.1)	56 (53.3)	104 (64.6)	81 (55.1)	166 (46.4)	527 (52.4)	$\chi^2(4) = 15.46; p = .004$
PHQ-9, M (SD)	9.29 (7.50)	10.09 (8.30)	10.52 (7.77)	9.33 (7.71)	7.52 (7.37)	8.95 (7.69)	$F(4,1005) = 5.64; p < .001; \eta^2 = 0.022$
GAD-7, M (SD)	7.71 (6.55)	8.54 (6.90)	9.16 (6.52)	8.37 (6.28)	7.44 (6.43)	8.03 (6.52)	$F(4,1005) = 2.36; p = .052; \eta^2 = 0.009$
ISI, M (SD)	10.43 (6.84)	11.80 (6.91)	11.40 (6.99)	11.17 (7.54)	9.28 (6.89)	10.43 (7.04)	$F(4,1005) = 4.61; p = .001; \eta^2 = 0.018$
WHOQOL BREF psychological domain, M (SD)	54.54 (22.20)	55.24 (21.23)	57.09 (19.71)	59.67 (19.63)	62.52 (21.69)	58.61 (21.39)	$F(4,1005) = 6.19; p < .001; \eta^2 = 0.024$
WHO-5, M (SD)	11.54 (6.03)	12.10 (5.66)	12.54 (5.79)	13.29 (5.57)	14.20 (6.04)	12.96 (5.98)	$F(4,1005) = 8.22; p < .001; \eta^2 = 0.032$
PSS-10, M (SD)	17.96 (8.27)	17.55 (7.94)	18.65 (7.53)	18.25 (7.20)	16.94 (8.16)	17.71 (7.94)	$F(4,1005) = 1.64; p = .162; \eta^2 = 0.007$

PHQ-9 = Patient Health Questionnaire-9 scale; n = frequencies; p = p values (two-tailed); GAD-7 = Generalized Anxiety Disorder-7 scale; ISI = Insomnia Severity Index; CMD = common mental disorder (yes if PHQ-9 ≥10 and/or GAD-7 ≥8 versus no if PHQ-9 <10 and GAD-7 <8); M = mean score; SD = standard deviation; F = F test; WHOQOL BREF = Quality of Life questionnaire of the World Health Organization; WHO-5 = Well-Being Questionnaire of the World Health Organization; PSS-10 = Perceived Stress Scale-10.

Social and Life-Style Factors

Physical activity was significantly associated with all symptom severity categories (all p values < .05) (Table 6). Physical activity was also significantly related to all continuous scales used to measure mental health ($p \leq .001$), except for anxiety and stress ($p > .05$). According to Bonferroni-corrected post hoc tests (Table S4, Supplemental Digital Content, <http://links.lww.com/PSYMED/A689>), more physical activity was related to better mental health ($p < .05$).

Table 7 shows that relationship status was significantly associated with depression and anxiety symptom severity categories ($p < .01$), but not with insomnia symptom severity categories ($p > .05$). Relationship status was also significantly associated with all mental health scale scores ($p < .01$) except for insomnia ($p > .05$). Those married or living as married had better mental health than did those who were not married or not living as married (including single, separated, divorced, and widowed respondents).

Regional Variations

A heat map showing mean depression symptom scores (and standard deviations) for each UK region is presented in Figure 1. The severity of depression varied across regions, with the lowest indices in the south west and the highest indices in the south east, north east, and Wales. Visual inspections for other indices of mental health were largely consistent with the findings observed for depression.

DISCUSSION

The prevalence of depression, anxiety, and insomnia symptoms is significantly higher in the UK, relative to prepandemic epidemiological data. The present study indicates that the point prevalence of respondents meeting threshold for any CMD (PHQ-9 ≥10 and/or GAD-7 ≥8) in the acute phase of COVID-19 is 52%, albeit using self-rated questionnaires rather than diagnostic interviews. In contrast, the prevalence of UK adults meeting diagnostic threshold for any CMD before COVID-19 was ~17%, and this is a stable estimate relative to earlier epidemiological surveys that used structured diagnostic interviews (20). If we compare our results with other UK studies that used self-rated screening tools, earlier prepandemic samples report a point prevalence of anxiety or depression symptoms of around 20% for respondents 16 years or older (21).

