

## Original Article

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**Abstract**

**Objective.** To investigate the effect of the time spent on quarantine on distress, anxiety, depression, and somatization of chronic disease patients during the COVID-19 quarantine in Greece and the differences in these parameters between healthy individuals and chronic disease patients.

**Method.** The sample consisted of 943 healthy individuals and 163 patients (respiratory, autoimmune, cardiovascular, endocrine, patients with other diseases, and patients with more than one disease) completing sociodemographic assessments as well as the 4-Dimensional Symptom Questionnaire (4DSQ) during March 30, 2020 to May 3, 2020. Pearson’s correlation was used to search for the association between time spent on quarantine and the 4DSQ subscales (distress, anxiety, depression, and somatization). Independent sample T-test and Glass’s  $\Delta$  were used for differences between healthy individuals and chronic disease patients in these subscales, an analysis also carried out between healthy individuals and all patient subgroups.

**Results.** No statistically significant correlations were noted between the 4DSQ subscales and the quarantine duration, both for the patient and the healthy individuals’ group. Chronic disease patients had significantly higher levels of distress ( $p = 0.001$ ,  $\Delta = 0.28$ ) and somatization ( $p = 0.000$ ,  $\Delta = 0.47$ ), but not there were no significant differences in anxiety ( $p = 0.098$ ,  $\Delta = 0.14$ ) and depression ( $p = 0.052$ ,  $\Delta = 0.19$ ). Concerning head-to-head comparisons between the healthy individuals’ group and each patient group, significantly higher scores in distress were found only for patients with respiratory diseases ( $p = 0.028$ ,  $\Delta = 0.42$ ). Regarding somatization, significantly higher scores were noted for the healthy individuals’ group compared with patients with autoimmune diseases ( $p = 0.010$ ,  $\Delta = 0.62$ ), respiratory diseases ( $p = 0.027$ ,  $\Delta = 0.42$ ), other diseases ( $p = 0.003$ ,  $\Delta = 0.55$ ), and more than one disease ( $p = 0.012$ ,  $\Delta = 0.60$ ). No statistically significant differences were found in anxiety and depression.

**Significance of results.** The results of this study indicate that interventional programs for chronic disease patients during quarantine should focus on distress and somatization, not on anxiety and depression. Respiratory patients might have more supportive care needs compared with patients with other diseases.

**Introduction**

Undoubtedly, COVID-19 is the biggest threat of global public health for 2020, since despite its low case fatality ratio (CFR), the easiness in transmission leads to a worldwide pandemic (Heymann and Shindo, 2020). The value of  $R_0$  of the disease during the early phase of the pandemic was estimated at 2.24–3.58 (Zhao et al., 2020), making the essential use of strict public health measures to set the transmission under control (Guo et al., 2020).

Several studies have investigated the impact of COVID-19 on patients with chronic diseases. Through an analysis of 72,314 cases in China, it was found that the CFR was 10.5% for cardiovascular disease patients, 7.3% for diabetes, 6.3% for chronic respiratory syndrome, and 6% for hypertension, while the CFR of the general population was 2.3% (Wu and McGoogan, 2020). In addition, even though the original data have not been published so far, it is widely accepted that patients receiving immunosuppressant or immunomodulatory therapy (e.g. those affected by multiple sclerosis) have an increased risk of complications and mortality from COVID-19 (Willis and Robertson, 2020). Furthermore, the disease outbreak has led to treatment delays in patients with chronic diseases, such as cancer, which might be disturbing and affect the treatment outcome. For example, delaying therapies for gastrointestinal and lung cancer patients was considered necessary in China during the disease outbreak to prevent the risk of infection (Moujaess et al., 2020). Hence, patients with chronic diseases consist a highly vulnerable group during the COVID-19 outbreak, which has to be further studied.

Quarantine is a must-use measure during a disease outbreak to protect public health (Tognotti, 2013; Parmet and Sinha, 2020). In the current pandemic, this approach has been firstly used in China to set COVID-19 under control and to protect the health of vulnerable populations, such as patients with chronic illness (Guo et al., 2020). Nevertheless, it is necessary to investigate the economic, societal, and psychological impact of this policy in order to improve the way it is implemented and to design strategies minimizing the negative effects, since the implementation of quarantine raises several ethical dilemmas (Upshur, 2003; Cetron and Landwirth, 2005).

