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Original Article

Knowledge, Attitudes, and Perceptions of the Greek Population Regarding the COVID-19 Pandemic during the National Lockdown (March 23–May 03, 2020): A Web-Based Cross-Sectional Study

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ABSTRACT

Introduction: The study assessed the knowledge, attitudes, and perceptions toward the COVID-19 pandemic during the total lockdown of spring 2020 in Greece.
Methods: A web-based cross-sectional study was conducted from April 13 to May 5, 2020 using snowball sampling method. Adult residents of Greece anonymously completed an online survey that was distributed through email and social media. Demographic questions, questions regarding the knowledge about the disease etiology, diagnosis and prevention, and questions related to the respondents' attitude and perception toward the restriction measures and the confidence in different kinds of institutions were included in the survey items. The appropriate statistical analyses were conducted according to the type of variable and the research question.
Results: A total of 1396 fully complete questionnaires were collected. A moderate-high knowledge about COVID-19 was found in the study population (median 74.8%). The highest knowledge scores were found in females (74.8%, $p = 0.015$), individuals over 60 years old (77.3%, $p < 0.001$) and individuals having completed post-secondary or tertiary education (76.5%, $p < 0.001$). Five attitude patterns toward the pandemic were identified: "trust in institutions", "trust in the restriction measures", "trust in media and the internet", "trust in traditional institutions", and "measures deniers". Age, education, and knowledge score were the factors defining the attitudinal patterns revealed.
Conclusion: Education and public awareness seem to be the factors defining the successful management of the pandemic's first wave in Greece. Repeated observations of attitudinal patterns are important for eliminating irresponsible behaviors in periods of health crises.

Introduction

Coronavirus disease 2019 (COVID-19) has been declared as a global public health emergency by the World Health Organization (WHO) on January 30, 2020[1] and as a pandemic a few weeks later.[2] The lack of antiviral treatment or vaccine during the first months of the novel

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health crisis highlighted the significance of applying the appropriate prevention measures to control human-to-human viral transmission.[3] The first confirmed COVID-19 case in Greece was reported on February 26, 2020. On the same day, the public information campaign about the disease by the Greek General Secretariat for Civil Protection, titled "We do not fear, Knowledge is our shield," was launched. The subsequent increase in the number of confirmed cases and deaths led to a progressive suspension of the operation of educational institutions (March 10), theaters and restaurants (March 13) and religious ceremonies (March 16). Finally, the Greek Government implemented a total lockdown on March 22, 2020. During the lockdown period, the Greek Health Authorities were daily informing the public about the disease progression. During the same period, a new campaign titled "We stay at home, we stay safe" was launched.[4] The lifting of the lockdown restrictions occurred gradually, being initiated on May 4, 2020. Greece has been described as an example of handling the first wave of the health crisis, showing the significance of acting quickly and informing people about the severity of the threat.[5]

The pandemic has globally caused the loss of numerous human lives, job losses, and deterioration of healthcare services and national economies.[6] In such periods of crisis, maintaining social integrity and functions depends on the level of public knowledge, the type of attitude and behavior toward the applied policies and measures and the confidence in authorities and institutions. Surveying knowledge, attitudes and perceptions allows information on what is known, believed, and done by the members of a population, to be collected. The analysis of such data can reveal the factors underlying possible trends and defining the major patterns of individual and social responses against the pandemic.

The present study aimed to assess the knowledge, attitudes, and perceptions of the adult Greek population toward the COVID-19 pandemic during the total lockdown period (March 22 – May 03, 2020), to shed light on the parameters having shaped the success of the "Greek example". Additionally, we investigated whether the observed trends are organized into patterns within the study population, as well as the major factors defining these patterns.

Materials and Methods

Study design and sample size

A cross-sectional, web-based questionnaire study was conducted from April 13 to May 5, 2020. The design and reporting of the study adhered to the STROBE guidelines for cross-sectional studies in epidemiology.[7] Snowball sampling was selected because of the difficulty in accessing subjects during the total lockdown, due to the imposed precautionary measures against COVID-19. Greek adults living in Greece during the period the study was conducted, were the target population. The sample size was calculated using the Raosoft sample size calculator.[8] Given the size of the Greek population[9] and for a response distribution of 50% the minimum recommended sample size was 664 (99% confidence level, 5% margin of error).

