

Perceived Health and Stress among Primary Care visitors - a comparative cross-sectional study between Greece and Scandinavia

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Keywords: Stress, cortisol, depression, anxiety, perceived health, economic crisis, Scandinavia, Greece

Posted Date: March 11th, 2020

DOI: <https://doi.org/10.21203/rs.3.rs-16764/v1>

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Version of Record: A version of this preprint was published on December 4th, 2020. See the published version at <https://doi.org/10.1186/s12942-020-00248-8>.

Abstract

Background: Health behavior varies highly across European countries, and stress and stress-related disorders are commonly seen in European Primary Health Care. Greece has suffered deeply from the 2008 international financial crisis, whereas Scandinavian countries were less affected. Several reports of increasing mental health issues and poorer perceived health among the Greek population have been published. Self-reported health and stress are established public health indicators. A novel physiological marker of long-term stress, cortisol in hair, is at hand and applied in this study. Here, our aim was to study perceived health, including mental health, and self-reported and biological stress in Greece compared to Scandinavia.

Methods: A cross-sectional comparative study of adult (18-65) Primary Health Care visitors from semi-rural areas in Greece (n=84) and Scandinavia (n=140). Data collection encompassed a questionnaire with a variety of health and stress indicators and hair samples for analyzes of cortisol levels.

Results: The Greek sample reported significantly poorer overall health ($p < 0.0001$) than the Scandinavians and significantly higher perceived stress ($p < 0.0001$). The Greeks were also less hopeful of the future ($p < 0.0001$), and to a larger extent fulfilled the HAD criteria for depression ($p < 0.0001$) and anxiety ($p = 0.002$). There were no significant differences in cortisol levels between the study-groups. The strongest predictors explaining ill health in logistic regressions were being Greek ($p = 0.001$) and feeling hopeless about the future $p = 0.001$, OR= 6.00 (CI; 2.10-14.88). Strong predictors in logistic regressions for high perceived stress were anxiety: high ($p < 0.0001$) and medium, ($p = 0.0001$), as well as medium depression ($p = 0.02$). Participants with either low or high cortisol levels, and those that reported ill health, had elevated self-reports of high stress, but these did not reach statistical significance.

Conclusions: The results suggest that Greek adult Primary Health Care visitors perceived their health more negatively than the Scandinavians, including a higher presence of depression, anxiety, and a lower hope for the future. The Greeks also reported higher perceived stress, not reflected in higher cortisol levels. These findings could be interpreted against the background of socio-cultural differences in northern and southern Europe, and might also reflect the economic crisis that the Greek population experienced at that time.

Introduction

Stress symptoms and stress-related disorders are commonly seen in everyday clinical practice in Primary Health Care. These types of disorders have during last decades become a focal point of interest in a wide variety of health research as it constitutes an increasing public health problem globally. This has also been recognized by the WHO, claiming that "mental health problems and stress-related disorders are the biggest overall cause of early death in Europe" [1].

Health behavior, and not least health care service utilization is highly variable across European countries. Clear differences between north-western and south-eastern Europe were found in a study of health care

utilization among elderly populations [2]. As an example, while a Swedish citizen might visit primary care on average once a year, a Greek citizen might visit their primary care up to six times per year. Additionally, the diagnose panorama could vary as well [3]. These differences reflect not only health care structure differences but also socio-cultural differences [4]. In a study of the disease IBS, it was found that individuals with the disease but living in different cultural environments, i.e. Sweden and Greece, perceived their disease differently, and the disease affected their everyday life differently [5]. Prescribing patterns by general practitioners and recipe-renewals also differed across sites in Europe, resulting in more or less frequent health care visits [6].

