A pilot study of the depression, anxiety and stress in Greek military personnel during the first year of the COVID-19 pandemic

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ABSTRACT

Introduction The ongoing SARS-CoV-2 pandemic is a global health crisis which poses many psychological research challenges. The objective of this study was to evaluate the responsiveness and validity of depression, anxiety and stress in a representative cohort of Hellenic military personnel using the short version of the Greek military version of the Depression–Anxiety–Stress Scales-21 (DASS-21) questionnaire.

Methods A total of 158 participants were voluntarily surveyed using an electronically developed structured questionnaire. The anonymous e-questionnaire included a social demographic section and the DASS-21 scale section. It was distributed in September 2020 to the military personnel of the Hellenic Tactical Air Force Units using an intranet network during government restrictive measures due to the COVID-19 crisis.

Results Our DASS-21 survey indicated a positive outcome at the psychometric level of our military sample population. Age, sex and systemic medications were statistically correlated with anxiety. Inter-correlations between the DASS-21 statements showed that individuals with low-level depression also experienced some degree of stress. Factor analysis indicated the reliability and validity of the questionnaire.

Conclusions The low levels of depression and stress among our military sample population demonstrate the importance of periodic monitoring of the psychometric items of the DASS-21 subscales to design and implement psychological prevention strategies, especially during the ongoing and future healthcare crises.

Key messages

- Identifying aspects of emotional disturbance (depression, anxiety, stress) among military personnel during a healthcare crisis is challenging.
- Prior civilian studies have indicated the impact and usefulness of the DASS-21 scores on non-clinical populations.
- This study is the first attempt to find correlations between demographic variables of an operational military population and the DASS-21 components during the first year of the COVID-19 outbreak in Greece and Europe.

INTRODUCTION

The COVID-19 healthcare crisis has fundamentally disrupted all daily human activities although, historically, human society knows about the consequences of previous pandemics. The generic government COVID-19 measures have restricted social life mobility, and the lockdown experiences could affect each person differently. The potential mutation of the virus and the ever-changing long-term protection measures introduced by the government could endanger people's physical and mental health, leading to several effects.[1] Moreover, the unknown short- and long-term side effects of the COVID-19 vaccines should be given serious consideration, as well as its influence on people's attitudes according to the daily news worldwide.[2] Previous and current research has indicated the psychological impacts of epidemics.[3–5] From a different psychological perspective, the influence of a severe global healthcare situation could be imprinted in a commonly accepted pattern measuring the depression, anxiety and stress status among different groups.[6] In this context, the primary version of the Depression–Anxiety–Stress Scales-21 (DASS-21) is an accepted screening questionnaire which numerically estimates three comorbid conditions (depression, anxiety and stress) in healthy individuals.[7] The validity and reliability of the DASS-21 questionnaire have been validated, and it has been verified in many previous studies.[8 9] The literature indicates that measuring the depression, anxiety and stress of non-clinical adult populations with the DASS-21 is a reliable and valid method.[10]

Mental health in the military workforce

Five related studies have reported on the use of DASS-21 in military training programmes[11–15] and one study has compared the construct validity of the DASS-21 with other psychometric self-report tools.[16] None of these studies were conducted in Europe or included European cohorts. Furthermore, the addition of the term 'COVID-19' to our query produced no results, enhancing the objective of our study.

No evidence exists that the short version of the DASS scale can be used as a valuable psychometric tool for the investigation of the depression, anxiety and stress levels of the military workforce, especially operational cohorts. Several studies of mental health and the COVID-19 crisis during the first year of the pandemic suggest that interventions to increase and maintain the psychological well-being of military personnel need to be applied and updated.[17 18]

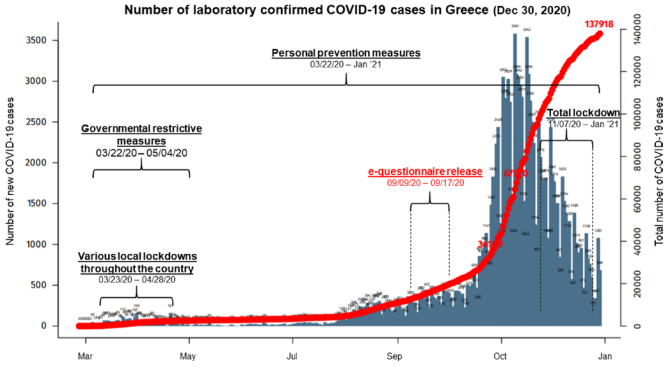

Figure 1 Graph showing the Hellenic epidemic trend during the first year of the COVID-19 crisis, the government measures and the release of our questionnaire.

