Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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The effect of age, gender, income, work, and physical activity on mental health during coronavirus disease (COVID-19) lockdown in Austria

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A B S T R A C T

Background: The impact of Coronavirus disease (COVID-19) and the governmental restrictions on mental health have been reported for different countries. This study evaluated mental health during COVID-19 lockdown in Austria and the effect of age, gender, income, work, and physical activity.
Methods: An online survey was performed through Qualtrics® after four weeks of lockdown in Austria to recruit a representative sample regarding gender, age, education, and region. Indicators of mental health were quality of life (WHO-QOL BREF), well-being (WHO-5), depression (PHQ-9), anxiety (GAD-7), stress (PSS-10), and sleep quality (ISI).
Results: In total, $N = 1005$ individuals were included (53% women). 21% scored above the cut off ≥10 points (PHQ-9) for moderate depressive symptoms, 119% scored above the cut-off ≥10 points (GAD-7) for moderate anxiety symptoms, and 16% above the cut-off ≥15 points (ISI) for clinical insomnia. ANOVAs, Bonferroni-corrected post-hoc tests, and *t*-tests showed highest mental health problems in adults under 35 years, women, people with no work, and low income (all *p*-values < .05). Comparisons with a large Austrian sample recruited within the ATHIS 2014 study showed increases of depression and decreases of quality of life in times of COVID-19 as compared to before COVID-19.
Conclusions: Depressive symptoms (21%) and anxiety symptoms (19%) are higher during COVID-19 compared to previous epidemiological data. 16% rated over the cut-off for moderate or severe clinical insomnia. The COVID-19 pandemic and lockdown seems particularly stressful for younger adults (< 35 years), women, people without work, and low income.

1. Introduction

The Coronavirus disease 2019 (COVID-19) pandemic and the governmental restrictions impact our daily life in most parts of the world. Although restrictions are effective to prevent the uncontrolled spreading of COVID-19 [1], they might negatively affect mental health [2]. It is common for individuals to feel stressed and worried in times of pandemics, with fears of falling ill or dying, being socially excluded in quarantine, or losing their work [3].

There is a rapidly increasing number of publications on mental health in the pandemic and the governmental restrictions, respectively. Many of them are statements or comments and report alarming implications on emotional and social functioning [4] or an increased vulnerability for mental health problems and suicidal behavior [5].

So far, there are a few empirical studies with regard to the effect of the pandemic on mental health, some are already published as final papers and others are available as preprints. Ahmad et al. [6] reported 25% suffering from anxiety in India, whereby work situation, income, gender, and relationship status were correlated with mental health. A large Italian study including 18,147 individuals found 37% with post-traumatic stress symptoms, 17.3% with depression, 20.8% with anxiety, 7.3% with insomnia, 21.8% with high stress, and 22.9%with adjustment disorder [7] whereby women and younger age were risk factors for worse mental health. In Portugal, 7.6% suffered from severe depression symptoms, 9.1% from severe anxiety symptoms, 9.3% from severe stress symptoms, and 12.4% from severe obsessive-compulsive symptoms [8] with having work and being more physical active protecting from mental health problems. In Brazil, mild to moderate peritraumatic distress was found in 52% of the participants and severe distress in 18.8% [9]. In Japan, [10] 18.1% with moderate to severe depression and 11.4% to moderate to severe anxiety, whereby younger age and unemployment were risk factors. Wang et al. [11] found higher mean scores for PTSD symptoms and more than half of the participants rated the psychological impact of the outbreak as moderate or severe with an increase of 16.5% in moderate to severe depressive symptoms and 28.8% in moderate to severe anxiety symptoms. Huang & Zhao [12] reported a higher prevalence of general anxiety disorder (GAD), especially in the younger population. However, the cut-off score for GAD was set to a GAD-7 score higher or equal 9 points, which might lead to an overestimation of GAD. Patients with GAD have an average sum score of 14 points [13], higher or equal 9 points corresponds with mild (5–9) or moderate (10–14) anxiety symptoms [14]. Another study

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from Spain measured levels of anxiety, stress, and depression during COVID-19 and found lower levels of depression [15] compared to the Chinese study mentioned above [11]. Interestingly, they reported higher mean levels of stress, anxiety, and depression in younger adults [15]. These results are in line with an study from India, which also found high scores for depression, anxiety and stress in younger adults [16]. Women and younger adults significantly felt more anxiety about COVID-19 according to a study from Iran [17]. These results suggest that especially women and younger adults suffer from the COVID-19 crisis. Also, children seem to suffer heavenly. Over 80% of parents noticed a perceived change in their children's emotional state and behavior, with more difficulties in concentrating (76.6%), boredom (52%), followed by irritability, restlessness, nervousness, or feelings of loneliness. That was shown by a study on 1143 parents in Italy and Spain, in which results were slightly higher for Spain compared to Italy [18]. Besides younger individuals, infected individuals, individuals with pre-existing mental health problems might be other groups more vulnerable to mental health burden due to COVID-19 [4].

In Austria, measures against COVID-19 became obligatory on 16th of March 2020 (COVID- 19 lockdown). To summarize entering public places was strictly prohibited and only in some exceptions allowed (see methods). The aim of this study was to evaluate mental health in a representative adult sample in Austria after 4 weeks of lookdown considering relevant influencing factors such as age [15], gender [19], income, and job situation [20].

2. Methods

2.1. Study design

An online survey was performed with Qualtrics® [21] to measure mental health during the COVID-19 restrictions in Austria. The survey started after 4 weeks of quarantine in Austria and was performed for two weeks (until April 30th, 2020). This measurement point was selected because the scales used relate to the last two or four weeks.

2.2. Governmental restriction during the survey

In Austria, measures against COVID-19 became obligatory on 16th of March 2020 (COVID- 19 lockdown). There were only the following five exceptions of the ban to enter public places. Activities to avert an immediate danger to life, limb, or property; professional activity (if home-office is not possible); errands to cover necessary basic needs; care and assistance for people in need of support; exercise outdoors (e.g. running, walking) alone and with pets / people living in the same household. A distance of at least 1 m to other people has to be ensured.

2.3. Study sample

A representative sample according to age, gender, education, and region for Austria was recruited through Qualtrics panel. Participants were contacted by Qualtrics project team who organized and coordinated data collection. We aimed for a representative sample size according to age, gender, education, and region of at least 1000 participants. After recruiting the majority within the first few days, we focused on the harder to reach niche segments (e.g. older respondents). Demographic characteristics of the study sample (N = 1005) are presented in Table 1.

2.4. Measures

The following measures were applied. These measures were selected, since they are validated in German and often used in the research literature to assess mental health and psychological symptoms.

Table 1
Study sample characteristics (N = 1005).