Self-reported health is an important and established public health indicator. Also, self-reports of perceived stress are an important indicator of stress-exposure [7], but today we also have at hand a physiological long-term stress marker: the steroid hormone cortisol, which is commonly used for measuring physiological stress [8–11]. The traditional methods for analyzing cortisol use blood, saliva, or urine, but fall short as they only indicate momentary stress, i.e. over a short time interval. Instead, a method to measure cortisol concentration in hair has been developed during the last decade, and has now become a rather well-established tool in stress research [12]. Cortisol in hair reflects the activity of the HPA-axis as a mean value over a time period up to several months. Up to date, research exploring possible associations between cortisol levels in hair and disease has found such connections with e.g. mental disorders [10] and chronic pain [13]. An association has also been found with long-term unemployment [14].

A factor known to correlate with physical and mental illness in a community is economic recession [15,16]. An international financial crisis emerged in 2008 and engulfed Europe, hitting e.g. Greece especially hard [17]. In the years following the onset of the crisis, negative health consequences in the Greek population have been connected to perceived diminishing health, and increased prevalence rates of mental health problems including depression [18,19]. There has also been an increase in suicide rates [20], and suicide attempts have been associated to increased hopelessness [21].

Here, set against the background of socio-cultural and economical differences between Greece and Scandinavia, we have conducted a comparative study of perceived health and stress among Primary Health Care visitors in Scandinavia and Greece. Our hypothesis being that the Greek population would report lower perceived health and higher perceived stress with corresponding increased cortisol levels than the Scandinavian population.

Aim of the study

In this study we aimed to analyze perceived health, self-reported and physiologically measured stress, and mental health problems (i.e. signs of depression and anxiety, experiences of serious negative life events, decreased hope for the future) in adult visitors at Primary Health Care centers in Greece compared to equivalent Primary Health Care visitors in Scandinavia.

Methods

Participants

This cross-sectional study included adults of working age (18–65 years) visiting semi-urban Primary Health Care Centers (PHC), one in Greece and three in Scandinavia (two in Sweden and one in Norway). The participants were recruited consecutively during their visit to the PHC. However, since normally PHC visitors consists of a high percentage of elderly and chronically ill persons [2], a random selection of elderly visitors was used to avoid an overrepresentation of this age-group (65 years and older) in the sample. This was done to get a more equal age distribution among the participants. Since the sampling method in this study was consecutive and random, no data was recorded about dropouts or how many and/or why people chose not to participate. The recruiting personnel's estimation was that approximately 50% declined, evenly spread among ages, sexes, and sites. Reasons, when such were given, for not wanting to participate were e.g. patient being called into medical appointment or not wanting to give hair sample.

Prior to data collection, power was calculated as $n = 58$ at each study site to reach a significance level of 0,05 and a power of 80 % between variables. The total number of participants included were $n = 84$ in Greece and $n = 140$ in Scandinavia. The participants are described in *table 1*. Noticeably, some questions regarding overall characteristics presented in *table 1* were not answered by all participants (Gender (Scandinavians), Age, Perceived health, Hope for the future, Perceived stress (Scandinavians), HAD depression (Scandinavians), HAD anxiety (Scandinavians)). Reasons for this were not given. The largest drop-out, 10/140, was for Age among the Scandinavian population.

Procedures and Measures

A questionnaire divided into three parts was used that included validated and previously tested questions measuring sociodemographic variables including: age, sex, employment, self-report of long-standing chronic illness, regular medication, and exposure to serious life events (e.g. divorce, unemployment, surgery, economic problems, serious illness or death in the family). Possible confounders were also included: regular medication with glucocorticoids, colored or permed hair, and smoking. The participants were asked to self-estimate their health as well as hope for the future. A Visual Analogue Scale (VAS) was used for self-estimated health (very bad—very good), hope for the future (hopeless - hopeful), and severity of serious life event (not at all stressful—very stressful). Each of these were then divided into five categories of increasing severity, and then further dichotomized for illustrative purposes. The questionnaire also included the Hospital Anxiety and Depression Scale (HAD) [22] and the Perceived Stress Scale (PSS) [7]. For PSS the 10-item scale was chosen before the 14-item scale since it has a slightly better variance and reliability [23] and in order to keep down the number of questions in the questionnaire for better compliance. Greek, Swedish and Norwegian established translations were used for both PSS and HAD [24–26]. When analyzing the results from PSS and HAD, each scale was divided

into subgroups; HAD depression and HAD anxiety were respectively divided into three groups following the clinical cut-offs [22], and PSS was divided into four equal groups (0–10p, 11–20p, 21–30p, and 31–40p; the high and very high scores were collapsed into one group for analyses) as it has no clinical cutoffs [10].