Regarding depression specifically, a previous study on individuals 15 years or older using a self-rated screening tool reported a depression prevalence rate of 7% in the UK (22). In contrast, 41% of the present study sample showed clinically relevant depressive symptoms (PHQ-9 ≥10) and 39% showed clinically relevant anxiety symptoms (GAD-7 ≥10). This is much higher than the available prepandemic general population data in Europe (anxiety disorders, 14%; major depression, 6.9%) (23). Furthermore, 28% of the sample scored above the cutoff for clinical insomnia (moderate severity) on the Insomnia Severity Index. According to a meta-analysis, the prepandemic prevalence of insomnia in Europe was around 7% (23). For the sample as a whole, the average PHQ-9 and GAD-7 scores of 9.0 and 8.0, respectively, approximate the cutoffs for clinically relevant depression and anxiety symptoms, respectively, and average insomnia symptoms are already above the cutoff for subthreshold insomnia.

TABLE 7. Number of Participants Exceeding the Cutoff Score for Clinically Relevant Depression/Anxiety/Insomnia, Measures of Psychological Health, Well-Being, and Stress by Relationship Status

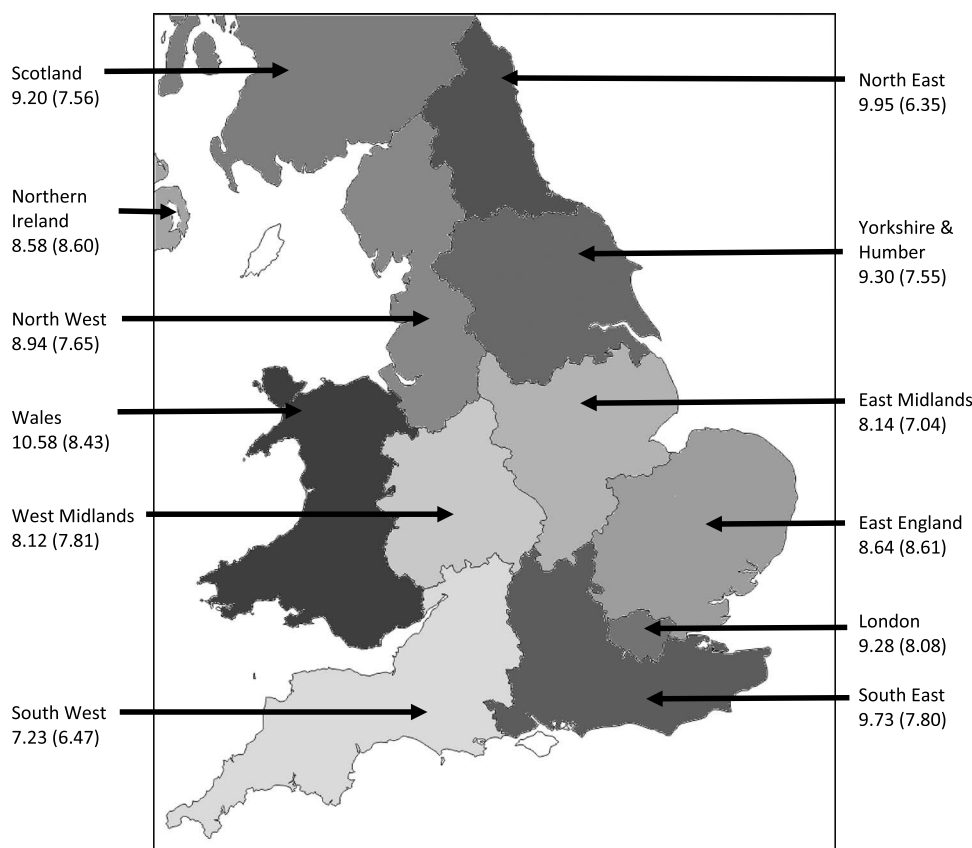
	Relationship Status		Total	Statistic
	Not Married/Not Living as Married	Married/Living as Married		
PHQ-9 ≥ 10 , <i>n</i> (%)	197 (47.7)	217 (36.6)	414 (41.2)	$\chi^2(1) = 12.40; p < .001$
GAD-7 ≥ 10 , <i>n</i> (%)	181 (43.8)	211 (35.6)	392 (39.0)	$\chi^2(1) = 6.96; p = .008$
ISI ≥ 15 , <i>n</i> (%)	129 (31.2)	154 (26.0)	283 (28.1)	$\chi^2(1) = 3.34; p = .068$
CMD, <i>n</i> (%)	240 (58.1)	287 (48.4)	527 (52.4)	$\chi^2(1) = 9.21; p = .002$
PHQ-9, M (SD)	10.07 (8.04)	8.16 (7.33)	8.95 (7.69)	$t(1004) = 3.91; p < .001; g = .25$
GAD-7, M (SD)	8.73 (6.65)	7.54 (6.38)	8.03 (6.52)	$t(1004) = 2.86; p = .004; g = .18$
ISI, M (SD)	10.79 (7.13)	10.18 (6.98)	10.43 (7.04)	$t(1004) = 1.35; p = .177; g = .09$
WHOQOL BREF psychological domain, M (SD)	53.39 (22.75)	62.25 (19.60)	58.61 (21.39)	$t(1004) = -6.60; p < .001; g = .41$
WHO-5, M (SD)	12.08 (6.19)	13.58 (5.75)	12.96 (5.98)	$t(1004) = -3.94; p < .001; g = .25$
PSS-10, M (SD)	18.76 (8.02)	16.98 (7.81)	17.71 (7.94)	$t(1004) = 3.52; p < .001; g = .23$

