

# INTERACTIONS BETWEEN ANXIETY LEVELS AND LIFE HABITS CHANGES IN GENERAL POPULATION DURING THE PANDEMIC LOCKDOWN: DECREASED PHYSICAL ACTIVITY, FALLING ASLEEP LATE AND INTERNET BROWSING ABOUT COVID-19 ARE RISK FACTORS FOR ANXIETY, WHEREAS SOCIAL MEDIA USE IS NOT

Daria Smirnova<sup>1,2</sup>, Timur Syunyakov<sup>3,4</sup>, Alexey Pavlichenko<sup>3</sup>, Dmitry Bragin<sup>1</sup>, Ilya Fedotov<sup>5</sup>,  
Viktoriiia Filatova<sup>6</sup>, Yulia Ignatenko<sup>3</sup>, Natalia Kuvshinova<sup>7</sup>, Egor Prokopenko<sup>1</sup>, Dmitry Romanov<sup>2</sup>,  
Anna Spikina<sup>8</sup>, Anna Yashikhina<sup>1,2</sup>, Petr Morozov<sup>1,9</sup> & Konstantinos N. Fountoulakis<sup>10</sup>

<sup>1</sup>International Centre for Education and Research in Neuropsychiatry, Samara State Medical University, Samara, Russia

<sup>2</sup>Department of Psychiatry, Narcology, Psychotherapy and Clinical Psychology, Samara State Medical University, Samara, Russia

<sup>3</sup>Education center, Mental Health Clinic No 1 n.a. N.A. Alexeev of Moscow Healthcare Department, Moscow, Russia

<sup>4</sup>Zakusov Institute of Pharmacology, Moscow, Russia

<sup>5</sup>Department of Psychiatry and Narcology, Ryazan State Medical University n.a. Academician I.P. Pavlov, Ryazan, Russia

<sup>6</sup>State Budgetary Institution of the Rostov Region "Psychoneurological Dispensary", Rostov-on-Don, Russia

<sup>7</sup>Department of Pedagogics, Psychology and Psycholinguistics, Samara State Medical University, Samara, Russia

<sup>8</sup>Saint Petersburg Psychoneurological Dispensary №2, Saint Petersburg, Russia

<sup>9</sup>Department of Postgraduate Education, Russian National Research Medical University n.a. N.I. Pirogov, Moscow, Russia

<sup>10</sup>Third Department of Psychiatry, School of Medicine, Faculty of Health Sciences, Aristotle University of Thessaloniki, Thessaloniki, Greece

## SUMMARY

**Background.** The COVID-19 pandemic has substantially contributed to increased anxiety rates among the general population worldwide. Pandemic-related health anxiety and worries about getting COVID-19 can lead to generalized anxiety and anxiety somatization, which, together with insalubrious daily life habits, are risk factors of worsening somatic health in people with SARS-Cov-2 infection.

**Subjects and methods:** The current study is a part of the COMET-G project (40 countries, n=55589; approved by the Ethics Committee of the Aristotle University of Thessaloniki), which represents an intermediate analysis of data collected anonymously via online links from a national sample of the Russian general population (n=9936, 31.09±12.16 y.o., 58.7% females) to estimate anxiety using STAI-S and self-reported changes in anxiety and life habits (physical activity, nutrition and weight, internet use, sleep) during the lockdown. All statistical calculations (descriptive statistics, between group comparisons using chi-square test, MANOVA, ANOVA, significant at p<0.05) were performed with IBM SPSS 27.

**Results:** Overall STAI-S scores were 29±5.4, a subjective feeling of anxiety increase was reported in 40.3% of respondents (43.9% significantly > in females), worsening to clinical anxiety in 2.1% (2.4% > in females). 54.2% of respondents reported decreased physical activity, 33.1% gained weight, 72% used internet more often, 52.6% experienced worries related to the information about COVID-19 (56.8% > in females). 88% experienced worsened sleep quality, 69.2% stayed up until late, 23.2% took sleeping pills, and 31% had nightmares in which they felt trapped. To ANOVA, such life habits as reduced physical activity during the lockdown, increased time spent online, internet browsing about COVID-19, tendency to stay up late, use of sleeping pills and disturbing dreams with scenario of being trapped were significantly related to worsening of clinical anxiety. However, eating behaviour, weight changes, and social media use did not contribute to the clinical anxiety increase.

**Conclusions:** Factors of decreased physical activity and sleep disturbances related to the lockdown, as well as excessive internet browsing for information about COVID-19, emerged as risk factors for increased anxiety, more notably in women than in men. Preventive measures should be targeted against relevant factors imparting anxiety in the vulnerable population.

**Key words:** anxiety - COVID-19 - insomnia - internet browsing - life habits - lockdown - sleep disturbances - social media

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## INTRODUCTION

The COVID-19 pandemic has led to a secondary infodemic (far-reaching spread of news, overload of controversial information, misbeliefs), psychodemic (increased level of daily life stress factors, sources of worries and mental disorders), and syndemic (growth of comorbidity between infection-related physical conditions and mental disturbances, and relapses of psycho-

somatic diseases). Each of these factors influences the mental health of the general population, broadly-considered as "a complete state from salutogenic perspective" and with respect of emotional, psychological, and social well-being (Galdersisi et al. 2015 p. 231, Keyes 2014, Kopishinskaia et al. 2021, Fountoulakis et al. 2021a, Tangcharoensathien et al. 2020, World Health Organization 2020). In accord with data on previous epidemics, pandemics and other natural disasters, the

COVID-19 pandemic has substantially affected mental health, contributing to an increased level of distress, a variety of fears, panic, subjective feelings of anxiety and elevated anxiety rates among the general population around the world (Cénat et al. 2020, Fountoulakis et al. 2021a,b, Sauer et al. 2020). In particular, COVID-19-related health anxiety and worries about falling seriously ill are associated with generalized anxiety and development of somatization, while constituting a risk factor for insalubrious daily life habits and behavioral changes (e.g., decreased physical activity or increased time spent online at the expense of social communication, and resultant social isolation); these factors promulgate a vicious circle of adverse consequences, such as mental, behavioural, and general health problems (Ferguson 2009, Ran et al. 2020, Sauer et al. 2020, Shevlin et al. 2020, Šuriņa et al. 2021). This is especially a matter of concern insofar as anxiety-associated somatization can worsen physical health and detrimentally affect recovery and outcomes in people with new coronavirus infection.

Meta-analyses of population studies in 2020 (n=5153, 31 studies, Deng et al. 2020; n=63489, 17 studies, Salari et al. 2020), as well as a number of recent European (n=2291, Casagrande et al. 2020, n=763, Kulig et al. 2020, n=2608, Vrublevska et al. 2021) and Asian (n=1770, Ran et al. 2020) studies, along with the results of major international COMET-G project including 40 countries from all continents (n=55589, Fountoulakis et al. 2021a) demonstrated the prevalence of anxiety ranging from 25 to 32%, with a particular increase of anxiety by up to 10% as compared to the pre-pandemic state and up to high numbers of 43.1% in France with respect to lockdown conditions (Fountoulakis et al. 2021a, Ramiz et al. 2021). Observations in Wuhan indicated a non-significantly higher incidence of COVID-19-related anxiety in women as compared to men (49% vs 35% in males, Deng et al. 2021). A rise in the prevalence of anxiety was also reported in conjunction with elevated rates of sleep disturbances (34%; pooled prevalence of 52% in females and 43% in males) and poor sleep quality in 57% of the general population during the pandemic (Casagrande et al. 2020, Deng et al. 2021, Xiao et al. 2020). In an investigation of sleep disorders during the pandemic, researchers found that insomnia (difficulties in falling asleep, insufficient night's sleep) was related to anxiety and psychosocial factors, whereas daytime sleepiness along with fatigue and REM sleep changes were predominantly associated with active SARS-Cov-2 infection, thus denoting the stress-sleep link for insomnia (Altena et al., 2020, Partinen, 2020). On the other hand, some researchers have concluded that COVID-19 anxiety-induced insomnia is rarely registered, when calculated from the stay-at-home conditions as a contributing factor (AMHSI Research Team et al. 2020).