Variable	n	%
Gender		
Women	530	52.7
Men	475	47.3
Age		
18–24	118	11.7
25–34	166	16.5
35–44	185	18.4
45–54	222	22.1
55–64	181	18.0
65+	133	13.2
Region		
Burgenland	35	3.5
Lower Austria	187	18.6
Vienna	218	21.7
Carinthia	66	6.6
Styria	149	14.8
Upper Austria	172	17.1
Salzburg	63	6.3
Tyrol	77	7.7
Vorarlberg	38	3.8
Education		
No school education	1	0.1
Secondary School	26	2.6
Apprenticeship	321	31.9
High School	288	28.7
University	369	36.7

n: frequencies; %: percent.

2.5. Quality of life (WHO-QOL BREF)

The WHOQOL-BREF [22] provides a reliable, valid, and brief assessment of quality-of-life. The 26 items self-rating questionnaire measures physical health, psychological health, social relationships, and environment during the past two weeks. WHOQOL-BREF has good to excellent psychometric properties of reliability and performs well in preliminary tests of validity [23].

General norms for the WHOQOL-BREF domains were found to be 73.5 (SD = 18.1) for the Physical health domain, 70.6 (14.0) for Psychological wellbeing, 71.5 (18.2) for Social relationships, and 75.1 (13.0) for the Environment domain [24]. Cronbach's alpha for the examined psychological domain was α = 0.86 in the current sample.

2.6. WHO-5 well-being

Well-being was measured with the WHO-5 questionnaire [25]. It measures well-being with five self-rating items rated on six-point Likert scales with higher score indicating higher well-being. The WHO-5 has good psychometric properties [26,27]. The raw score therefore theoretically ranges from 0 (absence of well-being) to 25 (maximal well-being). Because scales measuring health-related quality of life are conventionally translated to a percentage scale from 0 (absent) to 100 (maximal), it is recommended to multiply the raw score by 4 [27] . Cronbach's alpha was α = 0.90 in the current sample.

2.7. Perceived stress (PSS-10)

Stress-levels were assessed with the reliable and valid PSS-10 including 10 items on a five-point scale ranging from 0 to 4 [28]. Participants are asked to rate their stress-level over the last month. Cronbach's alpha was α = 0.89 in the current sample.

2.8. Depressive symptoms (PHQ-9)

Depressive symptoms were measured with the depression module of the Patient Health Questionnaire, the PHQ-9 [29], with 9 self-rating

Table 2
Number of participants exceeding the cut-off score for moderate depression/anxiety/insomnia, measures of psychological health, wellbeing and stress by gender.

		Gender			
		Male	Female	Total	Statistic
PHQ-9 score n (%)	< 10	397 (83.6)	397 (74.9)	7964(79.0)	χ^2 (1) = 11.36; p = .001
	≥10	78 (16.4)	133 (25.1)	211 (21.0)	
GAD-7 score n (%)	< 10	408 (85.9)	406 (76.6)	814 (81.0)	χ^2 (1) = 14.05; p < .001
	≥10	67 (14.1)	124 (23.4)	191 (19.0)	
ISI score n (%)	< 15	407 (85.7)	440 (83.0)	847 (84.3)	χ^2 (1) = 1.34; p = .25
	≥15	68 (14.3)	90 (17.0)	158 (15.7)	
	Total	475 (100)	530 (100)	1005 (100)	
PHQ-9	M	5.39	6.90	6.19	t(1003) = −4.45; p < .001; g = 0.28
	SD	5.08	5.58	5.40	
GAD-7	M	5.12	6.49	5.84	t(1003) = −4.67; p < .001; g = 0.30
	SD	4.41	4.85	4.70	
ISI	M	7.63	8.92	8.31	t(1003) = −3.62; p < .001; g = 0.23
	SD	5.69	5.66	5.70	
WHOQOL BREF (psychological domain)	M	72.75	67.21	69.83	t(1003) =4.74; p < .001; g = 0.30
	SD	18.56	18.45	18.70	
WHO-5	M	15.62	14.54	15.05	t(1003) = 3.17; p = .002; g = 0.20
	SD	5.31	5.44	5.40	
PSS-10	M	14.44	17.34	15.97	t(1003) = −6.25; p < .001; g = 0.40
	SD	6.77	7.80	7.47	

p: p-values (2-tailed); n: frequencies; M: mean score; SD: standard deviation, χ^2: Chi-square; F: F-test; ISI: Insomnia Severity Index, GAD-7 (Generalized Anxiety Disorder 7 scale); PHQ-9: Patient Health Questionnaire 9 scale; PSS-10: Perceived Stress Scale 10; WHO-5: Well-being questionnaire of the World Health Organization (WHO); WHO-QOL BREF: Quality of Life questionnaire of the World Health Organization (WHO).

items on a four point scale, from 0 to 3. Cut-off points are 5 for mild depression, 10 for moderate depression and at least 15 for severe levels of depression [30]. The 10-point cut-off was used in the present study to define clinically relevant depression. Cronbach's alpha was α = 0.89 in the current sample. Additionally, the PHQ-8 score was calculated [31] in order to be able to compare the PHQ-8 of the present study with the PHQ-8 of the Austrian Health Interview Survey 2014 (ATHIS) [32]. Cronbach's Alpha for the PHQ-8 was α = 0.88 in the current sample. The 10-point cut-off was used for the PHQ-8 as well [31].

2.9. Anxiety (GAD-7)

Anxiety symptoms were measured with Generalized Anxiety Disorder 7 scale (GAD-7) [14]. The GAD-7 is a validated [33] instrument which measures anxiety with 7 self-rating items on a four point scale, from 0 to 3. Cut-off points are 5 for mild, 10 for moderate and 15 for severe anxiety symptom levels. The 10-point cut-off was used in the current study to define clinically relevant anxiety. Cronbach's alpha was α = 0.90 in the current sample.

2.10. Sleep quality (ISI)

The Insomnia Severity Index (ISI) is a self-reported 7-item on a four point scale (from 0 to 4) questionnaire measuring sleep quality and insomnia with an excellent internal consistency (Cronbach α of 0.90 and 0.91) [34]. A cut-off score of 10 was optimal (86.1% sensitivity and 87.7% specificity) for detecting insomnia cases in the community sample. The total score categories are 1) no clinically significant insomnia (< 7 points), 2) subthreshold insomnia (8–14 points), 3) clinical insomnia (moderate severity) (15–21 points), and 4) clinical insomnia (severe) (22–28 points). The 15-point cut-off score was applied in the present study to define clinically relevant insomnia. Cronbach's alpha was α = 0.84 in the current sample.