The category not married/not living as married includes being single, separated, divorced, and widowed.

PHQ-9 = Patient Health Questionnaire-9 scale; *n* = frequencies; *p* = *p* values (two-tailed); GAD-7 = Generalized Anxiety Disorder-7 scale; ISI = Insomnia Severity Index; CMD = common mental disorder (yes if PHQ-9 ≥ 10 and/or GAD-7 ≥ 8 versus no if PHQ-9 < 10 and GAD-7 < 8); M = mean score; SD = standard deviation; WHOQOL BREF = Quality of Life questionnaire of the World Health Organization; WHO-5 = Well-Being Questionnaire of the World Health Organization; PSS-10 = Perceived Stress Scale-10.

The psychological health score (58.6) on the WHOQOL-BREF questionnaire was below the norm value of 70.6 reported by Hawthorne and colleagues (14). Similarly, with a score of 13, well-being (WHO-5) was lower compared with a previous

study from Denmark showing converted scores of 17 (24). The stress level (18) was higher compared with a previous study reported scores of 13 for a representative sample (not UK but Germany) by Klein and colleagues (25).

**FIGURE 1.** Variability in depression severity during the COVID-19 pandemic across UK regions (mean PHQ-9 scores and standard deviation). COVID-19 = coronavirus disease 2019; PHQ-9 = Patient Health Questionnaire-9.

To our knowledge, two previous UK surveys have been published as preprint reports. The study by Shevlin et al. (11) surveyed a general population sample using the same mental health measures (PHQ-9, GAD-7) during the earliest phase of the pandemic, reporting point prevalence rates of 22.1% of clinically relevant depression and 21.6% of anxiety cases, respectively. Relative to these figures, the present study indicates that mental health indicators worsened over time, as the pandemic progressed into the acute phase 4 weeks after lockdown. This corresponds to findings of a review that mental health is affected more when restrictions last longer (4). The study by White and Van der Boor (12) used a different measure (Hospital Anxiety and Depression Scale), so direct comparison is not possible, but their results also indicated that mean levels of depression and anxiety symptoms during the COVID-19 pandemic were elevated relative to available prepandemic normative data. Overall, data emerging from the UK consistently indicate that the mental health of the general population during the COVID-19 pandemic was considerably poorer relative to available prepandemic indicators, and it seems that it has gradually deteriorated over the first 4 weeks since the implementation of lockdown measures.