To date, limited studies have investigated the mental health of people with chronic diseases while implementing quarantine policies. More specifically, in a relevant study in South Korea during the MERS outbreak in 2015, it was found that those with history of physical disease had increased odds for clinically significant anxiety 4–6 months after the quarantine (Jeong et al., 2016). An additional study in the same country on quarantined hospitalized hemodialysis patients during the MERS outbreak found that 11% and 15.1% met the criteria for clinically significant anxiety and depression, respectively (Lee et al., 2018). Concerning the outbreak of COVID-19 and related quarantine measures, a recent study in Spain during March 11–15, 2020 found that chronic disease patients had higher levels of stress, anxiety, and depression compared with healthy individuals (Ozamiz-Etxebarria et al., 2020). Thus, chronic disease patients might have increased supportive care needs while placed in quarantine.

To date, no other relevant studies have been published, leading to several literature gaps, especially since the previous studies have not investigated patients with different types of chronic diseases while implementing quarantine policies. In that context, this study investigated mental health parameters of patients with chronic diseases during the COVID-19 outbreak in Greece.

## Methods

### Aim

The aims of the study were the following: (a) to search for an effect of quarantine duration on anxiety, depression, somatization, and distress of chronic disease patients and (b) to investigate differences between healthy individuals and patients with chronic diseases in anxiety, depression, somatization, and distress during the COVID-19 quarantine.

### Study design

This study was part of a wider ongoing research to investigate mental health parameters in the Greek population, which started at December 2018. The research has gained approval by the appropriate Committee of the Medical School of the National and Kapodistrian University of Athens and complies fully with the Declaration of Helsinki. At the present study, all the eligible participants from the dataset completing the assessments between March 30, 2020 and May 4, 2020 were extracted to be further analyzed.

### Participants

The inclusion criteria in the present study were the following: (a) age over 18 years old and (b) being able to communicate in Greek. The inclusion and exclusion criteria have not changed at any stage of the data collection process.

## Assessments

### Sociodemographic data

The sociodemographic data of the participants included gender (male/female), age (18–30/31–45/46–60/over 60), family status (married/unmarried living with a partner/unmarried living alone/divorced or widowed), having children (yes/no), educational level (primary/secondary/tertiary), smoking status (current smoker/occasional smoker/nonsmoker), and occupational status (unemployed/student/private sector worker/public sector worker/freelancer or businessman woman/pensioner/house worker).

### The 4-dimensional symptom questionnaire

The 4-Dimensional Symptom Questionnaire (4DSQ) consists a self-reported instrument including 50 items scored on a Likert-type scale (0 = no to 4 = very much or always). This instrument includes four different subscales, measuring distress, anxiety, depression, and somatization (Terluin et al., 2006). The 4DSQ has been previously validated in Greek (Tsourela et al., 2013). In this study, the  $\alpha$  level was 0.84 for depression, 0.88 for anxiety, 0.91 for distress, and 0.85 for somatization.

## Procedures

As mentioned above, this study is part of a wider research investigating mental health parameters in the Greek population. Several posts on social networks containing a link leading to the assessments, also explaining the study purpose, the inclusion criteria, and the anonymity of participation, were used for participant recruitment. The posts were placed on groups with general content to increase the representativeness of the study sample. The participants pressing the link were guided to the assessments, which were completed instantly. The time needed to complete the assessments was estimated at approximately 5 min. The participants analyzed in the present study were those that have completed the assessments from March 30, 2020 till May 3, 2020. The beginning of this time interval was one week after the start of the quarantine, since the recall period of the 4DSQ is one week. Thus, since the quarantine started at March 23, 2020, using participants who completed the assessments prior to March 30, 2020 would lead to recalling symptoms placed before the beginning of the quarantine. The end of this interval refers to the last day of the quarantine in Greece. In the present study, the participants analyzed were those with no chronic disease ( $N = 943$ ) and those with the following diseases: cardiovascular ( $N = 27$ ), autoimmune ( $N = 37$ ), chronic respiratory diseases ( $N = 29$ ), and endocrine disorders ( $N = 22$ ). These disease groups were included since at least 20 participants were found in the dataset for each of these subgroups. Patients with other diseases (e.g. schizophrenia) and patients with multiple chronic diseases (e.g. asthma and cancer) were analyzed in separate groups ( $N = 30$  and 18, respectively). Thus, the first group consisted of healthy individuals and the other six patients with different types of chronic diseases.