2.11. Statistical analysis

All data were analyzed using SPSS version 24 (IBM Corp, Armonk, NY, USA). Descriptive statistics were conducted to describe the demographic characteristics, scales mean values, and the prevalence of mental health burden stratified by gender, age, income, work, and physical activity reported in the representative Austrian sample. ANOVAs (mental health scales as dependent variables and age group, work, net income, and physical activity as between-subject variable), and Bonferroni-corrected post-hoc tests were performed to compare the impact on mental health in different age, work, net income, and physical activity groups. *t*-tests were calculated to compare differences on mental health scales between gender. As effect size measure, η2 was used to categorize small (η2 = 0.01), medium (η2 = 0.06), and large (η2 = 0.14) effects for ANOVAs; Hedges'g was calculated for gender (small effect: 0.2 to 0.5, medium effect: 0.5 to 0.8, large effect: > 0.8). Moreover, *t*-tests were calculated to compare the results for the PHQ-8 and the WHOQOL-BREF psychological domain of the present study with the results of these scales found in the ATHIS 2014 survey with 15,771 participants [32]. Chi-squared tests were performed to investigate differences between symptom severity categories and age, gender, income, work, physical activity, and sample (current sample vs. ATHIS 2014 sample). *P*-values of less than 0.05 were considered statistically significant (2-sided tests).

2.12. Ethical consideration

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

Table 3
Number of participants exceeding the cut-off score for moderate depression/anxiety/insomnia, measures of psychological health, wellbeing and stress by age.

		Age						Total	Statistic
		18–24	25–34	35–44	45–54	55–64	65+		
PHQ-9 score n (%)	< 10	80 (67.8)	110 (66.3)	148 (80.0)	178 (80.2)	152 (84.0)	126 (94.7)	794 (79.0)	χ^2 (5) = 48.02; p < .001
	≥10	38 (32.2)	56 (33.7)	37 (20.0)	44 (19.8)	29 (16.0)	7 (5.3)	211 (21.0)	
GAD-7 score n (%)	< 10	92 (78.0)	121 (72.9)	148 (80.0)	178 (80.2)	151 (83.4)	124 (93.2)	814 (81.0)	χ^2(5) = 21.63; p = .001
	≥10	26 (22.0)	45 (27.1)	37 (20.0)	44 (19.8)	30 (16.6)	9 (6.8)	191 (19.0)	
ISI score n (%)	< 15	96 (81.4)	136 (81.9)	159 (85.9)	177 (79.7)	152 (84.0)	127 (95.5)	847 (84.3)	χ^2 (5) = 17.93; p = .003
	≥15	22 (18.6)	30 (18.1)	26 (14.1)	45 (20.3)	29 (16.0)	6 (4.5)	158 (15.7)	
	Total	118 (100)	166 (100)	185 (100)	222 (100)	181 (100)	133 (100)	1005 (100)	
PHQ-9	M	8.25	7.89	6.07	6.21	5.16	3.74	6.19	F(5; 1004) = 14.37; p < .001; η^2 = 0.067
	SD	5.96	5.78	5.05	5.54	4.80	3.95	5.40	
GAD-7	M	7.26	7.07	6.06	5.92	4.91	3.85	5.84	F(5; 1004) = 11.27; p < .001; η^2 = 0.053
	SD	4.93	4.78	4.42	4.87	4.36	3.97	4.70	
ISI	M	8.59	9.72	8.34	8.77	7.86	6.11	8.31	F(5; 1004) = 6.75; p < .001; η^2 = 0.033
	SD	5.80	5.89	5.55	5.77	5.88	4.51	5.70	
WHOQOL BREF (psychological domain)	M	65.72	67.35	69.84	68.28	72.83	75.08	69.83	F(5; 1004) = 5.16; p < .001; η^2 = 0.025
	SD	20.32	19.12	17.60	20.60	16.65	15.82	18.70	
WHO-5	M	13.63	14.20	15.08	14.66	15.65	17.18	15.05	F(5; 1004) = 7.51; p < .001; η^2 = 0.036
	SD	4.91	5.26	5.00	5.88	5.46	4.97	5.40	
PSS-10	M	19.25	17.89	16.24	16.07	14.05	12.73	15.97	F(5; 1004) = 15.24; p < .001; η^2 = 0.071
	SD	6.80	7.05	7.04	7.78	7.37	6.80	7.47	

p: p-values (2-tailed); n: frequencies; M: mean score; SD: standard deviation, χ^2: Chi-square; F: F-test; ISI: Insomnia Severity Index, GAD-7 (Generalized Anxiety Disorder 7 scale); PHQ-9: Patient Health Questionnaire 9 scale; PSS-10: Perceived Stress Scale 10; WHO-5: Well-being questionnaire of the World Health Organization (WHO); WHO-QOL BREF: Quality of Life questionnaire of the World Health Organization (WHO);

3. Results

In total $N = 1005$ participated in the study (Women: $N = 530$; 52.7%). For the characteristics of the study sample, see Table 1.

Results for mean scores (M) and standard deviation (SD) for the PHQ-9, GAD-7, ISI, WHO-QOL BREF (psychological domain), WHO-5, as well as PSS-10 and number of participants below/above the cut-off score for moderate depression/anxiety/insomnia between women and men are presented in Table 2. Women were more burdened than men.

Results for mean scores (M) and standard deviation (SD) for the PHQ-9, GAD-7, ISI, WHO-QOL BREF (psychological domain), WHO-5, and PSS-10 between age groups as well as number of participants below/above the cut-off score for moderate depression/anxiety/insomnia stratified by age groups are given in Table 3. Post-hoc tests can be found in the supplement. To summarize the post-hoc tests, individuals younger than 35 years were most burdened and individuals being 65+ years were less burdened in all scales considering mean scores.

Results for mean scores (M) and standard deviation (SD) for the PHQ-9, GAD-7, ISI, WHO-QOL BREF (psychological domain), WHO-5, and PSS-10 between individuals with different work situation as well as number of participants below/above the cut-off score for moderate depression/anxiety/insomnia stratified by work situation are given in Table 4. Post-hoc tests can be found in the supplement. To summarize the post-hoc tests, individuals without work had more mental health problems in all scales considering cut-offs as well as mean scores.

Results for mean scores (M) and standard deviation (SD) for the PHQ-9, GAD-7, ISI, WHO-QOL BREF (psychological domain), WHO-5, and PSS-10 between income groups as well as number of participants below/above the cut-off score for moderate depression/anxiety/insomnia stratified by income groups are given in Table 5. Post-hoc tests can be found in the supplement. To summarize the post-hoc tests, low income was associated with less mental health in all scales considering cut-offs as well as mean scores.

Results for mean scores (M) and standard deviation (SD) for the PHQ-9, GAD-7, ISI, WHO-QOL BREF (psychological domain), WHO-5, and PSS-10 between physical activity groups as well as number of participants below/above the cut-off score for moderate depression/anxiety/insomnia stratified by physical activity groups are given in Table 6. Post-hoc tests can be found in the supplement. To summarize the post-hoc tests, more physical activity was related to better mental health in almost all scales (except ISI) considering cut-offs as well as mean scores.

Table 7 shows the comparisons between our sample and the ATHIS 2014 sample with regard to PHQ-8 and WHOQOL-BREF (psychological domain). It can be seen that mental health burden was significantly higher now than 2014 in Austria.

4. Discussion

The current study explored mental health four weeks after the COVID-19 lockdown in Austria. There are two major findings of this study. First, the COVID-19 pandemic, as well as the lockdown, seems to have a major impact on mental health. Second, young adults (< 35 years), women, people without work as well as with low income are significantly more burdened, physical activity has a positive association with mental health.

