Research Article

Impact of COVID-19 on University Students' Quality of Life and Mental Health in Greece: A Cross-sectional Study

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ABSTRACT

Background: COVID-19 pandemic has highlighted an increasing deterioration of university students' quality of life and mental health. COVID-19 pandemic forced university students to take online classes, which may have an impact on students' education. In addition, students lost many job opportunities because of the pandemic. Faced with unemployment and study pressure and worried about the epidemic, university students were prone to high overall negative emotions, anxiety, and depression.

Aims: Our study aims to conduct an impact assessment of the COVID-19 pandemic on the quality of life and mental health of university students.

Methods: We conducted a cross-sectional study using an online interview survey on students at public universities in Greece to better understand the effects of the pandemic on their quality of life and mental health. Three tools were used (WHOQOL-BREF, IES-R, and HADS).

Results: 1.266 university students from public Greek Universities participated in the study. We observed that 55.8% had a score lower than 50 in the psychological domain and 52.3% in the social domain of WHOQOL-BREF. Additionally, 46.6% of the respondents had a score of 37+ on the IES-R questionnaire, 45% of the respondents had abnormal results regarding anxiety and 33.6% had abnormal results regarding depression on the HADS questionnaire.

Conclusion: Due to the long duration of the pandemic and measures such as lockdown and stay-at-home orders, the COVID-19 pandemic brings negative impacts on the quality of life and wellbeing of students. The findings of our study highlight the urgent need to develop interventions and strategies to address the quality of life and mental health consequences of university students.

Keywords: COVID-19; Pandemic; Quality of life; Mental health; Stress; Anxiety; Self-management

INTRODUCTION

The outbreak of the novel coronavirus disease (COVID-19) in Wuhan, China, in December 2019 has rapidly escalated into a global health crisis and was declared a public health emergency of international concern on January 30, 2020, by the World Health Organization (WHO) [1]. The first case in Greece was confirmed on February 26, 2020, and as of 12 January 2022, there have been 1.568.215 confirmed cases of COVID-19 in Greece, including 21.559 deaths [2]. The presence of COVID-19 is manifested by several symptoms, ranging from asymptomatic, mild symptoms to severe illness [3].

Due to the growing numbers of cases and deaths and the contagious nature of the disease, many countries have declared a nationwide state of alert and implemented population blockades for indefinite periods of time to prevent the spread of the disease [4]. According to the World Health Organization, large-scale physical distancing measures and movement restrictions often referred to as 'lockdowns', can slow COVID-19 transmission by limiting contact between people [5]. However, the benefits of mandatory mass quarantine need to be weighed carefully against the possible psychological costs.

Literature suggests that restrictive measures such as quarantine, isolation, and social distancing, have an impact on the psychological wellbeing of people, adding to the reactions to the pandemic itself [6]. Like natural disasters, epidemics/pandemics commonly result in distress reactions, increased health risk behaviors, and exacerbation or manifestation of psychiatric disorders. An abrupt change in daily life, a sense of uncertainty about the future, resource limitations, fear for personal well-being, increased use of media, and the spread of misinformation can both be experienced during a pandemic and a natural disaster [7]. Anxiety and somatic symptoms, feelings of anger and irritability, depressive symptoms, post-traumatic stress symptoms as well as experiences of stigmatization, abandonment, and isolation have been reported during previous outbreaks, such as SARS, MERS, Ebola, and H1N1 [7,8].

Various studies have been conducted globally to explore the psychosocial outcomes of the COVID-19 pandemic in the general population. Overall, studies have reported increased emotional disturbance, depression, anxiety, acute panic, obsessive behaviors, hoarding, insomnia, post-traumatic stress symptoms, anger, and substance abuse [9-17]. The prevalence of depression and anxiety was found to be significantly higher in individuals affected by quarantine than that in the unaffected group [18].

Risk factors that have been associated with a worse psychological outcome include female gender, pre-existing mental illnesses, financial difficulties, lack of social support, frequent exposure to social media/news concerning COVID-19 [10-17,19], but also younger age (≤ 40 years) and student status [16,18].

As a result of physical distancing measures, tertiary education institutions have shifted to an online learning format, which could further exacerbate academic stressors for students, who are already worried about their academic and professional success [20]. Studies conducted in several countries regarding the psychosocial response to the pandemic among university students suggest a similar pattern. Student status was found to be a significant risk factor for developing more depressive symptoms as compared to other occupational statuses (i.e. employment or retirement) [18]. Worry of academic delays including delayed graduation [21,22], dormitory evacuation and cancellation of anticipated events such as exchange studies [22], unstructured or online learning [4], and the influence of the pandemic on their daily life [4,21-23] have led to a variety of psychological and physical manifestations of stress in university students. In addition, students who do not have adequate Internet access will suffer a disadvantage in the evaluation process, which could adversely affect their grades [23]. Students who have had to be distanced from their institutions have experienced stress, depressive or anxiety symptoms, boredom and loneliness, irritability, and anger [4,21-34]. Since March 2020, universities in Greece have shifted (either fully or partly) to online learning, except for some laboratory or clinical lectures with a reduced number of students and for different periods of time. Thus, regular daily lectures, as well as exams, take place *via* online platforms to date and as a result, many students studying away from home have returned to their hometowns. The aim of this study was to determine the impact of the COVID-19 pandemic on the quality of life and mental health of university students in Greece. As far as we know, it is one of the very few studies with such an extensive sample including data for quality of life and mental health.