Survey Development and Distribution

The survey instrument was in Greek and consisted of 49-items divided into three sections: demographics, COVID-19 related knowledge and self-reported attitude and

perception. The instrument was developed using a W.H.O. course material on COVID-19 methods for detection, prevention, response, and control.[10] Before the questionnaire was administered, an internal consistency test was conducted in a pilot study among 45 randomly chosen participants and Cronbach's alpha values for the Knowledge and Attitude - Perception sections were calculated. The time required to answer the survey was also assessed. The results of the pilot study were excluded from the final analysis. For assessing clarity and readability, the questionnaire was reviewed by 2 faculty members. Their suggestions for refinements were adopted in the final version of the instrument.

The survey was administered using Google Forms. Researchers' email and social networks contacts, as well as participants of online and open fora and groups were sent the link for the questionnaire. The responses were automatically entered into a Google database. Before data entry, participants were informed about the average length of time of the survey, the type of data stored, the database and the duration of their storage, the identity of the researchers and the purpose of the study.

Content of the Survey Instrument

The 49-item questionnaire consisted of closed-ended questions and it comprised three sections. The first section assessed the demographic characteristics of the participants. The second section included 23 items and assessed the respondents COVID-19 related knowledge regarding the disease etiology, diagnosis, transmission, symptoms, prevention, and treatment. A scoring system was used for the questions of this section. Correct answers were scored 1 point and incorrect or "I do not know" answers were scored 0 points. The overall knowledge scores were calculated from the total sum of correct responses and they were converted into percentiles. The third section of the questionnaire assessed the attitudes and perceptions of the respondents toward the pandemic. The items of this section were organized into two parts. The first part (12 items) was asking for the degree of agreement to statements regarding the significance, efficiency and impact of the restriction measures, and practices related to the prevention against COVID-19. The second part (10 items) assessed the confidence of the participants in political, scientific, social, and religious institutions as information providers. All the responses of the third part were recorded on a 1 to 5-point Likert scale ("very low", "very high"). It is clarified that, throughout the text, trust and confidence are used as synonymous terms.

Data Analysis

The data obtained were coded, validated, and analyzed using Microsoft Excel 2019 and Jamovi version 1.6.8.[11] In the analysis only completed questionnaires were used. Descriptive analysis was applied for calculating the frequencies and proportions for the categorical variables and the central tendency (mean, median) and dispersion (standard deviation, interquartile range – IQR) for the numerical variables, as appropriate.

The Kolmogorov-Smirnov normality test was applied for assessing the normality of the distribution of continuous variables; comparisons between demographic groups regarding the knowledge, attitude and perception of the respondents were made

using parametric or non-parametric analysis of variance (ANOVA), as appropriate. In all comparisons, a p value of less than .05 was considered statistically significant. Multiple linear regression was used to identify the main demographic variables (predictors) associated with the COVID-19 related knowledge scores. The final model included only the predictors that were statistically significant ($p < 0.05$).

Principal component analysis (PCA),[12] was performed for all attitude/perception items of the questionnaire. The Keiser – Meyer – Olkin (KMO)[13] measure of sampling adequacy and Bartlett's sphericity test were applied prior to the PCA to show whether associations between the original variables exist. Naming of the factors and the respective patterns of attitude/perception regarding COVID-19 was based on the factor loadings, considering the highest loadings. After the PCA, associations between attitude/perception patterns and knowledge scores were assessed through linear regression modeling, using the attitude and perception items per principal component as the predictors.

Ethical Considerations

Participants' information remained anonymous and confidentiality of personal information was protected throughout the study. The participation was voluntary, and the respondents were asked to provide honest answers. An informed consent was included on the initial page of the survey. The study was conducted in accordance with the ethical standards of the Declaration of Helsinki as revised in 2013 and had the Approval of the Bioethics Committee of the Medical School of Aristotle University (IRB No 202 / 22 – 06 – 2020).

Results

Instrument validity and completeness rate

The internal consistency of the survey was confirmed using the results of the pilot study. Cronbach's alpha values for the knowledge and attitude - perception sections were 0.76 and 0.71, respectively. The overall Cronbach's alpha value was 0.72. A total of 1537 individuals responded to the questionnaire and 1396 of them were completed without blanks, yielding a completeness rate of 90.82%.

