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The knowledge, perceptions and mental health impact of the COVID-19 pandemic in the Greek general population

OBJECTIVE To explore the knowledge and perceptions of COVID-19 in the general population in Greece, to gauge the prevalence of stress, anxiety and depression, and to examine the association between perceptions and socio-demographic variables and mental health status. METHOD Telephone interviews were conducted with a random, representative sample of 1,041 participants across Greece in the period 10th–14th April 2020. Knowledge and perceptions were assessed with a specially constructed questionnaire, mental health status was measured using the Depression, Anxiety Stress Scale-21 (DASS-21), and sociodemographic and physical characteristics were recorded. RESULTS According to the responses, COVID-19 has evoked diverse opinions in the general public, especially with respect to its similarity to common influenza, its mode of transmission (airborne), the belief that it is manufactured, and whether it is out of control. The responses to DASS-21 showed the prevalence of moderate/severe/extreme cases to be 22.3% for depression, 15.9% for anxiety, and 13.1% for stress. Those who acknowledged the dangerous nature of COVID-19 for certain groups exhibited higher stress and depression scores. Respondents who believed that the coronavirus is manufactured and those neutral towards its transmission by air, had higher anxiety, stress and depression scores, while those who agreed that the virus is out of control had lower stress scores. Women, young people, residents of urban areas, those residing in households with a member vulnerable to the virus, individuals with high educational attainment and respondents of lower socio-economic status, all manifested higher risk of mental health problems, as did people who endorsed the view that the virus was manufactured and served specific purposes. CONCLUSIONS Health education intervention, tele-psychiatry and mental health promotion strategies are urgently needed for mitigating the psychological burden of the COVID-19 pandemic.

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Γνώσεις, αντιλήψεις και επιπτώσεις της πανδημίας COVID-19 στην ψυχική υγεία του γενικού πληθυσμού της Ελλάδας

Περίληψη στο τέλος του άρθρου

In the event of natural hazards, fear, uncertainty and social disruption are commonplace, and act as barriers against appropriate treatment, including mental health interventions.[1,2] Past experiences of viral epidemics and other physical disasters corroborate their grave impact on population mental health, through documentation of high rates of common mental disorders, insomnia and self-harm behaviors.[1,3] As a corollary to this, addressing mental health issues should be an integral part of any health strategy tackling biological disasters.[4]

Coronavirus disease 2019 (COVID-19), caused by the novel coronavirus SARS-CoV-2, gives rise to acute respiratory illness. Its outset was pinpointed in Wuhan, Hubei province, China in December 2020,[5] but it soon spread rapidly throughout the country. The World Health Organization (WHO) declared the COVID-19 outbreak a Public Health Emergency of International Concern (PHEIC) on 30th January 2020,[6] and a global pandemic on 11th March 2020.[7] As of 4th August 2020, the unprecedented global public health crisis reached 18,142,718 confirmed cases worldwide, with 691,013 recorded deaths;[8] in Europe, the corresponding figures were 3,425,017 and 214,238, respectively.[8] In an endeavor to curb the outbreak of the virus, which is known to be transmitted through human contact, strict lockdown and quarantine measures were introduced in many different parts of the world, with vast implications.

In addition to its physical threat, the COVID-19 pandemic has triggered wide-ranging mental health consequences, pertaining to both the virus and the restrictive measures.[9,10] A large-scale survey of 54,730 participants from 36 provinces, autonomous regions and municipalities in China, and from Hong Kong, Macau and Taiwan, recorded that 29.3% were experiencing mild to moderate, and 5.1% severe psychological distress.[11] Similarly, Huang and Zhao (2020) gauged the prevalence of generalized anxiety disorder, depressive symptoms and sleep quality to be 35.1%, 20.1% and 18.2%, respectively. From employing the Symptom Checklist 90 (SCL-90), Tian and colleagues (2020) reported that 70% of respondents demonstrated moderate to high levels of psychological symptoms, primarily in the form of obsessive compulsion, interpersonal sensitivity, phobic anxiety and psychoticism, and Wang and colleagues (2020), in their sample, recorded 16.5% suffering moderate to severe depressive symptoms, 28.8% moderate to severe anxiety symptoms and 8.1% moderate to severe stress levels; in a repeat cross-sectional study conducted four weeks later, no change was discerned with respect to these levels.[15]

Regarding the risk factors for psychological burden dur-ing the COVID-19 crisis, the current evidence is inconclusive with regard to gender, age, educational attainment, and occupation. Only one study has documented a gender effect,[11] while, concerning age, respondents aged 18–30 years, and those aged above 60 years appeared to be at higher risk of psychological distress.[11] The study of Tian and colleagues identified the risk of older individuals for manifesting psychiatric morbidity,[13] while another study identified the same risk in younger individuals.[12] One study showed higher education to be a protective factor,[13] and another showed the opposite.[11] Across several studies, migrant workers, agricultural workers and health professionals were reported to display more mental health problems.[11–13] In contrast, increased confidence in physicians, belief in a low risk of infection with COVID-19, satisfaction with health information, and personal precautionary measures, were all found to be protective against psychiatric morbidity.[14] Finally, spending too much time thinking about the pandemic substantially increased the likelihood of mental illness.[12] Thus, it is apparent that there is considerable heterogeneity among population subgroups concerning the relative risk of mental health problems, and a dearth of robust research emanating from European countries.