METHODOLOGY

This cross-sectional study was conducted by the Department of Public Health of Medical School, University of Patras in collaboration with the Psychiatric Clinic of the same institution. The study protocol has been approved by the Institutional Review Board of Ethics of the University.

Participants

Participants were recruited from the student population of Greece. Most interviews were conducted at least 6 months after the stay-at-home orders were implemented in Greece. Participants were recruited by undergraduate student researchers through email, text messaging, and snowball sampling. Participants were recruited to our study if they followed the following inclusion criteria: i) students ≥ 18 years of age, ii) studying in a Greek University. There were no exclusion criteria. All participants have been informed about the study and the data is GDPR approved.

Study design and sample

The study was conducted between March and June 2021 aiming to assess the effect of the COVID-19 outbreak on the quality of life and mental health of university students in Greece. The study protocol was as follows: Questionnaires were distributed by social media (e.g., Facebook, Instagram, groups, etc.) to collect data from all academic institutions. The interviews were conducted by three independent researchers trained in quantitative methods and the use of the interview survey guide described above. All interviews were conducted *via* Google forms. Prior to the interview, participants were provided an information document about the study approved by the university's Institutional Review Board (No. 2021). Upon consent, participants were asked to respond to a questionnaire about their demographic information such as age, gender, year of college, and program of study. The survey link was online for 3 months and data from 1266 students were collected from students around Greece (capitals and suburbs) and from different faculties.

Instruments

The 92-item questionnaire included five parts. One part with demographic data, one part with the "World Health Organization Quality-of-Life Scale (WHOQOL-BREF)" [35], one part with the "Impact of Event Scale-Revised" (IES-R) [36], one part with the "Hospital Anxiety and Depression Scale (HADS)" [37], and a final part with five optional questions aimed only at individuals who had been hospitalized due to self-destructive behaviors to evaluate their experience. The participation was anonymous and voluntary, and the average completion time was 30 minutes.

The World Health Organization (WHO) has developed the WHOQOL, an instrument that captures many subjective aspects of quality of life [35]. The WHOQOL-BREF, an abbreviated version of the WHOQOL-100, is a 26-item self-report instrument and produces scores for four domains: physical health, psychological, social relationships, and environment. It also includes one facet on the overall quality of life and general health [38]. The WHOQOL-BREF is a valid and reliable alternative to the WHOQOL and is applicable in studies that require a brief assessment of the quality of life, such as epidemiological studies and clinical trials [38].

The Impact of Event Scale-Revised (IES-R), a 22-item self-report instrument, is a revised version of the scale including six hyperarousal items and was published in 1997 to adhere to the DSM-IV criteria for PTSD [39]. The current data generally support the IES-R as a useful instrument in the assessment of traumatic stress [39].

The Hospital Anxiety and Depression Scale (HADS) were developed by Zigmond and Snaith in 1983 to identify cases of anxiety disorders and depression among patients in nonpsychiatric hospital clinics. The HADS is a 14-item self-report scale designed to measure anxiety and depression, consisting of 7 items for each subscale [3]. When tested on a sample of Greek patients (inpatients and outpatients), and controls from the community, the HADS appears to have high internal consistency [37].

Domain scores for the WHOQOL were transformed to a 0-100 score according to accepted guidelines. Cronbach's alpha values of 7.0 and over were deemed acceptable.

The floor and ceiling effects were measured for the scales and their domains with the floor effect being the percentage of subjects with the lowest possible domain scores and the ceiling effect being the percentage of subjects with the highest possible domain scores. Scoring results of all questionnaires and the COVID-19–related findings are presented in this paper.

Data analysis

Descriptive statistics were compiled to describe participants' demographics (e.g., age, gender, academic year, and major) and the ratings on three questionnaire survey instruments. A total score per participant per questionnaire was also calculated. Participants' answers to academic-, health-, and lifestyle-related questions were analyzed to understand the relative impacts of the pandemic on various aspects of college students' mental health. Percentages of participants who indicated negative ratings (i.e, mild, moderate, or severe influence) on these questions were calculated and ranked in descending order. A single coder (AT), trained in analysis methods with the specific instruments, analyzed the data, put an emphasis on information that can be extracted directly from the data. Following the identification of data, the coder discussed the codes with the three interviewers (FT, AK, LAP) (trained in quantitative analysis and mental health research) to resolve discrepancies among related themes and discuss saturation.

The data entry, processing, and analysis of the questionnaire data were performed with IBM SPSS 26 for Windows. Descriptive analyses were performed including frequencies, percentages, ranges, means, and standard deviations (SD). Cronbach's alpha (internal consistency index) was used to estimate the reliability of the WHOQOL-BREF (Cronbach's alpha values of 0.70 and over were deemed acceptable). The chi-square test was applied for the examination of statistical significance. Pearson's correlations were used to determine the level of agreement between instruments, as well as with markers of disease severity. The limit for checking statistical significance was $p<0.05$.