## Statistical analysis

The statistical analysis of the present study was carried out by the use of SPSS statistical software version 26 (SPSS, Inc., Chicago, IL). Absolute values and proportions were used for descriptive analysis regarding the demographic characteristics of the study.

Since according to the Kolmogorov–Smirnov test the normality of the 4DSQ subscales was not violated, independent sample *T*-test was applied to investigate differences between healthy individuals and each subgroup with chronic disease. The effect size was calculated by the use of Glass's  $\Delta$ . Pearson's correlation was used to investigate the relationship between the duration of quarantine and the 4DSQ subscales for the chronic disease and the healthy individuals' group. The *p*-value was set at 0.05 for all the analyses.

## Results

The sociodemographic data of the participants are presented in Table 1. As indicated in the table, the sample consisted mostly be females (65.7%). A considerable proportion of participants was between 18–30 years old (47.3%) and unmarried who lived alone (40.3%). Most of the participants did not have children (68.3%), were nonsmokers (58.9%) and had received tertiary education (68.9%). Private sector workers (39.2%) and public sector workers (21.2%) were the most frequent types of occupational status. Further information is presented in Table 1.

The correlation between quarantine duration and the 4DSQ subscales score is presented in Table 2. As indicated in the table, there was no correlation between quarantine duration and the subscales' scores both in the healthy individuals and the chronic disease patients group.

With regard to differences in 4DSQ subscales between healthy individuals and chronic disease patients, the relevant analysis is presented in Table 3. As indicated in the table, chronic disease patients had statistically significant higher scores in somatization ( $p = 0.000$ ) and distress ( $p = 0.001$ ). The differences in anxiety and depression were not statistically significant ( $p = 0.098$  and  $0.052$ , respectively).

The mean value of the 4DSQ distress subscale was 7.828 for healthy individuals (SD 6.875). Statistically significant differences were noted only when compared with patients with respiratory diseases ( $p = 0.028$ ), as shown in Table 4.

The mean value in the 4DSQ anxiety subscale was 3.423 for healthy individuals (SD 4.375). As indicated in Table 5, there were no statistically significant differences with any of the patient groups.

The mean value of 4DSQ depression was 0.987 for the healthy individuals group (SD 2.002). The comparisons with each of the patient groups of the study did not lead to statistically significant differences in depression, as shown in Table 6.

The mean value of the 4DSQ somatization subscale was 5.181 for the healthy individuals group (SD 4.908). Concerning the differences in somatization between healthy individuals and each patient group, the relevant analysis is presented in Table 7. As indicated in the table, most patient subgroups had statistically significant higher scores of somatization.

## Discussion

This study aimed to investigate the correlation between time spent on quarantine and the 4DSQ subscales in chronic disease patients in contrast to the relevant correlation in healthy individuals, as well as to search for differences in the scores of these subscales based on the disease status of the participants. The first main finding of the study is that there is no correlation between the 4DSQ subscales and time spent on quarantine neither for the healthy individuals nor for the chronic disease group. The second finding regards the significantly higher levels of distress and

**Table 1.** The sociodemographic data of the study sample

Gender	
Male	379 (34.3%)
Female	727 (65.7%)
Age	
18–30	523 (47.3%)
31–45	356 (32.2%)
46–60	179 (16.2%)
Older than 60	48 (4.3%)
Family status	
Married	332 (30.0%)
Unmarried-living with a partner	259 (23.4%)
Unmarried-living alone	446 (40.3%)
Widowed or divorced	69 (6.2%)
Having children	
Yes	351 (31.7%)
No	755 (68.3%)
Educational status	
Primary	2 (0.2%)
Secondary	342 (31.0%)
Tertiary	762 (68.9%)
Occupational status	
Unemployed	67 (6.1%)
Student	111 (10.0%)
Public sector worker	235 (21.2%)
Private sector worker	422 (38.2%)
Freelancer or businessman woman	224 (20.3%)
Pensioner	32 (2.9%)
Houseworker	15 (1.4%)
Smoking status	
Smoker	307 (27.8%)
Nonsmoker	651 (58.9%)
Occasional smoker	148 (13.4%)

somatization in chronic disease patients, while anxiety and depression have no difference compared with healthy individuals. The analyses per disease indicate that endocrine and cardiovascular disease patients are not significantly affected, since they did not differ from healthy individuals in any of the 4DSQ subscales. Autoimmune patients, those affected by more than one disease and patients with other diseases, differ from healthy individuals only in somatization. Patients affected by respiratory diseases have additional supportive care needs, since they differ from healthy individuals in more than one parameter (somatization and distress). Of note, all the analyses indicated a nonsignificant effect on patient depression and anxiety.

