

## The psychological effect of COVID-19 quarantine on Greek young adults: Risk factors and the protective role of daily routine and altruism

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To save lives and slow the spread of COVID-19 Greece imposed a country-wide, 6-week lockdown and a stay-at-home order at an early stage. This study examines the effect of quarantine on young adults by assessing depression, anxiety, stress and the experience of positive and negative affect. The role of potential risk factors such as disruption of normal life, perceived threat of the disease, acquaintance with someone infected and gender; and protective factors, such as adherence to a daily routine and altruism was evaluated. An online questionnaire entailing demographics, the Depression, Anxiety and Stress Scales (DASS-21), the Positive and Negative Affect Schedule (PANAS), measures of life disruption, perceived threat and adherence to a daily routine and an altruism scale was completed by 1018 undergraduates. Increased levels of depression, anxiety, stress and negative affect were found. Life disruption and perceived threat of the disease were risk factors in all psychological distress measures, while a stable, satisfying daily routine and altruism mitigated the negative consequences. Gender was a moderator. Acknowledging the psychological effect of quarantine on young adults should be the starting point for interventions. Helping people build a new routine and assign an altruistic meaning to the confinement can protect psychological health.

**Keywords:** Mental health; Negative affects; Life disruption; Perceived threat; Altruism.

In Greece, the first COVID-19 (Corona Virus Disease 2019) case was confirmed on 26 February 2020. On 10 March with no deaths and just 89 confirmed cases, the government suspended the operation of all educational institutions. Within a week an unprecedented lockdown was imposed nationwide. A large “we stay home” campaign emphasised the need for social distancing and hygiene measures. Greece was one of the few countries that took strict measures early in the outbreak, despite their impact on the country’s vulnerable economy. As a result, the number of infections was low, saving human lives.

### Mental health during the COVID-19 pandemic

Quarantine may be an effective way to control an outbreak but it comes with a cost to psychological health (Brooks et al., 2020). The initial studies in China revealed increased levels of depression, stress, anxiety (Cao et al., 2020; Huang & Zhao, 2020; Qiu et al., 2020;

Wang et al., 2020) and post-traumatic stress symptoms (Liu et al., 2020) in the general population. A nationwide research found that more than a third experienced psychological distress (Qiu et al., 2020) and nearly a fifth had depressive symptoms and poor sleep quality (Huang & Zhao, 2020). College students exhibited high anxiety associated with the financial consequences of the outbreak and the changes in daily life (Cao et al., 2020). Wang et al. (2020) found that more than half of the participants (53.8%) experienced moderate or severe psychological impact, while 16.5, 28.8 and 8.1% reported moderate to severe depression, anxiety and stress, respectively.

Subsequent studies in Europe outlined comparable consequences on psychological health. In Italy, a country that experienced one of the highest rates of deaths, anxiety and distress rates reached 32.1 and 41.8%, respectively (Casagrande et al., 2020). PTSD symptoms were reported by 27.72% followed by a high increase of negative mood such as helplessness, preoccupation, insecurity, sadness,

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fear and boredom (Forte et al., 2020). Some studies reported stress levels up to 50.12% (Cellini et al., 2020) and sleep problems in more than half of the participants (Casagrande et al., 2020; Cellini et al., 2020). Similarly, in Spain a sizable percentage of adults exhibited depressive, anxiety and PTSD symptoms (González-Sanguino et al., 2020). Students were significantly affected displaying even higher levels of depression, anxiety, stress than university workers (Odriozola-González et al., 2020).

### Risk and protective factors

While infectious disease outbreaks are a stressful experience for most people, some appear to be more at risk. Research on the COVID-19 pandemic has so far identified several risk factors such as gender, with females being at greater risk (Casagrande et al., 2020; Liu et al., 2020; Mazza et al., 2020; Qiu et al., 2020; Wang et al., 2020), young age (Casagrande et al., 2020; Mazza et al., 2020), prior history of mental problems (Mazza et al., 2020) and acquaintance with someone infected (Cao et al., 2020; Casagrande et al., 2020; González-Sanguino et al., 2020; Mazza et al., 2020). Less is known about the role of factors that can shield psychological health. Germani et al. (2020) found that a collectivistic cultural orientation, a sense of relatedness and social connection among emerging adults had a protective role against psychological maladjustment. Sense of belonging and spiritual well-being also had a protecting role towards depression, anxiety and post-traumatic stress (González-Sanguino et al., 2020).

### Current study

The preliminary evidence suggests that the pandemic has an impact on the psychological health, but there is more to be understood about its consequences, potential risk factors and particularly about factors that can be protective, especially with the prospect of the second wave. Thus, the first aim of this study was to evaluate the early psychological effects of COVID-19 on non-infected young adults in Greece by assessing depression, anxiety, stress and the experience of positive and negative affect during the quarantine. Undergraduate students were the focus of the study as they constitute a vulnerable group for mental health problems (Auerbach et al., 2018) that can be exacerbated in times of crisis. The second aim of the study was to explore the role of potential risk and protective factors that have been understudied. The risk factors examined were life disruption, perceived threat of the disease and knowing someone infected. It was hypothesised that depression, anxiety, stress and negative affect will be positively associated with the extent of life disruption, the subjective evaluation of the risk posed by the disease and the acquaintance with someone infected. Adherence to a

daily routine and altruism were explored as potential protective factors. Although keeping a routine during quarantine has been proposed as a way to reduce mental health problems (Fiorillo & Gorwood, 2020), this recommendation has not been verified. Regarding the protective role of altruism Brooks et al. (2020) assumed that quarantine might be more bearable to those who believe that their confinement would benefit others. However, the evidence was limited in medical staff (Liu et al., 2012) and remains to be testified. We hypothesised that a stable daily routine and a prosocial altruistic tendency will be associated with less psychological distress.