Ethical considerations

The study has been approved by the Institutional Review Board of Ethics of the University. The survey was anonymous, and data confidentiality was assured. The procedures of this study complied with the provisions of the Declaration of Helsinki. The participants were informed that the participation is voluntary and that they could withdraw from the questionnaire at any time. The unfinished forms were excluded from the results. As stated in the questionnaire, completing all the mandatory questions has been recorded as a given consent.

RESULTS

Out of 794.107 (total sample) eligible students, 1266 enrolled in the study with a median age of 19 years old (range 18-60 y.o). Demographics information are shown in Table 1. Information on instruments WHOQOL, IES-R, HADS are shown in Tables 2-4. Table 5 demonstrates the characteristics of previously hospitalized students due to mental illness and during and after a hospital stay.

Table 1: Demographic characteristics of the sample.

Variables		Total 1266 (%)
Gender	710 mm	710 mm
	710 mm	710 mm
	Female	925 (73.1)
	Male	334 (26.4)
	Other	7 (0.6)
Family status	710 mm	710 mm
	710 mm	710 mm
	710 mm	710 mm
	Single	1204 (95.1)
	Married	49 (3.9)
	Divorced	10 (0.8)
	Widowed	3 (0.2)
Student status	710 mm	710 mm
	Undergraduate	1105 (87.3)
	Postgraduate	161 (12.7)
Income	<10.000 €	333 (26.3)
	10.000-20.000 €	521 (41.2)
	20.000-40.000 €	312 (24.6)
	>40.000 €	100 (7.9)
Chronic illness	Yes	256 (20.2)
	No	1010 (79.8)
Mental illness	Yes	151 (11.9)
	No	1115 (88.1)

Table 2: Effects on the quality of life of Greek University students because of the social isolation due to COVID-19 using World Health Organization Quality of Life (WHOQOL-BREF).

Variables	Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very satisfied
Sleep satisfaction	137 (10.8)	217 (17.1)	445 (35.2)	357 (28.2)	110 (8.7)
Sex life satisfaction	396 (31.3)	243 (19.2)	252 (19.9)	254 (20.1)	121 (9.6)
Satisfaction of friends support	60 (4.7)	145 (11.5)	301 (23.8)	509 (40.2)	251 (19.8)
	Never	Seldom	Quite often	Very often	Always
Frequency of negative feelings	43 (3.4)	179 (14.1)	308 (24.3)	446 (35.2)	290 (22.9)

Table 3: Effects on the quality of life of Greek University students because of the social isolation due to COVID-19 using impact of events scale-Revised (IES-R).

Variables	Not at all	A little bit	Moderately	Quite a bit	Extremely
Feeling irritable or/and angry	121 (9.6)	231 (18.2)	263 (20.8)	415 (32.8)	236 (18.6)
Trouble falling asleep	484 (38.2)	252 (19.9)	189 (14.9)	196 (15.5)	145 (11.5)
Physical Reactions after reminding of the pandemic	821 (64.8)	215 (17.0)	119 (9.4)	74 (5.8)	37 (2.9)

Table 4: Effects on the quality of life of Greek University students because of the social isolation due to COVID-19 using Hospital Anxiety and Depression Scale (HADS).

Variables	Not at all	Occasionally	Quite often	Most of the time
Feeling tense or "wound up"	89 (7.0)	472 (37.3)	397 (31.4)	308 (24.3)
Sit at easy/Feeling relaxed	108 (8.5)	518 (40.9)	430 (34.0)	210 (16.6)
Frightened Feeling/ Butterflies in the stomach	361 (28.5)	465 (36.7)	265 (20.9)	175 (13.8)
No interest in appearance	154 (12.2)	340 (26.9)	382 (30.2)	390 (30.8)
Sudden Panic Feelings	502 (39.7)	380 (30.0)	273 (21.6)	111 (8.8)

Table 5: Characteristics from previously hospitalized students due to mental illness.

Obstacles in addressing to a mental health center	N=487 (%)
There is no mental health center/clinic/ hospital nearby my home	26 (2.1)
Fear of recommendation for psychiatric hospitalization and being known to the local society	17 (1.3)
Traumatic former experience with the mental health system	10 (0.8)
Feeling that I could get over/deal with it on my own	288 (18.0)