Hair samples were collected from the vortex area of the head. Extraction and analysis of cortisol levels in hair was done using a competitive radioimmunoassay of methanol extracts from hair samples that were frozen in liquid nitrogen and mechanically pulverized according to previously described procedure by J. Karlén et al. [27]. In this study, no hair sample was shorter than 3cm in length, and all participants donated enough hair volume for analyses.

Statistical analyses

All statistical analyses were performed using The Statistical Package for the Social Sciences (SPSS ver. 24.) software (Chicago, IL, USA). Spearman's correlation was used for bivariate test and associations between variables. Mann-Whitney analyses were performed to analyze differences between sites and relevant variables. To further illustrate cortisol level distribution within and between sites, cortisol levels were divided into quintiles. Independent variables that univariately were statistically significant were included in binary logistic regression analyses to estimate the odds ratio (OR) with 95% confidence intervals (CI). Three models were created where the statistically significant factors related to the dependent factors perceived health and perceived stress from the univariate model were brought to the final model which was additionally adjusted for possible confounding factors. A p-value of $p \leq 0.05$ was considered statistically significant.

Results

Overall Characteristics of Sample Populations

The sex distribution was quite equal in the two sample-populations with an overall excess of women in both sample-populations. Age-wise, most participants at all sites was in the age group 30–49 years (*table 1*).

Table 1 here

The Greek sample generally displayed higher scores on negative health- and stress variables as they reported significantly poorer health ($p < 0.0001$) and higher perceived stress ($p < 0.0001$) compared to the Scandinavian population. The latter is also displayed in more detail in *figure 1*.

Figure 1. Perceived stress among Scandinavian and Greek participants. The mean PSS score was 19.87 (median = 19, IQR = 10) for the Greeks and 15.73 (median = 16, IQR = 11) for the Scandinavians, $p < 0.0001$.

The Greeks displayed less hope for the future ($p < 0.0001$), and to a larger extent fulfilled the HAD criteria for depression ($p < 0.0001$) and anxiety ($p = 0.002$) than the Scandinavian sample (*table 1*). The number of smokers as well as unemployment rate were significantly higher among the Greeks compared to the Scandinavians ($p < 0.0001$ for both measures), and a higher percentage of Greeks reported exposure to serious life-events ($p < 0.0001$). There were no differences between the samples on self-reported longstanding illness ($p = 0.277$) or medication with glucocorticoids ($p = 0.99$).

Hair Cortisol

The distribution of hair cortisol concentration among the participants is shown in *figure 2*.

Figure 2. The distribution of cortisol concentration in hair among Greek and Scandinavian participants. Mean cortisol levels were 20.0 pg/mg (median = 15.6, IQR = 12.9) for the Greeks, and 48.7 pg/mg (median = 14.6, IQR = 23.8) for the Scandinavians. The difference was not statistically significant, $p = 0.80$.

For the Greeks the mean cortisol levels were 20.0 pg/mg (median = 15.6 IQR = 12.9) and for the Scandinavians mean cortisol levels were 48.7 pg/mg (median = 14.6, IQR = 23.8). These differences were not statistically significant ($p = 0.80$). Furthermore, there were no significant associations between perceived health or perceived stress and cortisol levels, as shown in *table 2 and 3*.