## METHODS

### Participants and the timing of the study

A snowball sampling method was employed targeting undergraduate students all over Greece. The students were asked to fill-in an anonymous online questionnaire and pass it on to other students. The questionnaire was completed from 7 to 14 April by 1018 respondents (850 females) with a mean age of 21.5 years ( $SD = 4.2$ ). The students' subjects were Education (54.8%), Sciences (16.2%), Humanities and Social Sciences (13.5%), Health Sciences (8.8%) and Engineering (6.7%). At that time the country was going through the third week of quarantine and it was not known when it was going to end.

### The measures

The online questionnaire was divided into several sections.

- (1) Respondents were asked about essential *demographics* such as age, gender, University and subject. They were also asked whether they had been diagnosed with COVID-19 and if they knew someone infected.
- (2) *Depression, stress and anxiety* were measured with the Depression, Anxiety and Stress Scales (DASS-21; Lovibond & Lovibond, 1995) validated in Greek (Lyrakos et al., 2011). The scale consists of three self-reported scales with seven items each, designed to assess depression (e.g. "I felt that I had nothing to look forward to") anxiety (e.g. "I felt scared without any good reason") and stress (e.g. "I found it difficult to relax"). Participants rated each item on a 4-point Likert scale ranging from 0 (never) to 3 (almost always) indicating how much the item applied to them over the past week. The sum for each subscale was calculated with higher scores indicating higher levels of depression, anxiety and stress. The scores were doubled to be comparable to DASS-42. Participants were classified to normal, mild, moderate, severe and extremely severe levels using the recommended cut-off points: depression (0–8, 10–12,

14–20, 22–26, 28–42), anxiety (0–6, 8–10, 12–14, 16–18, 20–42) and stress (0–14, 16–18, 20–24, 26–32, 34–42). Cronbach's alphas were .87, .84 and .87 for the depression, anxiety and stress scales, respectively.

- (3) *Positive and negative affect* was measured with the Greek adaptation of the Positive Affect and Negative Affect Schedule (Watson et al., 1988). The scale consists of two 10-item measures of positive (e.g. active, enthusiastic) and negative affect (e.g. irritable, upset). Participants rated the prevalence of each emotion during the last week on a 5-point Likert scale ranging from 1 (very slightly or not at all) to 5 (very much). Two sums were calculated, one by adding up the positive and one by adding up the negative affect items. Cronbach's alphas were .84 for the positive and .83 for the negative affect scales.
- (4) *Perceived threat* of the disease was measured with five items developed for the purpose of this study recording participants fears of being infected and transmitting the disease as well as their fears about their family members (e.g. "I fear I might contract the disease", "I fear my parents might get sick"). Participants rated each item on a 5-point Likert scale ranging from 1 (not at all) to 5 (very much). A mean perceived threat score was calculated for each participant with higher values corresponding to increased threat. The internal consistency of the scale was high (Cronbach's alpha .82).
- (5) *Life disruption* due to COVID-19 was measured with five items asking the participants to rate how much important life domains (studies, work, social relationships, finance and plans) were disrupted on a 5-point Likert scale ranging from 1 (not at all) to 5 (a lot). A mean score was calculated with higher means indicating more disruption.
- (6) *Adherence to daily routine* was assessed with seven items assessing whether the respondents had a stable and satisfying routine during the quarantine (e.g. "I have a stable routine"). Each statement was assessed on a 5-point Likert scale ranging from 1 (not at all) to 5 (a lot). Higher mean scores indicated a more structured daily routine. The internal consistency of the scale was high (Cronbach's alpha 0.82).
- (7) *Altruism* was assessed with the altruism subscale of the Prosocial Tendencies Measure (Carlo & Randall, 2002) validated in Greek (Lampridis & Papastylianou, 2017). Five items assessed individuals' voluntary helping behaviour motivated by concern for the needs of others (e.g. "I feel that if I help someone, they should help me in the future"-reverse scored). Participants indicated whether each statement described them on a 5-point Likert scale ranging from 1 (does not describe me at all) to 5 (describes me greatly) with higher scores showing more altruism. Cronbach's alpha was .74.

## Procedure

The study was approved by the Departmental Ethics Committee. Participants provided their informed consent before completing the questionnaire. The questionnaire was anonymous and it required about 15 minutes to be completed.