Times you or anyone close to you needed to be admitted into a mental facility because of self-destructive thoughts and behavior	N=487	
None	433 (88.9)	
Once	30 (6.2)	
Twice	14 (2,9)	
Three times	2 (0.4)	
More than three times	8 (1.6)	
Involuntarily hospitalization	**N=404**	
Yes	17 (4.2)	
No	387 (95.8)	
During the hospital stay	**Yes (%)**	**No (%)**
Disorder, symptoms and what to expect in the future were explained	27 (40.9)	39 (59.1)
Purpose, necessary period of medication therapy and possible side effects were explained	22 (33.3)	44 (66.7)
Access to communicate with the therapeutic team	21 (31.3)	46 (68.7)
Communication with therapist	27 (40.3)	40 (59.7)
Instructions for dealing with self-destructive thoughts while being outside the facility were given	17 (26.2)	48 (73.8)
Feeling that the environment of the facility fulfilled the prerequisites for preventing a suicide attempt	22 (32.4)	46 (67.6)
b: After being discharged from the mental facility		
Got the contact details of a mental health service or professional in case of emerge need	23 (35.9)	41 (64.1)
A plan for a stable monitoring program with psychiatrist was established	18 (29.0)	44 (71.0)
Got clear instructions for the medication therapy	25 (39.1)	39 (60.9)
Was informed for the critical first period after hospitalization	14 (22.6)	48 (77.4)
Instructions for the management of self-destructive thoughts were given	13 (20.3)	51 (79.7)
Until the time of discharge the self-destructive thoughts were fallen back	23 (35.4)	42 (64.6)

Of the total sample, 73.1% are women, 26.3% are men and 90.4% of the sample are aged 19-32 years. Most respondents are unmarried at a rate of 95.1%. The annual family income of most respondents is 10,000-20,000 euros at a rate of 41.2%. 20.2% of the sample stated that they suffer from some chronic physical illness while 11.9% report some chronic mental illness (Table 1). Most respondents study in one of the three largest cities in Greece (Athens, Thessaloniki, and Patras) with percentages of 29.9%, 24.1%, and 25.7% respectively. The city of permanent residence of most students is Athens (32.8%) while Thessaloniki follows with a percentage of 15.1%. Of the total sample, 87.3% are undergraduate students and 12.7% are postgraduate students. 19.8% of the respondent's study in the Department of Medicine, Chemistry (4.9%) and Biology (4.3%).

Most respondents had a score greater than 50/100 in the physical domain section of WHOQOL-BREF. Specifically, 17.2% (n=217) had a score of 63/100, 15.3% (n=194) had a score of 69/100 and 14% (n=177) had a score of 56/100. The average was 53.4/100, and 34.8% had a score lower than 50. In the psychological domain 16.2% (n=205) scored 44/100, 16.1% (n=204) had a score of 56/100 and 10.7% (n=135) had a score of 31/100. The average score was 50/100 and 55.8% had a score lower than 50. The social domain had the following scores: 181 respondents from the sample (14.3%) had a score of 56/100, 161 respondents (12.7%) had a score of 50/100 and 157 respondents from the sample (12.4%) scored 44/100. The average was 50/100 and 52.3% had a lower than 50 score.

Lastly, in the environmental domain 204 respondents (16.1%) scored 56/100, 15.9% (n=202) scored 63/100 and 13.3% (n=168) scored 69/100. The average score was 50, 11/100 and 35.6% had a score lower than 50 (Table 2). Regarding IES-R, 46.6% of the respondents had a score of 37+ (This is high enough to suppress your immune system's functioning even 10 years after an impact event), 17.4% are in the score category 24-32 (PTSD is a clinical concern. Those with scores this high who do not have full PTSD will have partial PTSD or at least some of the symptoms) and 8.1% in the score category 33-36 (This represents the best cutoff for a probable diagnosis of PTSD) (Table 3).

Regarding HADS, 45% of the respondents are on the scale of 11-21 (abnormal case), 33.4% on the scale of 0-7 (normal), and 21.6% on a scale of 8-10 (borderline abnormal). Regarding depression, the largest percentage of respondents is on the scale 0-7 (normal) with a percentage of 40.8%, 33.6% on the scale of 11-21 (abnormal case), and 25.6% on the scale of 8-10 (borderline abnormal). It is also to note, that 36.7% (n=465) report occasional feelings of fright, 21.6% (n=273) report sudden feelings of panic, and 26.9% (n=340) believe that they didn't take as much care of their appearance as they should. The variation of the HADS Anxiety score is explained by 25.4% of the HADS Depression score and the variation of the IES-R score is explained by 20.4% of the HADS Depression score and by 33% of the HADS Anxiety score (Table 4). The characteristics of students having hospitalized with mental problems are analyzed in Table 5.

Age and gender had a significant correlation with all domains (physical, social, and environment) of the WHOQOL-BREF questionnaire ($p < 0.05$). The place of study had a statistical correlation with the psychological ($p = 0.010 < 0.05$) and the environmental ($p = 0.013 < 0.05$) domain. The place of permanent residence had a statistical correlation with the psychological domain ($p = 0.000$). The family status had a statistical correlation with the psychological domain ($p = 0.000$). Pre-existing mental illness had a statistical correlation with all domains ($p = 0.000$) and the IER-S questionnaire ($p = 0.008$). The level of studies had a statistical correlation with the psychological domain ($p = 0.035$). The HADS-Depression section had a statistical correlation with the department of studies ($p = 0.023$).