Military personnel comprise a significant part of almost all nations worldwide. One of the primary goals of each National Defence General Staff is to ensure the well-being of the military personnel to boost the readiness of the force, to succeed in daily military operations and to maintain each country's national defence. For the Hellenic Air Force, this is the norm. The DASS-21 has not previously been studied in Greek military personnel, especially during a global healthcare crisis. Thus, the objectives of our study were to validate the potential outcome of the DASS-21 in a Greek military operational cohort during the SARS-CoV-2 outbreak and to explore the psychological predictors of change during a long-term healthcare crisis. We also introduce a digital method of surveying military personnel. Figure 1 shows the progress of the COVID-19 crisis in the Hellenic community, the restrictive Hellenic government measures taken to control the crisis and the period during which the survey questionnaire was conducted.

The study aims to investigate whether the DASS-21 questionnaire is applicable and reliable as a psychometric tool to any higher level military healthcare manager such as the Ministry of Defence, with the objective of enhancing military mental health well-being processes during the ongoing pandemic.

METHODS

We implemented our research in the Hellenic Tactical Air Force Internal Units under the approval of the Healthcare Corps Administration of the Hellenic Air Force General Staff. Our study was based on the following: (a) all the military personnel were well informed about the healthcare crisis and the COVID-19 symptoms; (b) our investigation was conducted during the quarantine period, which resulted in a reduction in staff due to personal protection measures against the spread of the virus. Previous DASS-21-related studies on the psychological impacts of COVID-19, including other epidemic outbreaks, were also carefully reviewed.

Data collection procedure

A web-based structured questionnaire was conducted using a software survey tool. It was divided into two sections, the social demographic section and the DASS-21 questions. The generated web-based anonymous questionnaire was distributed twice via the intranet network of our military services, informing the personnel about the research objectives and requesting completion of the questionnaire within 2 weeks. Web-based configurations were included to prevent multiple attempts by the same individual to participate in the survey and exclude each participant from ongoing responses or other potential sample-specific biases. The electronic questionnaire (e-questionnaire) was released on 9 September 2020, and was completed by participants via the intranet.

The social demographic section of the questionnaire included questions on age, sex, marital status, number of offspring and height and weight to calculate the participant's body mass index (BMI). This section included additional questions about the participant's medical history and medication, questions associated with potential COVID-19 hospitalisation and web surfing time and questions on recording alcohol consumption. The second part of the electronic survey used the questions of the standard DASS-21 questionnaire, which includes 21 questions for the three subscales (seven questions each for the depression subscale, the anxiety subscale and the stress subscale).

Participants

The survey was conducted during periods when quarantine measures were in place. Voluntary (non-probability) response sampling was used and anonymisation configurations and General Data Protection Regulation were also considered.[19] The only inclusion criteria for participating in the survey were having a healthy medical file derived from the regular scheduled healthcare and the desire to participate.

Statistical analysis

Data collected were first screened for missing values and accurate responsiveness, and were analysed using the IBM SPSS v.23 statistical tools. Descriptive analytics were calculated for all variables to assess the percentages and levels of depression, anxiety and stress among the responders. Abnormal distribution of data (skewness >2.0, kurtosis >7.0) was observed for marital status and the DASS-21 items. Therefore, non-parametric tests were used for all the variables with abnormal distribution in which the normality assumption is not required. Cronbach's alpha values validated the internal consistency reliability; values >0.6 were considered acceptable. Linear regressions were used to calculate the univariate associations between social demographic responses and the subscales of the DASS-21. In addition, we conducted factor analysis, principal component analysis (PCA) and the reliability process in order to examine further correlations in our data. As there were no missing values, the factor analysis parameters were set as follows: (a) Eigenvalues were set at 1.00; (b) Varimax was chosen for the rotation method; (c) maximum iterations for convergence were set at 0.30.