There was a clear age-related effect in all tested mental health scales. These results are noteworthy and warrant more detailed consideration. For each aspect of mental health, the younger adult groups showed the worst scores and the older people the best. This is, perhaps, surprising in the context of COVID-19 because older people are more seriously physically threatened by COVID-19. Although the PHQ-9 is generally stable throughout all periods of adulthood (26), two-thirds (63%) of people aged between 18 and 24 years showed depressive symptoms, compared with 11.5% in the age group 65+ years. Similarly, rates of anxiety symptoms are 59% in the age group from 18 to 24 years versus 12% in the group 65+ years. For insomnia symptoms, there is also a decrease in the course of life, from 35% (age, 18–24 years) to 13% (age, 65+ years). Accordingly, the youngest age group (18–24 years) showed the lowest scores in psychological well-being. The differences are very marked; 47 versus 71 (in the 65+ year group). The same was observed with the WHO-5 questionnaire (11 versus 15). In essence, older adults seem to be handling this exceptional situation better than younger ones. Possible explanations for these findings include more uncertain working conditions and therefore more serious financial problems for younger people, but also the impact of the lockdown on freedom of movement is likely to have a greater immediate impact for the life-style of younger people. In addition, older people may have a context of growing up in postwar years that made the current situation more familiar. But whatever the reasons, these results seem robust and are in line with several studies in other countries such as China, Japan, Italy, and Portugal. For the UK, this age effect has also been reported in the survey by Shevlin et al. (11) during the earliest phase of the COVID-19 pandemic.

Besides age, sex also shows an impact on mental health. Women scored worse in every tested scale compared with men. Women scored worse in every tested scale compared with men. For example, 46.7% of women scored above the PHQ-9 cutoff greater-equal 10 points for depressive symptoms and 34.6% of men (35% more burden in women). Prepandemic values for the UK were 8.6% for women and 6.1% for men (41% more burden in women) (22). These results are in line with previous studies; sex differences in mental health are among the most intriguing and stable findings in psychiatry (27).

Our results indicate that unemployed and low-income respondents had poorer mental health, and regional variations in the severity of depression were consistent with known regional variations in socioeconomic deprivation. These results are in line with previous findings on socioeconomic deprivation and mental health. People with mild to moderate mental illness, such as anxiety or depression, are twice as likely to be unemployed (28). Unemployment rates for people with a severe mental disorder are five times as high as for people without a mental disorder (28). In addition, the relationship status showed an expected effect due to social isolation. A recent review showed that relationship or marriage improves mental health (29). Associations between physical activity and mental health have often been reported (30).

The present results should be interpreted in the context of some limitations. First, the cross-sectional design allows for no causal conclusions. A baseline stage immediately before the implementation of lockdown measures would have been a better control to study changes in mental health, but of course, the spread of the pandemic was unforeseen—a “black swan” event—so the circumstances require us to learn from limited available data and prior normative samples. Furthermore, we aimed to recruit a representative study sample according to age, sex, education, and region. However, the study sample was not entirely representative for combinations of these variables (e.g., age interlocked with sex). Thus, it is uncertain if our study sample is representative of the general population and if the results are generalizable. Moreover, the online survey was based entirely on self-rated questionnaires. Although valid and widely used, people are often biased when they report on their own experiences, and screening questionnaires can overestimate prevalence of mental disorders relative to structured diagnostic interviews. Higher values in levels of neuroticism or other background variables associated with negative affect could have an impact on our results, and we did not have data to adjust for these variables. Although we used a representative sample according to region, the sample size limitations did not permit more fine-grained statistical investigations across different regions of the UK. We also cannot rule out that more seriously affected older adults were less likely to participate.

This study examined a broad range of mental health and well-being indicators during the acute phase of the COVID-19 pandemic 4 weeks after lockdown. According to this evidence, the pandemic and associated lockdown restrictions had a major impact on mental health in the UK. In conclusion, self-reported mental health problems are higher and psychological well-being and quality of life is lower compared with preepidemiological data in the general population. It remains, however, unclear how similar these previous samples are in comparison to the sample of the current study.

