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## RESEARCH ARTICLE

## PSYCHOSOMATIC HEALTH AND SYMPATHETIC NERVOUS ADAPTATION OF HEALTH PROFESSIONALS AND THE GENERAL POPULATION DURING THE SECOND COVID-19 WAVE IN GREECE. BETWEEN-GROUP COMPARISONS AND REGRESSION ANALYSIS

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## Abstract

**Background:** Based on previous COVID-19 global literature, the second COVID-19 outbreak in Greece probably created a stressful environment for health professionals and the general population. It is likely that psychosomatic and sympathetic nervous symptoms increased in both groups.

**Aim:** The study tests whether health professionals would present significantly higher levels of psychosomatic and sympathetic nervous symptoms, and whether several biopsychosocial criteria would predict psychosomatic symptoms overall.

**Material & Methods:** 192 participants were recruited through the snowball strategy after the first domestic COVID-19 lockdown in Greece. Participants provided socio-demographic details, while they answered measurements regarding nervous adaptation (DASS-21), psychosomatics (PSSQ-29), resilience (NMRQ), self-efficacy (GSE) and personality (IPIP-50). The researchers performed independent t-tests, one-way ANOVAs, Pearson's r correlation analysis and a multiple linear regression.

**Results:** Health professionals experienced significantly less psychosomatic and sympathetic nervous symptoms compared to the general population, while none of the socio-demographic variables show between-groups differences. 10 out of 15 biopsychosocial variables were found significantly correlated with psychosomatic symptoms. The predictive model (Adjusted R<sup>2</sup>= .586) shows 'stress' ( $\beta = .242$ ,  $p = .006$ ), 'anxiety' ( $\beta = .494$ ,  $p < .001$ ) and 'emotional stability' ( $\beta = -.160$ ,  $p = .004$ ) to be significant predictors, excluding 'gender', 'being a health professional', 'resilience', 'self-efficacy' and 'extraversion'.

**Conclusions:** The findings contradict to previous studies regarding psychosomatic and sympathetic nervous symptoms in the COVID-19 era. Additionally, the prediction model is not consistent to the theories regarding resilience and self-efficacy. The present study provides much debate in the relevant fields of research.

**Keywords:** Greece, COVID-19, psychosomatic health, sympathetic nervous system, health professionals.

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## INTRODUCTION

The COVID-19 pandemic affected the lives of the global population very rapidly from December 2019. Governments in Europe established measures against the spread of the disease soon after the skyrocketing numbers in deaths and infection in China, Italy and Spain, while domestic 'lockdowns' were voted by parliaments as state laws and were enforced by the local authorities.<sup>1</sup> In Greece, the government established measures that included the closing of private and domestic businesses and prohibition of public transportation.<sup>1-3</sup> These measures were progressively abrogated until the start of the summer of 2020. The borders were opened to foreign visitors and tourists. According to the World Health Organization (WHO), at the end of the same summer the COVID-19 infections and deaths increased very rapidly.<sup>4</sup> It was then clear that everyone is vulnerable and can be exposed to the disease, especially the health professionals at hospital settings.

A systematic review found that 152,888 infections and 1,413 deaths of health-related staff had been reported until May 8, 2020 globally<sup>5</sup>, while on the 28<sup>th</sup> of October 2020 the International Council of Nurses announced that they estimate over 20,000 deaths just from their peers worldwide.<sup>6</sup> It seems that in Greece, health professionals were now facing a second wave of the pandemic, and they may have been certain that they will be again under extreme working conditions at the end of 2020 and early 2021. It is worth mentioning that WHO had not announced any approved or promising medicine against the disease until that time.

Previous literature shows that even under normal conditions health-rated occupations are quite stressful by their nature.<sup>7</sup> When this type of occupational stress is experienced for quite a long time, it is likely to be maladapted from the human body and be expressed at least as a common 'burnout syndrome',<sup>8</sup> or escalate up to several mental and somatic disorders.<sup>9</sup> For instance, an English study with a sample of 870 health professionals, found that 27% of participants scored high at stress levels, as well as that almost half (45%) of the nurses who were included

in the study reported that stress developed a disease or worsened a pre-existing one for them.<sup>10</sup> Furthermore, an American study<sup>11</sup> tested whether caregivers in critical care units in Boston, Massachusetts experience Post-Traumatic Stress Disorder (PTSD).<sup>12</sup> The authors conducted that the caregivers experienced PTSD, as well as that they were not aware of their condition. It was thus theorized that the participants were likely to experience chronic PTSD during data collection, and that the disorder started as a sympathetic adaptation –or as the authors named it, 'caregiver anxiety'– and escalated to PTSD through time.<sup>11</sup> It is noteworthy that PTSD is considered a 'multi-morbid condition'<sup>13-15</sup> in which the individual experiences a variety of somatic problems such as an increased likelihood of suffering from cardiovascular disease and obesity, mental problems such as nightmares and low mood, as well as other behavioral problems such as adapting smoking and alcohol abuse habits.<sup>16</sup>

In Greece, very little is currently known since the related studies are quite limited. Exceptions come from a study of 196 hospital professionals which clearly shows that the sample does experience high stress.<sup>17</sup> Moreover, the same study presents that there are significantly different levels of stress between participants employed at different health-related posts; as well as it was discussed by the authors that the intensity of stress for all participants was related to the nature of their occupation.<sup>17</sup> Probably, a high level of stress is lay knowledge between health professionals, and therefore a Greek study of 213 participants communicated that there is a clear need for health professionals in Greece to receive counseling sessions in order to prevent any foreseeable mental disorders.<sup>18</sup>

Under the present circumstances, it is currently unknown how exactly the COVID-19 pandemic has affected the mental and somatic wellness of health professionals in Greece, and especially it is quite unknown how it will affect both during the forthcoming second wave of the pandemic. Literature in Greece currently shows very little evidence regarding any potential increase of sympathetic nervous adaptation and psychosomatic health with regard to health professionals in the COVID-19 era. Most evidence comes predominantly from other countries. For instance,

health professionals, and especially the woman population, from China were found to develop stress and anxiety disorders in a very rapid and extreme manner.<sup>19</sup> Another Chinese study recruited 322 front-line health participants during the COVID-19 domestic outbreak to measure the somatic and mental health.<sup>20</sup> The authors reported that acute stress was the condition with the highest prevalence (38.3%), while it was followed by anxiety (24.7%) and depression (20.2%). What is more, the study presented that psychosomatic symptoms were significantly associated with acute stress.<sup>20</sup> In Europe, a Polish study of 2,039 participants found that medical staff experienced in higher tense mental and somatic symptoms when they were compared to the general population during the peak of the disease in the country.<sup>21</sup> This clearly leads to the idea that psychosomatic health and sympathetic nervous adaptation are strongly linked.