The impact of the current situation on mental health is also evident when examining the number of participants scoring above established cut-offs for depression, anxiety, and insomnia. In the current study, 19% scored 10 points or higher on the GAD-7. Previous representative population studies from Germany found that 5% scored above the same cut-off (greater-equal 10 points) in 2008 [33] or 6% in 2017 [35]. In addition, 21% of the participants in the present study showed

Table 4
Number of participants exceeding the cut-off score for moderate depression/anxiety/insomnia, measures of psychological health, wellbeing and stress by work.

		Work							
		No	No, but before the lockdown I did	Yes, Home-Office	Yes	Yes, reduced hours	Retired	Total	Statistic
PHQ-9 score n (%)	< 10	114 (65.1)	68 (72.3)	209 (78.9)	167 (86.1)	80 (78.4)	156 (89.1)	794 (79.0)	χ^2 (5) = 39.52; p < .001
	≥10	61 (34.9)	26 (27.7)	56 (21.1)	27 (13.9)	22 (21.6)	19 (10.9)	211 (21.0)	
GAD-7 score n (%)	< 10	128 (73.1)	73 (77.7)	214 (80.8)	162 (83.5)	82 (80.4)	155 (88.6)	814 (81.0)	χ^2 (5) = 15.04; p = .01
	≥10	47 (26.9)	21 (22.3)	51 (19.2)	32 (16.5)	20 (19.6)	20 (11.4)	191 (19.0)	
ISI score n (%)	< 15	134 (76.6)	77 (81.9)	235 (88.7)	166 (85.6)	82 (80.4)	153 (87.4)	847 (84.3)	χ^2(5) = 14.83; p = .01
	≥15	41 (23.4)	17 (18.1)	30 (11.3)	28 (14.4)	20 (19.6)	22 (12.6)	158 (15.7)	
	Total	175 (100)	94 (100)	265 (100)	194 (100)	102 (100)	175 (100)	1005(100)	
PHQ-9	M	8.14	6.97	6.14	5.42	6.19	4.74	6.19	F(5; 1004) = 8.58; p < .001; η^2 = 0.041
	SD	6.30	5.20	5.30	4.81	5.11	4.90	5.40	
GAD-7	M	7.05	6.65	5.83	5.63	5.98	4.35	5.84	F(5; 1004) = 6.67; p < .001; η^2 = 0.032
	SD	4.99	4.76	4.66	4.48	4.66	4.29	4.70	
ISI	M	9.75	8.69	7.63	8.60	8.22	7.42	8.31	F(5; 1004) = 4.09; p = .001; η^2 = 0.020
	SD	6.30	5.46	5.42	5.58	5.72	5.50	5.70	
WHOQOL BREF (psychological domain)	M	63.54	67.25	71.51	71.78	70.56	72.38	69.83	F(5; 1004) = 6.00; p < .001; η^2 = 0.029
	SD	20.62	20.00	17.71	16.74	18.25	18.45	18.70	
WHO-5	M	13.16	14.70	15.20	15.45	15.58.	16.15	15.05	F(5; 1004) = 6.43; p < .001; η^2 = 0.031
	SD	5.56	5.72	5.25	4.81	5.04	5.71	5.40	
PSS-10	M	18.47	17.56	16.00	15.15	16.04	13.45	15.97	F(5; 1004) = 9.67; p < .001; η^2 = 0.046
	SD	7.60	7.84	7.21	6.44	7.49	7.67	7.47	

p: p-values (2-tailed); n: frequencies; M: mean score; SD: standard deviation, χ^2: Chi-square; F: F-test; ISI: Insomnia Severity Index, GAD-7 (Generalized Anxiety Disorder 7 scale); PHQ-9: Patient Health Questionnaire 9 scale; PSS-10: Perceived Stress Scale 10; WHO-5: Well-being questionnaire of the World Health Organization (WHO); WHO-QOL BREF: Quality of Life questionnaire of the World Health Organization (WHO);

Table 5
Number of participants exceeding the cut-off score for moderate depression/anxiety/insomnia, measures of psychological health, wellbeing and stress by income.

		Net income					Total	Statistic
		< € 1.000,-	€ 1.000,- to € 2.000,-	€ 2.000,- to € 3.000,-	€ 3.000,- to € 4.000,-	> € 4.000,-		
PHQ-9 score n (%)	< 10	45 (63.4)	177 (75.3)	239 (78.6)	166 (84.7)	167 (83.9)	794 (79.0)	χ^2 (4) = 19.12; p = .001
	≥10	26 (36.6)	58 (24.7)	65 (21.4)	30 (15.3)	32 (16.1)	211 (21.0)	
GAD-7 score n (%)	< 10	49 (69.0)	182 (77.4)	250 (82.2)	170 (86.7)	163 (81.9)	814 (81.0)	χ^2 (4) = 13.15; p = .01
	≥10	22 (31.0)	53 (22.6)	54 (17.8)	26 (13.3)	36 (18.1)	191 (19.0)	
ISI score n (%)	< 15	52 (73.2)	194 (82.6)	251 (82.6)	173 (88.3)	177 (88.9)	847 (84.3)	$\chi^2(4) = 13.35$; $p = .01$
	≥15	19 (26.8)	41 (17.4)	53 (17.4)	23 (11.7)	22 (11.1)	158 (15.7)	
	Total	71 (100)	235 (100)	304 (100)	196 (100)	199 (100)	1005 (100)	
PHQ-9	M	8.34	7.03	6.34	5.35	5.01	6.19	F(4; 1004) = 8.04; p < .001; η^2 = 0.031
	SD	6.18	5.54	5.49	4.79	4.99	5.40	
GAD-7	M	7.62	6.17	5.86	5.44	5.17	5.84	F(4; 1004) = 4.25; $p = .002$; η^2 = 0.017
	SD	5.81	4.74	4.46	4.29	4.80	4.70	
ISI	M	9.65	9.22	8.33	7.77	7.26	8.31	F(4; 1004) = 4.65; p = .001; η^2 = 0.018
	SD	5.79	5.65	5.92	5.59	5.30	5.70	
WHOQOL BREF (psychological domain)	M	63.00	65.24	68.64	74.23	75.17	69.83	F(4; 1004) = 13.63; p < .001; η^2 = 0.052
	SD	21.36	19.12	18.70	15.13	18.10	18.70	
WHO-5	M	12.99	14.12	14.82	15.88	16.43	15.05	F(4; 1004) = 9.16; p < .001; η^2 = 0.035
	SD	6.28	5.50	5.33	4.63	5.35	5.40	
PSS-10	M	18.30	16.92	16.15	15.16	14.54	15.97	F(4; 1004) = 5.21; p < .001; η^2 = 0.020
	SD	8.47	7.86	6.98	6.84	7.61	7.47	

p: p-values (2-tailed); n: frequencies; M: mean score; SD: standard deviation, χ^2: Chi-square; F: F-test; ISI: Insomnia Severity Index, GAD-7 (Generalized Anxiety Disorder 7 scale); PHQ-9: Patient Health Questionnaire 9 scale; PSS-10: Perceived Stress Scale 10; WHO-5: Well-being questionnaire of the World Health Organization (WHO); WHO-QOL BREF: Quality of Life questionnaire of the World Health Organization (WHO).