This study is the largest conducted in Greece for measuring mental health conditions of university students during the COVID-19 pandemic. An internet survey was widely distributed, in which 1266 students from public universities nationwide in Greece participated, to better understand the psychosocial outcomes of the COVID-19 pandemic, and the effects on their quality of life, mental health, and well-being.

In our study, age was shown to have a positive but not strong correlation with the physical, social and psychological domains of the WHOQOL-BREF questionnaire. Age has a statistically significant dependence with all domains ($p < 0.05$). Literature reports mixed results for this variable, indicating a greater psychological impact for both young adults and the elderly. It has been observed that young adults are at a greater risk for depression, anxiety, and psychological distress during the pandemic, according to multiple studies [6,15,19,23-25,33]. One smaller study conducted on Greek university students reports a non-significant trend for greater sleep difficulties in younger ages (18–30) [26]. Weight was found to have a positive correlation with the physical and negative related to the social domain, while height has a positive correlation with the physical, psychological, and environmental domain. The

above correlations are not statistically significant. According to a systematic review [16], one study found that neither age nor BMI is correlated with the IES-scores. Another study indicated that age did not predict either depression or PTSD [27].

In our study, women reached higher levels of anxiety in the COVID-19 pandemic period. As observed in similar studies during the pandemic [4,6,26,29,30,32,33] that show a high prevalence of depression, anxiety, and distress in women, in our study, we found that gender has a statistically significant correlation with the categories physical, social, and environmental domain of the WHOQOL-BREF questionnaire ($p < 0.05$). In addition, it has been observed that the women are more susceptible to developing PTSD symptoms during the pandemic [16,19] and a Greek study found that women's insomnia during the pandemic is worse than the men's [26]. However, there are a small number of studies that did not find a statistically significant difference in the prevalence of anxiety, depression [24], sleep quality [31], and IES scores by gender [16].

The World Health Organization states that adult women, in general, tend to report higher levels of depression and anxiety so the higher prevalence in women during this period of our study is higher than expected [26]. That would also be consistent with evidence from the prior epidemic of the Middle East Respiratory Syndrome-CoronaVirus (MERS-CoV) [4]. One study has attributed the higher prevalence of negative feelings in women to the fact that during the pandemic period women are more likely to be tasked with additional caretaking duties [9], accounting for increased levels of symptoms of depression, stress, and anxiety.

Regarding the students' demographic variabilities, the literature agrees about the importance of this characteristic, however, mixed results are reported. Studies report that the place of residence (hit hardest or not by the pandemic) is significantly related to depression and anxiety symptoms [6,28], as well as PTSD symptoms [37].

In our study, we found that the location where the students attend the university has a statistically significant dependence on the psychological and environment domain, and that the place of permanent residence has a statistically significant dependence on the psychological domain. The literature reports mixed results. By some studies, living in an urban area was identified as a risk factor for developing psychological distress during the pandemic [16,22,26,34]. One study reports that anxiety were 64% times less likely to occur among students who live in a rural area than in an urban area [34]. A short Greek study reports that urban citizens suffer from insomnia more than rural residents, and attributes this to the fact that rural residence may act protectively as it provides more opportunities for physical activity and exposure to nature, as well as less strict application of restrictive measures [26]. Since reduced physical fatigue and exposure to the sun, as well as increased use of electronic devices which is often observed in urban areas, may negatively affect sleep homeostasis, living in an urban area acts as a risk factor for lower sleep quality [26].

On the other hand, several studies identify living in a rural area as a factor positively related to increased feelings of depression, anxiety, and psychological distress, and imply that living in an urban area may act protectively against negative psychological outcomes during the COVID-19 pandemic [21,33]. We could attribute these results to poorer economic conditions and less sanitary resources in rural areas [4], or to the less preventive strategies taken by the politicians of this area. The sanitary conditions in cities are usually better than

in towns and villages. Moreover, cities tend to make larger efforts to sensitize the public and spread knowledge on how to prevent the pandemic [21,27].

The economic status of university students is considered an important factor for mental well-being in several studies. It has been shown that low socioeconomic status and low or unstable household income contribute significantly to feelings of fear, anxiety, and depression during the COVID-19 pandemic [12,18,21,29,31-34], a problematic period for a lot of families who go through economic distress. A Chinese study reports that the high average household income group had a significantly lower level of depression than the low average household income groups [28]. The stability of students' family income as well as living with parents was found to be protective factors against anxiety [31]. In our study, we found that the variable concerning the annual family income has a statistically significant dependence on the psychological and environmental domain.

The variables related to chronic physical or mental illness have statistically significant dependence on all domains of WHOQOL-BREF. Additionally, we observe that the score of the IES-R questionnaire has a statistically significant dependence on chronic mental illness.

That result is consistent with multiple studies that demonstrated a significant correlation between pre-existing psychiatric or physical illness and increased feelings of health anxiety, depression, and distress during the COVID-19 pandemic [25,30,32].

Individuals with known obsessive-compulsive disorders (OCD) and 'high health anxiety' (likely patients of generalized anxiety disorders, somatization disorder) may experience an exacerbation of anxiety and distress by misinterpreting harmless bodily symptoms as the evidence of acquiring dangerous illness as well as by practicing frequent self-monitoring such as temperature checks and practicing extreme hygiene measures like very frequent handwashing [10].