Study population characteristics and knowledge scores

Participant characteristics regarding gender, age and education are shown in Table 1. Of the total number of participants, 64.6% were female, and most were in the 21 - 29 age class (31.1%). Almost half of the participants (48.5%) had a post-secondary diploma or a university degree. All prefectures were represented in the study population and the distribution of the participants in them was similar to the distribution of the general population (data not shown).

The results of the Kolmogorov - Smirnov normality test indicated that the knowledge scores in the study population were not normally distributed ($p < 0.01$). The median of the knowledge scores was 74.8%. Statistically significant differences in the knowledge scores were identified between genders, ages and education levels (Table 1). The highest median knowledge scores were found in females (74.8%, $p = 0.015$), individuals over 60 years old (77.3%, $p < 0.001$) and individuals having completed post-secondary or tertiary education (76.5%, $p < 0.001$). The overall effect size indicated weak - moderate associations between

the variables, the strongest being the one between the educational level and knowledge score ($\varepsilon^2 = 0.078$).

Multivariate linear regression was used to further investigate the combined effect of the demographic variables on the knowledge score. Collinearity checks (VIF and tolerance) confirmed the lack of interaction between the independent variables (age, gender, education level and prefecture). The prefecture was the only non-significant factor ($p > 0.05$) (Supplemental Material – Tables S1-S2), thus it was excluded from the final model (Table 2).

Table 1. Size and knowledge scores of the demographic groups of the study population. Comparisons within study subgroups with the Kruskal Wallis (age, educational level) or the Mann Whitney U (gender) nonparametric tests (N=1396).

Variable	Level	Size of subgroups		Knowledge Score (0-100)		P	ε^2
		n	%	Median	IQR		
Gender	Male	494	35.4	73.9	68.1, 78.2	0.004**	0.079
	Female	902	64.6	74.8	69.7, 79.0		
Age (years)	18 - 20	175	12.5	71.4	67.2, 75.6	<0.001***	0.045
	21 - 29	435	31.1	73.9	68.2, 77.3		
	30 - 39	235	16.8	74.8	69.7, 79.0		
	40 - 49	266	19.1	75.6	71.4, 79.8		
	50 - 59	191	13.7	75.6	71.4, 79.0		
	60 and over	94	6.7	77.3	70.8, 79.0		
Education Level (highest completed)	Primary, and secondary	719	51.5	73.8	68.1, 77.3	<0.001***	0.078
	Post - secondary and tertiary	677	48.5	76.5	73.1, 79.0		

*Significant at $p < 0.05$;
**significant at $p < 0.01$;
***significant at $p < 0.001$;
ε^2, Effect size

Table 2. Final demographic model for the knowledge score after the multivariate analysis. Only the predictors that were statistically significant ($p<0.005$) have been included.

Coefficient	Estimate	SE	P
Intercept	72.27	6.93	<0.001***
Female	1.76	0.39	<0.001***
21-29 y.o.	0.82	0.74	0.271
30-39 y.o.	2.43	0.85	0.005**
40-49 y.o.	3.74	0.83	<0.001***
50-59 y.o.	3.86	0.86	<0.001***
60 y.o. and over	3.88	1.02	<0.001***
Tertiary education	3.33	0.58	<0.01**

Reference group: male, 18-20 y.o., having completed the primary or secondary education.
*Significant at $p < 0.05$;
**Significant at $p < 0.01$;
***Significant at $p < 0.001$

Table 3. Respondents agreement with statements regarding attitudes and perceptions toward the COVID-19 pandemic. Comparisons within study subgroups with the Kruskal Wallis (age, educational level) or the Mann Whitney U (gender) nonparametric tests (N=1396).