### **Sympathetic Nervous Adaptation & Research in Psychosomatics**

Indeed, the physiology of sympathetic nervous adaptation may concern what was initially developed as the 'fight-or-flight' response by Walter Cannon and further explained by Hans Selye in the 'General-Adaptation-Syndrome'.<sup>1</sup> Briefly, after any exposure to an external negative stimulus, humans respond with the activation of their 'Hypothalamic-Pituitary-Adrenal (HPA) Axis' which is part of the 'Sympathetic-Nervous-System'.<sup>22</sup> This adaptation release key bodily hormones such as cortisol<sup>23</sup> in order to prepare the body to 'fight' or 'flight' from the external stimuli.<sup>24</sup> If the human input-output system has not received any negative stimulus, then the bodily organs adapt the 'rest-and-digest' response, which is part of the 'Parasympathetic-Nervous-System'.<sup>22</sup> Both the sympathetic and parasympathetic adaptations are not exclusively harmful or beneficial for mental or somatic wellness, since some organs adapt the one and some organs the other response under the same external stimulus.<sup>25</sup>

In Japan, Nakao and Takeuchi<sup>26</sup> presented a model in which somatic symptoms escalate and co-morbid at some time with mental disorders such as 'alexithymia', 'anxiety', 'depression' and 'early psychotic symptoms'. Another recent German study of

83,737 participants provided evidence that indeed anxiety, depression and somatic diseases co-morbid.<sup>27</sup> In Turkey, a relevant to COVID-19 study with a sample of 533 individuals reported that the domestic outbreak of the pandemic increased psychosomatic symptoms in the general population.<sup>28</sup> In the case of Greece, an epidemiological study that recruited 1,158 participants from the general population during the first wave of the COVID-19 outbreak in the country, found that several biopsychosocial factors predicted 63.4% of overall psychosomatic symptoms.<sup>1</sup> The significant predictors were 'acute stress' ( $\beta = .661$ ), 'psychological resilience' ( $\beta = -.209$ ), 'satisfaction with life' ( $\beta = -.066$ ) and 'age' ( $\beta = .041$ ), while 'gender' and the 'amount of days that had passed after the exposure to COVID-19 lockdown as a negative stimulus' were found to be non-significant predictors into the model.<sup>1</sup>

As reported in the later Greek epidemiological study, some elements like resilience may work as protective factors in psychosomatic health. A related published review article communicated clearly that during the COVID-19 era healthcare workers should exercise their skills over positive psychology capacities, including self-efficacy and resilience, in order to decrease the level of anxiety and depression.<sup>29</sup> Retrospectively, healthcare workers will be in a better position to deal with any psychosomatic symptoms.<sup>29</sup>

Regarding this idea, resilience is the ability to bounce back, into the pre-crisis condition.<sup>30</sup> Indeed, a Chinese study conducted during the COVID-19 outbreak found that mental resilience was higher in a medical team when compared to the community population.<sup>31</sup> The authors also concluded that health professional should seek for social support and adapt positive coping skills with a view to read their benefits against psychosomatic symptoms.<sup>31</sup>

With regard to self-efficacy, the term refers to the belief of the individual on his own competence.<sup>32</sup> Self-efficacy was found to be associated with stress, anxiety and social support in a Chinese study that included 180 medical staff during the pick of the spread of COVID-19 in China between January and February of 2020.<sup>33</sup> Self-efficacy was also found beneficial for psychosomatic

health in a large study of 8,754 participants in Germany.<sup>34</sup> In addition, an empirical study from Italy reported that self-efficacy worked against the development of stress and trauma for 210 health professionals and emergency workers during the first wave of the COVID-19 outbreak in the country.<sup>35</sup>

Another aspect that may work as a double-edge sword for psychosomatic health may be any high or low levels of personality traits. It is quite evident at this particular juncture that personality disorders co-morbid with psychosomatic illnesses as far as the psychiatric context is concerned.<sup>25</sup> However, there is only little evidence whether personality traits as measured in general psychology are protective or harmful for psychosomatic health. For instance, very recently a large study of 4,763 university students at Isfahan, Iran found that indeed personality traits, as measured by the Big-Five model, are related to psychosomatic complaints.<sup>36</sup>

### **Hypotheses, Aims & Expected Contribution**

Considering that related literature shows that health professionals experience more psychosomatic and sympathetic nervous adaptation from the general population as well as that resilience, self-efficacy and personality traits may benefit psychosomatic health, the present study examined two research outcomes.

The first is related to expected differences in the mean scores of psychosomatic symptoms and sympathetic nervous adaptation between health professionals and the general Greek population. It was hypothesized that the health professionals would show significant differences in all scales, due to the pressure that they received at work regarding the COVID-19. The second research outcome concerns whether several biopsychosocial criteria such as (i) gender, (ii) age, (iii) income, (iv) education, (v) place of residence, (vi) marital status, (vii) amount of children, (viii) occupation, (ix) level of resilience, (x) level of self-efficacy, the sympathetic nervous adaptation as measured by the levels of (x) stress, (xi) anxiety and (xii) depression, and finally (xiii) the personality traits can predict psychosomatic symptoms for the overall population, i.e. health professionals and the general population. Finally, the literature review that was obtained resulted in no

similar previous research questions, since peer-reviewed publications from Greece concern thus far affect and mood<sup>2,37</sup>, public health policies<sup>38</sup>, and eating disorders<sup>39</sup>. Therefore, it is reflected that the present article may provide some contribution to the related research fields in Behavioral Medicine.

## **METHODS**

### **Participants**

The population of the present study consisted of a convenient sample, while the participants were recruited through the snow-ball sampling method.<sup>42</sup> The number of participants in the study is 192. The mean age of the sample was 33.7 (SD± 12.16) and it ranges from 18 to 67. Further socio-demographic details are given in Table 1.

The eligibility criteria for participation were as follows. All participants were adults (≥18 years old) from the Greek general population. Every participant was a Greek native speaker, while there were no restrictions regarding any physical or mental disorders. The 22 health professionals that are included in the final sample were health-related employees or were nurse interns at any unit of the General Hospital of Nikaia, 'Ayios Panteleimon', in Athens, Greece.

Data collection was obtained through the use of Google Forms for the general population and hard copies for the 22 health professionals. Therefore, most of the participants had to have access to a personal computer or any other device that could support entering to Google Forms and providing their answers. Taking into consideration the later requirements, those participants had to be electronically literate.

There was no participant that was assisted by any mean at any stage of the procedure, such as being provided with hard copies of the questionnaires although s/he was expected to answer electronically, or having someone else answering the questionnaires for them on Google Forms or on hard copies due to any disability (e.g. physical blindness).

### **Sample size**

In order to acknowledge the final number of participants that

was needed to provide an actual power above 95%, it was performed an a priori calculation using the 'G\*Power 3.1' software.<sup>43</sup> The calculation shows that 176 participants would provide an a priori actual power of 95.1%. The final sample exceeds the aimed amount by 16 more participants.

### **Design & Statistical Methods**

The present study is quantitative, and was designed to answer accordingly the two main research questions that have been provided in the introduction.

### **Primary outcome**

The first outcome was expected to be answered by the use of independent t-tests. The two groups in question are the (a) health professionals and (b) the rest general population. The mean scores of (i) the psychosomatic symptoms and (ii) the sympathetic nervous adaptation of the latter two groups were compared. Any observed significant differences would reject the null hypothesis, while it was expected that the health professionals would illustrate significantly higher scores in all measurements due to the occupational pressure that was caused by the COVID-19 pandemic.

The t-test analysis was chosen due to the consideration that it is the only statistical method to illustrate significant differences between two different groups, since the dependent variables are continuous and the independent one is categorical.<sup>44</sup> What is more, the rest assumptions of the t-test analysis include that the analysis needs to show a normal distribution, no significant outliers and homogeneity of variances which will be observed by the use of Levene's test.<sup>45</sup> Altogether, the assumptions of the analysis may also provide some evidence to proceed with the analysis that was proposed for the second research outcome.

### **Secondary outcome**

In consequence, it was initially considered that the primary analysis would show that 'being a health professional' is a significant variable for psychosomatic health. If so, the variable would be used to predict the level of psychosomatic symptoms for the overall population. The prediction model was also expected to include other variables, including the sympathetic nervous ad-

aptation, resilience, self-efficacy, personality and the socio-demographic characteristics. In order to answer whether these variables can create a model of prediction for psychosomatic symptoms the study employed 5 one-way ANOVAs and a correlation analysis in advance. Those analyses served for a forward procedure of selection, as in stepwise regression<sup>46,47</sup> for the final multiple-linear regression model that followed.