RESULTS

Table 1 shows the descriptive statistics of our e-questionnaire sample population. A total of 158 independent participants, regardless of military rank and specialty, responded to our survey, of which 35 (22.2%) were female. All the participants were aged between 18 and 52 years, with the majority (93/158, 58.9%) aged between 41 and 50 years. 86.7% of them were married and most (70.3%) had at least one offspring. With regard to BMI, and considering the government lockdown restriction measures, only 39.9% were in the BMI normal range. A relatively small percentage of participants (28/158, 17.7%) received systemic medication for pathophysiological disorders (ie, hypertension, diabetes mellitus, cardiac issues, allergies), while only one reported receiving systemic anxiolytic treatment. Also, one participant (0.6%) had been affected by COVID-19 but had recovered. With regard to the DASS-21 subscales, our results indicated mild abnormal levels of depression and stress in

Table 1 Descriptive statistics of the demographic characteristics and the DASS-21 levels of the participants

Demographic variable	N (%)
Age (years)	
18–30	5 (3.2)
31–40	39 (24.7)
41–50	93 (58.9)
>51	21 (13.3)
Mean (SD)	43.23 (6.52)
Sex	
Male	123 (77.8)
Female	35 (22.2)
Marital status	
Married	137 (86.7)
Single	16 (10.1)
Divorced/widowed	5 (3.2)
No of offspring	
0	47 (29.7)
1	30 (19.0)
2	57 (36.1)
3	15 (9.5)
4	7 (4.4)
≥5	2 (1.3)
Body mass index (kg/m^2)	
18.50–24.99	63 (39.9)
25.00–29.99	80 (50.6)
30.00–39.00	15 (9.5)
Mean (SD)	25.88 (3.19)
Medications/systemic treatments	
None	129 (81.6)
Pathophysiological systemic treatments	28 (17.7)
Psychiatric systemic treatment	1 (0.6)
Have been a COVID-19 case	
No	157 (99.4)
Yes	1 (0.6)

Descriptive statistics of DASS-21 levels			
Levels	**Depression, N (%)**	**Anxiety, N (%)**	**Stress, N (%)**
Normal	156 (98.7)	158 (100)	157 (99.4)
Mild	2 (1.3)	–	1 (0.6)
Moderate/ severe/ extremely severe	–	–	–

DASS-21, Depression–Anxiety–Stress Scales-21.

only 1.3% and 0.6% of the respondents, respectively, during the first months of the COVID-19 pandemic. No abnormal levels of stress were observed in the sample population. Non-parametric tests (Mann–Whitney U test and Kruskal–Wallis U test) showed that depression was significantly correlated with systemic medication (p=0.03, Table 2), anxiety was significantly correlated with age (p=0.046), sex (p=0.01) and marginally with the systemic medication variable (p=0.05) and stress was correlated with sex (p=0.037).

Cronbach's alpha values were computed for each of the seven-item subscales. A marginally acceptable value was observed only for the anxiety factor (0.656>0.6). Cronbach's alpha values for the total 21 questionnaire items (0.915>0.5) indicated a high internal consistency and reliability level between items of our questionnaire (Table 3A). Moreover, previous research has

Table 2 Non-parametric tests between DASS-21 subscales and demographic variables

	Depression score		Anxiety score		Stress score	
Variables	**KWU*† **	**P value**	**KWU*†**	**P value**	**KWU*† (95% CI)**	**P value**
Age	3.706	0.295	7.983	0.046	2.417	0.49
Sex	2.624	0.105	11.574	0.01	4.369	0.037
Marital status	0.295	0.863	1.917	0.384	0.468	0.791
No of offspring	0.739	0.117	3.250	0.475	6.827	0.145
BMI	2.852	0.24	3.890	0.143	3.487	0.175
Medication	0.909	0.03	10.535	0.05	1.064	0.587
Have been a COVID-19 case	0.600	0.439	3.341	0.068	0.155	0.694

*Kruskal–Wallis U test (95% CI).
†KWU χ^2 test.
BMI, body mass index; DASS-21, Depression–Anxiety–Stress Scales-21; KWU, Kruskal–Wallis U test.

indicated that the 21-item version of the DASS-21 questionnaire is essentially correlated.[7 20–23] The Kaiser–Meyer–Olkin test for sampling adequacy (0.838>0.5) and the Bartlett's test of sphericity (p<0.05) indicated that the proportion of variance in our study variables is highly likely to be caused by underlying factors (Table 3B). As a result, factional analysis for structural detection was conducted to examine the underlying (or latent) relationships between the variables. The inter-correlation among the three factors of our DASS-21 items indicated that the depression and stress domain scores were highly correlated (r=0.754) (Table 3C).