All procedures performed were in accordance with the ethical standards of the Ethics Committee of the Department of Preschool Education, University of Crete (Protocol Number 247) and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

## Statistical analysis

Summary descriptive statistics are presented as mean (*SD*) or frequency (%), as appropriate. Independent samples t-tests were used to examine differences of quantitative measures between groups; 95% confidence intervals were also computed, to display the possible magnitude of the differences. Where appropriate, Bonferroni adjustment was used to control for type I error inflation. Pearson's correlation coefficients assessed the association between continuous variables. Stepwise linear regression analyses were employed to determine the effect of risk and protective variables on DASS-21 subscales. All tests were performed at the two-sided 5% level of significance using SPSS 21.

## RESULTS

None of the participants had been diagnosed with COVID-19 but 160 (15.7%) knew someone who had. The participants had been quarantined for 19.08 days on average (range 16 to 23 days).

As shown in Table 1, the health emergency had disrupted the life of the participants who exhibited moderate levels of perceived threat of the disease. Perceived threat for themselves ( $M = 2.48$ ,  $SD = 1.04$ ) was significantly lower than perceived threat for their family members ( $M = 4.04$ ,  $SD = 1.02$ ,  $t = -51.16$ ,  $p < .001$ ). Females reported significantly greater perceived threat. Those who knew someone who had been infected exhibited higher levels of perceived threat ( $M = 3.25$  vs.  $M = 3.07$ ,  $t = -2.22$ ,  $p = .02$ ).

### The psychological effect of quarantine on depression, anxiety, stress and affect

Table 2 presents the distribution of the participants across the severity levels of depression, anxiety and stress. A substantial number of the participants had severe or extremely severe depression (17.6%), anxiety (11.3%) and stress (17.9%), while 70 students (6.87%) were classified in the severe and extremely severe levels in all three

**TABLE 1**  
Means and standard deviations of life disruption and perceived threat by gender

	<i>n, M (SD)</i>	<i>Males, M (SD)</i>	<i>Females, M (SD)</i>	<i>t</i>	<i>p</i>
Life disruption	3.17 (.85)	3.06 (.89)	3.18 (.84)	-1.65	.10
Perceived threat	3.11 (.91)	2.91 (.87)	3.14 (.91)	-2.90	.004

**TABLE 2**  
Frequency distribution of depression, anxiety and stress severity levels

	<i>Depression (M = 11.53, SD = 10.05)</i>		<i>Anxiety (M = 6, SD = 7.84)</i>		<i>Stress (M = 14.35, SD = 10.45)</i>	
	<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>
Normal	507	49.8	711	69.8	591	58.1
Mild	149	14.6	109	10.7	103	10.1
Moderate	183	18	83	8.2	142	13.9
Severe	84	8.3	36	3.5	127	12.5
Extremely severe	95	9.3	79	7.8	55	5.4

measures. The mean scores of the PANAS and the means of all the affects are presented in Table 3 in decreasing order.

There were significant gender differences (Table 4). Independent samples t-tests revealed that females had a higher mean score than males in anxiety, stress and negative affect. Individuals who had an infected acquaintance had a significantly higher mean score in anxiety (Table 5).

### Risk and protective factors

Pearson's *r* correlations between the measures revealed that there were a number of significant associations (Table 6). Depression, anxiety and stress had a strong positive correlation with negative affect and life disruption and a weaker but significant correlation with perceived threat and acquaintance with someone infected. On the contrary, there were strong negative associations between depression, anxiety, stress, negative affect and

daily routine. Altruism also had a significant negative correlation with all DASS-21 subscales and negative affect.

Four stepwise multivariate linear regressions were performed with depression, anxiety, stress and negative affect as dependent variables and life disruption, perceived threat, gender, acquaintance with a COVID-19 patient (as potential risk factors), structured daily routine and altruism (as potential protective factors) as independent variables. Interactions of gender by perceived threat, gender by life disruption and acquaintance of someone infected by perceived threat were also included in the models. The overall model for depression was significant ( $R^2 = .291, F[4, 992] = 101.359, p < .001$ ). Structured day routine entered the model first, followed by life disruption, altruism and the gender by life disruption interaction (Table 7). The higher life disruption the higher depression was, while daily routine and altruism were associated with lower depression. The interaction effect indicates that the effect of life disruption was greater in

**TABLE 3**  
Means and standard deviations of each affect in the PANAS

	<i>Positive affect schedule (M = 24.04, SD = 7.09)</i>		<i>Negative affect schedule (M = 22.50, SD = 7.33)</i>		
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
Interested	3.53	1.02	Distressed	3.10	1.31
Strong	2.67	1.07	Upset	3.09	1.27
Active	2.59	1.17	Nervous	3.04	1.35
Determined	2.58	1.20	Irritable	2.56	1.31
Attentive	2.57	1.22	Scared	2.32	1.19
Alert	2.42	1.16	Afraid	2.16	1.20
Inspired	2.41	1.25	Jittery	1.80	1.10
Proud	2.05	1.18	Hostile	1.78	1.16
Enthusiastic	1.66	.95	Guilty	1.32	.72
Excited	1.64	.93	Ashamed	1.29	.75

**TABLE 4**  
Mean scores and standard deviations of DASS-21 subscales and PANAS by gender

	Males		Females		Males-females	<i>t</i>	<i>P</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	95% <i>CI</i>		
Depression	10.30	9.00	11.60	10.06	-2.97 to -.37	-1.53	.12
Anxiety	4.45	6.67	6.17	7.90	-2.89 to -.56	-2.91	.004 <sup>a</sup>
Stress	11.95	9.12	14.67	10.54	-4.31 to -1.13	-3.37	.001 <sup>a</sup>
Positive Affect	24.31	7.07	24.06	7.08	-.97 to 1.47	.41	.69
Negative Affect	19.94	6.40	22.88	7.31	-4.17 to -1.71	-4.69	<.001 <sup>a</sup>

<sup>a</sup> Starred *p*-values indicate Bonferroni adjusted significance.