Tables 2 and 3 here

Factors Associated with Lower Perceived Health and High Perceived Stress

Univariate analyses of factors possibly associated with perceived health are displayed in *table 2*, and those possibly associated to perceived stress are shown in *table 3*. For both outcomes, significant correlations between outcome and HAD depression, outcome and HAD anxiety, as well as outcome and PSS were shown. In the total population there was e.g. a positive correlation between PSS and previous experience of serious life event ($p < 0.0001$) self-reported low health ($p < 0.0001$), HAD anxiety ($p < 0.0001$) and HAD depression ($p < 0.0001$).

In order to further examine the obtained data, a set of logistic regressions were performed to elaborate possible factors associated with low perceived health (*table 4*) and high perceived stress (*table 5*).

Tables 4 and 5 here

The strongest predictors of ill health were being Greek $p = 0.001$, OR 3.94 (CI 1.81–8.60) and feeling hopeless about the future $p = 0.001$, OR 6.00 (CI 2.10–14.88). Furthermore, Greek individuals who had experienced previous serious life events and smokers were found to report poorer health $p = 0.04$, OR 2.12

(CI 1.05–4.27) and $p = 0.05$, OR 2.37 (CI 1.00–5.62). On the other hand, middle-aged people (50–65) as a group reported significantly worse health $p = 0.03$, OR 0.32 (CI 0.11–0.92).

Strongest predictor in logistic regressions for high perceived stress was if a person had high or even medium high measured anxiety (OR 3.79; $p < 0.0001$ and OR 4.90; $p < 0.0001$, respectively). Also, depression of intermediate range was a significant predictor of high perceived stress (OR 3.32; $p = 0.02$). Individuals with either low or high cortisol levels as well as those that reported bad health had elevated risks for reports of high stress, but these were not statistically significant.

Discussion

Our main finding in this study was that adult Greek PHC visitors had lower self-reported health, more symptoms of depression and anxiety, higher perceived stress, and lower hope for the future than their Scandinavian peers, which is consistent with our hypothesis. Important is also that more Greek participants fulfilled the criteria for depression and anxiety with the HAD questionnaire, which is a diagnostic tool used in health care. These findings are in consistency with a previous study comparing health and stress among Greek and Swedish young adults [28]. Notably, in the present study there were no significant differences in physiologically measured stress between Greeks and Scandinavians, contrary to what we hypothesized. The results suggest that the Greeks feel more stressed but that the perception of stress at this magnitude does not automatically induce higher activity of the HPA-axis. However, we also consider that the populations size might need to be larger in order to detect a significant difference in cortisol levels among PHC visitors, since they are likely to be less healthy than e.g. university students that constituted the population in our previous study [28]. To gain deeper understanding of the relationship between perceived and physiological stress, and how it can lead to increased disease risk, more research is needed. The overall differences in perceived health and stress found might reflect the general exposure to long-lasting community stress due to the economic crisis in Greece during the recent years. This consequential association requires another study design to be investigated, but the reasoning behind it is strengthened by the previous reports of increasing suicide rates [20] and mental health problems [18,19] in the financially challenged Greece.

The participants of the present study were ordinary primary health care visitors, a mixture of all adult age-groups with a predominance of middle-aged to older, and presumably more ill, patients. Whether age alters cortisol levels is not fully determined [29,30], but the older PHC visitors might be more affected by the economic crisis as they probably have more family responsibilities making them more vulnerable to financial strain, unemployment, and other austerity in health- and welfare [18], inducing higher perceived stress and poorer health. On the other hand, with age come life experience and, older PHC visitors might have better developed coping strategies that would reduce stress. A study among elderly in Israel concluded that personal resources and use of appropriate coping behaviors enable elderly people to control their well-being even in the presence of decline in health or function [31]. Health behavior and not least health care service utilization is highly variable between north and south Europe. Living in different social and cultural environments, e.g. Scandinavia and Greece, could also have impact on perceptions of

health and stress [5]. However, important to note here is that this cross-sectional study design cannot determine causality.