The PCA and scree plot indicated that a six-component structure interprets the total variability of the initial questions at a cumulative rate of 71.809% (Figure 2). Table 4 shows Pearson correlations (factor loadings) between our DASS-21 items and the components, clarifying the level of loading of each question on each of the six-component structures. PCA and loadings of 0.40 or greater composed the key output to determine what the components represent. Thus, component 1 represents

Table 3 (A) Reliability statistics (Cronbach's alpha), (B) KMO and Bartlett test of sphericity, and (C) intercorrelation matrix of the 21 items of DASS-21

(A) Cronbach's alpha value of the survey		
Subscale (factor)	**No of Items**	**Cronbach's alpha**
Depression	3, 5, 10, 13, 16, 17, 21 (DQ1–DQ7)	0.830
Anxiety	2,4,7,9,15,19,20 (AQ1–AQ7)	0.656
Stress	1,6,8,11,12,14,18 (SQ1–SQ7)	0.876
Overall	1–21	0.915

(B) KMO and Bartlett's test		
KMO measure of sampling adequacy		0.838
Bartlett's test of sphericity	Approximate χ^2	1914.511
	Degrees of freedom	210
	Significance	0.000

(C) Inter-item correlation matrix			
	DASS-D score	**DASS-A score**	**DASS-S score**
Depression	1000		
Anxiety	0.596*	1000	
Stress	0.754*	0.668*	1000

*Correlation is significant at the 0.01 level (2-tailed)
DASS-21, Depression–Anxiety–Stress Scales-21; KMO, Kaiser-Meyer-Olkin.

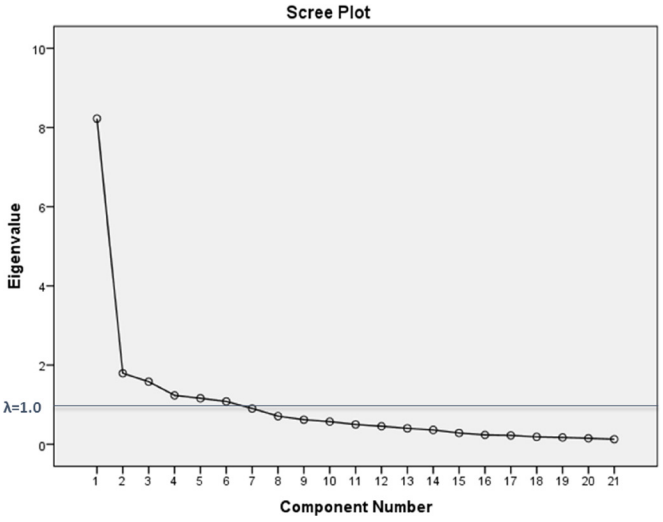

Figure 2 Scree plot derived from the principal component analysis (PCA).

the stress factor, components 2 and 3 represent the depression factor, and components 4–6 represent the anxiety factor. Most DASS-21 items loaded on the expected factors as identified in previous research.[21 24] Only four items were loaded on different factors (SQ6 on DASS-D, DQ2 on DASS-A, and AQ4 and AQ5 on DASS-S).

Furthermore, it was observed that statements such as 'I felt I wasn't worth much as a person' and 'I was unable to become enthusiastic about anything' were highly loaded on the depression subscale. Similarly, trembling hands and unjustified feeling scared were highly loaded on the anxiety subscale, while items of 'over-reaction to situations' and 'close to panic' were highly loaded on the stress subscale.

DISCUSSION

To date, only limited Greek studies have been able to validate the Greek version of the DASS-21 questionnaire in comparison with other psychometric tools.[25] Taking as a broad variable the prolonged healthcare crisis, this study proves that the Greek military DASS-21 version is a valid and reliable psychometric scale, becoming a systematic tool for military mental healthcare. In addition, and as Table 2 shows, it is evident that the possibility to become a COVID-19 positive case could be correlated with anxiety (p=0.068). A re-test of our survey during the second year of the ongoing healthcare crisis could further clarify this correlation.