Regarding the ANOVAs, all of the socio-demographic variables were tested as independent variables to the dependent [psychosomatic symptoms]. The one-way between participants ANOVA was chosen since the analysis is similar to the t-test as far as the assumptions are concerned, with the exception that the independent variable is categorical with three or more levels.<sup>44,45</sup> The ANOVAs were expected to show the significant socio-demographic elements that were to be used in the prediction model.<sup>48</sup>

The rest variables that were used in the prediction model were decided after the application of a Pearson's r correlation coefficients test. The analysis was chosen after the idea that it would provide evidence about any significant linear relationship between the psychosomatic symptoms and the rest variables.<sup>48</sup> What is more, the results that show a Pearson's r value above .800 may indicate that the correlated variables may measure the same outcome.<sup>44</sup> If so, it was considered in retrospect whether the variable should be included in the prediction model.

Finally, when the variables that were used in the prediction model were observed, the final analysis using a multiple-linear regression analysis tested if the model predicts the criterion [psychosomatic symptoms]. If so, the analysis was expected to show what are the individual predictors in the beta weightings that were more significant to the predictive model and how much contribution they had.<sup>48</sup> The linear regression analysis was chosen since the assumptions include (i) that the criterion has to be measured in a continuous scale, (ii) that the predictors have to be more than two and that they can be both continuous and ordinal, (iii) that there is an independence of observations, (iv) that there is a linear relationship between the criterion and each of the predictors (v) while the predictors are not necessarily correlated to each other (vi) which would result in multicollinearity,

(vii) that data show homoscedasticity, (viii) that there are no significant outlier and lastly (ix) that the residuals are normally distributed<sup>44,48</sup>. Further, the forward selection that resembled the methodology of a forward stepwise regression secured that there was no 'overloading' of predictors in the model [overloading bias], since the amount of participants (N= 192) was not epidemiological.<sup>46-47</sup>

## Measures

### **Psychosomatic Symptoms**

In order to measure psychosomatic symptoms, the participants answered the 'Psychosomatic-Screening-Questionnaire-29' (PSSQ-29).<sup>49</sup> The tool is self-reported and consists of 29 items with a scoring pattern of 0-to-10 scale in all items. In the introductory study the validity of PSSQ-29 was found at 95.5% at a large Greek sample of 1,158 individuals.<sup>49</sup>

### **Sympathetic Nervous Adaptation**

The levels of stress, anxiety and depression were measured through the Greek adapted version of 'Depression-Anxiety-Stress-21' (DASS-21) questionnaire.<sup>50</sup> DASS-21 is the short version of DASS-42 that was originally translated and found to have a reliability ratio of 90% to 97% in each of the three components in a sample of 537 Greeks.<sup>51</sup> DASS-21 is a self-reported 21 item screening tool, and all questions that are included are measured via a 0-to-4 scale. The validity of DASS-21 was found at Cronbach's alpha of .85 for the depression subscale, .84 for the anxiety subscale and .84 for the stress subscale in a Greek sample of 12,868 individuals.<sup>50</sup>

### **Self-Efficacy**

Self-Efficacy was measured through the use of the Greek version of 'General Self-Efficacy' (GSE) Questionnaire.<sup>52</sup> GSE is self-reported, and asks 10 questions in a 1-to-4 scoring pattern. There was no previous study that tested the validity and reliability of GSE in the Greek population. As a result, a Cronbach's alpha analysis and an Exploratory Factor Analysis (EFA) using varimax rotation were performed in the current study. The results show that GSE has a Cronbach's alpha of .909 in the sample of the 192 participants, suggesting an 'excellent' validity.<sup>45</sup> The inter-item correlation matrix shows values between  $r = .297$  and  $r = .673$ ,

and thus considered satisfying since there were no values below .200 and over .800.<sup>48</sup> Item-total statistics suggests that if item 2 is deleted then the Cronbach's alpha will increase from .909 to .910. However, item 2 was not excluded from the analysis since it was considered that the increase is very little. Furthermore, the EFA illustrates that GSE has only one component with an Eigenvalue of at least 1.5. This finding suggests that there is only one factor in the case of the present study, which is probably related to the background theory of general self-efficacy.<sup>45</sup>

### **Psychological Resilience**

The level of Psychological Resilience was measured through the Greek version of 'Nicholson McBride Resilience Questionnaire' (NMRQ).<sup>30</sup> The questionnaire consists of 12 questions with a self-reported Likert scoring pattern in which the self-reported scores are between 1 and 5.<sup>53</sup> The validity of NMRQ was found recently at 80% in a sample of 1,158 Greeks.<sup>30</sup>

### **Personality**

The personality traits of the participants were measured through the use of the 'International-Personality-Item-Pool' (IPIP-50).<sup>54</sup> The questionnaire is self-reported, and consists of 50 independent items which include statements regarding the personality of the participants. The scoring pattern of the items adds or excludes points to five respective personality traits, including 'Extraversion', 'Agreeableness', 'Conscientiousness', 'Emotional Stability' and 'Intellect/Imagination'. The Greek version of IPIP-50 is reported 88 % reliable in a sample of 811 Greeks.<sup>54</sup>

### **Procedure & Statistical Analysis**

As long as the study received ethical approval by all committees one of the authors transferred the questionnaires into the Google form platform along with the consent form. The link was sent by the authors through emails, social media platforms and communication apps including 'Viber', 'Messenger' and 'WhatsApp' to potential participants, while the City Unity support team in Athens, Greece forwarded an email with the link to the members and the students of the institution.

After that, the authors created and printed the same material into hard copies. From October 26 to November 4, 2020 the authors distributed to all units of the General Hospital of Nikaia

'Ayios Panteleimon' in Athens, Greece the total sum of 50 hard copies in order for any health employee to answer them. Out of the 50 pieces, 31 (62%) were received back and of which only 22 (44%) were valid and could be used in the final dataset of the study.

In the meanwhile, electronic answers were received between October 5 and November 18, 2020. When the last answer was received on Google forms, the authors downloaded the answers into an Excel file and added the rest answers that were given by the health professionals on the hard copies accordingly.

Altogether, the answers were encoded and transferred to SPSS version 26 software for further statistical analysis.<sup>55</sup> The statistical analysis was performed solely by the use of the later software. Finally, the present article was conducted and submitted.

### **Ethics**

The present study has received approval by the Ethics Committee of Research and Conduct of City Unity College and the City Unity Research Center in Athens, Greece. The title of the research protocol is '*Stress Management and Prevention of Psychosomatic Symptoms for Health Professionals*' and the approval reference number is 2020MSC-008. The ethic committees follow in line the guidelines of (i) the Cardiff Metropolitan University, (ii) the City Unity College, (iii) the British Psychological Society's (BPS) code of ethics and conduct<sup>40</sup>, (iv) the BPS guidelines to practice<sup>41</sup>, and (v) the domestic Greek law.

The research was also approved by the Scientific Council of the General Hospital of Nikaia, 'Ayios Panteleimon'. The reference number of the approval paper is 40030/18-09-20. The scientific committee of the hospital follows the restrictions of the (i) internal regulation of the hospital, (ii) the Greek Ministry of Health and (iii) the domestic law.

## **RESULTS**

Proceeding with the results, the clinical characteristics and the personality scales that were obtained in this study can be found in Table 2.

### **Primary outcome**

The main hypothesis of the study was that the health professionals will show significantly higher levels of sympathetic nervous adaptation, including stress, anxiety and depression, from the rest population due to their daily exposure with COVID-19 at the hospital, while this significant difference will be shown in the level of psychosomatic symptoms between the same two groups.

The results of the independent t-tests are shown in Table 3.