**TABLE 5**  
Mean scores and standard deviations of DASS-21 and PANAS by acquaintance

	No acquaintance		With acquaintance		No-with	<i>t</i>	<i>p</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	95% <i>CI</i>		
Depression	11.09	9.77	12.94	11.09	-3.70 to .02	-1.95	.05
Anxiety	5.39	7.32	7.69	8.86	-3.77 to -.82	-3.06	.002 <sup>a</sup>
Stress	13.75	10.16	15.86	11.33	-3.87 to -.34	-2.34	.02
Positive Affect	23.86	7.17	24.93	7.06	-2.31 to .17	-1.69	.09
Negative Affect	22.12	7.1	23.7	8.1	-2.82 to -.33	-2.47	.01

<sup>a</sup> Starred *p*-values indicate Bonferroni adjusted significance.

**TABLE 6**  
Pearson's *r* correlations between the explored measures

	1	2	3	4	5	6	7	8	9	10	11
Depression	—	—	—	—	—	—	—	—	—	—	—
Anxiety	.634**	—	—	—	—	—	—	—	—	—	—
Stress	.751**	.660**	—	—	—	—	—	—	—	—	—
Positive affect	-.342**	-.140**	-.199**	—	—	—	—	—	—	—	—
Negative affect	.593**	.655**	.681**	-.065*	—	—	—	—	—	—	—
Life disruption	.335**	.290**	.327**	-.067*	.353**	—	—	—	—	—	—
Perceived threat	.112**	.239**	.165**	.120**	.362**	.172*	—	—	—	—	—
Infected acquaintance	.069*	.113*	.076*	.056	.082*	.043	.073*	—	—	—	—
Gender	.048	.081**	.096**	.013	.148**	.052	.091**	.000	—	—	—
Daily routine	-.487**	-.271**	-.369**	.496**	-.281**	-.235**	-.026	.008	.011	—	—
Altruism	-.106**	-.137**	-.099**	.081*	-.109**	-.069*	-.062*	-.009	.081*	-.004	—

\**p* < .05. \*\**p* < .01.

**TABLE 7**  
Stepwise regression analyses for depression

		<i>B</i>	<i>SE B</i>	$\beta$	<i>p</i>	<i>R</i> <sup>2</sup>	<i>F</i>	<i>p</i>
Step 1	Daily routine	-5.792	.339	-.447	<.001	.227	291.180	<.001
Step 2	Daily routine	-5.152	.338	-.423	<.001	.276	189.093	<.001
	Life disruption	2.652	.323	.228	<.001			
Step 3	Daily routine	-5.172	.336	-.426	<.001	.284	132.315	<.001
	Life disruption	2.558	.322	.220	<.001			
	Altruism	-1.453	.390	-.100	<.001			
Step 4	Daily routine	-5.191	.335	-.427	<.001	.291	101.359	<.001
	Life disruption	2.036	.382	.175	<.001			
	Altruism	-1.518	.390	-.105	<.001			
	Gender × Life disruption	.576	.229	.081	.012			

**TABLE 8**  
Stepwise regression analyses for anxiety

		<i>B</i>	<i>SE B</i>	$\beta$	<i>p</i>	<i>R</i> <sup>2</sup>	<i>F</i>	<i>p</i>
Step 1	Life disruption	2.539	.277	.280	<.001	.078	84.066	<.001
Step 2	Life disruption	2.122	.279	.234	<.001	.116	65.159	<.001
	Daily routine	-1.902	.291	-.201	<.001			
Step 3	Life disruption	1.825	.277	.201	<.001	.150	58.438	<.001
	Daily routine	-1.947	.286	-.205	<.001			
	Perceived threat	1.600	.253	.188	<.001			
Step 4	Life disruption	1.747	.276	.192	<.001	.165	48.991	<.001
	Daily routine	-1.965	.283	-.207	<.001			
	Perceived threat	1.540	.252	.181	<.001			
Step 5	Altruism	-1.391	.331	-.123	<.001	.172	41.140	<.001
	Life disruption	1.717	.275	.189	<.001			
	Daily routine	-1.980	.282	-.209	<.001			
	Perceived threat	1.501	.251	.176	<.001			
	Altruism	-1.385	.329	-.122	<.001			
Step 6	Infected acquaintance	.874	.304	.084	.004	.178	35.601	<.001
	Life disruption	1.272	.323	.140	<.001			
	Daily routine	-1.996	.282	-.210	<.001			
	Perceived threat	1.442	.251	.169	<.001			
	Altruism	-1.446	.329	-.128	<.001			
	Infected acquaintance	.892	.303	.085	.003			
Gender × Life disruption	.501	.193	.090	.010				