In Greece, the first COVID-19 case was recorded on 26th February 2020, in a 38-year-old who had recently returned from a visit to Northern Italy. Mounting numbers of cases led the Greek government to suspend operation of educational institutions on 10th March 2020, and in the ensuing days all cafes, bars, museums, shopping centers, retail stores, sports facilities, restaurants and churches were closed down. On 23rd March 2020, and until the 4th May 2020, the government introduced strict lockdown measures. Concerning the COVID-19 caseload, as of 4th August 2020, a total of 4,737 confirmed cases had been documented, with 209 deaths. As a corollary of this, sleep problems were detected in 37.6% of the Greek population in survey conducted 10th–13th April 2020,[16] which also showed that women, residents of urban areas, those who were unsure whether they had been infected with the virus, people intolerant of uncertainty, those with COVID-19 pertinent worry, people feeling lonely and those with depressive symptomatology, all displayed a greater likelihood of suffering from sleep disturbances.[16] An exacerbation of mental health problems was also recorded in Greek university students, with substantial increases in the levels of anxiety, depression, and suicidal thoughts.[17]

In this context, and in view of the scarcity of research on the mental health effects of COVID-19 in Europe, this study explored the knowledge and perceptions of individuals about COVID-19, recorded the prevalence of stress, anxiety

and depression in the Greek population and investigated the association of socio-demographic characteristics and COVID-19 perceptions with stress, anxiety and depression rates. To our knowledge, this is the first study that has used a nationally, representative, random sample to this end.

MATERIAL AND METHOD

Participants

This was a cross-sectional telephone survey designed to collect information on the views, perceptions and practices of Greek citizens towards the COVID-19 pandemic and to explore its psychological and mental health impact. The sample was randomly selected and was distributed proportionately among the 13 administrative regions in the country. Specifically, the sample was generated by a random stratified selection from the 2011 national telephone directory, taking into account geographic region, gender and age. The numbers were categorized by region, prefecture, municipality and urbanization level, in accordance with the 2011 National Population Census. Only telephone numbers belonging to individuals were utilized. Within each household, the person with the most recent birthday was selected, provided they were aged older than 17 years, and were fluent in the Greek language. Calls were made during both weekdays and weekends, and during morning and evening hours. At least 6 callbacks were made for each number selected.

A total of 1,205 individuals were approached, of whom 1,041 agreed to participate (response rate 86.4%). No difference was recorded between responders and non-responders with respect to administrative region. The survey was carried out by a commercial company working in the field of demographic surveys, under the close guidance of the scientific supervisor of the study. The process was supported by the specialized software computer assisted telephone interviewing (CATI). The data were collected between 10th and 14th April 2020, roughly four weeks after the implementation of strict lockdown measures in Greece by the government. The study received approval from the Ethics Committee of the University of the Peloponnese, and was performed in accordance with the ethical standards delineated in the Declaration of Helsinki 1964/2013, and informed consent was obtained from all participants.

Instruments

The telephone questionnaire consisted of nine parts, three of which were of interest to this study, specifically: (a) Sociodemographic and physical characteristics, (b) knowledge and perceptions about the current virus, and (c) mental health status. Sociodemographic and physical characteristics included age, gender, body mass index (BMI), area of residence, education, occupation, income, marital status, number of household members, presence of underage children in the household, vulnerability

to the virus of a household member, self-reported health status, smoking and alcohol use.

Knowledge and perceptions included (a) the possibility of being an asymptomatic carrier of the virus, (b) coronavirus being dangerous for those who have an underlying disease and are older, (c) coronavirus being out of control, (d) coronavirus being engineered and serving a purpose, (e) coronavirus being like flu, and (f) coronavirus being transmitted by air. Respondents were asked to indicate whether they agree or not with each sentence on a 5-point Likert scale (1=strongly disagree; 5=strongly agree). These items were constructed by the research team, based on current evidence about the coronavirus, as reported by the WHO, and on similar instruments reported in the international literature.[14,18]

Mental health status was measured using the self-reported Depression, Anxiety and Stress Scale (DASS-21) which has been validated for use in the Greek population and used in previous studies.[19,20] The DASS-21 covers three factors, the score on each of which ranges from 0 to 42 points: The "Depression" subscale that assesses dysphoria, hopelessness, devaluation of life, self-deprecation, lack of interest/involvement, anhedonia and inertia, the "Anxiety" subscale that assesses autonomic arousal, skeletal muscle effects, situational anxiety, and subjective experience of anxious affect, and the "Stress" subscale that assesses the degree of non-specific arousal and includes the items difficulty relaxing, nervous arousal, and being easily upset agitated, irritable/over-reactive and impatient. Based on cut-off scores, four different severity labels are estimated for each subscale (normal, moderate, severe, extremely severe); the Greek version of the scale has demonstrated good psychometric properties in the Greek population.[19,20]