The results clearly show that there is a significant difference between the two groups as far as the levels of psychosomatic symptoms, overall sympathetic nervous adaptation, stress and depression are concerned. The only non-significant difference between the groups is presented in the levels of anxiety. Though, health professionals present again a lower mean score. It is worth mentioning that although there are significant differences in 4 out of 5 measurements between the two groups and the null hypothesis is rejected, the results are not consistent to what was initially hypothesized. This is due to the fact that it was originally expected that the health professionals will present higher levels of sympathetic nervous adaptation and psychosomatic symptoms in comparison with the general population. The present results illustrate the exact opposite outcome.

### **Secondary outcome**

To proceed, the second outcome to be tested was whether the sympathetic nervous adaptation, positive psychology capacities, personality traits and the socio-demographic groups that appear in Table 1, can create a significant predictive model of psychosomatic symptoms for the present overall sample.

As explained in the methodology of the study, the first phase of the secondary analysis included 5 between groups one-way ANOVAs that would present the significant differences between groups of participants formed according to their socio-demographic background when the psychosomatic symptoms were the dependent variable. Regarding the results that were provided by the ANOVAs, the scores of the participants did not show any significant statistical difference when the groups were formed according to (i) their 'total household annual income'



[ $F(3, 188) = 1.271, p = .286$ ], (ii) their 'current occupation and employment status' [Welch's  $F(9, 17.645) = 2.275, p = .067$ ], (iii) their 'place of permanent residence' [ $F(3, 188) = .179, p = .911$ ], (iv) their 'current marital status' [Welch's  $F(5, 17.377) = 1.307, p = .306$ ] and (v) their 'level of education' [ $F(3, 188) = .168, p = .918$ ]. As reported, none of the ANOVA analysis presented any statistically significant difference, and therefore none of these socio-demographic variables was included in the upcoming linear regression analysis.

The second phase of the secondary analysis included the application of Pearson's coefficients correlation analysis. Psychosomatic symptoms were found to be significantly correlated with 10 out of the 15 variables included in this analysis. The findings are summarized with details in Table 4.

None of the Pearson's  $r$  values between the significantly correlated variables with PSSQ-29 is found above .800. Therefore, it was considered that none of the 10 variables measures the same outcome with PSSQ-29.<sup>45</sup> What is more, the matrix of graphs below in Figure 1, suggests that the correlated variables are linearly correlated. Finally, the graph of the relationship between PSSQ-29 and NMRQ shows two obvious cases of outliers.

In the final phase of the secondary analysis, the significantly correlated variables with the psychosomatic symptoms in the correlation analysis created solely the predictive model since the ANOVAs did not provide any significant difference between the levels of groups, and thus all of the 5 socio-demographic variables were excluded from the model. This happened in order for the analysis to not violate any of the assumptions of the linear multiple regression, and more specifically the one of linearity that would probably increase the probability for parallel violation of the assumptions of multicollinearity, homoscedasticity and normality of the distribution of the residuals.<sup>44</sup>

The final model includes the predictors of (i) gender [pseudo-variable], (ii) 'being a health professional' [pseudo-variable], (iii) stress [DASS-21, stress subscale], (iv) anxiety [DASS-21, anxiety subscale], (v) depression [DASS-21, depression subscale], (vi) psychological resilience [NMRQ scale], (vii) general self-efficacy [GSE scale], (viii) emotional stability [IPIP-50, emotional stability

subscale] and (ix) extraversion [IPIP-50, extraversion trait subscale]. It is noteworthy that the two suspected outliers in the relationship between PSSQ-29 and NMRQ were not considered to have an impact against the assumptions of the multiple-linear regression and that they would not affect the normality of residuals.

The results of the multiple-linear regression show an Adjusted  $R^2$  value at .586, suggesting a prediction of variance of 58.6% in the variance of answers of psychosomatic symptoms by the predictive model. An expected and acceptable value with a large effect size of prediction in behavioral science starts from 20-26%, while when the same value comes closer to 100% there is a considerable probability that the criterion and the predictors measure the same outcome.<sup>56</sup> The present result may suggest that the prediction model is accepted and highly effective. The rest results of the analysis are summarized in Table 5, along with the coefficients analysis of contribution to the model by each of the significant predictors.

## DISCUSSION

### Summary of Findings

To begin with, the health professionals that were included in the final sample presented a lower level of psychosomatic symptoms and a lower level of overall sympathetic nervous adaptation from the general Greek population. When the differences in the sympathetic nervous adaptation were seen from a deeper perspective, again the health professional showed lower levels in stress and depression when compared with the rest sample. The only non-significant difference comes in the level of anxiety, in which both groups showed no major differences. It is noteworthy, that the study took place when no vaccine had been announced against the COVID-19. Rather, the Greek media covered that only the research team at the University of Oxford in the UK had shown some progress in clinical trials. Therefore, the first outcome of the study was not anticipated and, as already reported, was not initially hypothesized in the research questions. The study shows without a considerable effect that the 22 health professional did not show higher levels of psychosomatic

symptoms and sympathetic nervous adaptations, but rather that they are statistically in a better position compared to the rest 170 participants coming from the general Greek population.

The second outcome to discuss, is that none of the socio-demographic background had any impact on participants' level of psychosomatic health. More specifically, their income, current occupation, marital status, the place of their permanent residence and their achieved level of education did not provide any significance. Furthermore, participants' age and the number of children that they had, were again not important for psychosomatic health for the overall population. The only factor that showed a link with psychosomatics was participants' gender, and therefore was included in the predictive model that followed.

Moreover, the overall level of sympathetic nervous adaptation, as well as its respective outcomes that include stress, anxiety and depression, was indeed correlated with psychosomatic health, as it was expected in the design of the study. The outcomes were found to be linked in a harmful way to psychosomatic health. On the contrary, the two outcomes that are relevant to positive psychology, i.e. the level of psychological resilience and general self-efficacy, were found to be just correlated in a positive way to the level of psychosomatic health of the participants.

In addition, the personality traits were not all linked to psychosomatic symptoms. The study shows that only the traits of emotional stability and extraversion were relative to psychosomatic health, while the personality traits of conscientiousness, intellect/imagination and agreeableness were not.

Retrospectively, the final predictive model presented a large effect of predicting psychosomatic symptoms. It is noteworthy that not all of the components that were included in the model predicted equally the level of psychosomatic symptoms, while some other had no contribution. To elaborate, the level of anxiety that the participants were experiencing at the time they provided their answers was the most important negative element, followed by the level of stress. Considering all the negative elements, the level of depression was not important to the model at all. On the other hand, the protective elements were expected

to have a contribution in the model in a positive manner. However, the results show that both psychological resilience and general self-efficacy were not significant to the predictive model. This outcome was not anticipated, since it was hypothesized that the two elements would work as protective factors in psychosomatic health.

Beyond the harmful and beneficial elements that were tested in the model, the two personality traits of emotional stability and extraversion were also included, as well as the gender of the participants and being employed as a health professional. Between the two personality traits only emotional stability had a significant role in predicting psychosomatic health. In fact, emotional stability seems in the present study to work against psychosomatic symptoms, making it a protective factor of psychosomatic health for the overall population. In contrast, extraversion had no effect within the model. Proceeding with gender, it is worth mentioning that again, an element that is more related to the socio-demographic background of the participants had no effect in the predictive model of the present study. What is more, 'being a health professional' was not included in the model although that the first analysis showed that health professionals were statistically experiencing a lower level of psychosomatic symptoms. This result might be related to the outcome that presents that there were no differences in the levels of anxiety between health professionals and the general Greek population. This is hypothesized since the level of anxiety was found to be the most important predictor within the model, and thus might have an impact on excluding the criterion of 'being a health professional'.