Table 6
Number of participants exceeding the cut-off score for moderate depression/anxiety/insomnia, measures of psychological health, wellbeing and stress by physical activity.

		Days of physical activity					Total	Statistic
		0	1	2	3	4 or more		
PHQ-9 score n (%)	< 10	85 (64.9)	67 (70.5)	139 (80.8)	121 (78.1)	382 (84.5)	794 (79.0)	$\chi^2(4) = 28.55$; $p < .001$
	≥10	46 (35.1)	28 (29.5)	33 (19.2)	34 (21.9)	70 (15.5)	211 (21.0)	
GAD-7 score n (%)	< 10	93 (71.0)	72 (75.8)	147 (85.5)	117 (75.5)	385 (85.2)	814 (81.0)	$\chi^2(4) = 20.61$; $p < .001$
	≥10	38 (29.0)	23 (24.2)	25 (14.5)	38 (24.5)	67 (14.8)	191 (19.0)	
ISI score n (%)	< 15	100 (76.3)	78 (82.1)	145 (84.3)	133 (85.8)	391 (86.5)	847 (84.3)	$\chi^2(4) = 8.54$; $p = .07$
	≥15	31 (23.7)	17 (17.9)	27 (15.7)	22 (14.2)	61 (13.5)	158(15.7)	
	Total	131 (100)	95 (100)	172 (100)	155 (100)	452 (100)	1005 (100)	
PHQ-9	M	8.09	7.52	5.81	6.59	5.36	6.19	$F(4; 1004) = 8.86$; $p < .001$; $\eta^2 = 0.034$
	SD	6.22	5.45	4.63	5.48	5.20	5.40	
GAD-7	M	6.71	6.67	5.75	6.34	5.27	5.84	$F(4; 1004) = 4.01$; $p = .003$; $\eta^2 = 0.016$
	SD	5.42	4.27	4.04	5.10	4.58	4.70	
ISI	M	9.54	8.71	8.05	8.48	7.91	8.31	$F(4; 1004) = 2.35$; $p = .05$; $\eta^2 = 0.009$
	SD	5.93	5.62	5.37	5.40	5.84	5.70	
WHOQOL BREF (psychological domain)	M	62.82	64.11	69.14	70.29	73.17	69.83	$F(4; 1004) = 10.94$; $p < .001$; $\eta^2 = 0.042$
	SD	23.33	18.40	16.38	18.35	17.37	18.70	
WHO-5	M	12.17	13.60	14.99	15.15	16.18	15.05	$F(4; 1004) = 16.99$; $p < .001$; $\eta^2 = 0.064$
	SD	5.94	5.03	4.80	5.02	5.30	5.40	
PSS-10	M	17.89	17.56	16.38	16.48	14.75	15.97	$F(4; 1004) = 6.73$; $p < .001$; $\eta^2 = 0.026$
	SD	8.55	6.88	6.86	7.58	7.24	7.47	

p: p-values (2-tailed); n: frequencies; M: mean score; SD: standard deviation, χ^2: Chi-square; F: F-test; ISI: Insomnia Severity Index, GAD-7 (Generalized Anxiety Disorder 7 scale); PHQ-9: Patient Health Questionnaire 9 scale; PSS-10: Perceived Stress Scale 10; WHO-5: Well-being questionnaire of the World Health Organization (WHO); WHO-QOL BREF: Quality of Life questionnaire of the World Health Organization (WHO).

Table 7
Comparisons of the current sample during COVID-19 with the sample of the Austrian Health Interview Survey 2014 (ATHIS) [32] in the PHQ-8 and the psychological domain of the WHO-QOL BREF.

		Sample		
		ATHIS 2014 $N = 15{,}771$	Sample of current study N = 1005	Statistic
PHQ-8 score n (%)	< 10	15,185 (96.3)	805 (80.1)	$\chi^2(1) = 554.19$; $p < .001$
	≥10	586 (3.7)	200 (19.9)	
PHQ-8	M	2.53	5.93	$t(1051.07) = -21.27$; $p < .001$; $g = 1.07$
	SD	3.02	5.00	
WHOQOL BREF psychological domain	M	76.55	69.83	$t(1077.37) = 11.19$; $p < .001$; $g = 0.47$
	SD	14.04	18.70	

p: p-values (2-tailed); n: frequencies; M: mean score; SD: standard deviation, χ^2: Chi-square; F: F-test; PHQ-8: Patient Health Questionnaire 8 scale; WHO-QOL BREF: Quality of Life questionnaire of the World Health Organization (WHO).

depressive symptoms (above the cut-off greater-equal 10 points) on the PHQ-9. Comparable representative population studies found that 4% scored above this cut-off in 2006 [36], or 6% in 2013 [37], and again 4% in an Austrian sample in 2014 (but measured with the PHQ-8) [32]. The prevalence rate for depression during COVID-19 is comparable to Huang & Zhao [12], who reported 20% depression and 35% anxiety. The higher anxiety percentage might be influenced, among other factors, by their GAD-7 cut-off of 9 instead of 10 points. In the current study 16% rated above the cut-off for clinical insomnia (moderate severity) in the ISI. According to a meta-analysis, the prevalence of insomnia in Europe was 7% [38]. However, compared to depression and anxiety, these prevalence rates are not totally comparable as it compares the prevalence of the diagnosis insomnia with a cut-off score for clinical insomnia.

In addition, the mean scores showed that the PHQ-8 scores were higher than 2014 in Austria (current sample: 5.9 vs. ATHIS 2014 sample: 2.5) with a large effect size. The average score in the PHQ-9 for depression was 6.2 in contrast to 3.3 for the general population in Germany in 2016 [39]. Although this score is below the cut-off score for moderate depressive symptoms (greater-equal 10 points), it indicates mild depressive symptoms (greater-equal 5 points). For anxiety symptoms, we found an average score of 5.8 in contrast to 3.6 for the general population in Germany in 2017 [35]. This also indicates mild symptoms of anxiety (from 5 to 9 points) with a cut-off for moderate anxiety symptoms greater-equal 10 points. The average psychological health score of the WHO-QOL BREF questionnaire was significantly lower than in the ATHIS 2014 sample (ATHIS 2014 sample: 76.6 vs. current sample: 69.8) with a small to medium effect size [32]. However, data for the ATHIS 2014 study [32] was collected years ago and the sample was different to ours so that a comparison is only possible to a limited extend. Similarly, well-being (WHO-5) was lower compared to a study from Denmark published in 2003 (presented in percent, not as raw score: 15.05 × 4 = 60.2 vs. 68.7 reported by Bech et al. [40]. The stress-level (PSS-10: 16.0) is comparable with a COVID-19 study including 41 countries showing a mean PSS-10 score of 17.4 [41]. However, stress-level was especially in the younger age groups higher than in studies from pre-corona times [42]. Klein et al. [42] found an average score of 12.7 in 20–39 years old adults compared to 19.3 (age 18–24), 17.9 (age 25–34), and 16.2 (age 35–44) in the current study. Average insomnia symptoms (ISI mean score 8.3) are below clinical insomnia (greater-equal 15), but slightly above the cut-off for subthreshold insomnia (greater-equal 8 points).