Nevertheless, there is a body of data indicating that lifestyle changes, fears of getting infection, female gender, as well as a prior history of mental disorders, have an association with insomnia during the COVID-19 pandemic, such that attention to sleep hygiene has been recommended to prevent sleep and other mental disturbances during lockdown (Medina-Ortiz et al. 2020).

Moreover, the post-COVID syndrome is characterized by various neurocognitive symptoms, including brain fog, and mental symptoms such as insomnia, persisting beyond three months after the diagnosis (Jimeno-Almazán et al. 2021). Regular physical exercise has been described as a protective factor mitigating against the long-lasting complications of SARS-Cov-2 neurotropic infection, and as an important therapeutic approach against mental and somatic consequences of COVID-19 quarantine (Jimeno-Almazán et al. 2021, Jiménez-Pavón et al. 2020). This latter association is particularly important, considering that 41% of previously inactive people became even less active during the period of indoor social isolation, whereas otherwise inactive persons who had nonetheless engaged in an outdoor physical activity demonstrated a lower anxiety level as compared to the more house-bound (Lesser & Nienhuis 2020). Another cross-sectional study found that participants who performed moderately intense or vigorous physical activity had lower incidence of anxiety and co-occurring mood disturbances during social isolation (Schuch et al. 2020). Chronic stress due to the lack of physical activity during pandemic-related social isolation and restriction measures acts as a prominent negative modulator of immunity, which increases the risk of developing infectious disease; on the other hand, regular physical activity of moderate intensity sufficient to provoke the release of pro- and anti-inflammatory cytokines and increased circulating lymphocyte levels, is suggested as an approach for strengthening the immune response against SARS-Cov-2, especially in older people (Burtscher et al. 2020, da Silveira et al. 2021). Reduced physical activity, emotional eating style, and decreased sleep quality during quarantine, as well as a history of obesity, have been registered as the risk factors for weight gain up to two kilograms within only two months of social isolation during the pandemic (Zeigler 2021). However, Kolokotroni et al. (2021) demonstrated that time spent sitting increased, while physical activity did not significantly change during the lockdown.

Among other life habits associated with the pandemic, internet misuse plays a controversial role. From one perspective, searching information about the novel virus and the pandemic may lead to significantly increased anxiety symptoms and greater mental symptoms in general, especially among infected people or those at high risk to be infected. On the other hand, experienced internet use of internet and interactive social

media, which is usually considered to be psychologically protective through engagement in a group of trusted peers, has been associated with fewer anxiety symptoms in the face of the pandemic (Ebrahim et al. 2020, Sigurvinsdottir et al. 2020). However, using social media for gaining information about the virus led to lower social trust mediated via an increased level of anxiety with promoting self-protective or COVID-safe behaviours (Wong et al. 2021). Time spent on the internet and the rates of internet addiction among the general population, especially in younger people, have increased over the pandemic, denoting the risk factors such as lack of social support and mental health problems (Li et al. 2021).

Since the start of the Russian COVID-19 lockdown in April 2020, we have administered an online questionnaire for investigating the anxiety state and subjective feelings of anxiety, as well as their relationships with life habit changes, among the general population. In accord with previous findings, we hypothesized that anxiety level and subjective feelings of anxiety would prove to be increased during the lockdown period, along with a reduction in physical activities, in association with sleep disturbances and worsened quality of sleep, as well as increased internet usage, this at the expense of social media participation. We further hypothesized that deleterious life habits changes would be related to the anxiety increase associated with the COVID-19 pandemic, with a greater prevalence in females.

## SUBJECTS AND METHODS

The current study of a sample of the Russian general population (n=9936) is part of COMET-G project (COVID-19 MEntal health in Ternational for the General population, 40 countries, n=55589), and presents an intermediate analysis of data related to anxiety measures, life habit changes, and their interrelationships. The Ethics Committee of the Faculty of Medicine, Aristotle University of Thessaloniki, Greece approved the COMET-G protocol, which was in accordance with the Helsinki declaration (see detailed protocol in the Web-Appendix at Fountoulakis et al. 2021a). The questionnaire was translated into Russian language and double checked by back translation into English by bilingual speakers. All data were collected anonymously via an online link with automatic recording of responses during the period of social isolation measures and lockdown conditions from their onset in April 2020 until December 2020. The link was distributed via personal and professional contacts using messengers, social media groups, web-sites and the mobile application Appbonus. The first page of the online questionnaire included the declaration of voluntarily consent for participation, so respondents could only proceed to the main questionnaire after indicating their consent.

The study population was self-selected and consisted of 9936 participants (58.9% females; 38.5% males; 2.6% other; see Table 1 for the details of sociodemographic characteristics such as marital status, education, and employment). Anxiety symptoms were measured using the STAI (State-Trait Anxiety Inventory, Spielberger 1970) incorporated into the online questionnaire/protocol. The items related to subjective measures of anxiety changes during the COVID-19 pandemic and life habits variables (physical activity, nutrition and weight, internet use, sleep) are presented in Table 2. All statistical calculations were performed with IBM SPSS 27 (IBM Corp. 2020). We applied a descriptive analysis to all the data; between group comparisons were performed using Pearson chi-square tests for categorical variables. MANOVA and ANOVA were used to evaluate how certain factors (life habits changes during the lockdown) might contribute to the development of other factors (clinical anxiety increase). Statistical significance was considered at two-tailed  $p < 0.05$ .

## RESULTS

The study sample included 9936 responses from participants aged  $31.09 \pm 12.16$  years, including females 58.7% (n=5837), 38.5% males (n=3825) and 2.8% (n=264) who chose not to report their gender (see Table 1 for the details of socio-demographic variables). Urban populations predominated among the respondents, of whom 42.9% (n=4256) were living either in state capitals or in cities with more than 1 million inhabitants and 26.1% in other large cities (n=2597). Approximately half of respondents were married or lived with a life-partner (n=4818, 48.5%), with a tendency for males being single more often rather than females (females n=1490, n=25.5%; males n=1461, 38.2%,  $\chi^2(1, N=9,672) = 175.85, p < 0.0001$ , Cohen's  $w = 0.135$ ), whereas females were more apt to be married (females n=2460, n=42.1%; males n=1243, 32.5%,  $\chi^2(1, N=9672) = 89.73, p < 0.0001$ , Cohen's  $w = 0.096$ ) and to have been divorced (females n=478, n=8.2%; males n=208, 5.4%,  $\chi^2(1, N=9672) = 27.51, p < 0.0001$ , Cohen's  $w = 0.053$ ), albeit with small effect sizes for these findings. 13.2% (n=1312) participants were living alone, of whom males proportionally twice as often as females (females n=551, n=9.4%; males n=700, 18.3%,  $\chi^2(1, N=9672) = 162.78, p < 0.0001$ , Cohen's  $w = 0.129$ ). More than half of participants had a Bachelor's degree or higher (n=3,879, 51.7%) and did not have children (n=5496, 55.4%). Among the respondents, 22.3% were working in public institutions, 21% in the private sector, 15.8% were university students and the time of responding, while 12.1% were unemployed and the remainder were retired or not working for other reasons. 14.7% of the whole study sample have been working in the health sector, and 6.9% were doctors. Almost one third of respondents (30.9%) did not work during the pandemic associated lockdown.