Statistical analysis

Descriptive analysis of the sociodemographic and physical characteristics of the study participants was expressed as percentages for categorical variables and mean and standard deviation (SD) (mean±SD) for numeric variables. The knowledge and perceptions of the respondents related to the new coronavirus, and the DASS-21 scores on the Depression, Anxiety, and Stress subscales were analyzed. Finally, to estimate the association between knowledge and perceptions and the three DASS-21 subscale scores, multivariate negative binomial regression analysis was applied, controlling for sociodemographic and physical characteristics. Since the scores on the three DASS-21 subscales ranged from 0 to 42 and were right-skewed (non-normal distribution), a count model was more appropriate for this analysis.[21] The choice of the negative binomial regression model over alternative count models (i.e., Poisson, zero-inflated count models) was evaluated and corroborated using Akaike's Inclusion Criteria (AIC). Geographic-level fixed effects and clustered standard errors (SE) at the geographical region of residence were used to control for unobserved time-invariant regional characteristics. Data were collected in the Statistical Package for Social Sciences (SPSS) and all statistical analyses were conducted using Stata (version 16.1; StataCorp, College Station, TX).

RESULTS

The sociodemographic and physical characteristics of the study population

In total, 1,041 individuals participated in the survey, but of those 111 did not fully complete the questionnaire (10.6%), resulting in 930 valid questionnaires. More than half of the respondents (52.4%) were aged between 25 and 54 years and one third were aged 40 to 54 years, and 49.8% were male. The characteristics of the study population are shown in table 1. Most resided in urban areas (71.8%) and had tertiary-level education (51.6%). A total of 56.2% were employed full time and around 6% were healthcare professionals. Most indicated an average income (38.1%), but almost one-quarter (26.6%) reported a very low or low income. More than half were married (55.9%) and the average household size was 2.7±1.3 people, and 19.7% of households included underage children. About 38% of re-

Table 1. Sociodemographic and physical characteristics of respondents to a telephone questionnaire on COVID-19.

	Participants (n=930)		Participants (n=930)
Gender (%)		*Income (%)*	
Male	49.8	Very low	11.9
Female	50.2	Low	14.7
Age categories (years) (%)		Low to average	16.6
17 to 24	10.2	Average	38.1
25 to 39	23.2	Higher than average	18.7
40 to 54	29.2	*Marital status (%)*	
55 to 64	15.7	Married	55.9
65 or more	21.7	Not married	23.9
Body mass index (BMI) (%)		Divorced/widowed	20.2
Normal/low	37.0	Number of people in household	2.7 (1.3)
Above normal	41.6	*Underage children in household (%)*	
Obese	21.4	No	80.3
Place of residence (%)		Yes	19.7
Urban	71.8	*Household member vulnerable to COVID due to underlying health problem (%)*	
Suburban	17.7	No	65.3
Rural	10.5	Yes	37.7
Education (%)		*Perceived health status (%)*	
Tertiary (AEI/TEI)	51.6	Very good	22.4
Primary or secondary (High School or less)	28.1	Good	54.7
Post-tertiary (Masters/Doctoral)	20.3	Medium	18.8
Employment status (%)		Very bad/bad	4.1
Full-time	56.2	*Smoker (%)*	
Retired	24.0	No	57.1
Unemployed	9.3	Yes	42.9
Student	3.9	*Alcohol use (regular) (%)*	
Other	6.7	No	88.6
Healthcare professional (%)		Yes	11.4
No	93.8		
Yes	6.2		

AEI/TEI: Higher Educational Institute/Technological Educational Institute

spondents reported that a member of their household was vulnerable to the new virus, because of an existing health condition. In terms of health status, the majority rated their health as good (54.7%) or very good (22.4%); 42.9% were current smokers and 11.4% were drinking alcohol regularly.

Knowledge and perceptions about the new coronavirus

The knowledge and perceptions of the respondents about the new coronavirus are presented in table 2. Almost all of the participants knew that infection with the virus might be asymptomatic (93.3%), and particularly dangerous for older individuals and those with underlying health conditions (86.6%). Almost half (44.7%) considered the

virus to be out of control, and 42.6% did not agree with the statement that the new coronavirus is manufactured and serves a purpose. Regarding its similarity with common flu, 42.3% thought that the new virus was different, while 35.3% believed it to be similar. Opinions diverged on whether the virus is airborne, with just over one third knowing the means of transmission.

The mental health status of the participants

As shown in table 3, the mean scores on the three DASS-21 subscales were 4.37±6.73 for anxiety, 9.49±9.02 for stress, and 8.0±9.14 for depression. The majority of participants recorded normal scores across all three mental health outcomes. Severe or extremely severe anxiety, stress, and depression were reported by 8.3%, 7.0%, and 10.7% of respondents, respectively.