Psychiatric patients have been identified as of high risk for contracting pneumonia and COVID-19 but even non-infected individuals with pre-existing depression, anxiety, and other mental health issues are expected to experience elevated worry and anxiety symptomatology due to exacerbation of their symptoms by pandemic-related stress [17]. History of self-injury and suicide attempts have also been identified as risk factors [30].

A study examined the psychological well-being of eating disorder patients during the pandemic and found 37.5% to report worsening in their symptomatology and 56.2% to report additional anxiety symptoms, while another study reported that 20.9% of patients with preexisting psychiatric disorders reported worsening of their symptoms [15]. A systematic review reported the prevalence of anxiety and depression was the highest among patients with pre-existing conditions [27].

While similar studies in other countries like Bangladesh showed no dissatisfactory sleep during the pandemic [9], only 38.2% of our participants experienced not at all trouble falling asleep. Because sleep helps maintain the biological rhythm of an individual and since it is strictly connected to one's mental health, sleep disorder during the pandemic reflects the negative impacts on students' mental health. Studies report low sleep quality [16], as well as short sleep duration (<6 h/night) to be a risk factor for PTSD and depression symptoms [37]. Another Greek study on university students reports increased quantity (66.3%) but lower quality of sleep (43.0%) during the first days of the lockdown in Greece [38,39].

DISCUSSION

Social support has also been studied for its correlation with anxiety and depression of students during the COVID-19 crisis. Lack of social support and loneliness have been identified as risk factors for worse mental health by several studies [26,33]. One study reports that individuals with low perceived social support were 4.92-5.97 times more likely to experience anxiety or depressive symptoms [35], compared to individuals with high perceived social support, and one study claims that the largest protective factor against stress was social support [13]. A decrease in going out for drinks or food with friends is a predictor for stress [36], and impacted social life is one of the factors of concern by students during the pandemic [40,41]. Interestingly, a small number of students reported that they were experiencing reduced social anxiety from not having to interact with other students [31].

Even being divorced or widowed, being single [16,28], and living alone have been identified as risk factors for worsening mental health [21], especially during quarantine. Loneliness also showed a positive correlation with insomnia in Greece [26]. On the other hand, it has been reported that married participants had higher anxiety levels than those who were unmarried [16], and another story reports that students who live with their parents have higher stress and depression, possibly due to the fear of infecting their family [34].

Another aspect of social support includes spiritual and religious activities, as spiritual well-being was identified as a protective factor against stress [19]. Social distancing and stay-at-home orders limit involvement in religious communities and services, reducing the protective effects these practices typically have on suicide risk on those who practice religion [17].

The results of our study show that even though most of the participants (60%) are satisfied with their friends and social support, for 82.4% of them the frequency of exhibiting negative feelings, such as anxiety or depression is not uncommon.

This result raises the question if social and friend support reduces the psychological pressure during the epidemic. Nevertheless, it is a common opinion that effective social support is necessary during public health emergencies.

Multiple studies globally have been conducted to evaluate the university students' mental health during the COVID-19 pandemic. Student status has been identified as a risk factor for problematic mental health in studies conducted on the general population [6,10,16,28]. For university students heightened levels of psychological distress and downstream negative academic consequences are prevalent under normal circumstances [30], let alone during a pandemic that disrupts their routines and jeopardizes the quality of their education.

Regarding the education level, both high [16,23], and low education levels were found as risk factors for negative psychological outcomes [25,27]. Students studying in non-health-related departments were found to have higher depression levels [34], and students following theoretical studies in Greece were found to accept conspiracy theories by 20%-68% [40]. Additionally, being a graduating/final year student is related to higher levels of anxiety, depression, and PTSD [32,35,37], an expected reaction to anxiety about the job

market after graduation. The biggest contributor to the declining mental health of students was found to be academic-related stress, regarding the transition to online classes, declining grades, and delayed graduation [41]. School routines are important coping mechanisms especially for young people with mental health issues. When in-person education is prohibited, their routine is disrupted, not to mention stress about dormitory evacuation and cancellation of anticipated events such as exchange studies and graduation ceremonies [32]. Lastly, many students are international students studying away from home, who are not only worried about their health and safety but also face a big amount of stress concerning the well-being of their families [33].

Having accurate and high-quality information available during a time of crisis such as a global pandemic can help prevent mass panic and overreactions. However, excess time spent reading or watching news about COVID-19 was found to be a factor contributing to feelings of anxiety and panic [19,25,32]. Poor-quality media and news can not only increase stress and panic but also spread misinformation and lead to wrong decisions by the public.

Additionally, the increased use of social media by students during the quarantine was related to worse mental health outcomes [35,36]. A study showed that students with exposure to media coverage of the COVID-19 ≥ 3 h/day were 2.13 times more likely than students with media exposure <1 h/day to have acute stress symptoms.