Although the long-term effects of the pandemic cannot be estimated at this time, the short-term effect of the COVID-19 pandemic and the lockdown is likely to place a considerable burden on the mental health of many people. The lockdown is a major burden especially for younger adults, where almost two-thirds experience depressive or anxiety symptoms. Furthermore, younger people, women, the unemployed, and those with low income seem to be more severely burdened. Access to psychological support, especially for the most burdened groups, should be widely accessible to counteract this development.

Author Contribution: C.P. drafted the manuscript and contributed to the study design; S.B. revised the manuscript, performed statistical analyses, and contributed to the study design; J.D. revised the manuscript, performed statistical analyses, and contributed by interpreting the results; M.B. revised the manuscript and contributed by interpreting the results; J.F. revised the manuscript and contributed by interpreting the results; T.P. revised the manuscript, performed statistical analyses, and contributed to the study design.

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REFERENCES

- Nussbaumer-Streit B, Mayr V, Dobrescu AI, Chapman A, Persad E, Klerings I, Wagner G, Siebert U, Christof C, Zachariah C, Gartlehner G. Quarantine alone or in combination with other public health measures to control COVID-19: a rapid review. *Cochrane Database Syst Rev* 2020;2020:CD013574.
- WHOEurope. COVID-19 situation in the WHO European Region. WHO Maps Arcgis. 2020. Available at: <https://who.maps.arcgis.com/apps/opsdashboard/index.html#/e4d3c6475654481ca51c248d52ab9c61>. Accessed November 5, 2020.
- Office for National Statistics. Comparison of weekly death occurrences in England and Wales: up to week ending 24 April 2020. Available at: <https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/causesofdeath/articles/comparisonofweeklydeathoccurrencesinenglandandwales/latest>. Accessed November 5, 2020.
- Brooks SK, Webster RK, Smith LE, Woodland L, Wessely S, Greenberg N, Rubin GJ. The psychological impact of quarantine and how to reduce it: rapid review of the evidence. *The Lancet* 2020;395:912–20.
- Pfefferbaum B, North CS. Mental health and the COVID-19 pandemic. *N Engl J Med* 2020;383:510–2.
- Rajkumar RP. COVID-19 and mental health: a review of the existing literature. *Asian J Psychiatr* 2020;52:102066.
- Ueda M, Stickley A, Sueki H, Matsubayashi T. Mental health status of the general population during the COVID-19 pandemic: a cross-sectional national survey in Japan [published online May 30, 2020]. *medRxiv*. doi:10.1101/2020.04.28.20082453.
- Kazmi SSH, Hasan K, Talib S, Saxena S. COVID-19 and lockdown: a study on the impact on mental health [published April 21, 2020]. *SSRN Electron J* doi:10.2139/ssrn.3577515.
- Rossi R, Soccì V, Talevi D, Mensi S, Nioi C, Pacitti F, Di Marco A, Rossi A, Siracusano A, Di Lorenzo G. COVID-19 pandemic and lockdown measures impact on mental health among the general population in Italy. An N = 18147 web-based survey [published online April 14, 2020]. *medRxiv*. doi:10.1101/2020.04.09.20057802.
- Moreira PS, Ferreira S, Couto B, Machado-Sousa M, Fernandez M, Raposo-Lima C, Sousa N, Pico-Perez M, Morgado P. Protective elements of mental health status during the COVID-19 outbreak in the Portuguese population [published online May 1, 2020]. *medRxiv*. doi:10.1101/2020.04.28.20080671.
- Shevlin M, McBride O, Murphy J, Gibson Miller J, Hartman TK, Levita L, Mason L, Martinez AP, McKay R, Stocks TV, Bennett KM, Hyland P, Karatzias T, Bentall R. Anxiety, depression, traumatic stress, and COVID-19 related anxiety in the UK general population during the COVID-19 pandemic [published online April 18, 2020]. *PsyArXiv* 2020; doi:10.31234/osf.io/hb6nq.