A strength of this study is the unique opportunity to study possible signs of deteriorated health and community stress in a PHC population from Greece, a country that has suffered from several years of financial crisis compared to a population in Scandinavia without this burden. Of course, there are differences between the populations regarding socio-cultural factors and their geographic location. Social norms may influence the understanding and reporting of anxious/depressed feelings between different countries. Cultural standards could play a role in explaining these differences, but only a small number of differences in these respects seems to exist between the northern and southern Europe [32,33]. Further research is necessary to confirm the influence of culturally related factors on self-reports of mental health problems in different countries. Another strength in this study is the use of PHCs for recruiting participants as it enabled us to easily reach a wide variety of participants of both sexes and all ages. However, though all samples come from patients in primary care, one must keep in mind that there are marked organizational differences, as well as seeking patterns, between primary health care and health care utilization of the populations in northern and southern Europe as described earlier [2,3]. This could possibly cause different burden of disease between the populations and thus skew the results. However, we found no significant difference for longstanding illness between the populations, although smoking was significantly more common in Greece, which would suggest a higher prevalence of smoking-related diseases. As predicted, the Greek population suffered from lower perceived health and stress, as well as more anxiety and depression, but their cortisol levels were not significantly different from the Scandinavians and, thus, unlikely to have caused a higher degree of somatic illness, at least not at the time for the data collection. Using validated and established questionnaires like HAD and PSS is a strength. A limitation is the sample size, but the study has nonetheless an acceptable statistical power. An obvious limitation in studies where hair cortisol is measured is “the natural drop-out” among men. This was seen on all sites, which is a general limitation for the cortisol in hair method, but the strength is the analysis method for measuring cortisol in hair, RIA. An international interlaboratory project concluded that this RIA-method applied in this study is quite robust and sensitive [34].

Conclusions

We found that adult Greek PHC visitors experienced significantly poorer perceived health and a higher level of perceived stress, including more symptoms of depression and anxiety as well as lower hope for the future, than the Scandinavian sample. We speculate whether the results of this study reflect the economic crisis in Greece, and/or a difference in social and cultural tradition including health behavior and health care service utilization between the sites, but in order to confirm that another study design must be applied.

Declarations

Ethics approval and consent to participate

The study was approved by the Research Ethics Committee at the Faculty of Health Sciences, Linköping University, Sweden (Dnr 2012/43–31) and The Research Ethics Committee at Athens University, Greece. All original research data will be stored for at least 10 years and will be available on request. All participant gave their written informed consent to participate including answering a questionnaire, and approval to have a small piece of hair cut from the back of the head.

Availability of data and materials

All data is available and can be obtained from the corresponding author on request.

Competing interest

We declare that no competing interests exist.

Funding

No specific funding for this study.

Author Contributions

Conceived and designed the experiments: JK, MC, ÅF, ET, TF.

Performed the experiments: JK, MC.

Analyzed the data: JK, ÅF, TF, AT, SN.

Contributed reagents/materials/analysis tools: ÅF, ET, JK, MC, O. J. O.

Wrote the paper: JK, ÅF, AT, SN, TF

Acknowledgements

We wish to express our gratitude to Dr Apostolos Mintoglou, Region Östergötland, Sweden, who supported the Greek-Swedish translation and back-translation of the questionnaire and the staff of the participating health care centers in Sweden, Norway and Greece.

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Tables

Due to technical limitations, all tables are only available for download from the Supplementary Files section.