Table 2. Perceptions and opinions of respondents to a telephone questionnaire related to the current COVID-19 pandemic.

	Participants (n=930)
The virus may be asymptomatic (%)	
Agree	93.3
Neutral	5.5
Disagree	1.2
The virus is dangerous for older people and for those with underlying health problems (%)	
Agree	86.6
Neutral	6.9
Disagree	6.5
The virus is out of control (%)	
Agree	44.7
Neutral	28.7
Disagree	26.6
The virus is manufactured and serves specific purposes (%)	
Agree	24.4
Neutral	33.0
Disagree	42.6
The virus is similar to common flu (%)	
Agree	35.3
Neutral	22.5
Disagree	42.3
The virus is airborne (%)	
Agree	37.4
Neutral	28.0
Disagree	34.6

Table 3. The scores on the Depression, Anxiety Stress Scale-21 (DASS-21) score of respondents to a telephone questionnaire on COVID-19 (n=930).

Anxiety	
DASS-21 score – average (SD)	4.37 (6.73)
DASS-21 score (%)	
Normal (0–7)	78.9
Mild (8–9)	5.2
Moderate (10–14)	8.3
Severe (15–19)	2.9
Extremely severe (20+)	4.7
Depression	
DASS-21 score – average (SD)	8.00 (9.14)
DASS-21 score (%)	
Normal (0–9)	67.4
Mild (10–13)	10.3
Moderate (14–20)	11.6
Severe (21–27)	4.2
Extremely severe (28+)	6.5
Stress	
DASS-21 score – average (SD)	9.49 (9.02)
DASS-21 score (%)	
Normal (0–14)	77.9
Mild (15–18)	9.0
Moderate (19–25)	6.1
Severe (26–33)	4.0
Extremely severe (34+)	3.0

Note this table would be better if the order was Depression, Anxiety, Stress (as in DASS) SN

Association of knowledge and perceptions about COVID-19 with the mental health status

Table 4 presents results of multivariate negative binomial regression analysis of the scores on the DASS-21 Anxiety, Stress, and Depression subscales with COVID-19 knowledge and perceptions, sociodemographic and physical characteristics as predictors. Respondents who recognized the dangerous nature of the new coronavirus for older and sicker individuals had higher scores for "Stress" (p=0.011) and "Depression" (p=0.023). In contrast, respondents who considered that the virus is out of control had lower scores on the "Stress" subscale (p=0.044), but not the other two. Those who agreed with the statement that the virus is manufactured and serves a specific purpose scored higher on all three subscales ($p_{anxiety}<0.001$; $p_{stress}<0.001$; $p_{depression}=0.004$). Regarding the transmission of the virus by air, respondents who were neutral towards this statement had significantly higher scores for "Anxiety" compared with those who reported agreement or disagreement (p=0.031). Finally, no significant association was observed between the scores on the three mental health subscales and knowledge and perceptions related to the similarity of the new coronavirus to common flu and the asymptomatic nature of the virus.

Association of sociodemographic and physical characteristics with the mental health status

The scores on the DASS-21 subscales were significantly higher for younger respondents, particularly for those aged between 17 and 54 years, than for those who were 65 years of age or older (tab. 4). There was a tendency for lower scores on the "Anxiety" and "Stress" subscales in the age group 55 to 64 years that reached significance only for "Stress" (p=0.005). Women scored significantly higher than men on all three subscales (p<0.001), and respondents residing in urban areas scored higher than those in non-urban areas on all three subscales. Respondents with a masters or doctorate degree scored marginally higher on the "Stress" subscale than to those with a university degree (p<0.05). Those who were unemployed had significantly higher "Anxiety" scores than full-time employees (p=0.028). Respondents with "very low income" scored higher on the "Stress" subscale than those with "low income" (p=0.006), and higher on all three subscales than those with "low to average", "average" and "higher than average income", although this did not reach significance on the "Anxiety" subscale (p=0.079) for those with "average income". No difference was demonstrated between respondents based on their marital status, but the presence of underage children in the household was associated with higher scores on the "Anxiety" subscale

(p=0.033). The presence of vulnerable household members was associated with higher scores on the "Anxiety" and "Stress" subscales (p=0.003 and p=0.036, respectively). Medium, bad or very bad perceived health status was associated with higher scores on all three subscales, while very good perceived health status was associated with lower scores on the "Anxiety" subscale (p=0.042). Regular alcohol use was associated with higher scores on the "Stress" and "Depression" subscales (p=0.025 and p=0.002, respectively). Finally, no significant association was observed between the scores on any of the three mental health subscales and BMI, marital status or smoking.

DISCUSSION

This study explored the knowledge of and perceptions on COVID-19 using telephone interviews with a random, representative sample of the Greek population. It estimated the prevalence of stress, anxiety and depression among this population associated with the novel coronavirus, and identified multiple risk factors for adverse mental health outcomes.