- White RG, Van Der Boer C. The impact of the COVID19 pandemic and initial period of lockdown on the mental health and wellbeing of UK adults [published online April 29, 2020]. *medRxiv* 2020. doi:10.1101/2020.04.24.20078550.
- Skevington SM, Lotfy M, O'Connell KA. The World Health Organization's WHOQOL-BREF quality of life assessment: psychometric properties and results of the international field trial. a report from the WHOQOL group. *Qual Life Res* 2004;13:299–310.
- Hawthorne G, Herman H, Murphy B. Interpreting the WHOQOL-BREF: preliminary population norms and effect sizes. *Soc Indic Res* 2006;77:37–59.
- Topp CW, Østergaard SD, Søndergaard S, Bech P. The WHO-5 Well-Being Index: a systematic review of the literature. *Psychother Psychosom* 2015;84:167–76.
- Cohen S, Kamarck T, Mermelstein R. A global measure of perceived stress. *J Health Soc Behav* 1983;24:385–96.
- Kroenke K, Spitzer RL. The PHQ-9: a new depression diagnostic and severity measure. *Psychiatr Ann* 2002;32:509–15.
- Kroenke K, Spitzer RL, Williams JB, Monahan PO, Löwe B. Anxiety disorders in primary care: prevalence, impairment, comorbidity, and detection. *Ann Intern Med* 2007;146:317–25.
- Morin CM, Belleville G, Bélanger L, Ivers H. The Insomnia Severity Index: psychometric indicators to detect insomnia cases and evaluate treatment response. *Sleep* 2011;34:601–8.
- McManus S, Bebbington P, Jenkins R, Brugha T, NHS Digital, UK Statistics Authority. Mental health and wellbeing in England: Adult Psychiatric Morbidity Survey 2014: a survey carried out for NHS Digital by NatCen Social Research and the Department of Health Sciences, University of Leicester. 2016. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/556596/apms-2014-full-rpt.pdf. Accessed May 3, 2020.
- Evans J, Macrory I, Randall C. Measuring national well-being: life in the UK: 2016 2016. Office for National Statistics. Available at: <https://www.ons.gov.uk/peoplepopulationandcommunity/wellbeing/articles/measuringnationalwellbeing/2016/how-good-is-our-health>. Accessed November 5, 2020.
- Hapke U, Cöhres C, Nübel J. Depressive symptoms in a European comparison – Results from the European Health Interview Survey (EHIS) 2. *J Health Monit* 2019;4:57–65.
- Wittchen HU, Jacobi F, Rehm J, Gustavsson A, Svensson M, Jönsson B, Olesen J, Allgulander C, Alonso J, Faravelli C, Fratiglioni L, Jennum P, Lieb R, Maercker A, van Os J, Preisig M, Salvador-Carulla L, Simon R, Steinhausen H-C. The size and burden of mental disorders and other disorders of the brain in Europe 2010. *Eur Neuropsychopharmacol* 2011;21:655–79.
- Bech P, Olsen LR, Kjoller M, Rasmussen NK. Measuring well-being rather than the absence of distress symptoms: a comparison of the SF-36 Mental Health subscale and the WHO-Five Well-Being Scale. *Int J Methods Psychiatr Res* 2003;12:85–91.
- Klein EM, Brähler E, Dreier M, Reinecke L, Müller KW, Schmutz G, Wölfling K, Beutel ME. The German version of the Perceived Stress Scale—psychometric characteristics in a representative German community sample. *BMC Psychiatry* 2016;16:159.
- Tomitaka S, Kawasaki Y, Ide K, Akutagawa M, Ono Y, Furukawa TA. Stability of the distribution of Patient Health Questionnaire-9 scores against age in the general population: data from the National Health and Nutrition Examination Survey. *Front Psychiatry* 2018;9:390.
- Riecher-Rössler A. Sex and gender differences in mental disorders. *Lancet Psychiatry* 2017;4:8–9.
- OECD. Mental Health And Work: United Kingdom. Paris: OECD Publishing; 2014. doi:10.1787/9789264204997-en.
- Rapp I, Stauder J. Mental and physical health in couple relationships: is it better to live together? *Eur Sociol Rev* 2020;36:303–16.
- Penedo FJ, Dahn JR. Exercise and well-being: a review of mental and physical health benefits associated with physical activity. *Curr Opin Psychiatry* 2005;18:189–93.