CONCLUSION

University students are a group susceptible to developing feelings of stress, anxiety and depression under normal circumstances, due to their rigorous schedule, the demanding job market, and potential financial issues. During the global crisis that the COVID-19 has brought, these existing issues have been highlighted and new stressing factors have occurred. With their routines disturbed, a lot of students in Greece have returned to their hometowns and moved back in with their families while facing feelings of anxiety concerning not only their education but also theirs and their families' health and well-being. The results of our study highlight the need for preventative measures to prevent university students from burnout and ensure that their mental health and quality of life do not suffer.

DECLARATIONS

Ethics approval and consent to participate

The study has been approved by the Institutional Review Board of Ethics of the University. The survey was anonymous, and data confidentiality was assured. The procedures of this study complied with the provisions of the Declaration of Helsinki. The participants were informed that the participation is voluntary and that they could withdraw from the questionnaire at any time. The unfinished forms were excluded from the results. As stated in the questionnaire, completing all the mandatory questions has been recorded as a given consent.

DATA AVAILABILITY

The datasets generated during and/or analysed during the current study are available from the corresponding author on reasonable request.

CONSENT FOR PUBLICATION

The authors consent for publication.

COMPETING INTERESTS

The authors declare no conflict of interest.

AUTHORS' CONTRIBUTIONS

FT, AK, and LAP did the research and wrote the main manuscript text, AT did the scoring, KK and PA revised the questionnaires, AV wrote and reviewed the manuscript.

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REFERENCES

1. Statement on the second meeting of the International Health Regulations (2005) Emergency Committee regarding the outbreak of novel coronavirus (2019-nCoV). World Health Organization.

2. Greece: WHO Coronavirus Disease (COVID-19) Dashboard. World Health Organization.

3. Esakandari H, Nabi-Afjadi M, Fakkari-Afjadi J, Farahmandian N, Miresmaeili SM, Bahreini E. A comprehensive review of COVID-19 characteristics. Biol Proced Online. 2020;22(1):1-0.

4. Lasheras I, Gracia-García P, Lipnicki DM, Bueno-Notivol J, López-Antón R, De La Cámara C, et al. Prevalence of anxiety in medical students during the COVID-19 pandemic: A rapid systematic review with meta-analysis. Int J Environ Res Public Health. 2020;17(18):6603.

5. Coronavirus disease (COVID-19): Herd immunity, lockdowns and COVID-19. World Health Organization.

6. Talevi D, Socci V, Carai M, Carnaghi G, Faleri S, Trebbi E, et al. Mental health outcomes of the COVID-19 pandemic. Riv Psichiatr. 2020;55(3):137-144.

7. Esterwood E, Saeed SA. Past epidemics, natural disasters, COVID19, and mental health: learning from history as we deal with the present and prepare for the future. Psychiatr Q. 2020;91(4):1121-1133.

8. Chew QH, Wei KC, Vasoo S, Chua HC, Sim K. Narrative synthesis of psychological and coping responses towards emerging infectious disease outbreaks in the general population: practical considerations for the COVID-19 pandemic. Singapore Med J. 2020;61(7):350.

9. Islam MS, Sujan MS, Tasnim R, Sikder MT, Potenza MN, Van Os J. Psychological responses during the COVID-19 outbreak among university students in Bangladesh. PloS One. 2020;15(12):245083.

10. Gloster AT, Lamnisos D, Lubenko J, Presti G, Squatrito V, Constantinou M, et al. Impact of COVID-19 pandemic on mental health: An international study. PloS one. 2020;15(12):244809.

11. Vindegaard N, Benros ME. COVID-19 pandemic and mental health consequences: Systematic review of the current evidence. Brain Behav Immun. 2020;89:531-542.

12. Xiong J, Lipsitz O, Nasri F, Lui LM, Gill H, Phan L, et al. Impact of COVID-19 pandemic on mental health in the general population: A systematic review. J Affect Disord. 2020;277:55-64.

13. González-Sanguino C, Ausín B, Castellanos MÁ, Saiz J, López-Gómez A, Ugidos C, et al. Mental health consequences during the initial stage of the 2020 Coronavirus pandemic (COVID-19) in Spain. Brain Behav Immun. 2020;87:172-176.

14. Zhang J, Lu H, Zeng H, Zhang S, Du Q, Jiang T, et al. The differential psychological distress of populations affected by the COVID-19 pandemic. Brain Behav Immun. 2020;87:49.

15. Mazza C, Ricci E, Biondi S, Colasanti M, Ferracuti S, Napoli C, et al. A nationwide survey of psychological distress among Italian people during the COVID-19 pandemic: Immediate psychological responses and associated factors. Int J Environ Res Public Health. 2020;17(9):3165.

16. Voitsidis P, Gliatas I, Bairachtari V, Papadopoulou K, Papageorgiou G, Parlapani E, et al. Insomnia during the COVID-19 pandemic in a Greek population. Psychiatry Res. 2020;289:113076.

17. Luo M, Guo L, Yu M, Jiang W, Wang H. The psychological and mental impact of coronavirus disease 2019 (COVID-19) on medical staff and general public: A systematic review and meta-analysis. Psychiatry Res. 2020;291:113190.