Almost all the participants agreed that infection with the COVID-19 virus may be asymptomatic and that it is dangerous for older individuals and those with underlying health conditions. The beliefs that the virus is similar to common flu, that it is airborne and out of control, and has been manufactured to serve specific purposes were conflicting among the participants. The preponderance of misconceptions about COVID-19 is consonant with evidence from the UK and USA;[22] however, based on the responses of the study participants, the Greek population appears, at first glance, to be less knowledgeable than its American and British counterparts, especially with respect to the pathway of transmission. This could be explained by methodological artefacts (e.g., different wording of the pertinent questions), the ongoing scientific debate about airborne transmission and or optimism among Greek people, largely cultivated by the media, that the course of the pandemic will improve during summertime when people are not confined to closed places. Emphasis may have been misplaced from the heightened crowding in closed places with limited air renewal, which in turn may have perplexed the population about airborne transmission. In sharp contrast to Western countries, evidence from China corroborates advanced knowledge of the population, and optimism about the virus.[14,18] Specifically, in one cross-sectional survey in China, 9.2% of the sample was not confident that the virus will be successfully controlled. In spite of differences in the wording of the questions and the sampling strategy, in

Table 4. Multivariate negative binomial regression estimates between scores on the Depression, Anxiety, Stress Scale-21 (DASS-21) and perceptions of respondents to a telephone questionnaire on COVID-19 and their sociodemographic and physical characteristics.

	Anxiety		Stress		Depression	
	IRR (95% CI)	p-value	IRR (95% CI)	p-value	IRR (95% CI)	p-value
Perceptions						
The virus may be asymptomatic						
Agree	Reference		Reference		Reference	
Neutral	1.15 (0.78–1.68)	0.482	1.04 (0.86–1.26)	0.710	1.20 (0.99–1.45)	0.065
Disagree	0.74 (0.91–1.41)	0.360	1.11 (0.45–2.73)	0.818	0.91 (0.32–2.56)	0.858
The virus is dangerous for older people and for those with underlying health problems						
Agree	Reference		Reference		Reference	
Neutral	1.23 (0.88–1.72)	0.214	1.19 (0.91–1.55)	0.207	1.09 (0.85–1.38)	0.504
Disagree	0.85 (0.64–1.14)	0.281	0.78 (0.64–0.94)	0.011	0.76 (0.60–0.96)	0.023
The virus is out of control						
Agree	Reference		Reference		Reference	
Neutral	1.07 (0.85–1.35)	0.550	1.13 (0.98–1.31)	0.099	1.06 (0.92–1.22)	0.421
Disagree	0.95 (0.80–1.11)	0.512	1.13 (1.00–1.27)	0.044	0.86 (0.83–1.12)	0.599
The virus is manufactured and serves specific purposes						
Agree	Reference		Reference		Reference	
Neutral	0.92 (0.79–1.06)	0.265	0.97 (0.88–1.07)	0.566	0.93 (0.79–1.09)	0.373
Disagree	0.80 (0.71–0.90)	<0.001	0.87 (0.77–0.91)	<0.001	0.76 (0.68–0.92)	0.004
The virus is similar to common flu						
Agree	Reference		Reference		Reference	
Neutral	1.25 (1.00–1.55)	0.050	1.13 (0.91–1.32)	0.111	1.06 (0.88–1.28)	0.532
Disagree	1.15 (0.92–1.45)	0.222	1.00 (0.86–1.17)	0.976	0.95 (0.80–1.13)	0.559
The virus is airborne						
Agree	Reference		Reference		Reference	
Neutral	1.19 (1.02–1.39)	0.031	1.01 (0.90–1.14)	0.844	1.03 (0.87–1.21)	0.766
Disagree	1.08 (0.90–1.29)	0.420	1.01 (0.92–1.11)	0.849	1.06 (0.92–1.23)	0.422
Sociodemographic and physical						
Age categories (years)						
65 or more	Reference		Reference		Reference	
17 to 24	1.76 (1.26–2.45)	0.001	1.68 (1.23–2.29)	0.001	1.44 (1.03–2.01)	0.035
25 to 39	1.40 (1.06–1.86)	0.019	1.51 (1.20–1.90)	<0.001	1.33 (1.01–1.77)	0.044
40 to 54	1.53 (1.17–1.98)	0.002	1.41 (1.11–1.79)	0.004	1.26 (1.00–1.57)	0.047
55 to 64	1.14 (0.80–1.63)	0.464	1.08 (0.80–1.46)	0.627	1.12 (0.87–1.43)	0.380
Gender						
Male	Reference		Reference		Reference	
Female	2.06 (1.66–2.55)	<0.001	1.41 (1.24–1.60)	<0.001	1.55 (1.37–1.75)	<0.001
Body mass index (BMI) (%)						
Normal/low	Reference		Reference		Reference	
Above normal	1.00 (0.81–1.22)	0.996	1.05 (0.94–1.18)	0.368	1.01 (0.89–1.14)	0.913
Obese	0.83 (0.63–1.10)	0.202	1.01 (0.86–1.17)	0.932	0.95 (0.79–1.12)	0.500
Place of residence						
Urban	Reference		Reference		Reference	
Suburban	0.71 (0.58–0.87)	0.001	0.84 (0.70–1.00)	0.046	0.77 (0.62–0.97)	0.023
Rural	0.76 (0.54–1.07)	0.111	0.68 (0.51–0.92)	0.013	0.82 (0.60–1.10)	0.187