**TABLE 9**  
Stepwise regression analyses for stress

		<i>B</i>	<i>SE B</i>	$\beta$	<i>p</i>	<i>R</i> <sup>2</sup>	<i>F</i>	<i>p</i>
Step 1	Daily routine	-4.563	.376	-.359	<.001	.129	146.967	<.001
Step 2	Daily routine	-3.846	.374	-.303	<.001	.186	113.527	<.001
	Life disruption	2.993	.358	.246	<.001			
Step 3	Daily routine	-3.908	.371	-.308	<.001	.201	83.190	<.001
	Life disruption	2.774	.359	.228	<.001			
	Gender × Perceived threat	.906	.211	.123	<.001			
Step 4	Daily routine	-3.930	.369	-.309	<.001	.210	65.721	<.001
	Life disruption	2.676	.358	.220	<.001			
	Gender × Perceived threat	.930	.210	.127	<.001			
	Altruism	-1.416	.430	-.093	.001			
Step 5	Daily routine	-3.945	.369	-.311	<.001	.214	53.668	<.001
	Life disruption	2.643	.358	.217	<.001			
	Gender × Perceived threat	.924	.209	.126	<.001			
	Altruism	-1.408	.429	-.093	.001			
	Infected acquaintance	.841	.396	.060	.034			

women than in men. For anxiety as dependent variable, the model was significant ( $R^2 = .178$ ,  $F[6, 993] = 35.601$ ,  $p < .001$ ). As shown in Table 8, life disruption entered the model first indicating a significant negative association with anxiety followed by daily routine that had a significant protective effect. Perceived threat was associated with higher anxiety while altruism was associated with less anxiety. There was also a significant gender by life disruption interaction, in the sense that the effect of life disruption on anxiety was greater for women. For stress as the dependent variable, the model was significant ( $R^2 = .214$ ,  $F[5, 993] = 53.668$ ,  $p < .001$ ) with daily routine as a protective factor entering the model first

(Table 9). Life disruption and knowing someone infected contributed to higher stress scores, while altruism was associated with less stress. The significant gender by perceived threat interaction suggests that the effect of perceived threat on stress was higher in women. Finally, with negative affect as dependent variable, the model was significant ( $R^2 = .272$ ,  $F[5, 967] = 72.060$ ,  $p < .001$ ). Perceived threat and life disruption were associated with more negative affect while a structured day routine and altruism had a protective role (Table 10). The gender by life disruption interaction suggests that the effect of life disruption on negative affect was once again greater for women.

**TABLE 10**  
Stepwise regression analyses for negative affect

		<i>B</i>	<i>SE B</i>	$\beta$	<i>p</i>	<i>R</i> <sup>2</sup>	<i>F</i>	<i>p</i>
Step 1	Perceived threat	2.845	.240	.356	<.001	.127	139.919	<.001
Step 2	Perceived threat	2.455	.232	.307	<.001	.212	129.687	<.001
	Life disruption	2.531	.248	.296	<.001			
Step 3	Perceived threat	2.506	.226	.313	<.001	.252	108.258	<.001
	Life disruption	2.115	.248	.247	<.001			
	Daily routine	-1.832	.255	-.206	<.001			
Step 4	Perceived threat	2.427	.225	.303	<.001	.265	86.831	<.001
	Life disruption	1.488	.289	.174	<.001			
	Daily routine	-1.857	.253	-.209	<.001			
	Gender × Life disruption	.713	.172	.137	<.001			
Step 5	Perceived threat	2.381	.224	.298	<.001	.272	72.060	<.001
	Life disruption	1.404	.289	.164	<.001			
	Daily routine	-1.869	.251	-.210	<.001			
	Gender × Life disruption	.750	.172	.144	<.001			
	Altruism	-.921	.294	-.087	.002			

**DISCUSSION**

The purpose of this study was to examine the psychological effect of COVID-19 quarantine in Greek undergraduate students and explore potential risk and protective factors. The unprecedented, mandatory country-wide quarantine disrupted students' life. They perceived COVID-19 as a threat for their family members more than for themselves, a finding reflecting their concern about the vulnerability of older people. A similar pattern was observed in previous studies (Germani et al., 2020; Odriozola-González et al., 2020) where the participants were more concerned about family members contracting the disease than themselves.

The findings revealed elevated levels of depression, anxiety and stress. Lyrakos et al. (2011) found that the mean scores in adult Greek population for depression, anxiety and stress were 8.05 (*SD* 9.6), 7.19 (*SD* = 7.7) and 12.46 (*SD* = 9.82), respectively. Compared to these normative means before the COVID-19 outbreak the depression and stress scores were raised. It is concerning that more than a third of the participants (35.6%) exhibited moderate to extremely severe depression symptoms, while 31.8 and 19.5% reported moderate to extremely severe stress and anxiety respectively. The mean scores and the levels of depression, anxiety and stress were very close to the ones reported in Italy (Mazza et al., 2020) and among University students in Spain (Odriozola-González et al., 2020) using the same scales.