Statements	Overall degree of agreement and significance of sub-groups differences						
	Overall Agreement (M±SD)	Gender differences		Age differences		Educational level differences	
		p	ε^2	p	ε^2	p	ε^2
Confirmed COVID-19 cases that violate the restriction measures should pay at least partially for their treatment	2.77±1.55	0.003**	0.092	0.062	0.009	0.954	0.006
Violating the restriction measures is unethical	3.42±1.60	0.223	0.038	0.055	0.009	0.187	0.016
The economic impacts of the lockdown will be tremendous	3.46±1.43	0.329	0.030	0.023*	0.010	0.037*	0.020
The Public Healthcare System can cope with the COVID-19 outbreak	2.74±1.26	0.293	0.032	0.001**	0.016	0.420	0.012
Restriction measures had to be adopted regardless the economic impact	3.45±1.62	0.131	0.047	0.001**	0.016	0.141	0.017
Restriction measures violate human rights	2.28±1.34	0.414	0.025	0.439	0.004	0.523	0.011
Restriction measures will eliminate the viral spread	3.82±1.59	0.709	0.019	0.017*	0.011	0.002**	0.028
There should be no restrictions for religious operations	1.62±1.17	0.791	0.007	0.035*	0.010	0.449	0.012
Individual responsibility is more significant than state responsibility, toward coping with COVID-19	3.35±1.71	0.495	0.021	0.162	0.007	0.783	0.009
Herd immunity is an effective protection method	2.08±1.15	0.463	0.022	0.004**	0.013	0.214	0.015
I get regularly vaccinated	2.72±1.44	0.001*	0.096	<0.001***	0.023	<0.001***	0.044
I have adopted all the precaution measures against COVID-19	4.18±0.85	0.002*	0.081	<0.001***	0.058	0.030*	0.021

Agreement Likert scale: 1 (totally disagree) – 5 (totally agree); p: values from Kruskal Wallis or Mann-Whitney U test;
*Significant at $p < 0.05$;
**Significant at $p < 0.01$;
***Significant at $p < 0.001$;
ε^2, Effect size;
M, Mean;
SD, Standard deviation

Attitudes and perceptions

Attitudes and perceptions of the study population toward COVID-19 pandemic were recorded as the degree of agreement to a set of statements (Table 3) and the level of confidence in different institutions (Table 4). The highest mean agreement scores were recorded for adopting the precautionary measures against COVID-19 (4.18 ± 0.85) and the perception that the viral spread will be eliminated due to the restriction measures (3.82 ± 1.59). Medical

Table 4. Respondents confidence in institutions during the COVID-19 pandemic. Comparisons within study subgroups with the Kruskal Wallis (age, educational level) or the Mann Whitney U (gender) nonparametric tests (N=1396).

Institutions	Overall confidence levels and significance of sub-groups differences						
	Confidence Level (M ± SD)	Gender differences		Age differences		Educational level differences	
		p	ε^2	p	ε^2	p	ε^2
World Health Organization	3.85 ± 1.12	0.454	0.023	<0.001***	0.032	<0.001***	0.048
Greek government	3.14 ± 1.24	0.246	0.036	0.003*	0.014	0.201	0.015
Greek political parties	1.90 ± 1.02	0.145	0.044	0.053	0.009	0.036*	0.021
Hellenic National Public Health Organization	3.92 ± 1.07	0.842	0.006	0.605	0.003	0.007**	0.025
Panhellenic Medical Association	3.66 ± 1.22	0.558	0.018	0.018*	0.011	0.239	0.015
Church	1.52 ± 1.02	0.616	0.013	0.009**	0.012	0.357	0.013
Media	2.09 ± 1.09	0.748	0.009	<0.001***	0.020	0.337	0.013
Social Networks	1.89 ± 1.03	0.517	0.019	0.089	0.008	0.647	0.010
Independent Scientists	2.76 ± 1.22	0.791	0.008	0.195	0.006	0.006**	0.025
Internet sources	2.32 ± 1.16	0.002*	0.016	0.856	0.002	0.017*	0.022

Confidence Likert scale: 1 (no/very low confidence) – 5 (very high confidence); p: values from Kruskal Wallis or Mann-Whitney U test;
*Significant at $p < 0.05$,
**Significant at $p < 0.01$,
***Significant at $p < 0.001$;
ε^2, Effect size; M: mean;
SD, Standard deviation;

and scientific institutions seemed to have gained the trust of the public (level of confidence range: 3.66 - 3.92), while this was not true for political and religious institutions and social networks (level of confidence range: 1.52 - 1.90). Statistically significant differences in the attitudes and perceptions of the respondents were identified mainly between ages and education levels (Tables 3, 4).