#### **Comparison with Previous COVID-19 Literature**

To continue, the findings of the present study in some cases are consistent to previous literature in the field and in other cases they are not.

More specifically, the first research outcome does not follow previous findings. The health professionals who were included in the study showed clearly that they experience less psychosomatic symptoms and less level of stress and depression from the general Greek population, while no differences were observed

between the levels of anxiety between the two groups. It is important to notice that the amount of the health professionals is quite limited, and thus it provides a limited effect to the result. Regarding the previous literature, a systematic review and meta-analysis that included eight papers published during the first global wave of COVID-19 between December, 2019 and April 2020, concluded that health professionals are in significantly worst position of developing distress, including amongst other stress, anxiety and depression, as well as to experience the somatization of the occupational pressure.<sup>57</sup> Additionally, an electronic-based American study of 3,042 individuals during the domestic COVID-19 spread, found that levels of anxiety and depression were not different between healthcare and non-healthcare providers.<sup>58</sup> Another study of 403 individuals from India, discusses that health professionals and students experience more stress, anxiety and depression from other occupations.<sup>59</sup> It is noteworthy that in the present study the general population consists of 192 people of whom 51 are students. Thus, the later population may have had an impact into the results by increasing the mean score of the general population in the relative scales. Regarding the psychosomatic health, a study of 2,039 participants in Poland showed that health-related professionals experience higher symptoms of somatic and anxiety symptoms than other professionals during the first COVID-19 outbreak in the country.<sup>21</sup> In China, a sample of 1,255 non-healthcare workers was compared with a sample of 927 health workers between late February and early March of 2020.<sup>60</sup> It was found that the health workers experienced higher levels of psychosomatic symptoms including insomnia, anxiety, depression, any somatization and obsessive-compulsive symptoms.<sup>60</sup> Overall, although there might be a clear absence of related Greek studies, relevant findings from Europe, Asia and North America show that health professionals experienced more symptoms in comparison with the general population.

A possible explanation may be that the health professionals in this study had developed some experience in retaining their level of 'control' and 'coherence' from the first wave of the COVID-19 spread, since the data collection took place after the

first COVID-19 lockdown. More specifically, they knew the outcome of the first COVID-19 spread and how it can be dealt if they use properly the uniforms and masks that they were provided at work, follow the instruction for personal hygiene and keep all the measures of social distancing that the hospital had communicated to them. All this personal knowledge that was obtained during the first wave and the preparation that was taking place for the upcoming second wave by the hospital and the Greek Ministry of Health probably increased the sense of control and the level of coherence, which retrospectively prevented any further increase in levels of stress, anxiety, depression and psychosomatic symptoms. Another possible explanation may be that beyond the pandemic, the diplomatic situation in Greece was quite fragile. At the end of the summer of 2020 Greece and Turkey were in a dispute over Greece's proposed 'Exclusive Economic Zone' (EEZ) and armies from both sites were gathered in the East Mediterranean region.<sup>61,62</sup> This continuous event was communicated by the domestic Greek media as a situation that might spark a war conflict between Greece and Turkey. As of early 2021, the diplomatic tensions between the two countries fluctuate, but are still ongoing at any case. The events of COVID-19 and the EEZ crisis may have created at the time of data gathering a very uncertain environment for all Greek citizens, without any exceptions. It is noteworthy, that the published works that the findings were compared reflect the results during the first wave of the disease at those states, as well as those studies included a much higher number of health professionals in contrast to the present one that shows a small effect.

Further, the outcome according to which the socio-demographic backgrounds of the general population had on psychosomatic health is contradictory to previous findings. To depict the controversy, in a study of 1,060 Chinese citizens during the first peak of the disease, it was found that there are no differences between the two gender in psycho-physiological symptoms, while 'being over 50 years old', 'having an educational level equal or below to a bachelor's degree', 'being divorced or widowed' and 'being an agricultural worker' increased the level of symptoms.<sup>63</sup> Another Chinese study of 1,134 people found that

married people tended to be located into the research group that experience somatization of anxiety.<sup>64</sup> In the same study it was found that 'being a woman' and 'having a chronic disease' predicted somatic disorders, while 'being a male' was associated with anxiety which in retrospect led to somatization.<sup>64</sup> Furthermore, it was found that the 'educational level', 'perceived health perception' and 'being a class leader' were associated with mental and somatic psychiatric disorders of 448 Chinese student nurses.<sup>65</sup> In Europe, an Italian epidemiological study of 6,412 participants showed that 'age', 'gender', 'residence' -as divided between North, Central and South Italy- and 'having children' were included in the stepwise prediction model using mental and somatic distress as the criterion.<sup>66</sup> Only 'residence' was found to have no contribution.<sup>66</sup> In Austria, it was found throughout a sample of 1,005 participants that the outcome of COVID-19 was stressful for people 'aged below 35 years-old', 'females', 'unemployed people' and 'of low income'.<sup>67</sup> It is worth mentioning that a UK study of 1,006 participants found identical outcomes with the later Austrian study.<sup>68</sup> Moreover, a study of 101 health care providers at San Raffaele Hospital in Milan, Italy, found that 'being jobless' increased somatic adaptation of quarantine pressure and anxiety.<sup>69</sup> It is thus clear that the results of the present study contradict to previous findings, while they are only consistent to the fact that gender was found to be correlated with psychosomatic symptoms. Again, a possible explanation may be that the expected second wave of the COVID-19 in the country and the EEZ tensions did increase sympathetic adaptation for all socio-economic groups, as much as a phenomenon of a 'low intense' mass panic.

Proceeding with the findings regarding psychological resilience and self-efficacy, the current COVID-19 literature is quite limited. More specifically, resilience was only found to be a protective factor in a sample of 1,770 Chinese<sup>70</sup> and amongst 160 hospital health workers.<sup>31</sup> On the other hand self-efficacy was found to be beneficial for non front-line professionals.<sup>70</sup> With the exception of Ran et al.<sup>70</sup>, it is almost clear that both capacities of positive psychology are almost exclusively measured in Chinese studies where only health professionals participated. The rest

studies did not include the general population or they did not test the capacities on psychosomatic health. Rather, most published articles show the impact of resilience and self-efficacy to affect and mood of health professionals, while other articles communicate the need that health professionals have for support and the necessity to receive sessions to increase these two positive components. What is more, there is still a strong absence of any European studies regarding resilience and self-efficacy for the general population. The results of the present study may be compared only to one Greek epidemiological study.<sup>1</sup> In contrast to the later study resilience was found non-significant to the prediction model. The only main difference between the studies is that the epidemiological study recruited its population during the lockdown, while this study received answers after the first lockdown.

Regarding the findings that anxiety is the most important component to the prediction of psychosomatic health followed by stress, the study is consistent to the main background of psychosomatics in psychoneuroendocrinology and findings from previous studies. More specifically, evidence in the COVID-19 era is such evident that regardless of the limitations in time, a meta-analysis and systematic review was published without following the fast-publication policy of many international journals.<sup>72</sup> The study clearly presents that levels of sympathetic nervous adaptation increased in the spread of the disease globally.<sup>72</sup> This evidence reflects further findings. For instance, it was found that chronic stress and anxiety during the COVID-19 outbreak were related to a variety of physical symptoms for 325 university students in India<sup>73</sup>, while in Colombia, somatic symptoms and stress were found to be related to anxiety in a sample of 539 general practitioners.<sup>74</sup> In Europe, a Polish study found that anxiety and psychosomatic health are strongly correlated in the general population.<sup>75</sup> In Italy, a sample of 148 healthy older adolescents, aged between 17 and 19 years old, were found to experience somatic symptoms with breathing difficulties as the main impact, due to anxiety from the COVID-19 domestic spread.<sup>76</sup> In addition, in the UK it was presented in a large study of 2,025 UK-based participants that general anxiety disorder

predicted somatic symptoms.<sup>76</sup> It is noteworthy, that in most studies depression was found to be correlated with somatic symptoms<sup>73,77,78</sup> and COVID-19-related somatic symptoms.<sup>79</sup> However, there may still be no study that used depression as a predictor of psychosomatic health in a sample from the general population in contrast to the present one. Consequently, it is unsafe to discuss that the present study is either confirmatory or contradictory to previous related COVID-19 results regarding the role of depression on psychosomatic health. Nevertheless, Shevlin et al.<sup>77</sup> theorized that depression may have been developed before the COVID-19 outbreak probably since the condition is not spontaneous, but rather progressive. This idea may indeed provide some theoretical support on the fact that in this study depression did not predict psychosomatic health. What is more, probably designs that include general anxiety disorder and depressive disorders as diagnosed by the DSM system<sup>12</sup> should raise some skepticism since the diagnoses need several weeks and months of clinical assessment.