In terms of affectivity, there was a major decrease of positive emotions. Watson et al. (1988) found that undergraduate students have a mean score of 33.3 for positive and 17.4 for negative affect. In our study, positive affect was low (*M* = 24.04) compared to the findings of other studies with non-clinical samples (Crawford & Henry, 2004). Excitement and enthusiasm, emotions expected to be dominant among undergraduates

were very low and the only positive affect rated high was that of *interested*. This might reflect the high interest in the rapidly evolving health emergency. On the contrary, negative affect was high (*M* = 22.05). The most prevalent negative affects were distress, upset and nervousness. Affects usually experienced in social interaction such as guiltiness, hostility and shame were very low due to social distancing. The findings suggest that during confinement people did not experience intense positive emotions and this might explain the increased levels of depression.

The study identified several risk factors of psychological distress and negative affect, such as life disruption, perceived threat of the disease, acquaintance with someone infected and gender. Life disruption was consistently the strongest risk factor associated with depression, anxiety and stress. In Greece, the general lockdown and the restrictions in movement and transport were imposed in short-time putting usual activities on halt. Students discontinued their studies and the majority travelled hastily back to their home towns, before the implementation of travel restrictions. Most of them lost their jobs and were separated from their friends and partners. For the first time there was a shift from the traditional classroom to e-classes. Despite this alternative, there is evidence that e-learning crack-up and the fear of losing the semester were associated with psychological distress (Hasan & Bao, 2020).

Perceived threat was another risk factor. Although fear in a fundamental adaptive response in the face of a threat that can generate protective behaviours, excessive fears can lead to adverse psychological consequences. In a study among university students in USA, the fear about their own health and the health of their loved ones was the main stressor of their psychological health (Son et al., 2020). COVID-19 worries and low perceived likelihood of surviving have been associated with psychological maladjustment (Germani et al., 2020) and

stress (Wang et al., 2020), respectively. Several factors could have raised perceived threat. At the time of the study, the National Public Health Organisation described COVID-19 as an invisible and insidious enemy and the control of the situation as an ongoing battle, while the media were flooded with images of hospitals in Italy and Spain counting hundreds of deaths every day. Although we did not explore the sources fuelling perceived threat, excessive social media exposure has been blamed for heightening anxiety and depression (Gao et al., 2020).

The study also showed that knowing someone infected can be a stressor. Those who had an infected acquaintance had a higher level of anxiety, a finding that has been demonstrated in previous studies (Cao et al., 2020; Casagrande et al., 2020; González-Sanguino et al., 2020).

Regarding the role of gender, women had a higher mean score for anxiety, stress and negative affect than men. Although gender was not per se a predictor of DASS-21 scores and negative affect, the interaction effects suggest that gender was a significant moderator. Female gender strengthened the negative effects of life disruption on depression, anxiety and negative affect while it intensified the effect of perceived threat on depression. This finding is in accordance to pre-COVID-19 research revealing a higher prevalence of depression and anxiety rates among female college students (Auerbach et al., 2018).

The study identified two significant protective factors of psychological health. The first factor, a daily routine, was predictive of lower DASS-21 and negative affect scores. The effect of this variable was substantial. Previous studies have examined one component of daily routine, that of sleep, and found that better sleep quality related to less post-traumatic stress symptoms (Liu et al., 2020). In the present study, those who had the ability to adapt to the new circumstances and sustain a gratifying routine while staying home exhibited less mental health problems. This is because routine is associated with feelings of safety, confidence and comfort and creates positive feelings (Avni-Babad, 2011). Mundane routines are among the things that make life meaningful and generate a sense of purpose in life (Heintzelman & King, 2019). They also entrain and regulate the human circadian rhythms that are essential for mental health (Grandin et al., 2006).

The second protective factor identified was altruism. The more altruistic participants exhibited less psychological distress and less negative affect. This is in line with evidence showing that altruistic behaviour is associated with better mental health (Schwartz et al., 2003). Our finding adds to previous limited evidence on outbreaks showing the medical staff's altruistic acceptance of the risk to help SARS patients decreased the odds of having depressive symptoms (Liu et al., 2012). Altruistic behaviour is motivated by other-oriented concerns and is highly correlated with social responsibility, the tendency to act in a

manner that benefits the society (Carlo & Randall, 2002). It is possible that altruistic individuals feel responsible to confine the spread of the disease for the welfare of others and that sense of obligation makes quarantine more bearable. The ascription of altruistic meaning to quarantine might help them cope with the situation alleviating their psychological distress.

## Implications

The findings have several implications for social policy makers, mental health professionals and academic institutions. The psychological effect of quarantine should not be underestimated. University students are a vulnerable population and their institutions should not only prepare the transition to distant education but take also provision for their increased psychological needs during this challenging time. Students should have access to intervention programmes addressing their concerns, fears and psychological difficulties. Mental health services should support students to adjust to the “new normal” by employing adaptive coping strategies. The findings suggest that helping people reorganise their daily routine can be an effective way of coping. Building a new routine, enriching daily life with gratifying activities, having stable sleep–wake and meal times can create a sense of regularity. A stable routine in times of uncertainty can be a source of security. Moreover, stressing the altruistic component of the quarantine can potentially be protective for psychological health. Increasing the concern for others, especially to those vulnerable, can promote social connectedness and join people in the common effort to control the outbreak. It is believed that the altruistic aspect of health messages in UK had a positive effect on wellbeing compared to the messages stressing the obligation to stay home (Holmes et al., 2020).