**Table 1.** Socio-demographic characteristics of the COMET-G national study sample in Russia

Socio-demographic variables	Gender			Total (n=9936)
	Female (n=5847)	Male (n=3825)	Other (n=264)	
Mean Age (SD)	31.74 (12.25)	30.34 (12.03)	27.64 (10.87)	31.09 (12.16)
Residence				
Capital City	803 (13.7%)	559 (14.6%)	55 (20.8%)	1417 (14.3%)
City > 1 million population	1855 (31.7%)	927 (24.2%)	57 (21.6%)	2839 (28.6%)
City (100.000 – 1 million population)	1525 (26.1%)	1025 (26.8%)	47 (17.8%)	2597 (26.1%)
Town (20.000 – 100.000 inhabitants)	732 (12.5%)	540 (14.1%)	41 (15.5%)	1313 (13.2%)
Town (< 20.000 inhabitants)	262 (4.5%)	174 (4.5%)	19 (7.2%)	455 (4.6%)
Rural area - Village	670 (11.5%)	600 (15.7%)	45 (17.0%)	1315 (13.2%)
Marital status				
Single	1490 (25.5%)	1461 (38.2%)	100 (37.9%)	3051 (30.7%)
Live with someone without an official relationship	742 (12.7%)	302 (7.9%)	27 (10.2%)	1071 (10.8%)
Married (or in a civil partnership)	2460 (42.1%)	1243 (32.5%)	44 (16.7%)	3747 (37.7%)
Divorced (or estranged)	478 (8.2%)	208 (5.4%)	18 (6.8%)	704 (7.1%)
Widower	94 (1.6%)	25 (0.7%)	5 (1.9%)	124 (1.2%)
Other	583 (10.0%)	586 (15.3%)	70 (26.5%)	1239 (12.5%)
Number of people living together - How many people reside in the house you are staying in during this period (including yourself)?				
1 - live alone	551 (9.4%)	700 (18.3%)	61 (23.1%)	1312 (13.2%)
2 people	1834 (31.4%)	929 (24.3%)	54 (20.5%)	2817 (28.4%)
3 people	1535 (26.3%)	918 (24.0%)	60 (22.7%)	2513 (25.3%)
4 people	1274 (21.8%)	766 (20.0%)	40 (15.2%)	2080 (20.9%)
5 or more people	653 (11.2%)	512 (13.4%)	49 (18.6%)	1214 (12.2%)
Children - How many children do you have (regardless of whether they live in the same house with you or not)?				
I do not have any children	2976 (50.9%)	2341 (61.2%)	179 (67.8%)	5496 (55.3%)
1 child	1450 (24.8%)	652 (17.0%)	26 (9.8%)	2128 (21.4%)
2 children	1089 (18.6%)	590 (15.4%)	28 (10.6%)	1707 (17.2%)
3 children	242 (4.1%)	161 (4.2%)	14 (5.3%)	417 (4.2%)
4 or more children	90 (1.5%)	81 (2.1%)	17 (6.4%)	188 (1.9%)
Education				
Elementary School (less than 9 years)	556 (9.5%)	818 (21.4%)	70 (26.5%)	1444 (14.5%)
High school (9-12 yers)	1815 (31.0%)	1440 (37.6%)	100 (37.9%)	3355 (33.8%)
Bachelor Degree	1057 (18.1%)	510 (13.3%)	35 (13.3%)	1602 (16.1%)
University/Master's degree	2197 (37.6%)	865 (22.7%)	39 (14.8%)	3101 (31.2%)
Doctorate or PhD	222 (3.8%)	192 (5.0%)	20 (7.6%)	434 (4.4%)
Employment				
Working in the Public sector	1365 (23.3%)	799 (20.9%)	53 (20.1%)	2217 (22.3%)
Salaried employee at the Private Sector	1146 (19.6%)	904 (23.6%)	32 (12.1%)	2082 (21.0%)
Self-employed/Freelancer	409 (7.0%)	329 (8.6%)	15 (5.7%)	753 (7.6%)
Retired	187 (3.2%)	116 (3.0%)	8 (3.0%)	311 (3.1%)
Unemployed	646 (11.0%)	514 (13.4%)	45 (17.0%)	1205 (12.1%)
Housekeeping	307 (5.3%)	64 (1.7%)	6 (2.3%)	377 (3.8%)
Retirement for health reasons	18 (0.3%)	40 (1.0%)	2 (0.8%)	60 (0.6%)
Allowance for health reasons	33 (0.6%)	46 (1.2%)	5 (1.9%)	84 (0.8%)
Not working by choice (e.g. living via corporate earnings etc.)	66 (1.1%)	76 (2.0%)	8 (3.0%)	150 (1.5%)
University or college student	1033 (17.7%)	491 (12.8%)	41 (15.5%)	1565 (15.8%)
Other	637 (10.9%)	446 (11.7%)	49 (18.6%)	1132 (11.4%)
Employment in the Health Sector				
I do not work in the Health Sector	4862 (83.2%)	3388 (88.6%)	230 (87.1%)	8480 (85.3%)
Doctor	494 (8.4%)	182 (4.8%)	14 (5.3%)	690 (6.9%)
Nurse	172 (2.9%)	22 (0.6%)	1 (0.4%)	195 (2.0%)
Other healthcare profession	160 (2.7%)	44 (1.2%)	6 (2.3%)	210 (2.1%)
Administrative employee at a hospital	78 (1.3%)	66 (1.7%)	2 (0.8%)	146 (1.5%)
Other hospital staff	81 (1.4%)	123 (3.2%)	11 (4.2%)	215 (2.2%)
Work during lockdown - Do you continue to exercise your profession during the period of the lockdown?				
Yes	2600 (44.5%)	1985 (51.9%)	88 (33.4%)	4673 (47.0%)
No	1990 (34.0%)	984 (25.7%)	102 (38.6%)	3076 (30.9%)
n/a	1257 (21.5%)	856 (22.4%)	74 (28.0%)	2187 (22.1%)

**Table 2.** Anxiety and life style changes in the general population of Russia during the COVID-19 pandemic lockdown, according to the COMET-G project protocol