Notes: All regression models control for geographic level fixed effects
AEI/TEI: Higher Educational Institute/Technological Educational Institute, IRR: Incidence rate ratio, CI: Confidence interval

Table 4. (continued) Multivariate negative binomial regression estimates between scores on the Depression, Anxiety, Stress Scale-21 (DASS-21) and perceptions of respondents to a telephone questionnaire on COVID-19 and their sociodemographic and physical characteristics.

	Anxiety		Stress		Depression	
	IRR (95% CI)	p-value	IRR (95% CI)	p-value	IRR (95% CI)	p-value
Education (%)						
Tertiary (AEI/TEI)	Reference		Reference		Reference	
Primary or secondary (High School or less)	1.06 (0.91–1.24)	0.449	0.95 (0.81–1.10)	0.474	0.97 (0.77–1.23)	0.816
Post-tertiary (Masters/Doctoral)	1.17 (0.94–1.47)	0.166	1.13 (1.00–1.27)	0.048	1.16 (0.95–1.42)	0.145
Employment status						
Full-time	Reference		Reference		Reference	
Retired	1.00 (0.85–1.19)	0.964	0.93 (0.74–1.18)	0.555	0.75 (0.61–0.92)	0.006
Unemployed	1.41 (1.04–1.92)	0.028	1.06 (0.94–4.19)	0.367	1.00 (0.83–1.19)	0.980
Student	1.12 (0.73–1.71)	0.608	1.14 (0.81–1.60)	0.459	1.33 (1.00–1.77)	0.048
Other	0.76 (0.56–1.04)	0.086	0.95 (0.81–1.10)	0.492	0.83 (0.66–1.05)	0.127
Healthcare professional						
No	Reference		Reference		Reference	
Yes	1.35 (1.05–1.74)	0.019	1.07 (0.82–1.40)	0.510	1.00 (0.77–1.29)	0.972
Income (%)						
Very low	Reference		Reference		Reference	
Low	0.74 (0.46–1.17)	0.197	0.75 (0.60–0.92)	0.006	0.81 (0.62–1.05)	0.111
Low to average	0.60 (0.39–0.92)	0.020	0.77 (0.64–0.93)	0.006	0.79 (0.66–0.94)	0.010
Average	0.77 (0.57–1.04)	0.079	0.81 (0.66–0.99)	0.036	0.82 (0.68–0.98)	0.029
Higher than average	0.68 (0.48–0.98)	0.040	0.69 (0.59–0.81)	<0.001	0.70 (0.58–0.86)	0.001
Marital status (%)						
Married	Reference		Reference		Reference	
Not married	1.24 (0.97–1.51)	0.085	1.07 (0.95–1.20)	0.257	1.17 (0.93–1.48)	0.177
Divorced/widowed	1.13 (0.74–1.71)	0.561	1.06 (0.79–1.44)	0.682	1.27 (0.91–1.77)	0.164
Underage children in household (%)						
No	Reference		Reference		Reference	
Yes	1.24 (1.02–1.50)	0.033	1.10 (0.96–1.25)	0.167	1.20 (1.00–1.44)	0.050
Household member is vulnerable to COVID due to underlying health problem						
No	Reference		Reference		Reference	
Yes	1.26 (1.09–1.47)	0.003	1.11 (1.01–1.22)	0.036	1.11 (0.98–1.27)	0.105
Perceived health status (%)						
Good	Reference		Reference		Reference	
Very good	0.80 (0.65–0.99)	0.042	0.93 (0.80–1.08)	0.357	0.87 (0.71–1.07)	0.187
Medium	1.84 (1.45–2.32)	<0.001	1.49 (1.31–1.69)	<0.001	1.75 (1.45–2.13)	<0.001
Very bad/bad	2.01 (1.62–2.48)	<0.001	1.36 (1.08–1.70)	0.008	2.01 (1.62–2.48)	<0.001
Smoking (%)						
No	Reference		Reference		Reference	
Yes	1.04 (0.94–1.15)	0.466	1.04 (0.96–1.12)	0.378	1.05 (0.93–1.19)	0.454
Alcohol use (regular) (%)						
No	Reference		Reference		Reference	
Yes	1.49 (0.96–2.32)	0.074	1.30 (1.03–1.64)	0.025	1.36 (1.12–1.65)	0.002

Notes: All regression models control for geographic level fixed effects
AEI/TEI: Higher Educational Institute/Technological Educational Institute, IRR: Incidence rate ratio, CI: Confidence interval

our study, one in two respondents considered the virus out of control. Hence, it may be the case that the Greek population was more pessimistic with respect to curtailing the spread of the virus in the early stages of the pandemic; while Chinese people, perhaps due to previous experience with SARS, were more confident about it.