To the best of our knowledge, this paper is the first attempt to describe factor analysis and reliability of the short version of the DASS questionnaire among operational military personnel in Europe during the COVID-19 era. Our findings could contribute to the psychological support strategies and the military version of DASS-21 could become a periodic psychometric tool for the operational military workforce in times of crises.[18 25] Moreover, the statistical methodology of the present study verifies previous procedures in factor analysis of the DASS-21 questionnaire.[21 24] Furthermore, based on the philosophy of prior psychometric research, this study could function as an initial trigger to evaluate the dimensionality and the invariance of the DASS-21 scale across international operational military personnel during the fight against COVID-19.[26]

One limitation of our study is the lack of generalisability beyond military personnel. It is possible that the military profession and what it entails could be an important bias towards positive psychometric measurements in the study population. For instance, there have been no abnormal levels of stress observed in our sample, which is probably related to the sense of responsibility, the type of profession and the daily preventive psychiatric support of the HQ staff. Moreover, the relatively small sample

Table 4 Results of PCA using Varimax with Kaiser normalisation methodology (rotated component matrix)

		Rotated factor loadings		
Abrr	**DASS-21 items**	**Depression**	**Anxiety**	**Stress**
DQ6	I felt I wasn't worth much as a person	0.885	–0.59	0.030
DQ5	I was unable to become enthusiastic about anything	0.834	0.149	0.132
DQ7	I felt that life was meaningless	0.748	0.256	–0.027
DQ1	I couldn't seem to experience any positive feeling at all	0.713	0.181	0.463
DQ3	I felt that I had nothing to look forward to	0.699	0.193	0.453
DQ4	I felt down-hearted and blue	0.592	0.232	0.318
SQ6	I was intolerant of anything that kept me from getting on with what I was doing	0.555	0.447	0.465
AQ3	I experienced trembling (eg, in the hands)	0.034	0.895	0.019
AQ7	I felt scared without any good reason	0.231	0.869	0.056
AQ1	I was aware of dryness of my mouth	0.306	0.745	0.141
AQ2	I experienced breathing difficulty	–0.141	0.676	0.040
AQ6	I was aware of the action of my heart in the absence of physical exertion	0.231	0.571	0.343
DQ2	I found it difficult to work up the initiative to do things	0.456	0.494	0.269
SQ2	I tended to over-react to situations	0.282	0.094	0.769
AQ5	I felt I was close to panic	–0.130	0.231	0.732
SQ7	I felt that I was rather touchy	0.369	0.165	0.721
AQ4	I was worried about situations in which I might panic and make a fool of myself	0.345	0.351	0.649
SQ3	I felt that I was using a lot of nervous energy	0.402	0.233	0.621
SQ5	I found it difficult to relax	0.352	0.345	0.604
SQ1	I found it hard to wind down	0.235	0.333	0.578
SQ4	I found myself getting agitated	0.386	0.411	0.446

PCA, principal component analysis.

size of 158 military personnel might not provide a convenient and generic picture of the Hellenic Armed Forces. At the time this paper was submitted Greece was still in an unprecedented prolonged lockdown due to the COVID-19 pandemic. Therefore, revalidation of our study will be needed to verify or extend our preliminary findings, particularly the levels of mental health of a larger sample and the correlations between the demographic variables and the DASS-21 factors.

CONCLUSION

The present study shows low levels of depression and stress among our military personnel. Age, sex and systemic medication were found to be significantly correlated with experiencing anxiety. The inter-correlations between the DASS-21 items showed that depressed individuals may also experience some degree of stress.

This study has highlighted the significance of a periodic survey of the DASS-21 psychometric tools among our military personnel to design and implement potential psychological preventive measures. Our survey provides adequate psychometric responsiveness and assessment in relation to similar previous research based on non-clinical participants.

Contributors ASK, DK and PK conceived the idea and developed the theory. ASK and DK designed the framework. ASK developed the e-questionnaire, gathered and processed the appropriate data. DK supervised the implementation stage. GL verified the statistics results. ASK and GL wrote the manuscript. All authors discussed the results. ASK and DK co-directed the project.

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Competing interests None declared.

Patient consent for publication Not required.

Ethics approval The Board of Research Ethics of the Healthcare Corps Administration of the Hellenic Air Force General Staff approved the study. The authors confirm that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration. Electronic informed consent was obtained from all individual participants included in the study via our e-survey application.

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Data availability statement Data are available upon reasonable request. All data relevant to the study are available upon reasonable request directly by the corresponding author.

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