Anxiety and life habit variables as presented in the COMET-G study protocol	Gender			
	Female (n=5847)	Male (n=3825)	Other (n=264)	Total (n=9936)
Anxiety State / Mean STAI-S (SD)	28.8 (5.1)	29.3 (5.9)	30.0 (6.5)	29.0 (5.4)
Subjective feeling of anxiety				
F21. How much has your emotional state changed in relation to the appearance of anxiety and insecurity compared to before the COVID-19 pandemic?				
It got a lot worse	647 (11.1%)	476 (12.4%)	54 (20.5%)	1177 (11.8%)
It got a little worse	1915 (32.8%)	853 (22.3%)	67 (25.4%)	2835 (28.5%)
Neither better nor worse	2910 (49.8%)	2063 (53.9%)	105 (39.8%)	5078 (51.1%)
It's a little improved	246 (4.2%)	273 (7.1%)	19 (7.2%)	538 (5.4%)
It has improved a lot	129 (2.2%)	160 (4.2%)	19 (7.2%)	308 (3.1%)
Subjective feeling of anxiety increase	2562 (43.9%)	1329 (34.7%)	121 (45.29%)	4012 (40.3%)
Worsend	138 (2.4%)	63 (1.6%)	9 (3.4%)	210 (2.1%)
Physical activity				
H1. Does exercise help you at the prevention of anxiety?				
Not at all	1687 (28.9%)	1248 (32.6%)	95 (36.0%)	3030 (30.5%)
A little bit	1348 (23.1%)	699 (18.3%)	50 (18.9%)	2097 (21.1%)
Moderately	1527 (26.1%)	1037 (27.1%)	65 (24.6%)	2629 (26.5%)
Much	1004 (17.2%)	568 (14.8%)	35 (13.3%)	1607 (16.2%)
Very much	281 (4.8%)	273 (7.1%)	19 (7.2%)	573 (5.8%)
H2. Do you consider that exercise is important during this pandemic?				
Not at all	936 (16.0%)	886 (23.2%)	71 (26.9%)	1893 (19.1%)
A little bit	888 (15.2%)	600 (15.7%)	57 (21.6%)	1545 (15.5%)
Moderately	1651 (28.2%)	1046 (27.3%)	64 (24.2%)	2761 (27.8%)
Much	1737 (29.7%)	821 (21.5%)	53 (20.1%)	2611 (26.3%)
Very much	635 (10.9%)	472 (12.3%)	19 (7.2%)	1126 (11.3%)
H3. Do you have increased the frequency and intensity of your physical workout during this pandemic/lockdown?				
Not at all	3068 (52.5%)	1732 (45.3%)	106 (40.2%)	4906 (49.4%)
A little bit	959 (16.4%)	653 (17.1%)	62 (23.5%)	1674 (16.8%)
Moderately	1028 (17.6%)	804 (21.0%)	45 (17.0%)	1877 (18.9%)
Much	555 (9.5%)	361 (9.4%)	37 (14.0%)	953 (9.6%)
Very much	237 (4.1%)	275 (7.2%)	14 (5.3%)	526 (5.3%)
H4. How much has your physical activity been affected by this epidemic of COVID-19?				
It decreased much	1838 (31.4%)	1429 (37.4%)	84 (31.8%)	3351 (33.7%)
It decreased a little	1231 (21.1%)	739 (19.3%)	66 (25.0%)	2036 (20.5%)
Neither decreased, nor increased	1237 (21.2%)	851 (22.2%)	54 (20.5%)	2142 (21.6%)
It increased a little	1032 (17.7%)	517 (13.5%)	36 (13.6%)	1585 (16.0%)
It increased much	509 (8.7%)	289 (7.6%)	24 (9.1%)	822 (8.3%)
Nutrition and weight				
I1. During the days of the lockdown did you notice the need to eat larger amounts of food or eat more often?				
I eat much less than I used to	481 (8.2%)	596 (15.6%)	61 (23.1%)	1138 (11.5%)
I eat bit less than I used to	578 (9.9%)	424 (11.1%)	48 (18.2%)	1050 (10.6%)
Neither more nor less	2538 (43.4%)	1966 (51.4%)	103 (39.0%)	4607 (46.4%)
I eat a bit more than I used to	1551 (26.5%)	618 (16.2%)	34 (12.9%)	2203 (22.2%)
I eat much more than I used to	699 (12.0%)	221 (5.8%)	18 (6.8%)	938 (9.4%)
I2. During the period of the lockdown your eating habits has changed in the following way:				
I eat in a healthier way	1076 (18.4%)	412 (10.8%)	49 (18.6%)	1537 (15.5%)
My eating habits have not changed	3913 (66.9%)	2606 (68.1%)	152 (57.6%)	6671 (67.1%)
I eat in a more unhealthy way	858 (14.7%)	807 (21.1%)	63 (23.9%)	1728 (17.4%)
I3. During the period of the lockdown your body weight has/is:				
Significantly decreased (> 2-3 kilos)	513 (8.8%)	582 (15.2%)	52 (19.7%)	1147 (11.5%)
Slightly decreased (< 2 kilos lost)	686 (11.7%)	511 (13.4%)	46 (17.4%)	1243 (12.5%)
Stable	2378 (40.7%)	1787 (46.7%)	94 (35.6%)	4259 (42.9%)
Slightly increased (< 2 kilos put)	1391 (23.8%)	608 (15.9%)	41 (15.5%)	2040 (20.5%)
Significantly increased (> 2-3 kilos)	879 (15.0%)	337 (8.8%)	31 (11.7%)	1247 (12.6%)

**Table 2.** Continues

Anxiety and life habit variables as presented in the COMET-G study protocol	Gender			Total (n=9936)
	Female (n=5847)	Male (n=3825)	Other (n=264)	
<b>Internet use</b>				
K1. The information and use of the internet worry me about the issue regarding the COVID-19:				
Not at all	2525 (43.2%)	2084 (54.5%)	96 (36.4%)	4705 (47.4%)
A little	1509 (25.8%)	730 (19.1%)	65 (24.6%)	2304 (23.2%)
Moderately	1163 (19.9%)	653 (17.1%)	61 (23.1%)	1877 (18.9%)
Much	460 (7.9%)	235 (6.1%)	24 (9.1%)	719 (7.2%)
Very much	190 (3.2%)	123 (3.2%)	18 (6.8%)	331 (3.3%)
K2. Generally, most of the internet sources regarding information about COVID-19 are misleading:				
Not at all	855 (14.6%)	956 (25.0%)	54 (20.5%)	1865 (18.8%)
A little	1742 (29.8%)	989 (25.9%)	65 (24.6%)	2796 (28.1%)
Moderately	1774 (30.3%)	1042 (27.2%)	77 (29.2%)	2893 (29.1%)
Much	1175 (20.1%)	563 (14.7%)	51 (19.3%)	1789 (18.0%)
Very much	301 (5.1%)	275 (7.2%)	17 (6.4%)	593 (6.0%)
K3. Due to the conditions, the internet takes up more of my time than usual:				
Not at all	1474 (25.2%)	1244 (32.5%)	66 (25.0%)	2784 (28.0%)
A little more	765 (13.1%)	616 (16.1%)	31 (11.7%)	1412 (14.2%)
Moderately more	1347 (23.0%)	898 (23.5%)	67 (25.4%)	2312 (23.3%)
Much more	1527 (26.1%)	705 (18.4%)	69 (26.1%)	2301 (23.2%)
Too much	734 (12.6%)	362 (9.5%)	31 (11.7%)	1127 (11.3%)
K4. How much do you use the social media while in isolation at home?				
More than before	331 (5.7%)	409 (10.7%)	32 (12.1%)	772 (7.8%)
The same as before	2830 (48.4%)	2105 (55.0%)	129 (48.9%)	5064 (51.0%)
Less than before	2686 (45.9%)	1311 (34.3%)	103 (39.0%)	4100 (41.3%)
K5. Have you acquired internet-related habits that you did not have before the lockdown (for example: created a Facebook account, engaging in cybersex or gambling)?				
Yes	4009 (68.6%)	2427 (63.5%)	132 (50.0%)	6568 (66.1%)
No	1838 (31.4%)	1398 (36.5%)	132 (50.0%)	3368 (33.9%)
<b>Sleep</b>				
L1. The quality of my sleep has changed recently. It is:				
Much worse	1261 (21.6%)	621 (16.2%)	55 (20.8%)	1937 (19.5%)
A little bit worse	3950 (67.6%)	2696 (70.5%)	158 (59.8%)	6804 (68.5%)
The same (neither worse nor better)	420 (7.2%)	300 (7.8%)	35 (13.3%)	755 (7.6%)
A little better	216 (3.7%)	208 (5.4%)	16 (6.1%)	440 (4.4%)
L2. I tend to stay up late and sleep for many hours during the day.				
Almost never	1708 (29.2%)	1290 (33.7%)	60 (22.7%)	3058 (30.8%)
Rarely	1118 (19.1%)	715 (18.7%)	50 (18.9%)	1883 (19.0%)
Sometimes	1475 (25.2%)	1045 (27.3%)	76 (28.8%)	2596 (26.1%)
Often	901 (15.4%)	466 (12.2%)	39 (14.8%)	1406 (14.2%)
Almost always	645 (11.0%)	309 (8.1%)	39 (14.8%)	993 (10.0%)
L3. I take sleeping pills to help me sleep at night.				
Almost never	4687 (80.2%)	2803 (73.3%)	144 (54.5%)	7634 (76.8%)
Rarely	366 (6.3%)	307 (8.0%)	35 (13.3%)	708 (7.1%)
Some times	478 (8.2%)	429 (11.2%)	51 (19.3%)	958 (9.6%)
Often	160 (2.7%)	176 (4.6%)	17 (6.4%)	353 (3.6%)
Almost always	156 (2.7%)	110 (2.9%)	17 (6.4%)	283 (2.8%)
L4. I am having dreams in which I feel trapped, over the last 3 weeks.				
Almost never	4109 (70.3%)	2620 (68.5%)	122 (46.2%)	6851 (69.0%)
Rarely	706 (12.1%)	425 (11.1%)	45 (17.0%)	1176 (11.8%)
Sometimes	637 (10.9%)	476 (12.4%)	48 (18.2%)	1161 (11.7%)
Often	274 (4.7%)	178 (4.7%)	28 (10.6%)	480 (4.8%)
Almost always	121 (2.1%)	126 (3.3%)	21 (8.0%)	268 (2.7%)