Figures

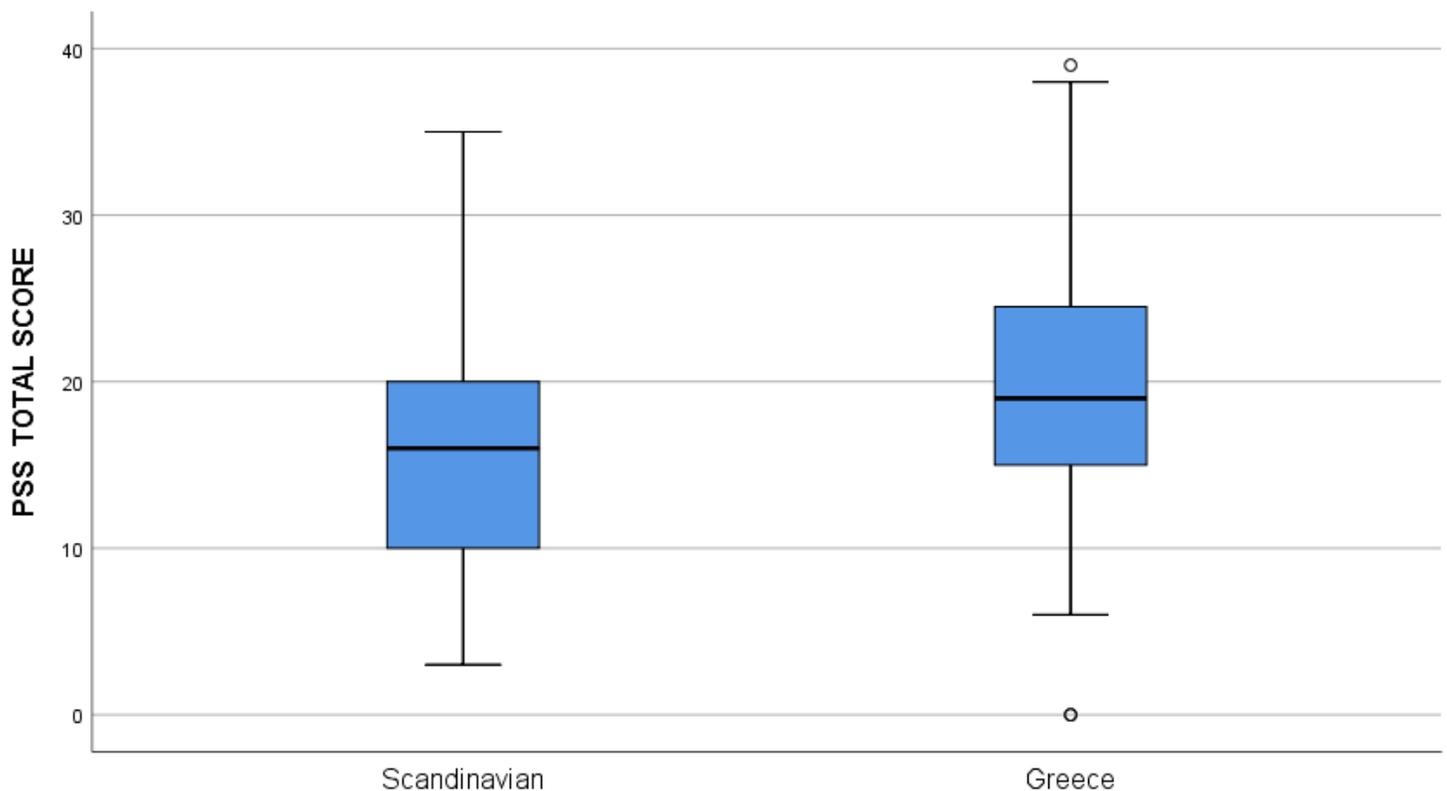


Figure 1

Perceived stress among Scandinavian and Greek participants. The mean PSS score was 19.87 (median=19, IQR=10) for the Greeks and 15.73 (median=16, IQR=11) for the Scandinavians, $p < 0.0001$.