## Limitations

The current study has several limitations. Cross-sectional designs cannot provide evidence of causality. Longitudinal studies are needed to examine the long-term effects of this pandemic and cause-effect relationships. The difficulty of obtaining a random sample in short time led to the snowball sampling method. Thus, selection bias cannot be ruled out. Females were overrepresented in the study, possibly because the questionnaire was first distributed in a department that had predominantly female students. The participants were undergraduate students and that limits the generalizability of the findings. We do not know how many of them belonged to vulnerable mental health groups before the outbreak. Moreover, due to lack of research, DASS-21 scores were compared with the normative data of Greek adult population and not of university students, a population known to have



elevated prevalence of mental health problems (Auerbach et al., 2018). The findings reflect mental health at a specific time point. The quarantine lasted 3 more weeks after data were collected. Therefore, assumptions about the psychological effect of the whole quarantine period cannot be made. Although it might be reasonable to assume that the prolonged duration could have further strained psychological health, it is also likely that the emerging containment of the disease could have created feelings of hope and relief.

Nevertheless, the findings of the study suggest that the quarantine imposed during the COVID-19 outbreak in Greece had a psychological effect on young adults increasing depression, anxiety, stress symptoms and negative affect. Life disruption and the perceived threat of the disease significantly contributed to increased psychological distress while a stable daily routine and altruism buffered against the negative effects.

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## REFERENCES

- Auerbach, R. P., Mortier, P., Bruffaerts, R., Alonso, J., Benjet, C., Cuijpers, P., Demuyttenaere, K., Ebert, D. D., Green, J. G., Hasking, P., Murray, E., Nock, M. K., Pinder-Amaker, S., Sampson, N. A., Stein, D. J., Vilagut, G., Zaslavsky, A. M., Kessler, R. C., & WHO WMH-ICS Collaborators. (2018). WHO world mental health surveys international college student project: Prevalence and distribution of mental disorders. *Journal of Abnormal Psychology, 127*(7), 623–638. <https://doi.org/10.1037/abn0000362>
- Avni-Babad, D. (2011). Routine and feelings of safety, confidence, and well-being. *British Journal of Psychology, 102*(2), 223–244.
- Brooks, S. K., Webster, R. K., Smith, L. E., Woodland, L., Wessely, S., Greenberg, N., & Rubin, G. J. (2020). The psychological impact of quarantine and how to reduce it: Rapid review of the evidence. *The Lancet, 395*, 912–920.
- Cao, W., Fang, Z., Hou, G., Han, M., Xu, X., Dong, J., & Zheng, J. (2020). The psychological impact of the COVID-19 epidemic on college students in China. *Psychiatry Research, 287*, 112934. <https://doi.org/10.1016/j.psychres.2020.112934>
- Carlo, G., & Randall, B. A. (2002). The development of a measure of prosocial behaviors for late adolescents. *Journal of Youth and Adolescence, 31*(1), 31–44.
- Casagrande, M., Favieri, F., Tambelli, R., & Forte, G. (2020). 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 Medicine, 75*, 12–20. <https://doi.org/10.1016/j.sleep.2020.05.011>
- Cellini, N., Canale, N., Mioni, G., & Costa, S. (2020). Changes in sleep pattern, sense of time and digital media use during COVID-19 lockdown in Italy. *Journal of Sleep Research, 29*(4), e13074. <https://doi.org/10.1111/jsr.13074>
- Crawford, J. R., & Henry, J. D. (2004). The positive and negative affect schedule (PANAS): Construct validity, measurement properties and normative data in a large non-clinical sample. *British Journal of Clinical Psychology, 43*(3), 245–265.
- Fiorillo, A., & Gorwood, P. (2020). The consequences of the COVID-19 pandemic on mental health and implications for clinical practice. *European Psychiatry, 63*(1), e32. <https://doi.org/10.1192/j.eurpsy.2020.35>
- Forte, G., Favieri, F., Tambelli, R., & Casagrande, M. (2020). The enemy which sealed the world: Effects of covid-19 diffusion on the psychological state of the Italian population. *Journal of Clinical Medicine, 9*(6), 1802. <https://doi.org/10.3390/jcm9061802>
- Gao, J., Zheng, P., Jia, Y., Chen, H., Mao, Y., Chen, S., Wang, Y., Fu, H., & Dai, J. (2020). Mental health problems and social media exposure during COVID-19 outbreak. *PLoS One, 15*(4), e0231924. <https://doi.org/10.1371/journal.pone.0231924>
- Germani, A., Buratta, L., Delvecchio, E., & Mazzeschi, C. (2020). Emerging adults and COVID-19: The role of individualism-collectivism on perceived risks and psychological maladjustment. *International Journal of Environmental Research and Public Health, 17*(10), 3497. <https://doi.org/10.3390/ijerph17103497>
- González-Sanguino, C., Ausín, B., Castellanos, M. A., Saiz, J., López-Gómez, A., Ugidos, C., & Muñoz, M. (2020). Mental health consequences during the initial stage of the 2020 coronavirus pandemic (COVID-19) in Spain. *Brain, Behavior, and Immunity, 87*, 172–176. <https://doi.org/10.1016/j.bbi.2020.05.040>
- Grandin, L. D., Alloy, L. B., & Abramson, L. Y. (2006). The social zeitgeber theory, circadian rhythms, and mood disorders: Review and evaluation. *Clinical Psychology Review, 26*(6), 679–694.
- Hasan, N., & Bao, Y. (2020). Impact of “e-learning crack-up” perception on psychological distress among college students during COVID-19 pandemic: A mediating role of “fear of academic year loss”. *Children and Youth Services Review, 118*, 105355. <https://doi.org/10.1016/j.childyouth.2020.105355>
- Heintzelman, S. J., & King, L. A. (2019). Routines and meaning in life. *Personality and Social Psychology Bulletin, 45*(5), 688–699.
- Holmes, E. A., O'Connor, R. C., Perry, V. H., Tracey, I., Wessely, S., Arseneault, L., Ballard, C., Christensen, H., Silver, R. C., Everall, I., Ford, T., John, A., Kabir, T., King, K., Madan, I., Michie, S., Przybylski, A. K., Shafran, R., Sweeney, A., ... Bullmore, E. (2020). Multidisciplinary research priorities for the COVID-19 pandemic: A call for action for mental health science. *The Lancet Psychiatry, 7*(6), 547–560. [https://doi.org/10.1016/S2215-0366\(20\)30168-1](https://doi.org/10.1016/S2215-0366(20)30168-1)
- Huang, Y., & Zhao, N. (2020). Generalized anxiety disorder, depressive symptoms and sleep quality during COVID-19 outbreak in China: A web-based cross-sectional survey. *Psychiatry Research, 288*, 112954. <https://doi.org/10.1016/j.psychres.2020.112954>
- Lampridis, E., & Papastylianou, D. (2017). Prosocial behavioural tendencies and orientation towards individualism–collectivism of Greek young adults. *International Journal of Adolescence and Youth, 22*(3), 268–282.