The misconceptions discerned in our study underline the importance of health education interventions. Information campaigns organized by public health authorities and media reports should be geared towards differentiating COVID-19 from common flu and should elaborate on its routes of transmission. Concomitantly, concerted efforts should be made, at both the national and international level, to counteract fake news. Facilitating access to official public health organizations websites, delegitimizing the sources of fake news and encouraging people to think about the accuracy of the information they share, are, among other activities, promising lines of intervention.[23–25]

Regarding the mental health effects of the COVID-19 pandemic, our study is, to the best of our knowledge, the only one to prioritize concern about depression over anxiety. Converging evidence from the international literature substantiate growing rates of anxiety disorders in the general population, in the form of generalized anxiety disorder, phobic anxiety and obsessive-compulsive disorder.[12–15,26] The prevalence of moderate to extreme severe anxiety in our sample was 15.9%, compared to 28.8% in one study in China, which also employed DASS-21 for assessing the mental health status.[14] Conversely, the corresponding figures for depression were 22.3% in Greece and 16.5% in China, using the same instrument.

Our findings concur with evidence from a telephone helpline, which has also documented preponderance of depression in the Greek population.[27] A possible explanation for this may be that the early and timely response of health authorities in introducing restrictive measures has contained the threat, as evidenced by the limited morbidity levels in Greece as opposed to other countries. Therefore, the Greek population had to deal primarily with the mental health effects of the quarantine, rather than increasing mortality rates. The raised rates of depression in the Greek sample may be ascribed, alternatively, to the recent long-term recession, which resulted in a gradual but steady increase in the incidence of major depression from 3.3% in 2008 to 12.3% in 2013.[28] The prevalence of major depression, therefore, could have already been high before the pandemic. It is of note that prior to the pandemic, a study investigating the psychometric properties of DASS-21 in the Greek population documented lower mean values

for all three subscales, compared to those in our study: mean=4.91 vs mean=8.00 for "Depression", mean=3.76 vs mean=4.37 for "Anxiety" and mean=7.49 vs mean=9.49 for "Stress".[20] At first glance, this may substantiate an adverse impact of the COVID-19 pandemic on the mental health of the Greek population, but possible methodological differences between the two studies should be taken into consideration.

Concerning the risk factors for psychiatric morbidity, in our study, women, young people, residents of urban areas, those residing in households with a member vulnerable to the virus, people with higher educational attainment and people of lower socio-economic status, were shown to be at increased risk of mental health problems during the COVID-19 pandemic. While women, residents of urban areas and people of lower socio-economic status are susceptible to common mental disorders, irrespective of the pandemic, this is usually not the case for very young people or individuals with high education.[29–31] The independent association between younger age and psychiatric morbidity is congruent with other studies,[12,13] and it might be explained by the high exposure of young people to social media, and thus to fake news. Furthermore, young people have been shown to find it harder to cope with quarantine, as evidenced by its grave psychological impact on them that has been documented.[32] With regard to the high educational level, greater self-awareness of danger and health may have mediated the psychological distress discerned in this population subgroup.

Among the most intriguing findings of the present study is the increased risk of psychiatric morbidity among those who believe that the virus is manufactured and serves specific aims. In general, conspiracy theories fulfill various purposes, and they appear to provide a broad and consistent account that enables people to preserve their beliefs in face of uncertainty.[33] It has been demonstrated that belief in conspiracy theories is strengthened when there is high motivation to discern patterns in the environment,[34] and conspiracy theories serve the need for people to feel safe and secure in their environment and to exert control over it as autonomous individuals and group members.[35] Evidence suggests that people subscribe to conspiracy theories when they are anxious[36] and feel powerless,[37] and hence, it is not surprising that they are spawned in times of adversity. A survey in the UK reported considerable endorsement of conspiracy thinking amid the COVID-19 pandemic, with alarming implications for non-adherence to government guidelines.[38] There is paucity of research with respect to the link between conspiracy theories and common mental disorders,[33] especially during the COVID-19 pandemic, and

the present study makes an important contribution to this branch of the literature.

This study is among a handful of studies in the international literature that have recruited a random sample to investigate the mental health effects of the COVID-19 pandemic. The possibility of sampling bias cannot be excluded, as people with mental health problems and or people with more negative attitudes towards COVID-19 may have refused to participate, or, alternatively been more ready to talk about their concerns. The mental health status was assessed with a self-reported instrument, and this can only approximate the accuracy of a clinical interview. Finally, a cross-sectional design tempers conclusions, due to concerns about the direction of causality.

In conclusion, diversity in government responses to the COVID-19 pandemic appears to go hand-in-hand with heterogeneity in the international literature about its mental health effects. Evidence from our random and representative sample of the Greek population suggests that the coronavirus has evoked diverse opinions in the population and has resulted in raised rates of depression and anxiety. Women, young people, residents of urban areas, those residing in households with a member vulnerable to the virus, individuals with high educational attainment and respondents with lower socio-economic status manifested higher risks of mental health problems. Similarly, people who endorse the view that the virus was manufactured and served specific purposes displayed more marked morbidity.