Concerning anxiety measurements (see Table 2 for details), mean STAI-S scores were  $29 \pm 5.4$ , with no difference in relation to the gender factor. An increased subjective feeling of anxiety, which was calculated based

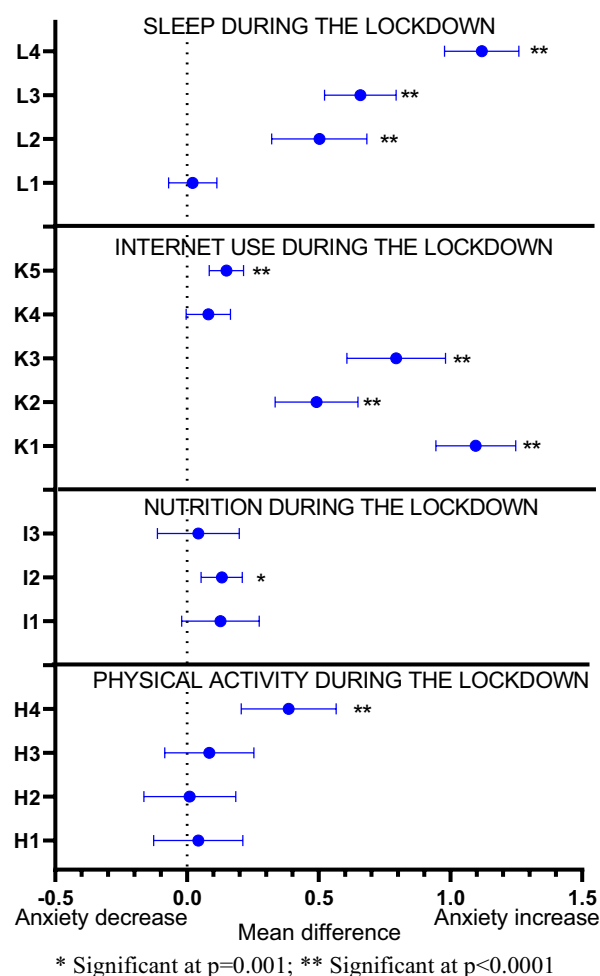
on the sum of the cases who reported anxiety becoming either a lot worse or a little worse, was described in 40.3% of respondents ( $n=3955$ ), with a significantly higher rate in female respondents (females  $n=2562$ ,

n=43.9%; males n=1329, 34.7%,  $\chi^2(1, N=9672) = 81.36$ ,  $p < 0.0001$ , Cohen's  $w = 0.091$ ). Worsening to clinical anxiety, which was estimated from the incidence of a clinical state of anxiety based on STAI-S score  $> 38$  among the respondents with an increased subjective feeling of anxiety, was low in the entire population (n=210; 2.1%) but significantly higher in females rather than males (females n=138, n=2.4%; males n=65, 1.6%,  $\chi^2(1, N=9672) = 7.25$ ,  $p < 0.05$ , Cohen's  $w = 0.027$ ), with the small effect size for proportions comparisons.

Details of the self-reported life habits changes over the period of lockdown, as extracted from the COMET-G protocol for Russian national sample, are presented in Table 2. 54.2% of respondents (n=5387) confirmed that their physical activity had declined as compared to their prepandemic activity, and the third of respondents (n=3287, 33.1%) gained weight during lockdown, with 12.6% (n=1247) having gained more than two kilograms. The majority of respondents (n=7152, 72%) used the internet more often than before the pandemic, including those who used the internet much more often (n=2301, 23.3%) and too much (n=1127, 11.3%). 66.1% of respondents (n=6568) acquired new internet-related habits, which they had not had before the period of lockdown, whereas 51% (n=5064) of respondents used social media in much the way the same as before or even less often (n=4100, 41.3%). Information about COVID-19 from the internet and the internet use itself were reported as being stressful and bringing worries by 52.6% of the respondents (n=5231), with females being significantly more vulnerable than males (females n=3322, n=56.8%; males n=1741, 45.5%,  $\chi^2(1, N=9672) = 118.35$ ,  $p < 0.0001$ , Cohen's  $w = 0.111$ ). The self-reported quality of sleep worsened in 88% of the respondents (n=8741), including much worse quality in 19.5% (n=1937), with no differences with respect to gender. 69.2% of respondents (n=5472) tended to either stay up late or had daily sleepiness during the lockdown, in particular, 10% (n=993) had persistent sleep disturbances. Moreover, 23.2% (n=2302) took sleeping pills to help themselves sleep at night, among whom 3.6% (n=353) used medications often and 2.8% (n=283) almost every night during the pandemic. 31% of the respondents (n=3085) reported disturbing nightmares in which they felt trapped during the final three weeks of the lockdown, which occurred often for 4.8% (n=480) and almost nightly for 2.7% (n=268).