- Liu, N., Zhang, F., Wei, C., Jia, Y., Shang, Z., Sun, L., Wu, L., Sun, Z., Zhou, Y., Wang, Y., & Liu, W. (2020). Prevalence and predictors of PTSS during COVID-19 outbreak in China hardest-hit areas: Gender differences matter. *Psychiatry Research*, *287*, 112921. <https://doi.org/10.1016/j.psychres.2020.112921>
- Liu, X., Kakade, M., Fuller, C. J., Fan, B., Fang, Y., Kong, J., Guan, Z., & Wu, P. (2012). Depression after exposure to stressful events: Lessons learned from the severe acute respiratory syndrome epidemic. *Comprehensive Psychiatry*, *53*(1), 15–23.
- Lovibond, S. H., & Lovibond, P. F. (1995). *Manual for the depression anxiety stress scales* (2nd ed.). Psychology Foundation.
- Lyrakos, G. N., Arvaniti, C., Smyrnioti, M., & Kostopanagiotou, G. (2011). P03-561-translation and validation study of the depression anxiety stress scale in the Greek general population and in a psychiatric patient's sample. *European Psychiatry*, *26*, 1731.
- Mazza, C., Ricci, E., Biondi, S., Colasanti, M., Ferracuti, S., Napoli, C., & Roma, P. (2020). A nationwide survey of psychological distress among Italian people during the COVID-19 pandemic: Immediate psychological responses and associated factors. *International Journal of Environmental Research and Public Health*, *17*(9), 3165. <https://doi.org/10.3390/ijerph17093165>
- Odriozola-González, P., Planchuelo-Gómez, Á., Irujo, M. J., & de Luis-García, R. (2020). Psychological effects of the COVID-19 outbreak and lockdown among students and workers of a Spanish university. *Psychiatry Research*, *290*, 113108. <https://doi.org/10.1016/j.psychres.2020.113108>
- Qiu, J., Shen, B., Zhao, M., Wang, Z., Xie, B., & Xu, Y. (2020). A nationwide survey of psychological distress among Chinese people in the COVID-19 epidemic: Implications and policy recommendations. *General Psychiatry*, *33*(2), e100213. <https://doi.org/10.1136/gpsych-2020-100213>
- Schwartz, C., Meisenhelder, J. B., Ma, Y., & Reed, G. (2003). Altruistic social interest behaviors are associated with better mental health. *Psychosomatic Medicine*, *65*, 778–785.
- Son, C., Hegde, S., Smith, A., Wang, X., & Sasangohar, F. (2020). Effects of COVID-19 on college students' mental health in the United States: Interview survey study. *Journal of Medical Internet Research*, *22*(9), e21279. <https://doi.org/10.2196/21279>
- Wang, C., Pan, R., Wan, X., Tan, Y., Xu, L., Ho, C. S., & Ho, R. C. (2020). Immediate psychological responses and associated factors during the initial stage of the 2019 coronavirus disease (COVID-19) epidemic among the general population in China. *International Journal of Environmental Research and Public Health*, *17*(5), 1729. <https://doi.org/10.3390/ijerph17051729>
- Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology*, *54*(6), 1063–1070.