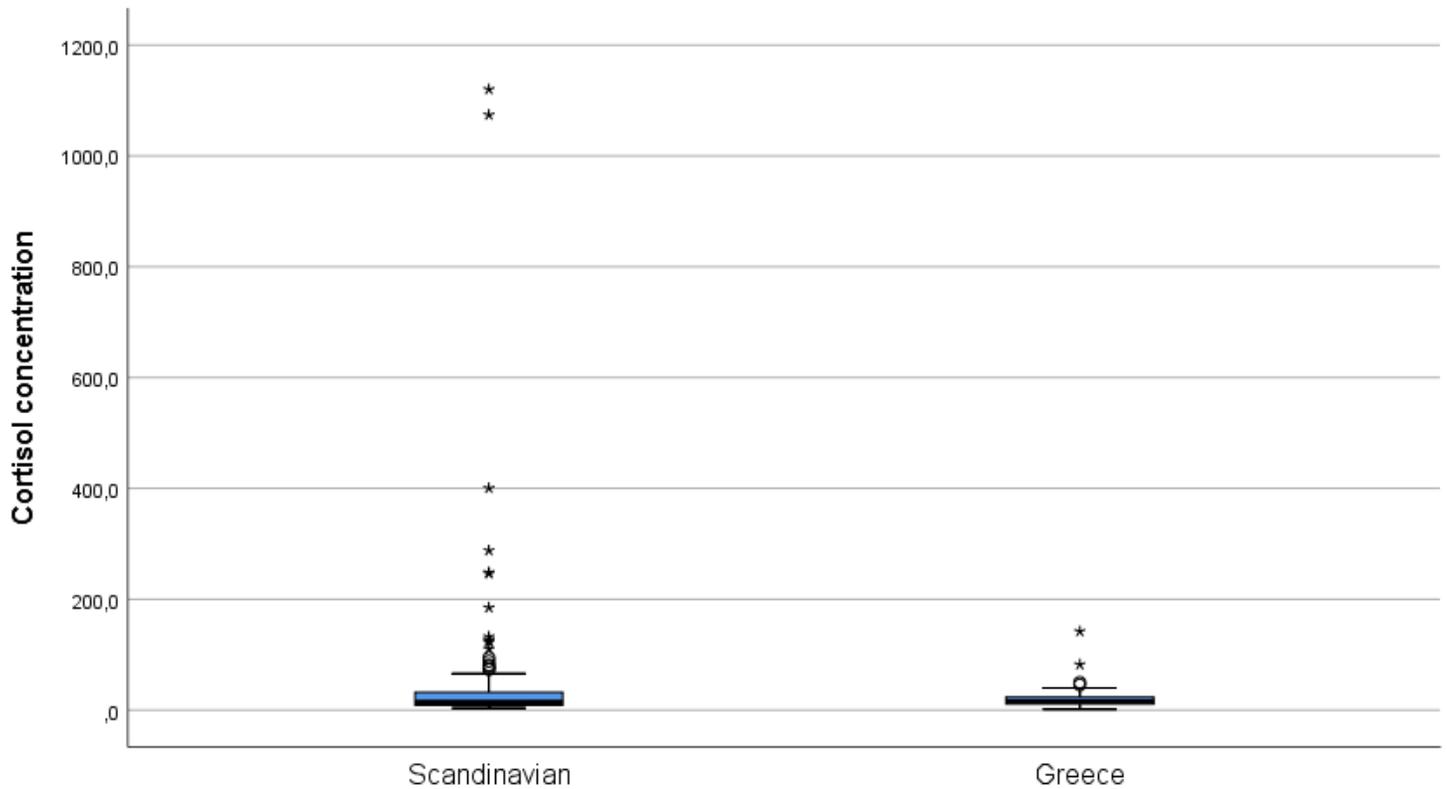


Figure 2

The distribution of cortisol concentration in hair among Greek and Scandinavian participants. Mean cortisol levels were 20.0 pg/mg (median=15.6, IQR=12.9) for the Greeks, and 48.7pg/mg (median=14.6, IQR=23.8) for the Scandinavians. The difference was not statistically significant, $p = 0.80$.

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