Principal Component Analysis

The KMO score was 0.77 and Bartlett's test of sphericity was statistically significant ($p < 0.001$) supporting the application of factor analysis. The PCA results indicated five components with eigenvalues greater than 1.00, corresponding to a cumulative variance equal to 59.03% (Supplemental Material, Table S3). The variables considered in the PCA and their factor loadings are shown in Table 5. Five principal components corresponding to five attitude and perception patterns regarding COVID-19 were identified in the study population. Based on factor loadings, the components were named as follows: component 1: "trust in institutions"; component 2: "trust in the restriction measures"; component 3: "trust in media and the internet"; component 4: "trust in traditional institutions"; and component 5: "measures deniers". The adjusted R^2 values for the linear regression modeling indicated weak associations between the attitude and perception variables of each principal component and the

Table 5. Principal Component Analysis (PCA) of the attitude and perception survey items. Component loadings are the outcome of varimax rotation. Only loadings > 0.300 are shown.

	Components				
	1	2	3	4	5
Confidence in the Hellenic National Public Health Organization	0.842	-	-	-	-
Confidence in the WHO	0.831	-	-	-	-
Confidence in the Panhellenic Medical Association	0.745	-	-	-	-
Confidence in the Government	0.610	-	-	-	-0.346
Violating the restriction measures is unethical	-	0.709	-	-	-
Restriction measures will eliminate the viral spread	-	0.697	-	-	-
Individual responsibility is more significant than state	-	0.663	-	-	-
Restriction measures had to be adopted regardless the economic impact	-	0.632	-	-	-
Confirmed COVID-19 cases that violate the restriction measures should pay at least partially for their treatment	-	0.543	-	-	-
The economic impacts of the lockdown will be tremendous	-	0.416	-	-	0.378
I have adopted all the precaution measures against COVID-19	-	-	-	-	-
Confidence in social networks	-	-	0.837	-	-
Confidence in internet sources	-	-	0.765	-	-
Confidence in the media	-	-	0.719	-	-
Confidence in specialists	-	-	0.592	-	-
Confidence in Political Parties	0.386	-	0.389	0.306	-
Confidence in Church	-	-	-	0.716	-
There should be no restrictions for religious operations	-	-	-	0.625	0.389
The Public Healthcare System can cope with the COVID-19 outbreak	-	-	-	0.486	-0.343
Restriction measures violate human rights	-	-	-	-	0.706
Herd immunity is an effective protection method	-	-	-	-	0.388
I get regularly vaccinated	-	-	-	-	-0.302

knowledge score. Among them, the variables of principal component 2, named "trust in the restriction measures" fitted a slightly better with the linear model compared to the rest of the components (adjusted $R^2 = 0.0816$, $p < 0.001$). On the contrary, the variables loaded on principal component 3, "trust in media and the internet" had the lowest adjusted R^2 values (0.0240, $p < 0.001$). (Supplemental Material, Table S4).

Discussion

This study assessed the level of knowledge of the Greek population about the COVID-19 etiology, prevention and treatment and their attitudes and perceptions regarding the restriction precaution measures and the trust they showed to scientific, political, and other institutions during the national lockdown period of the spring 2020 (March 23 - May 3). The participants of the study had a moderate high knowledge about the disease etiology, diagnosis, transmission, symptoms, prevention, and treatment (overall median score: 74.8%). Higher educational level is a consistent indicator of higher knowledge scores regarding the pandemic in different studies. In contrast, the correlation between age

and knowledge scores appears differentiated in different populations. For example, survey studies in Egypt,[14] China,[15] and Bangladesh[16] concluded that younger individuals tend to have higher knowledge scores. In these cases, the observed differences were attributed to an existing educational gap between people of different age, socioeconomic status, or place of residence (rural vs urban).

The accurate knowledge about the COVID-19 pandemic originates from the scientific authorities and media that reproduce the relevant information. On the other side, the lack of knowledge can be attributed to lack of interest, lack of access to information, or use of easily accessible but unreliable sources of information. Misinformation has been characterized as the leading cause of confusion that hampers the appropriate attitudes toward the pandemic.[17,18] An example of the latter are the social media which function as open access medical education providers, though in an uncontrolled online environment, thus raising concerns about the actual benefits and risks of people seeking information from these resources. Indeed, in a short time after the emergence of the disease in China, conspiracy theories and rumors regarding the origin of the virus and the efficiency of the prevention measures and treatments were globally spread through digital media accompanied by fearmongering and racist trends.[19]