The absence of significant associations between the 4DSQ subscales and quarantine duration is in line with previous studies concerning the association between quarantine duration and

**Table 2.** The correlation between quarantine duration and the 4DSQ subscales in healthy individuals and chronic disease patients

Group	Somatization	Distress	Anxiety	Depression
Healthy individuals				
Quarantine duration				
r	0.059	-0.004	-0.003	0.023
P	0.070	0.907	0.923	0.482
N	943	943	943	943
Chronic disease patients				
Quarantine duration				
r	-0.019	-0.019	-0.021	-0.005
P	0.806	0.810	0.788	0.949
N	943	943	943	943

psychopathological manifestations in the general population. For example, during the COVID-19 massive quarantine in China, it was found that time was unrelated to the intensity of anxiety levels (Hu et al., 2020), while, in a previous study in Toronto, Canada during the SARS outbreak, it was found that quarantine duration was not significantly related to depressive symptoms, although there was a trend toward a positive association (Hawryluck et al., 2004). The results of the present study confirm and expand the current knowledge, since, both in the healthy individuals and in the chronic disease patient group, there was no association between the 4DSQ subscales and time spent in quarantine.

A paradoxical finding of the present study has to do with the absence of higher depressive levels for chronic disease patients during the lockdown, since, according to the previous study in Greece, chronic disease patients have higher levels of depressive symptoms compared with healthy individuals (Gerontoukou et al., 2015). The absence of differences could be attributed to mechanisms activated during societal threat in collective-oriented societies, such as Greece. More specifically, during the 2015 capital controls, a study in breast cancer patients found that depressive symptoms were queerly lower during that period of economic and political destabilization, a finding that could be attributed to an increase of social support toward the vulnerable during the general societal threat (Pelekasis et al., 2017). Similar mechanisms could have been activated during the current crisis, leading to higher support toward patients with chronic diseases, and positive effects on depressive levels, leading to the absence of differences from healthy individuals.

**Table 3.** The differences in 4DSQ subscales between healthy individuals and chronic disease patients

Group	N	Mean	SD	P	Δ
Somatization					
Healthy individuals	943	5,181	4,908	<b>0.000</b>	0.47
Chronic disease patients	163	7,478	5,771		
Distress					
Healthy individuals	943	7,828	6,875	<b>0.001</b>	0.28
Chronic disease patients	163	9,773	7,293		
Anxiety					
Healthy individuals	943	3,423	4,375	0.098	0.14
Chronic disease patients	163	4,042	4,601		
Depression					
Healthy individuals	943	,987	2,002	0.052	0.19
Chronic disease patients	163	1,374	2,383		

All the statistically significant values have been highlighted in bold.

Nonetheless, since this study found higher levels of distress and somatization for chronic disease patients, developing and implementing appropriate mental health interventions during quarantine policies is essential. In addition, as indicated from a study during the SARS outbreak, psychopathological manifestations could lead to extra secretion of catecholamine, which causes instability of myocardial electricity and adverse outcomes on cardiovascular disease patients (Pan et al., 2003). As for patients with autoimmune diseases, such as multiple sclerosis, it is supported that COVID-19-related anxiety could lead to disease exacerbations (Ahadi et al., 2020). Thus, developing and applying appropriate interventions for chronic disease patients during a pandemic is essential.

As for the content of those interventions, aiming only at mental health parameters might be somehow restricting, since chronic disease patients might have additional supportive care needs while placed in quarantine. Interestingly, it has been supported that an underrated threat for chronic disease patients, such as cardiovascular, regards the absence of physical activity during quarantine, which could lead to a further risk for adverse outcomes (Mattioli et al., 2020). For that reason, it is essential to design appropriate interventions targeting both the improvement of mental health and the adoption of a healthy lifestyle during the quarantine. In Greece, recent studies testing the effectiveness of a relevant culturally oriented intervention entitled "Pythagorean

**Table 4.** The differences in distress between healthy individuals and each patient group

Group	N	Mean	SD	P	Δ
Cardiovascular diseases	27	8.518	6,524	0.607	0.10
Autoimmune diseases	37	9.864	7,976	0.079	0.30
Endocrine disorders	22	8.954	8.357	0.450	0.16
Respiratory diseases	29	10.689	7.324	<b>0.028</b>	0.42
Other diseases	30	10.300	7.777	0.054	0.36
More than one disease	18	10.111	4.873	0.161	0.33

All the statistically significant values have been highlighted in bold.