The multivariate analysis of variance (MANOVA) demonstrated a significant effect for the indicator of worsening to clinical anxiety ( $F(16, 9919) = 24.24$ ,  $p < 0.001$ ,  $\eta^2 = 0.04$ ), suggesting that the linear combination of the studied life habit variables differed significantly with respect to the clinical anxiety level. ANOVA demonstrated that certain life habit factors were significantly associated with the increased clinical state of anxiety related to the lockdown: (i)

physical activities affected by the lockdown (H4:  $F(1, 9934) = 17.70$ ,  $p < 0.001$ , partial  $\eta^2 = 0.00$ ), (ii) eating habits related to healthy food (I2:  $F(1, 9934) = 10.84$ ,  $p < 0.001$ , partial  $\eta^2 = 0.00$ ), (iii) internet misuse, including worries due to information about COVID-19 and internet use (K1:  $F(1, 9934) = 201.66$ ,  $p < 0.001$ , partial  $\eta^2 = 0.02$ ), misleading information about COVID-19 as presented in the internet (K2:  $F(1, 9934) = 37.67$ ,  $p < 0.001$ , partial  $\eta^2 = 0.02$ ), internet overuse in terms of time spent online (K3:  $F(1, 9934) = 69.11$ ,  $p < 0.001$ , partial  $\eta^2 = 0.01$ ), and acquisition of the new internet-related habits (K5:  $F(1, 9934) = 20.66$ ,  $p < 0.001$ , partial  $\eta^2 = 0.00$ ), as well as (iv) sleep disturbances during the lockdown, in particular, a tendency to stay up late and sleeping during the day time (L2:  $F(1, 9934) = 29.84$ ,  $p < 0.001$ , partial  $\eta^2 = 0.00$ ), sleeping medication use (L3:  $F(1, 9934) = 89.98$ ,  $p < 0.001$ , partial  $\eta^2 = 0.01$ ) and nightmares with a scenario of being trapped (L4:  $F(1, 9934) = 242.60$ ,  $p < 0.001$ , partial  $\eta^2 = 0.02$ ) (see Figure 1).



\* Significant at  $p = 0.001$ ; \*\* Significant at  $p < 0.0001$   
**Figure 1.** Association between the variables of clinical anxiety worsening and life habits changes during the COVID-19 pandemic related lockdown (Item codes for life habits variables (H1-4, I1-3, K1-5, L1-4) are described in Table 2)

However, the variables denoting the attitudes and beliefs towards the relationships between physical activity and anxiety did not contribute to the clinical anxiety increase (H1:  $F(1, 9934) = 0.25$ ,  $p=0.620$ ; H2:  $F(1, 9934) = 0.01$ ,  $p=0.908$ ), frequency and intensity of physical activity (H3:  $F(1, 9934) = 0.95$ ,  $p=0.329$ ), amount of food eaten (I1:  $F(1, 9934) = 2.86$ ,  $p=0.091$ ), weight changes (I3:  $F(1, 9934) = 0.30$ ,  $p=0.583$ ). Moreover, such life habits as social media use (K4:  $F(1, 9934) = 3.57$ ,  $p=0.059$ ) and quality of sleep changes (L1:  $F(1, 9934) = 0.21$ ,  $p=0.648$ ) were not associated with the anxiety increase due to pandemic.

## DISCUSSION

In this study we aimed to investigate the increased anxiety and its relationships with altered life habits in the general Russian population in the context of the COVID-19 related lockdown. Our study sample included 9936 respondents, whose socio-demographic characteristics, as presented in Table 1, are consistent with the data for the general urban population (Russian Federal Service of State Statistics 2010). Our analysis of the data showed 40.3% of the respondents reported an increased subjective feeling of anxiety as compared to the period before the lockdown. This finding of widespread increase in anxiety rates during the COVID-19 pandemic is in accord with the majority of data received from different studies on the general populations of various countries, and matches the observations in regions with the highest incidence rates of COVID-19-related anxiety such as the epicentre in Wuhan and in France following lockdown (Casagrande et al. 2020, Deng et al. 2020, Fountoulakis et al. 2021a,b, Kulig et al. 2020, Ramiz et al. 2021, Ran et al. 2020, Salari et al. 2020, Vrublevska et al. 2021). Present results confirmed our hypothesis indicating that anxiety scores within (i) the measurements of self-reported subjective feeling of anxiety and (ii) indicators of progression of anxiety states to the level of clinical anxiety (STAI-S cut-off scores  $> 38$ ) were significantly higher in females than in males. This matches with other results indicating a non-significantly higher pandemic-associated anxiety rate in women, and that female gender is a risk factor for stress-related mental disturbances during the pandemic (Deng et al. 2021, Medina-Ortiz et al. 2020). Women in our sample were significantly more likely than the men to be presently married or to have been divorced, which might contribute to the higher levels of anxiety in women and their greater vulnerability to develop anxiety due to the presence of psychosocial factors related to marital status and family-associated economic reasons, responsibilities, and worries (Altena et al. 2020, Medina-Ortiz et al. 2020, Partinen 2020).

Half of the respondents reported reduced physical activity during the pandemic lockdown, and one third experienced significant weight gain, in agreement with results of a previous study (for review Zeigler 2021). Moreover, our findings of significant relationships between the variables of decreased physical activity, changes in food preferences (healthy vs unhealthy eating), and increased anxiety, contribute to an understand of the role of reduced physical activity as a key risk factor for developing anxiety states and associated changes in eating behaviour; this would include adoption of an emotional eating style and resultant weight gain during pandemic, which, affects in turn not only mental health, but also immunity, somatic health, and resistance to and recovery from SARS-Cov-2 infection (Burtscher et al. 2020, da Silveira et al. 2021, Lesser & Nienhuis 2020, Schuch et al. 2020). It is important to note that the link with anxiety changes over the lockdown emerged only in relation to the indicator of physical activity being affected detrimentally by the lockdown, whereas the variables of attitudes towards the importance of physical activity or beliefs about physical activity as a means for coping with anxiety did not actually correlate with reported anxiety level. This points to the key role of physical activity itself rather than attitudes and beliefs about physical activity in relation to anxiety changes over the lockdown.

Concerning sleep disturbances, 88% of the general population pointed to the reduced quality of sleep. In particular, 69.2% had symptoms of insomnia, 23.2% took sleeping medicines, 31% of the respondents had nightmares, during the lockdown time preceding their response to the questionnaire where they felt trapped over the three weeks during the period of lockdown; these three variables each had a significant association with the factor of worsening in clinical anxiety, thus denoting a conspicuous link between sleep disturbances and stress related to the social isolation conditions (Altena et al. 2020, Casagrande et al. 2020, Deng et al. 2021, Fountoulakis et al. 2021a,b, Partinen 2020, Xiao et al. 2020), manifesting in our respondents frequently reporting scenarios in their nightmares about being trapped. Sleep disturbances and lack of physical activity are typical manifestations of chronic stress, bringing a risk for increased anxiety and detrimentally affecting somatic health. It follows that taking regular exercises with moderate physical activity and normalization of the sleep regimen should be considered as protective measures to preserve mental and physical health during the pandemic, in particular, to protect from the mental consequences of social isolation as well as the neurocognitive complications of the SARS-Cov-2 infection within the post-COVID syndrome (Jimeno-Almazán et al. 2021, Jimeno-Almazán et al. 2021, Jiménez-Pavón et al. 2020, Lesser & Nienhuis 2020, Schuch et al. 2020).



Our study confirmed previous reports of internet overuse by the majority of the general population over the lockdown, including e-browsing about COVID-19, worries related to this information and related to their perception of habitual internet use (notably among female respondents), excessive time spent online, and acquisition of the new internet-related habits. All of these indicators have been significantly associated with the anxiety increase due to lockdown in European and Asian populations (Kulig et al. 2020, Li et al. 2021). Internet overuse might also bear a relation with the recent report in increased time spent sitting during the pandemic (Kolokotroni et al. 2021). We suppose that relevant life habits such as decreased physical activity, eating behaviour changes, reduced sleep quality, and internet overuse are inter-related. However, our participants reported that their social media use was unaltered or reduced during the pandemic, and, moreover, this indicator was not associated with their anxiety changes. Other studies have demonstrated that social media use during the lockdown may even serve as a protective factor against an anxiety increase, as such activities facilitate trust, engage people in social interactions, and provide psychological support (Ebrahim et al. 2020, Sigurvinsdottir et al. 2020, Wong et al. 2021).