As expected, gender showed an impact on mental health in the current study. Differences in mental disorders are among the most

intriguing and stable findings in psychiatry [19]. Women were scoring worse in every tested scale compared to men. For example, 25% of women scored above the PHQ-9 cut-off greater-equal 10 points for depressive symptoms and 16% of men. Thus, women scored significantly higher now compared to the ATHIS 2014 study, when 5.1% of women and 3.4% of men in Austria were clinically relevant depressed according to the PHQ-8 cut-off greater-equal 10 points [43]. Moreover, mental quality of life was lower (67 vs. 73) in women compared to men. In line with previous studies [44] well-being was lower for women than for men (14.5 vs. 15.6).

Noteworthy, there was a clear age-related effect in all tested mental health scales. These results are alarming and should be considered in more detail. In each tested mental health aspect, the younger adult groups (< 35 years) showed the worst scores (depending on the scaling higher or lower score) and the older people (65+ years) the best. These results are reverse to a previous studies before COVID-19 in Austria as mental health was decreasing with age [32]. In this previous study, psychological health (measured with the WHO-QOL BREF) decreased from 77.9 (age 15–30) to 69.6 (> 75 years) [32]. The PHQ-9 is generally stable throughout all periods of adulthood according to a large survey of 15,847 participants [45]. However, in the current study the youngest age group (18–24 years) showed twice as high scores in the PHQ-9 compared to the oldest (65+ years) (8.3 vs. 3.7). Over 30% of people below 35 years show depressive symptoms, compared to 5% in those being 65+ years old. Similar effects were found for anxiety: A study on the GAD-7 showed similar scores for every age group with lowest scores for the youngest age group [33]. These findings are reversed to the current ones, were the youngest group (18–24) again showed the highest scores (7.3 compared to 3.9 for the 65+). 25% of adults under 35 years score above the GAD-7 cut-off for at least moderate anxiety symptoms, only 7% in people 65+. Interestingly, the older adults seem to be handling this exceptional situation better than the younger ones. In every measurement, the scores get better with every age category. There might be various explanations for these findings, such as more uncertain working conditions and therefore serious financial problems for younger people. The lockdown might also lead to larger restriction for younger than for older people. However, these results seem robust and are in line with several other COVID-19 studies cited in the introduction [12,15,16].

Our results are in line with previous findings on job situation and mental health. People with mild to moderate mental illness, such as anxiety or depression, are twice as likely to be unemployed [46]. Unemployed rates for people with a severe mental disorder are five times as high as for people without a mental disorder [46]. In connection to these findings, a reduction in household income is associated with increased risk for incident mental disorders [47].

Association between physical activity and mental health as found in the current study is well known [48]. Increased duration and greater intensity of physical activity were both associated with further reduction in prevalence of depression in men [49]. Such results were found for adults (e.g. [50,51] as well as in children and adolescents [48].

When interpreting the results, the following limitations have to be considered. Although the sample is representative for age, gender, education, and region, it is not representative for combinations of these variables, e.g. age interlocked with gender. This cross-sectional study allows no causal conclusions. Two measurement points (before vs. in COVID-19 lockdown) would have been more adequate to study changes in mental health. Furthermore, there is a potential bias since the sample was actively recruited and the sample size is small. Other interesting and probably influencing demographics (such as number of migrants) were not assessed. Moreover, the online survey was based only on self-rating tests. Although valid and widely used, people are often biased when they report on their own experiences [52]. Using screening questionnaires to estimate prevalence can overestimate prevalence: For example, if 20% of patients had a score above the cut-off ≥10 points in the PHQ-9, plausible estimates of true disorder prevalence would range from 6% to 17% when adjusted with the formula recommended from [53]: Prevalence = (% above cut-off + specificity - 1) / (sensitivity + specificity - 1). Although a representative sample according to age, gender, education, and income was recruited, the sample size is rather small, and the generalizability is questionable. A clinician assessment necessary to make statements about psychiatric disorders such as the Structured Clinical Interview was missing, which makes the interpretation of the results vague. Furthermore, the current results were compared to previous studies, in general some years earlier and from different countries. It is unclear, which effect is explained by the current situation.

To sum these first findings up, there is a major increase of mental health problems in the general population compared to pre-corona studies. Doubtless, the effect of the pandemic cannot be estimated at this time, especially the long-term effects. However, the prevalence of moderate to severe depressive and anxiety symptoms is higher compared to several previous studies [32–36]. Also insomnia symptoms seem more prevalent compared to previous studies [38], whereas psychological health and well-being are lower [32,40]. Especially young adults, women, people with low income, without a job, and those being physical inactive, are burdened in the current situation. As already recommended from other authors [54], timely psychological support should be offered to counteract this development.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jpsychores.2020.110186.

References

[1] B. Nussbaumer-Streit, V. Mayr, A.I. Dobrescu, A. Chapman, E. Persad, I. Klerings, G. Wagner, U. Siebert, C. Christof, C. Zachariah, G. Gartlehner, Quarantine alone or in combination with other public health measures to control COVID-19: a rapid review, Cochrane Database Syst. Rev. (2020), https://doi.org/10.1002/14651858.CD013574.

[2] S.K. Brooks, R.K. Webster, L.E. Smith, L. Woodland, S. Wessely, N. Greenberg, G.J. Rubin, The psychological impact of quarantine and how to reduce it: rapid review of the evidence, Lancet 395 (2020) 912–920, https://doi.org/10.1016/S0140-6736(20)30460-8.

[3] IFRC, IFRC, https://media.ifrc.org/ifrc, (2020).

[4] B. Pfefferbaum, C.S. North, Mental Health and the Covid-19 Pandemic, N. Engl. J. Med. 0 (2020), https://doi.org/10.1056/NEJMp2008017 null.

[5] D. Gunnell, L. Appleby, E. Arensman, K. Hawton, A. John, N. Kapur, M. Khan, R.C. O'Connor, J. Pirkis, L. Appleby, E. Arensman, E.D. Caine, L.F. Chan, S.-S. Chang, Y.-Y. Chen, H. Christensen, R. Dandona, M. Eddleston, A. Erlangsen, D. Gunnell, J. Harkavy-Friedman, K. Hawton, A. John, N. Kapur, M. Khan, O.J. Kirtley, D. Knipe, F. Konradsen, S. Liu, S. McManus, L. Mehlum, M. Miller, P. Moran, J. Morrissey, C. Moutier, T. Niederkrotenthaler, M. Nordentoft, R.C. O'Connor, S. O'Neill, A. Page, M.R. Phillips, J. Pirkis, S. Platt, M. Pompili, P. Qin, M. Rezaeian, M. Silverman, M. Sinyor, S. Stack, E. Townsend, G. Turecki, L. Vijayakumar, P.S. Yip, Suicide risk and prevention during the COVID-19 pandemic, Lancet Psychiatry (2020), https://doi.org/10.1016/S2215-0366(20)30171-1 S2215036620301711.