Further, studies on psychosomatic health during the COVID-19 era may have not measured personality traits, and retrospectively those traits were not used in the main research questions as in this study. Literature is limited to affect and mood psychology and COVID-19 perceived perspectives. For instance, recently it was found that 'coronophobia' and 'health anxiety' are strongly related to personality traits of the Big Five in the two USA samples.<sup>80,81</sup> Both studies discussed the role of neuroticism, as the opposite trait of having emotional stability in the personality measurement, to have a role in the perception of the disease. A Japanese study of 2,223 participants found that neuroticism, openness, conscientiousness and agreeableness predicted overall mental health, as well as that self-rated health status, including the somatic part, was relevant to the level of neuroticism, conscientiousness and extraversion.<sup>82</sup> In the Republic of Ireland, a study amongst 1,020 people found that conscientiousness and somatic complaints predicted a part of anxiety or depression during COVID-19.<sup>83</sup> Other personality traits such as neuroticism were excluded from the prediction model. On the

contrary, a study that consists of 301 Italians from the south regions, with a distinct young mean age of 22.12, discussed that neuroticism had a significant role in coping with COVID-19. At this particular juncture, it seems that personality traits as measured in general psychology are not commonly used in psychosomatic research, hence why no comparisons may be drawn for the findings of this study regarding the protective role of emotional stability against psychosomatic symptoms.

### Limitations

Considering the limitations of the present study a few issues should be discussed. Firstly, two studies, one in Spain<sup>84</sup> and one in Morocco<sup>85</sup>, with little to moderate effect found that people who performed physical exercise experienced less somatic symptoms of anxiety. In Greece, a study that compared the level of somatization between a sample of 943 healthy individuals and 163 unhealthy participants reported that only significant differences were obtained when the participants were chronically ill.<sup>86</sup> Unfortunately, the present study did not include any relevant questions for further analysis.

Furthermore, the final sample consists of a convenient sample. The most important limitation is that there were no people from the general Greek population that were not electronically literate. This also includes that they were using social media, emails and other applications such as 'Viber', 'Messenger' and 'WhatsApp' to be contacted for participation. Therefore, it is quite likely that a portion of the population that has no access to the internet was never able to participate.

Moreover, the majority of the student population was probably recruited through the use of emails that were sent by the student support team of the City Unity College to the students of the organizations. This limits any safe generalization for the results that occur in this study for the group of 'students'.

Similarly, the group of health professionals consists only by 22 individuals from the General Hospital 'Ayios Panteleimon', at Nikaia in Greece. It is quite likely that the amount is quite limited with a small effect size, and it is thus not representative to the general population of health professionals. What is more, the 22

professionals were recruited only in one hospital, and as a consequence the occupational environment of this specific setting may have had an impact on their answers.

Additionally, the study included the amounts of 141 females (73.4%) and 51 males (26.6%). This may indicate that women showed more willingness in providing their answers, while the unequal sequence may result into the idea that the study is more representative to the female Greek population or that any outcome for the general Greek population is more likely to be biased. In such a manner, between the 22 health professionals only 2 were males. Consequently, the criterion of 'being a health professional' also implies that there is a high probability of being a female health professional.

Further, participants were all Greeks. The findings of the present study may present a cultural bias, and may reflect only the case of Greece in the global standing.

Lastly, although PSSQ-29 and NMRQ have been 95.5% and 80% reliable for the Greek population accordingly, this is the second time that both scales are used in a research study. Similarly, GSE received a reliability and factor analysis in this study, since there were no published works that tested the reliability and validity of the Greek translation that was initially retrieved for this study.

#### **Future studies**

As far as the directions to future studies are concerned, it is reflected that the study may open a few future research opportunities. It is highly recommended for the present design to be tested in different cultures and countries, especially in Latin America, Africa and Oceania where there is currently some lack of related literature. Secondly, components of positive psychology such as types of resilience, self-efficacy, sense of coherence, optimism, openness alongside with personality traits may be included in predictive models of psychosomatic health, since current research may be limited to prediction designs using affect and mood disorders as the criterion. Future studies in occupational/organization psychology may add measurements of productivity in the current design, while having regular physical activity sessions and having a chronic illness may be added in

the demographic questionnaire. Finally, any new design may include COVID-19 specific questionnaires, such as measures of coronophobia.

#### **CONCLUSIONS**

To recapitulate, the present study took place in Greece after the first domestic social and economic lockdown, and investigated two main research outcomes. The first was whether health professionals would present significantly higher levels of psychosomatic symptoms and sympathetic nervous adaptations from the general Greek population due to occupational pressure and instability caused by the second wave of the COVID-19 outbreak. The results show there were significant differences, though the health professionals showed lower scores in both outcomes. Regardless of the small amount of health professionals, the findings do not follow previous global outcomes that were published during the spread of the pandemic. It is strongly hypothesized that the health professionals had already had the capacity and experience to deal with extreme occupational conditions, without thus losing their sense of control over the situation. The second research outcome was whether the sympathetic nervous adaptation, several socio-demographic variables, two components of positive psychology and personality traits could predict the level of psychosomatic symptoms for all participants. Throughout the analysis that was performed for the creation of the final predictive model, all of the socio-demographic variables that have a strong theoretical background with psychosomatic health were found statistically non-significant. The correlation analysis that followed, presented that 10 out of the 15 remaining biopsychosocial variables were significantly correlated to psychosomatic health. In retrospect, the created model predicted 58.6% of the criterion, while the levels of depression, resilience, self-efficacy and extraversion were found non-significant to the model in the coefficients analysis. The findings of the secondary outcome confirm previous theories upon the link between psychosomatics and sympathetic nervous adaptation, while they contradict to the protective role of positive psychol-

ogy capacities. On the whole, the study provides much new evidence that is not consistent to previous research outcomes in the COVID-19 era, while the current results show the protective role of emotional stability against psychosomatic symptoms.

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#### DECLARATIONS & CONFLICTS OF INTEREST

The authors declare nothing more. There is no conflict of interests in this study.