18. Lei L, Huang X, Zhang S, Yang J, Yang L, Xu M. Comparison of prevalence and associated factors of anxiety and depression among people affected by versus people unaffected by quarantine during the COVID-19 epidemic in Southwestern China. Med Sci Monit. 2020;26:924609.

19. Li J, Yang Z, Qiu H, Wang Y, Jian L, Ji J, et al. Anxiety and depression among general population in China at the peak of the COVID-19 epidemic. World Psychiatry. 2020;19(2):249-250.

20. Grubic N, Badovinac S, Johri AM. Student mental health in the midst of the COVID-19 pandemic: A call for further research and immediate solutions. Int J Soc Psychiatry. 2020;66(5):517-518.

21. Cao W, Fang Z, Hou G, Han M, Xu X, Dong J, et al. The psychological impact of the COVID-19 epidemic on college students in China. Psychiatry Res. 2020;287:112934.

22. Lee J. Mental health effects of school closures during COVID-19. Lancet Child Adolesc Health. 2020;4(6):421.

23. Sahu P. Closure of universities due to coronavirus disease 2019 (COVID-19): impact on education and mental health of students and academic staff. Cureus. 2020;12(4).

24. Mekonen EG, Workneh BS, Ali MS, Muluneh NY. The psychological impact of COVID-19 pandemic on graduating class students at the University of Gondar, Northwest Ethiopia. Psychol Res Behav Manag. 2021;14:109.

25. Ma Z, Zhao J, Li Y, Chen D, Wang T, Zhang Z, et al. Mental health problems and correlates among 746 217 college students during the coronavirus disease 2019 outbreak in China. Epidemiol Psychiatr Sci. 2020;29.

26. Rens E, Smith P, Nicaise P, Lorant V, Van den Broeck K. Mental distress and its contributing factors among young people during the first wave of COVID-19: A Belgian survey study. Front Psychiatry. 2021;12:575553.

27. Tang W, Hu T, Hu B, Jin C, Wang G, Xie C, et al. Prevalence and correlates of PTSD and depressive symptoms one month after the outbreak of the COVID-19 epidemic in a sample of home-quarantined Chinese university students. J Affect Disord. 2020;274:1-7.

28. Kaparounaki CK, Patsali ME, Mousa DP, Papadopoulou EV, Papadopoulou KK, Fountoulakis KN. University students' mental health amidst the COVID-19 quarantine in Greece. Psychiatry Res. 2020;290:113111.

29. Skapinakis P, Bellos S, Oikonomou A, Dimitriadis G, Gkikas P, Perdikari E, et al. Depression and its relationship with coping strategies and illness perceptions during the COVID-19 lockdown in Greece: A cross-sectional survey of the population. Depress Res Treat. 2020;2020:3158954.

30. Patsali ME, Mousa DP, Papadopoulou EV, Papadopoulou KK, Kaparounaki CK, Diakogiannis I, et al. University students' changes in mental health status and determinants of behavior during the COVID-19 lockdown in Greece. Psychiatry Res. 2020;292:113298.

31. Wang X, Hegde S, Son C, Keller B, Smith A, Sasangohar F. Investigating mental health of US college students during the COVID-19 pandemic: Cross-sectional survey study. J Med Internet Res. 2020;22(9):22817.

32. Wathelet M, Duhem S, Vaiva G, Baubet T, Habran E, Veerapa E, et al. Factors associated with mental health disorders among university students in France confined during the COVID-19 pandemic. JAMA Netw Open. 2020;3(10): 2025591.

33. Fu W, Yan S, Zong Q, Anderson-Luxford D, Song X, Lv Z, et al. Mental health of college students during the COVID-19 epidemic in China. J Affect Disord. 2021;280:7-10.

34. Essadek A, Rabeyron T. Mental health of French students during the COVID-19 pandemic. J Affect Disord. 2020;277:392-393.

35. Group TW. The World Health Organization quality of life assessment (WHOQOL): development and general psychometric properties. Soc Sci Med. 1998;46(12):1569-1585.

36. Weiss DS, Marmar CR. The Impact of Events Scale-Revised. In: Assessing Psychological Trauma and PTSD; 2004.

37. Zigmond AS, Snaith RP. The hospital anxiety and depression scale. Acta Psychiatr Scand. 1983;67(6):361-370.

38. Whoqol Group. Development of the World Health Organization WHOQOL-BREF quality of life assessment. Psychol Med. 1998;28(3):551-558.

39. Creamer M, Bell R, Failla S. Psychometric properties of the impact of event scale-revised. Behav Res Ther. 2003;41(12):1489-1496.

40. Michopoulos I, Douzenis A, Kalkavoura C, Christodoulou C, Michalopoulou P, Kalemi G, et al. Hospital Anxiety and Depression Scale (HADS): validation in a Greek general hospital sample. Ann Gen Psychiatry. 2008;7(1):1-5.

41. Hellenic Authority for Higher Education. Annual Report on the Quality of Higher Education, National Higher Education Authority, Athens. 2020.