[6] A. Ahmad, I. Rahman, M. Agarwal, FACTORS Influencing Mental Health During Covid-19 Outbreak: An Exploratory Survey Among Indian Population, Psychiatry and Clinical Psychology (2020), https://doi.org/10.1101/2020.05.03.20081380.

[7] R. Rossi, V. Socci, D. Talevi, S. Mensi, C. Niolu, F. Pacitti, A. Di Marco, A. Rossi, A. Siracusano, G. Di Lorenzo, COVID-19 pandemic and lockdown measures impact on mental health among the general population in Italy. An N = 18147 web-based survey, Psych. Clin. Psychol. (2020), https://doi.org/10.1101/2020.04.09.20057802.

[8] P.S. Moreira, S. Ferreira, B. Couto, M. Machado-Sousa, M. Fernandez, C. Raposo-Lima, N. Sousa, M. Pico-Perez, P. Morgado, Protective Elements of Mental Health Status during the COVID-19 Outbreak in the Portuguese Population, Psychiatry and Clinical Psychology (2020), https://doi.org/10.1101/2020.04.28.20080671.

[9] S.X. Zhang, Y. Wang, A. Afshar Jahanshahi, J. Jia, V.G. Haensel Schmitt, First Study on Mental Distress in Brazil during the COVID-19 Crisis, Psychiatry and Clinical Psychology (2020), https://doi.org/10.1101/2020.04.18.20070896.

[10] M. Ueda, A. Stickley, H. Sueki, T. Matsubayashi, Mental Health Status of the General Population during the COVID-19 Pandemic: A Cross-Sectional National Survey in Japan, Psychiatry and Clinical Psychology (2020), https://doi.org/10.1101/2020.04.28.20082453.

[11] C. Wang, R. Pan, X. Wan, Y. Tan, L. Xu, C.S. Ho, R.C. Ho, Immediate psychological responses and associated factors during the initial stage of the 2019 coronavirus disease (COVID-19) epidemic among the general population in China, Int. J.