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## ANNEX

**TABLE 1.** Summary of socio-demographic details of the participants of the study.

Main Variable	Variable's Subcategories	Total (%) N <sup>a</sup> = 192	Males (%) n = 51, (26.6%)	Females (%) n = 141, (73.4%)	Missing Answers (%)
<b>Education<sup>b</sup></b>					
	School Level, (%)	59, (30.7%)	13, (25.5%)	46, (32.6%)	-
	Bachelor's Degree, (%)	83, (43.2%)	27, (52.9%)	56, (39.7%)	-
	Master's Degree, (%)	45, (23.4%)	10, (19.6%)	35, (24.8%)	-
	Doctorate Degree (%)	5, (2.6%)	1, (2%)	4, (2.8%)	-
<b>Marital Status</b>					
	Single, (%)	67, (34.9%)	26, (51%)	41, (29.1%)	-
	In relationship, <5 years, (%)	44, (22.9%)	12, (23.5%)	32, (22.7%)	-
	In relationship, >5 years, (%)	14, (7.3%)	2, (3.9%)	12, (8.5%)	-
	Married, (%)	54, (28.1%)	11, (21.6%)	43, (30.5%)	-
	Divorced, (%)	10, (5.2%)	-	10, (7.1%)	-
	Widowed, (%)	3, (1.6%)	-	3, (2.1%)	-
<b>Children</b>					
	None, (%)	133, (69.3%)	43, (84.3%)	90, (63.8%)	-
	1, (%)	20, (10.4%)	2, (3.9%)	18, (12.8%)	-
	2, (%)	29, (15.1%)	4, (7.8%)	25, (17.7%)	-
	3, (%)	10, (5.2%)	2, (3.9%)	8, (5.7%)	-
<b>Occupation</b>					
	Unemployed, (%)	15 (7.8%)	1, (2%)	14, (9.9%)	-
	School & University Student, (%)	51 (26.6%)	16, (31.4%)	35, (24.8%)	-
	Self-Employed/Freelancer, (%)	21 (10.9%)	8 (15.7%)	13, (9.2%)	-
	Public Servant, (%) <sup>c</sup>	21 (10.9%)	8, (15.7%)	13, (9.2%)	-
	Health Professional, (%)	22 (11.5%)	2, (3.9%)	20, (14.2%)	-
	Employee at the private sector, (%)	43 (22.4%)	13, (25.5%)	30, (21.3%)	-
	Rentier/Landlord, (%)	2 (1%)	-	2, (1.4%)	-
	Retired, (%)	8 (4.2%)	1, (2%)	7, (5%)	-
	Disability Pension, (%)	5 (2.6%)	-	5, (3.5%)	-
	Other occupation, non specified (%)	4 (2.1%)	2, (3.9%)	2 (1.4%)	-
<b>Income<sup>d</sup></b>					
	≤ 10,000 €, (%)	73, (38%)	18, (35.3%)	55, (39%)	-
	10,001 – 20,000 €, (%)	68, (35.4%)	17, (33.3%)	51, (36.2%)	-
	20,001 – 30,000 €, (%)	25, (13%)	6, (11.8%)	19, (13.5%)	-
	≥ 30,001 €, (%)	26, (13.5%)	10, (19.6%)	16, (11.3%)	-
<b>Residence</b>					
	Athens, (%)	169, (88%)	47, (92.2%)	122, (86.5%)	-
	Rest Mainland Greece, (%)	7, (3.6%)	2, (3.9%)	5, (3.5%)	-
	Greek Islands, (%)	4, (2.1%)	-	4, (2.8%)	-
	Other, non specified, (%)	12, (6.3%)	2, (3.9%)	10, (7.1%)	-

**Notes:** <sup>a</sup> N= total amount of participants; <sup>b</sup> Participants were asked to declare the level of the education, as this had already been achieved; <sup>c</sup> Health professionals consist of a sample of health employees and nurse interns at the General Public Hospital of Nikaia 'Ayios Panteleimon' in Athens, Greece; <sup>d</sup> Participants were asked to declare the level of their income, based on the total annual household income and not based on their individual earnings and contribution to the household expenditures.

**TABLE 2.** Clinical Characteristics and Personality Traits of the final sample. N= 192

Outcome	Measurement	M	(SD)	Range, [Min. – Max.]	SE
<b>Psychosomatic Symptoms</b>	• PSSQ-29	90.3	(61.40)	269, [0 - 269]	4.43
	<b>Sympathetic Nervous Adaptation</b>				
	• DASS-21, Overall	18.8	(14.20)	56, [0 - 56]	1.02
	• DASS-21, Stress subscale	15.6	(10.81)	40, [0 - 40]	.78
	• DASS-21, Anxiety subscale	9.9	(9.48)	40, [0 - 40]	.68
	• DASS-21, Depression subscale	12	(10.86)	42, [0 - 42]	.78
<b>Psychological Resilience</b>					
	• NMRQ	39.1	(7.19)	45, [12 - 57]	.51
<b>Self-Efficacy</b>					
	• GSE	28.4	(6.32)	30, [10 - 40]	.45
<b>Personality Traits</b>					
	• IPIP-50, Conscientiousness subscale	3.7	(.85)	3.7, [1.3 - 5]	.06
	• IPIP-50, Emotional Stability subscale	3	(.79)	3.3, [1.4 - 4.7]	.05
	• IPIP-50, Intellect/Imagination subscale	3.7	(.66)	3.6, [1.4 - 5]	.04
	• IPIP-50, Agreeableness subscale	4.2	(.56)	2.8, [2.2 - 5]	.04
	• IPIP-50, Extraversion subscale	3.4	(.80)	3.9, [1 - 4.9]	.05

**Notes:** N= Total amount of participants; M= Mean score; SD= Standard deviation; SE= Standard Error

**TABLE 3.** Results of independent samples t-test for Equality of Means. N= 192

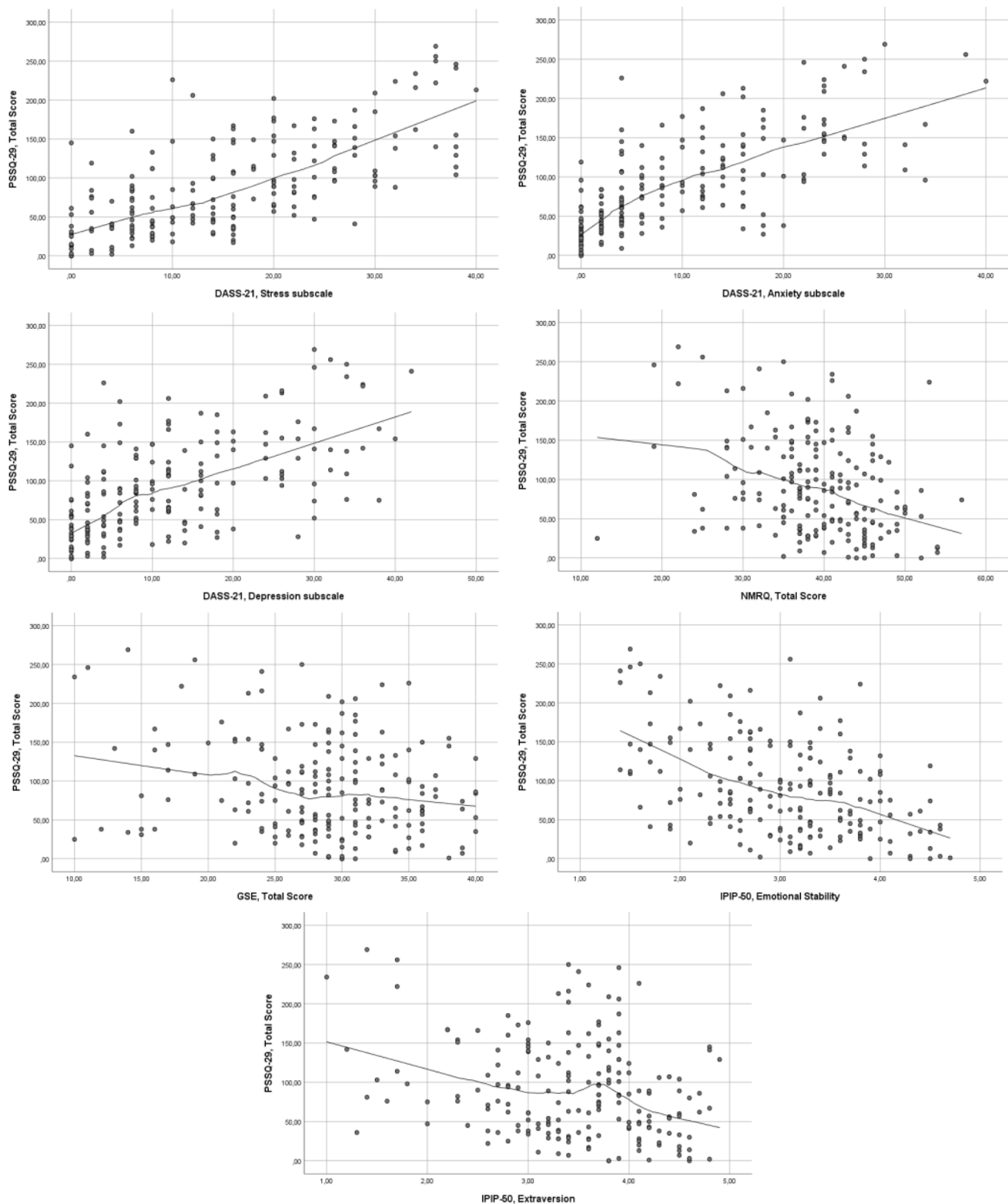
	Health Professionals (n = 22)		Other Occupations (n = 170)		t-test	95% CI	
	M	SD	M	SD		Lower	Higher
PSSQ-29	61.90	43.44	93.90	62.51	<b>-3.075**</b>	-53.28	-10.86
DASS-21, Overall	11.04	10.54	19.82	14.32	<b>-2.775**</b>	-15.01	-2.53
DASS-21, Stress subscale	8.09	6.39	16.67	10.88	<b>-5.364***</b>	-11.81	-5.34
DASS-21, Anxiety subscale	6.45	7.55	10.37	9.62	-1.837	-8.13	-.28
DASS-21, Depression subscale	7.54	9.41	12.60	10.92	<b>-2.071*</b>	-9.86	-.24