## CONCLUSIONS

Results of our study showed an anxiety increase, which was more pronounced in women, and associated alterations in life habits in relation to the pandemic associated lockdown among the general population in Russia. Sleep disturbances related to the lockdown, such as insomnia and nightmares (often on a theme of being trapped), and reduced physical activity, as well as excessive internet browsing for information about COVID-19 and increased time spent online emerged as risk factors for increased anxiety. Results indicate preventive measures that could be implemented to control relevant factors imparting anxiety, especially among the more vulnerable female population: (i) regular moderate physical activity, (ii) normalization of sleep schedule, (iii) healthy eating, and (iv) counselling avoidance of excessive focus on internet browsing about the pandemic, but (iv) no particular limits for social media use.

## Limitations of the study

The major limitation of the study lies in our study design being based on self-reports and self-selected sample of the respondents, which oversampled the urban population. We have so far undertaken only an intermediate analysis of the data, without yet considering all variables that are potential contributing factors to the results and their interpretation. Nonetheless, our large sample of the general population proved fit for using advanced statistics to test sensitively the hypotheses.

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**Conflict of interest:** None to declare.

## Contribution of individual authors:

Daria Smirnova wrote the first draft of the manuscript, which has been revised by Timur Syunyakov and Konstantinos N. Fountoulakis and upon input from the other co-authors.

Daria Smirnova, Timur Syunyakov, Alexey Pavlichenko, Dmitry Bragin, Ilya Fedotov, Viktoriia Filatova, Yulia Ignatenko, Natalia Kuvshinova, Egor Prokopenko, Dmitry Romanov, Anna Spikina, Anna Yashikhina collected the data.

Konstantinos N. Fountoulakis designed the project.

Daria Smirnova, Alexey Pavlichenko & Yulia Ignatenko, translated the questionnaire into Russian language.

Daria Smirnova & Timur Syunyakov analyzed the data with advice from Petr Morozov and Konstantinos N. Fountoulakis.

## References

1. *Altena E, Baglioni C, Espie CA, Ellis J, Gavriloff D, Holzinger B, Schlarb A, Frase L, Jernelöv S, Riemann D: Dealing with sleep problems during home confinement due to the COVID-19 outbreak: Practical recommendations from a task force of the European CBT-I Academy. J Sleep Res 2020; 29:e13052. doi: 10.1111/jsr.13052*
2. *AMHSI Research Team; Milken Research Team, Roitblat Y, Burger J, Leit A, Nehuliaieva L, Umarova GS, Kaliberdenko V, Kulanthaivel S, Buchris N, Shterenshis M: Stay-at-home circumstances do not produce sleep disorders: An international survey during the COVID-19 pandemic. J Psychosom Res 2020; 139:110282. doi: 10.1016/j.jpsychores*
3. *Burtscher J, Burtscher M, Millet GP: (Indoor) isolation, stress, and physical inactivity: Vicious circles accelerated by COVID-19? Scand J Med Sci Sports 2020; 30:1544-1545. doi:10.1111/sms.13706*
4. *Casagrande M, Favieri F, Tambelli R, Forte G: The enemy who sealed the world: effects quarantine due to the COVID-19 on sleep quality, anxiety, and psychological distress in the Italian population. Sleep Med 2020; 75:12-20. doi:10.1016/j.sleep.2020.05.011*

5. Cénat JM, Felix N, Blais-Rochette C, Rousseau C, Bukaka J, Derivois D, Noorishad PG, Birangui JP: Prevalence of mental health problems in populations affected by the Ebola virus disease: A systematic review and meta-analysis. *Psychiatry Res* 2020; 289:113033. doi:10.1016/j.psychres.2020.113033
6. da Silveira MP, da Silva Fagundes KK, Bizuti MR, Starck É, Rossi RC, de Resende E Silva DT: Physical exercise as a tool to help the immune system against COVID-19: an integrative review of the current literature. *Clin Exp Med* 2021; 21:15-28. doi:10.1007/s10238-020-00650-3
7. Deng J, Zhou F, Hou W, Silver Z, Wong CY, Chang O, Huang E, Zuo QK: The prevalence of depression, anxiety, and sleep disturbances in COVID-19 patients: a meta-analysis. *Ann N Y Acad Sci* 2021; 1486:90-111. doi:10.1111/nyas.14506
8. Ebrahim AH, Saif ZQ, Buheji M, AlBasri N, Al-Husaini FA, Jahrami H: COVID-19 information-seeking behavior and anxiety symptoms among parents. *OSP J Health Care Med* 2020; 1:1-9
9. Federal Service of State Statistics: Results of the All-Russian Population Census, 2010. [https://www.gks.ru/free\\_doc/new\\_site/perepis2010/croc/Documents/Vol2/pub-02-01.pdf](https://www.gks.ru/free_doc/new_site/perepis2010/croc/Documents/Vol2/pub-02-01.pdf)
10. Ferguson E: A taxometric analysis of health anxiety. *Psychol Med* 2009; 39:277-85. doi:10.1017/S0033291708003322
11. Fountoulakis KN, Abraham S, Ahmed HU, Alarcon R, Arai K et al.: Results of the COVID-19 MEntal health inTernational for the General population (COMET-G) study. *Eur Neuropsychopharmacol* 2021a: (submitted)
12. Fountoulakis KN, Apostolidou MK, Atsiova MB, Filippidou AK, Florou AK, Gousiou DS, Katsara AR, Mantzari SN, Padouva-Markoulaki M, Papatriantafyllou EI, Sacharidi PI, Tonia AI, Tsagalidou EG, Zymara VP, Prezerakos PE, Koupidis SA, Fountoulakis NK, Chrousos GP: Self-reported changes in anxiety, depression and suicidality during the COVID-19 lockdown in Greece. *J Affect Disord* 2021b; 279:624-629. doi:10.1016/j.jad.2020.10.061
13. Galderisi S, Heinz A, Kastrup M, Beezhold J, Sartorius N: Toward a new definition of mental health. *World Psychiatry* 2015; 14:231-3. doi:10.1002/wps.20231
14. Jiménez-Pavón D, Carbonell-Baeza A, Lavie CJ: Physical exercise as therapy to fight against the mental and physical consequences of COVID-19 quarantine: Special focus in older people. *Prog Cardiovasc Dis* 2020; 63:386-388. doi: 10.1016/j.pcad.2020.03.009
15. Jimeno-Almazán A, Pallarés JG, Buendía-Romero Á, Martínez-Cava A, Franco-López F, Sánchez-Alcaraz Martínez BJ, Bernal-Morel E, Courel-Ibáñez J: Post-COVID-19 Syndrome and the Potential Benefits of Exercise. *Int J Environ Res Public Health* 2021; 18:5329. doi:10.3390/ijerph18105329
16. Keyes CLM: Mental health as a complete state: how the salutogenic perspective completes the picture. In: Bauer GF, Hämmig O, editors. *Bridging occupational, organizational and public health*. Dordrecht: Springer, 2014. pp. 179-92
17. Kolokotroni O, Mosquera MC, Quattrocchi A, Heraclides A, Demetriou C, Philippou E: Lifestyle habits of adults during the COVID-19 pandemic lockdown in Cyprus: evidence from a cross-sectional study. *BMC Public Health* 2021; 21:786. doi:10.1186/s12889-021-10863-0. PMID: 33892688; PMCID: PMC8064698
18. Kopishinskaia S, Cumming P, Karpukhina S, Velichko I, Raskulova G, Zheksembaeva N, Tlemisova D, Morozov P, Fountoulakis KN, Smirnova D: Association between COVID-19 and catatonia manifestation in two adolescents in Central Asia: Incidental findings or cause for alarm? *Asian J Psychiatr* 2021; 63:102761. doi:10.1016/j.ajp.2021.102761
19. Kulig B, Erdelyi-Hamza B, Elek LP, Kovacs I, Smirnova D, Fountoulakis K, Gonda X: Effects of COVID-19 on psychological well-being, lifestyle and attitudes towards the origins of the pandemic in psychiatric patients and mentally healthy subjects: first Hungarian descriptive results from a large international online study. *Neuropsychopharmacol Hung* 2020; 22:154-165
20. Lesser IA, Nienhuis CP: The Impact of COVID-19 on Physical Activity Behavior and Well-Being of Canadians. *Int J Environ Res Public Health* 2020; 17:3899. doi:10.3390/ijerph17113899
21. Li YY, Sun Y, Meng SQ, Bao YP, Cheng JL, Chang XW, Ran MS, Sun YK, Kosten T, Strang J, Lu L, Shi J: Internet Addiction Increases in the General Population During COVID-19: Evidence From China. *Am J Addict* 2021; 30:389-397. doi:10.1111/ajad.13156
22. Medina-Ortiz O, Araque-Castellanos F, Ruiz-Domínguez LC, Riaño-Garzón M, Bermudez V: Sleep disorders as a result of the COVID-19 pandemic. *Rev Peru Med Exp Salud Publica* 2020; 37:755-761. doi:10.17843/rpmpesp.2020.374.6360
23. Partinen M: Sleep research in 2020: COVID-19-related sleep disorders. *Lancet Neurol* 2021; 20:15-17. doi:10.1016/S1474-4422(20)30456-7
24. Ramiz L, Contrand B, Rojas Castro MY, Dupuy M, Lu L, Sztal-Kutas C, Lagarde E: A longitudinal study of mental health before and during COVID-19 lockdown in the French population. *Global Health* 2021; 17:29. doi:10.1186/s12992-021-00682-8
25. Ran L, Wang W, Ai M, Kong Y, Chen J, Kuang L: Psychological resilience, depression, anxiety, and somatization symptoms in response to COVID-19: A study of the general population in China at the peak of its epidemic. *Soc Sci Med* 2020; 262:113261. doi:10.1016/j.socscimed.2020.113261
26. Salari N, Hosseinian-Far A, Jalali R, Vaisi-Raygani A, Rasoulpoor S, Mohammadi M, Rasoulpoor S, Khaledi-Paveh B: Prevalence of stress, anxiety, depression among the general population during the COVID-19 pandemic: a systematic review and meta-analysis. *Global Health* 2020; 16:57. doi:10.1186/s12992-020-00589-w
27. Sauer KS, Jungmann SM, Witthöft M: Emotional and Behavioral Consequences of the COVID-19 Pandemic: The Role of Health Anxiety, Intolerance of Uncertainty, and Distress (In)Tolerance. *Int J Environ Res Public Health* 2020; 17:7241. doi:10.3390/ijerph17197241
28. Schuch FB, Bulzing RA, Meyer J, Vancampfort D, Firth J, Stubbs B, Grabovac I, Willeit P, Tavares VDO, Calegari VC, Deenik J, López-Sánchez GF, Veronese N, Caperchione CM, Sadarangani KP, Abufaraj M, Tully MA, Smith L: Associations of moderate to vigorous physical activity and sedentary behavior with depressive and anxiety symptoms in self-isolating people during the COVID-19 pandemic: A cross-sectional survey in Brazil. *Psychiatry Res* 2020; 292:113339. doi:10.1016/j.psychres.2020.113339