Environ. Res. Public Health 17 (2020) 1729, https://doi.org/10.3390/ijerph17051729.
[12] Y. Huang, N. Zhao, Generalized anxiety disorder, depressive symptoms and sleep quality during COVID-19 outbreak in China: a web-based cross-sectional survey, Psychiatry Res. 288 (2020) 112954, https://doi.org/10.1016/j.psychres.2020.112954.
[13] K. Kroenke, R.L. Spitzer, J.B.W. Williams, P.O. Monahan, B. Löwe, Anxiety disorders in primary care: prevalence, impairment, comorbidity, and detection, Ann. Intern. Med. 146 (2007) 317, https://doi.org/10.7326/0003-4819-146-5-200703060-00004.
[14] R.L. Spitzer, K. Kroenke, J.B.W. Williams, B. Löwe, A brief measure for assessing generalized anxiety disorder: the GAD-7, Arch. Intern. Med. 166 (2006) 1092, https://doi.org/10.1001/archinte.166.10.1092.
[15] N. Ozamiz-Etxebarria, M. Dosil-Santamaria, M. Picaza-Gorrochategui, N. Idoiaga-Mondragon, Níveis de estresse, ansiedade e depressão na primeira fase do surto de COVID-19 em uma amostra no norte da Espanha, Cad Saúde Pública. 9 (2020).
[16] S.S.H. Kazmi, K. Hasan, S. Talib, S. Saxena, COVID-19 and Lockdwon: a study on the impact on mental health, SSRN Electron. J. (2020), https://doi.org/10.2139/ssrn.3577515.
[17] A. Moghanibashi-Mansourieh, Assessing the anxiety level of Iranian general population during COVID-19 outbreak, Asian J. Psychiatr. 51 (2020) 102076, https://doi.org/10.1016/j.ajp.2020.102076.
[18] M. Orgilés, A. Morales, E. Delvecchio, C. Mazzeschi, J.P. Espada, Immediate psychological effects of the COVID-19 quarantine in youth from Italy and Spain, PsyArXiv, (2020), https://doi.org/10.31234/osf.io/5bpfz.
[19] A. Riecher-Rössler, Sex and gender differences in mental disorders, Lancet Psychiatry 4 (2017) 8–9, https://doi.org/10.1016/S2215-0366(16)30348-0.
[20] OECD, Mental Health and Work: Austria, OECD, 2015, https://doi.org/10.1787/9789264228047-en.
[21] P.U. Qualtrics, Qualtrics, Qualtrics, Provo, Utah, USA, 2019https://www.qualtrics.com.
[22] World Health Organization, Programme Ment. Health WHOQOL User Man. 2012 Revis. World Health Organ, https://apps.who.int/iris/handle/10665/77932, (1998).
[23] S.M. Skevington, M. Lotfy, K.A. O'Connell, 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. 13 (2004) 299–310, https://doi.org/10.1023/B:QURE.0000018486.91360.00.
[24] G. Hawthorne, H. Herrman, B. Murphy, Interpreting the WHOQOL-Brèf: preliminary population norms and effect sizes, Soc. Indic. Res. 77 (2006) 37–59, https://doi.org/10.1007/s11205-005-5552-1.
[25] WHO, Wellbeing Measures in Primary Health Care/The Depcare Project, (1998).
[26] E. Brähler, H. Mühlan, C. Albani, S. Schmidt, Teststatistische Prüfung und Normierung der deutschen Versionen des EUROHIS-QOL Lebensqualität-Index und des WHO-5 Wohlbefindens-Index, Diagnostica. 53 (2007) 83–96, https://doi.org/10.1026/0012-1924.53.2.83.
[27] C.W. Topp, S.D. Østergaard, S. Søndergaard, P. Bech, The WHO-5 well-being index: a systematic review of the literature, Psychother. Psychosom. 84 (2015) 167–176, https://doi.org/10.2307/48516524.
[28] S. Cohen, T. Kamarck, R. Mermelstein, A global measure of perceived stress, J. Health Soc. Behav. 24 (1983) 385–396, https://doi.org/10.2307/2136404.
[29] R.L. Spitzer, Validation and utility of a self-report version of PRIME-MDThe PHQ primary care study, JAMA. 282 (1999) 1737, https://doi.org/10.1001/jama.282.18.1737.
[30] K. Kroenke, R.L. Spitzer, The PHQ-9: a new depression diagnostic and severity measure, Psychiatr. Ann. 32 (2002) 509–515, https://doi.org/10.3928/0048-5713-20020901-06.
[31] K. Kroenke, T. Strine, R. Spitzer, J. Williams, J. Berry, A. Mokdad, The PHQ-8 as a measure of current depression in the general population, J. Affect. Disord. (2009) 163–173, https://doi.org/10.1016/j.jad.2008.06.026.
[32] Statistik Austria, Österreichische Gesundheitsbefragung 2014. Hauptergebnisse des Austrian Health Interview Survey (ATHIS) und methodische Dokumentation.Wien 2015, Wien (2015), p. 2014.
[33] B. Löwe, O. Decker, S. Müller, E. Brähler, D. Schellberg, W. Herzog, P.Y. Herzberg, Validation an Standardization of the Generalized Anxiety Disorder Screener (GAD-7) in the General Population, Med. Care 46 (2008) 266–274, https://doi.org/10.1097/MLR.0b013e318160d093.
[34] C.M. Morin, G. Belleville, L. Bélanger, H. Ivers, The insomnia severity index: psychometric indicators to detect insomnia cases and evaluate treatment response, Sleep. 34 (2011) 601–608, https://doi.org/10.1093/sleep/34.5.601.
[35] A. Hinz, A.M. Klein, E. Brähler, H. Glaesmer, T. Luck, S.G. Riedel-Heller, K. Wirkner, A. Hilbert, Psychometric evaluation of the generalized anxiety disorder screener GAD-7, based on a large German general population sample, J. Affect. Disord. 210 (2017) 338–344, https://doi.org/10.1016/j.jad.2016.12.012.
[36] A. Martin, W. Rief, A. Klaiberg, E. Braehler, Validity of the brief patient health questionnaire mood scale (PHQ-9) in the general population, Gen. Hosp. Psychiatry 28 (2006) 71–77, https://doi.org/10.1016/j.genhosppsych.2005.07.003.
[37] R.-D. Kocalevent, A. Hinz, E. Brähler, Standardization of the depression screener patient health questionnaire (PHQ-9) in the general population, Gen. Hosp. Psychiatry 35 (2013) 551–555, https://doi.org/10.1016/j.genhosppsych.2013.04.006.
[38] H.U. Wittchen, F. Jacobi, J. Rehm, A. Gustavsson, M. Svensson, B. Jönsson, J. Olesen, C. Allgulander, J. Alonso, C. Faravelli, L. Fratiglioni, P. Jennum, R. Lieb, A. Maercker, J. van Os, M. Preisig, L. Salvador-Carulla, R. Simon, H.-C. Steinhausen, The size and burden of mental disorders and other disorders of the brain in Europe 2010, Eur. Neuropsychopharmacol. 21 (2011) 655–679, https://doi.org/10.1016/j.euroneuro.2011.07.018.
[39] A. Hinz, A. Mehnert, R.-D. Kocalevent, E. Brähler, T. Forkmann, S. Singer, T. Schulte, Assessment of depression severity with the PHQ-9 in cancer patients and in the general population, BMC Psychiatry. 16 (2016) 22, https://doi.org/10.1186/s12888-016-0728-6.
[40] P. Bech, L.R. Olsen, M. Kjoller, N.K. Rasmussen, 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. 12 (2003) 85–91, https://doi.org/10.1002/mpr.145.
[41] R.S.G. Limcaoco, E.M. Mateos, J.M. Fernandez, C. Roncero, Anxiety, Worry and Perceived Stress in the World Due to the COVID-19 Pandemic, March 2020, Preliminary results, Psychiatry and Clinical Psychology, 2020, https://doi.org/10.1101/2020.04.03.20043992.
[42] E.M. Klein, E. Brähler, M. Dreier, L. Reinecke, K.W. Müller, G. Schmutzer, K. Wölfling, M.E. Beutel, The German version of the perceived stress scale – psychometric characteristics in a representative German community sample, BMC Psychiatry. 16 (2016) 159, https://doi.org/10.1186/s12888-016-0875-9.
[43] Robert Koch-Institut, Berlin, Depressive symptoms in a European comparison – Results from the European Health Interview Survey (EHIS) 2, J. Health Monitor. 4 (4) (2019), https://doi.org/10.25646/6227.
[44] S. Dreger, T. Gerlinger, G. Bolte, Gender inequalities in mental wellbeing in 26 European countries: do welfare regimes matter? Eur. J. Pub. Health 26 (2016) 872–876, https://doi.org/10.1093/eurpub/ckw074.
[45] S. Tomitaka, Y. Kawasaki, K. Ide, M. Akutagawa, Y. Ono, T.A. Furukawa, 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. 9 (2018) 390, https://doi.org/10.3389/fpsyt.2018.00390.
[46] OECD, Fit Mind, Fit Job: From Evidence to Practice in Mental Health and Work, OECD, (2015), https://doi.org/10.1787/9789264228283-en.
[47] J. Sareen, T.O. Afifi, K.A. McMillan, G.J.G. Asmundson, Relationship between household income and mental disorders: findings from a population-based longitudinal study, Arch. Gen. Psychiatry 68 (2011) 419, https://doi.org/10.1001/archgenpsychiatry.2011.15.
[48] S.J.H. Biddle, M. Asare, Physical activity and mental health in children and adolescents: a review of reviews, Br. J. Sports Med. 45 (2011) 886–895, https://doi.org/10.1136/bjsports-2011-090185.
[49] D. Currier, R. Lindner, M.J. Spittal, S. Cvetkovski, J. Pirkis, D.R. English, Physical activity and depression in men: increased activity duration and intensity associated with lower likelihood of current depression, J. Affect. Disord. 260 (2020) 426–431, https://doi.org/10.1016/j.jad.2019.09.061.
[50] P. Callaghan, Exercise: a neglected intervention in mental health care? J. Psychiatr. Ment. Health Nurs. 11 (2004) 476–483, https://doi.org/10.1111/j.1365-2850.2004.00751.x.
[51] A. Sharma, V. Madaan, F.D. Petty, Exercise for mental health, Prim. Care Companion J. Clin. Psychiatry. 08 (2006) 106, https://doi.org/10.4088/PCC.v08n0208a.
[52] M. Devaux, F. Sassi, Social disparities in hazardous alcohol use: self-report bias may lead to incorrect estimates, Eur. J. Pub. Health 26 (2016) 129–134, https://doi.org/10.1093/eurpub/ckv190.
[53] B.D. Thombs, L. Kwakkenbos, A.W. Levis, A. Benedetti, Addressing overestimation of the prevalence of depression based on self-report screening questionnaires, Can. Med. Assoc. J. 190 (2018) E44–E49, https://doi.org/10.1503/cmaj.170691.
[54] Y.-T. Xiang, Y. Yang, W. Li, L. Zhang, Q. Zhang, T. Cheung, C.H. Ng, Timely mental health care for the 2019 novel coronavirus outbreak is urgently needed, Lancet Psychiatry 7 (2020) 228–229, https://doi.org/10.1016/S2215-0366(20)30046-8.