**Notes:** N= sum of participants; M= Mean score; SD= Standard Deviation; \*p < .05; \*\*p < .01; \*\*\*p < .001; Significant values are highlighted in bold.; Although the H<sub>0</sub> hypothesis is rejected in four out of the five scales, the mean scores between the two groups suggest the opposite phenomenon to the research hypothesis since the health professionals illustrate a lower mean score from the rest participants in all scales.

**Table 4.** Correlation Matrix between the variables, using Pearson's r correlation analysis. N= 192

No. Variable name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. PSSQ-29	-															
2. Gender	<b>,182*</b>	-														
3. Age	,128	,055	-													
4. Being Health Professional	<b>,167*</b>	-		-												
		<b>,142*</b>	,094													
5. Children	,081	<b>,161*</b>	<b>,672*</b>	-	-											
				<b>,152*</b>												
6. DASS-21, Overall	<b>,737*</b>	<b>,144*</b>	,070	<b>,197**</b>	-	-										
					,001											
7. DASS-21, Stress	<b>,690*</b>	<b>,190**</b>	,099	<b>,253**</b>	,019	<b>,914*</b>	-									
8. DASS-21, Anxiety	<b>,724*</b>	,115	,020	,132	-	<b>,900*</b>	<b>,733*</b>	-								
					,012											
9. DASS-21, Depression	<b>,608*</b>	,086	,067	<b>,149*</b>	-	<b>,921*</b>	<b>,755*</b>	<b>,751*</b>	-							
					,010											
10. NMRQ	-	-	,023	,009	,007	-	-	-	-	-	-	-	-	-	-	-
	<b>,330*</b>	,136				<b>,480*</b>	<b>,418*</b>	<b>,468*</b>	<b>,431*</b>							
11. GSE	-	-	-	,035	-	-	-	-	-	<b>,712**</b>	-					
	<b>,227*</b>	,028	,057		,027	<b>,386*</b>	<b>,289*</b>	<b>,369*</b>	<b>,401*</b>							
12. Conscientiousness	-,126	,110	-	-	,004	-	-,120	-,090	-	<b>,258**</b>	<b>,330**</b>	-				
			,026	,058		<b>,147*</b>				<b>,186*</b>						
13. Emotional Stability	-	-	-	-	-	-	-	-	-	<b>,300**</b>	<b>,237**</b>	<b>,312**</b>	-			
	<b>,465*</b>	,096	,034	,097	,009	<b>,463*</b>	<b>,499*</b>	<b>,384*</b>	<b>,379*</b>							
14. Intellect/Imagination	-,018	-	-	<b>,221**</b>	-	-,121	-,042	-,141	-	<b>,510**</b>	<b>,528**</b>	<b>,206**</b>	-	-		
		,065	<b>,152*</b>		<b>,167*</b>					<b>,153*</b>			,048			
15. Agreeableness	,028	<b>,186**</b>	-	,111	-	-,096	-,004	-,083	-	<b>,213**</b>	<b>,325**</b>	<b>,312**</b>	,102	<b>,407**</b>	-	
			,075		,019					<b>,174*</b>						
16. Extraversion	-	-	-	-	,023	-	-	-	-	<b>,418**</b>	<b>,444**</b>	,080	<b>,221**</b>	<b>,481**</b>	<b>,365**</b>	-
	<b>,270*</b>	,031	,037	,016		<b>,429*</b>	<b>,322*</b>	<b>,401*</b>	<b>,452*</b>							

Notes: N= Total amount of participants; \*p ≤ 0.05 level; \*\*p ≤ 0.01 level; Significant p values have been bolded.

**FIGURE 1.** Correlation Graphs illustrating the Linearity of the respective suggested predictors with the criterion. N= 192

**Notes:** N= Total amount of participants.; The variables of 'Gender' and 'Being a Health Professional' are not illustrated since both were coded as a nominal variable.; In each of the respective graphs a Loess line has been used to show the linearity.; The graph suggests that the assumption of linearity in the contemplated multiple linear may not be violated.; The correlation graph between PSSQ-29 and NMRQ illustrate two potential outliers, one on the bottom left and one on the top right; The respective graphs in the correlation of psychosomatic symptoms with the rest predictors may not show obvious cases of outliers.



**TABLE 5.** Results of the Multiple Linear Regression Coefficients Analysis for Prediction of Psychosomatic Symptoms. N= 192.

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error (SE)	Beta ( $\beta$ )	t	p
Constant	32.47	27.22		1.193	.235
Gender	10.09	6.78	.073	1.488	.139
Being a Health Professional	5.81	9.55	.030	.609	.543
<b>DASS-21, Stress subscale</b>	<b>1.37</b>	<b>.48</b>	<b>.242</b>	<b>2.806</b>	<b>.006</b>
<b>DASS-21, Anxiety subscale</b>	<b>3.20</b>	<b>.50</b>	<b>.494</b>	<b>6.328</b>	<b>&lt;.001</b>
DASS-21, Depression subscale	.13	.47	.023	.278	.781
NMRQ	.27	.61	.033	.456	.649
GSE	.38	.67	.040	.571	.569
<b>IPIP-50, Emotional Stability trait subscale</b>	<b>-12.31</b>	<b>4.16</b>	<b>-.160</b>	<b>-2.955</b>	<b>.004</b>
IPIP-50, Extraversion trait subscale	1.74	4.26	.023	.408	.683

**Notes:** N= total amount of participants in the analysis; Criterion variable is PSSQ-29; 'Gender' and 'Being a Health Professional' variables are nominal, where '0= male, 1= female' and '0= Health Professional, 1= Other occupation' accordingly. The rest seven predictors are scale variables; Adjusted R<sup>2</sup> is found at .586; The beta weighting scores of the significant predictors to the model have been bolded.