29. Shevlin M, Nolan E, Owczarek M, McBride O, Murphy J, Gibson Miller J, Hartman TK, Levita L, Mason L, Martinez AP, McKay R, Stocks TVA, Bennett KM, Hyland P, Bentall RP: COVID-19-related anxiety predicts somatic symptoms in the UK population. *Br J Health Psychol* 2020; 25:875-882. doi:10.1111/bjhp.12430
30. Sigurvinsdottir R, Thorisdottir IE, Gylfason HF: The Impact of COVID-19 on Mental Health: The Role of Locus on Control and Internet Use. *Int J Environ Res Public Health* 2020; 17:6985. doi:10.3390/ijerph17196985
31. Spielberger CD: *Manual for the State-Trait Anxiety Inventory (Self-Evaluation Questionnaire)*. Palo Alto, CA, Consulting Psychologists press; 1970
32. Šuriņa S, Martinsone K, Perepjolkina V, Kolesnikova J, Vainik U, Ruža A, Vrublevska J, Smirnova D, Fountoulakis KN & Rancans E: Factors Related to COVID-19 Preventive Behaviors: A Structural Equation Model. *Front Psychol* 2021; 12:676521. doi:10.3389/fpsyg.2021.676521
33. Tangcharoensathien V, Calleja N, Nguyen T, Purnat T, D'Agostino M, Garcia-Saiso S, Landry M, Rashidian A, Hamilton C, AbdAllah A, Ghiga I, Hill A, Hougendobler D, van Andel J, Nunn M, Brooks I, Sacco PL, De Domenico M, Mai P, Gruzd A, Alaphilippe A, Briand S: Framework for Managing the COVID-19 Infodemic: Methods and Results of an Online, Crowdsourced WHO Technical Consultation. *J Med Internet Res* 2020; 22:e19659. doi:10.2196/19659
34. Vrublevska J, Sibalova A, Aleskere I, Rezgale B, Smirnova D, Fountoulakis KN, Rancans E: Factors related to depression, distress, and self-reported changes in anxiety, depression, and suicidal thoughts during the COVID-19 state of emergency in Latvia. *Nord J Psychiatry* 2021; 9:1-10. doi:10.1080/08039488.2021.1919200
35. Wong FHC, Liu T, Leung DKY, Zhang AY, Au WSH, Kwok WW, Shum AKY, Wong GHY, Lum TY: Consuming Information Related to COVID-19 on Social Media Among Older Adults and Its Association With Anxiety, Social Trust in Information, and COVID-Safe Behaviors: Cross-sectional Telephone Survey. *J Med Internet Res* 2021; 23:e26570. doi:10.2196/26570
36. World Health Organization: Infodemic management: a key component of the COVID-19 global response. *Weekly Epidemiological Record* 2020; 95:145-160. <https://apps.who.int/iris/handle/10665/331775>
37. Xiao H, Zhang Y, Kong D, Li S, Yang N: The Effects of Social Support on Sleep Quality of Medical Staff Treating Patients with Coronavirus Disease 2019 (COVID-19) in January and February 2020 in China. *Med Sci Monit* 2020; 26:e923549. doi:10.12659/MSM.923549
38. Zeigler Z: COVID-19 Self-quarantine and Weight Gain Risk Factors in Adults. *Curr Obes Rep* 2021; 12:1-11. doi:10.1007/s13679-021-00449-7

Correspondence:

Assoc. Prof. Daria Smirnova, MD, PHD  
International Centre for Education and Research in Neuropsychiatry & Department of Psychiatry,  
Narcology, Psychotherapy and Clinical Psychology, Samara State Medical University  
18 Gagarina Street, 443 079 Samara, Russia  
E-mail: daria.smirnova.md.phd@gmail.com