To mitigate the mental health effects of the pandemic, health interventions geared towards debunking myths about COVID-19 should be implemented, coupled with national and international efforts to counteract fake news. Concomitantly, telemedicine mental health visits, online counseling interventions, and peer support groups can alleviate the emerging anxiety and depressive symptoms. Finally, encouraging people to develop and implement routines, especially for those who work from home, may cultivate a sense of security and control over their micro-environment, attenuating, in this way, the tendency to conspiracy thinking.

ΠΕΡΙΛΗΨΗ

Γνώσεις, αντιλήψεις και επιπτώσεις της πανδημίας COVID-19 στην ψυχική υγεία του γενικού πληθυσμού της Ελλάδας

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ΣΚΟΠΟΣ Η διερεύνηση των γνώσεων και των αντιλήψεων του γενικού πληθυσμού της Ελλάδας αναφορικά με την COVID-19, η εκτίμηση της επικράτησης του stress, του άγχους και της κατάθλιψης και η εξέταση πιθανών συσχετίσεων μεταξύ αντιλήψεων και κοινωνικο-δημογραφικών μεταβλητών αναφορικά με την ψυχική υγεία. **ΥΛΙΚΟ-ΜΕΘΟΔΟΣ** Το δείγμα ήταν τυχαίο και αντιπροσωπευτικό και αποτελείτο από 1.041 συμμετέχοντες από όλη την Ελλάδα, οι οποίοι έλαβαν μέρος στην παρούσα έρευνα μέσω τηλεφωνικών συνεντεύξεων από 10–14 Απριλίου του 2020. Οι γνώσεις και οι αντιλήψεις αξιολογήθηκαν μέσω ενός αυτοσχέδιου ερωτηματολογίου, ενώ οι επιπτώσεις στην ψυχική υγεία διερευνήθηκαν χρησιμοποιώντας την κλίμακα μέτρησης των αρνητικών συναισθημάτων του άγχους, της κατάθλιψης και του stress-21 (Depression, Anxiety Stress Scale-21, DASS-21). Επίσης, συλλέχθηκαν πληροφορίες αναφορικά με τα δημογραφικά και τα κοινωνικοοικονομικά χαρακτηριστικά του δείγματος. **ΑΠΟΤΕΛΕΣΜΑΤΑ** Τα ευρήματα κατέδειξαν τη διαφορετικότητα των απόψεων του κοινού αναφορικά με τον νέο κορωνοϊό, ιδιαίτερα όσον αφορά στην ομοιότητά του με την κοινή γρίπη, τον τρόπο μετάδοσής του (αερομεταφερόμενος), την πεποίθηση ότι είναι κατα-

σκευασμένος σε εργαστήριο, καθώς επίσης ότι είναι ανεξέλεγκτος. Ο επιπολασμός των μέτριων/σοβαρών/ιδιαίτερα σοβαρών περιπτώσεων βρέθηκε να είναι 22,3% για την κατάθλιψη, 15,9% για το άγχος και 13,1% για το stress. Όσοι αναγνώρισαν την επικινδυνότητα του κορωνοϊού προς κάποιες ομάδες είχαν υψηλότερες βαθμολογίες stress και κατάθλιψης. Οι συμμετέχοντες που δήλωσαν πως πίστευαν ότι ο κορωνοϊός είναι κατασκευασμένος και η εξάπλωσή του εξυπηρετεί συγκεκριμένους σκοπούς και όσοι παρέμειναν ουδέτεροι στη δήλωση ότι μεταφέρεται μέσω του αέρα, είχαν υψηλότερες βαθμολογίες άγχους, stress και κατάθλιψης. Οι ομάδες υψηλού κινδύνου εμφάνισης ψυχικής νόσου ήταν οι γυναίκες, οι νέοι, οι κάτοικοι αστικών περιοχών, όσοι διέμεναν μαζί με άτομο ευπαθές στη νόσηση από τον ιό, άτομα με υψηλό μορφωτικό επίπεδο και άτομα χαμηλότερης κοινωνικοοικονομικής κατάστασης. Ομοίως, οι άνθρωποι που υποστήριξαν την άποψη ότι ο ιός έχει κατασκευαστεί σε εργαστήριο και εξυπηρετεί συγκεκριμένους σκοπούς εμφάνισαν έντονη νοσηρότητα. **ΣΥΜΠΕΡΑΣΜΑΤΑ** Οι παρεμβάσεις αγωγής υγείας, η Τηλεψυχιατρική και οι στρατηγικές προαγωγής της ψυχικής υγείας κρίνονται άκρως απαραίτητες για την αντιμετώπιση της ψυχολογικής επιβάρυνσης από την πανδημία.

Λέξεις ευρετηρίου: Άγχος, Κατάθλιψη, Κορωνοϊός, Stress, Ψυχολογική επιβάρυνση

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