At the time the study was conducted, the practice of vaccination seemed to be a controversial issue in Greece, as shown by both the overall score in the relevant item and the significant score differences between people of different gender, age and education. An attitude against vaccination by a significant proportion of the Greek population had also been reported during the influenza A (H1N1) pandemic of 2009.[20] Only 22.2% of the general population were then likely to accept vaccination, mainly because of uncertainty about the safety of the vaccine. The same barrier against vaccination has also been reported in other studies of the Greek[21] or other[22,23] populations. The negative attitude toward vaccination against H1N1 in Greece was associated with female gender, ages 30-64 y.o. and perception of low risk of being infected or at risk because of infection. Compared to the above, in this study the anti-vaccination attitude observed during the first months of the pandemic was not correlated with gender, but with younger age and lower education.

The results regarding the trust of the respondents in institutions and authorities showed differences associated with the age and education level. More educated people expressed stronger trust in scientific institutions. Younger people trusted more the W.H.O. compared to older individuals. In contrast, older people showed more confidence in the media (television and radio) and the Church. The latter is reasonable since older people are expected to be closer to the religious culture of the country and familiar with the traditional means of communication. Obviously, these findings reflect the public's perceptions during a crisis period, and they could be different if the pandemic was missing. When confronted with an external threat, people may respond in two different ways; they might either increase their trust in institutions and strengthen ingroup relations,[24] or respond with distrust, forming conspiracy theories about the nature and cause of threatening events.[25, 26] In agreement with the findings of this study for Greece, citizens' trust in Public Authorities during the first period of the COVID-19 health crisis exhibited high levels even in countries with historically low levels of institutional

confidence.[27] However, according to previous examples, people's levels of confidence could change during a period of crisis.[28] For example, during the initial stages of the H1N1 pandemic in Switzerland people showed high levels of confidence in government, but that trust declined as the pandemic progressed.[29]

Finally, Principal Component Analysis was implied to investigate the attitudinal barriers within the study population and potentially explain the trends revealed by the independent attitude, perception, and knowledge scores. Obviously, in the absence of vaccination or other effective medical intervention during the early stages of the pandemic, attitude patterns have been critical in preventing the spread of COVID-19.[30] The two major patterns, "trust in scientific institutions" and "trust in the restriction measures" included variables correlated with a higher education level and exhibited a stronger association with higher knowledge scores. On the contrary, the "trust in traditional institutions" pattern showed an association with older ages and low knowledge scores, while the "measures deniers" was correlated with younger ages and lower education levels. During times of societal crisis, new "opinion-based groups" can emerge with little to no connection to previous social or political structures.[31] These groups are defined by mutual characteristics that cross established social boundaries and are formed around a common set of values.[32] Their emergence is often enhanced as a result of online interaction.[30] Our findings suggest that the continuum of attitudes and perceptions of the Greek population toward the COVID-19 pandemic is separated into areas, between which the barriers are set by the level of education, the age and the obtained knowledge about the disease. Attitudinal patterns indicating a higher level of individual and social responsibility and a positive attitude toward the scientific institutions and the implemented measures were the most common and they tended to be correlated with higher levels of education and knowledge score. On the contrary, negative attitudes were associated with lower education and younger ages.

Conclusion

In conclusion, the participants of this survey study showed a moderate high level of knowledge about COVID-19. Age, education, and knowledge score were the factors defining the attitudinal patterns revealed. We conclude that education, as an overarching, long-term target, and public awareness of scientifically accurate information through multimedia reports, internet messages, campaigns etc. are the means for eliminating irresponsible and dangerous behaviors and for protecting individual and public health, social integrity, and prosperity in periods of health crises. These have probably been the factors defining the success of the Greek example. Repeated observations of behavioral and attitudinal patterns are important in guiding decision-making and developing appropriate public health campaigns.

Limitations

Training material about COVID-19 pandemic was used for constructing the survey instrument, that was further validated through a pilot study. However, this was a cross-sectional study, conducted online once, at a particular time, during a global health crisis, and with the use of a convenience sample. Thus, generalizations were limited, and causality between variables

could not be investigated.

Authors' Contribution

Andreas Anestis supervised the project, reviewed the literature, made the data analysis, and wrote the manuscript.
Odysseas Lomvardeas conceived the presented idea, constructed, and administered the surveys and participated in data analysis and review of literature.
Nikolaos Papadakis gathered and analyzed the data and contributed to drafting the manuscript.

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