**Table 5.** The differences in anxiety between healthy individuals and each patient group

Group	N	Mean	SD	P	Δ
Cardiovascular diseases	27	4.740	5.439	0.126	0.30
Autoimmune diseases	37	3.243	4.098	0.806	0.04
Endocrine disorders	22	4.454	5.518	0.278	0.23
Respiratory diseases	29	4.310	4.089	0.282	0.20
Other diseases	30	4.400	4.860	0.231	0.22
More than one disease	18	3.111	3.445	0.764	0.07

**Table 6.** The differences in depression between healthy individuals and each patient group

Group	N	Mean	SD	P	Δ
Cardiovascular diseases	27	1.555	2.819	0.152	0.28
Autoimmune diseases	37	1.351	2.323	0.281	0.18
Endocrine disorders	22	1.409	2.938	0.335	0.21
Respiratory diseases	29	1.069	2.051	0.829	0.04
Other diseases	30	1.766	2.500	0.101	0.39
More than one disease	18	0.944	1.258	0.928	0.02

**Table 7.** The differences in somatization between healthy individuals and each patient group

Group	N	Mean	SD	P	Δ
Cardiovascular diseases	27	6,259	5,095	0.261	0.22
Autoimmune diseases	37	8,216	6,774	<b>0.010</b>	0.62
Endocrine disorders	22	7,000	6,697	0.089	0.37
Respiratory diseases	29	7,241	5,193	<b>0.027</b>	0.42
Other diseases	30	7,866	5,386	<b>0.003</b>	0.55
More than one disease	18	8,111	5,155	<b>0.012</b>	0.60

All the statistically significant values have been highlighted in bold.

Self-Awareness" indicate a wide range of benefits for mental health and health behaviors of patients with chronic diseases, such as cancer and multiple sclerosis (Darviri et al., 2016; Anagnostouli et al., 2019; Charalampopoulou et al., 2020). Thus, developing and applying an internet-based intervention using this content could lead to improvements in mental health and health behaviors of patients with chronic disease during a future COVID-19 quarantine or generally in future pandemics.

A few limitations for this study have to be reported. At first, internet data collection is prone to selection bias, since potential participants with no or low access to the internet have a smaller chance to be included (Bethlehem, 2010). Even though carrying out an internet-based data collection process was unavoidable due to the lockdown, this leads to a selection bias that cannot be ignored. The young age of the study participants and the high proportion of those with no children reflect this type of bias. In addition, there could be a sample size bias, since not using a relevant formula to determine the optimal sample size indicates that the results of a study are prone to this type of

error (Campbell and Machin, 1999). Finally, it is unclear if the differences recorded between patients and healthy individuals are similar to those under normal circumstances, since patients with chronic diseases, especially those with advanced illness, have a generally higher risk of psychopathology compared with healthy individuals (Turner and Kelly, 2000; Tremblay and Breitbart, 2001; Gerontoukou et al., 2015; Rabiee et al., 2016).

Relevant studies have to be carried out in other countries to understand if the differences reported at the present study account only for Greece or are general. More specifically, Greece is considered as a successful case in COVID-19 outbreak management (Tsiotas and Magafas, 2020). Hence, studies in other countries more significantly affected by the outbreak (e.g. Italy, Spain, and France) could allow us to understand if the effects are similar across different countries or are influenced by the degree that each country was affected by the pandemic.

## Conclusions

This study investigated the effect of massive quarantine during COVID-19 in Greece on distress, anxiety, depression, and somatization of patients with chronic diseases. Distress and somatization were increased in chronic disease patients, while anxiety and depression were not. Endocrine and cardiovascular disease patients were not significantly affected, since they did not differ from healthy individuals in any of the 4DSQ subscales. Patients affected by respiratory diseases had additional supportive care needs, since they scored significantly higher from healthy individuals in more than one parameter (somatization and distress). Autoimmune patients, those affected by more than one disease and patients with other diseases differed from healthy individuals only in somatization. Since this study indicates that chronic disease patients have additional supportive care needs, developing and delivering relevant interventional programs during pandemics is essential.

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**Conflict of interest.** The authors hereby state that they have no potential conflicts of interest to declare.

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