Full title: Comparing eating behaviours, and symptoms of depression and anxiety between Spain and Greece during the COVID-19 outbreak: Cross-sectional analysis during two different confinement strictness strategies

Running title: COVID-19 and behavior/mental health

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Abstract

Objective: We compared eating behaviours, and depressive and anxiety symptoms in two countries with different confinement strictness strategies and different levels of COVID-19 pandemic.

Method: A web-based cross-sectional survey was administered during and shortly after the COVID-19 related lockdown in Spain and Greece. Multivariable linear regression analyses were performed to identify country differences associated with eating behaviour, and symptoms of depression and anxiety.

Results: This study included 1002 responders in Spain and 839 in Greece. The mean±SD of restraint, emotional and external eating was 2.5±0.79, 2.1±0.81 and 2.6±0.65 in Spain, whereas 2.7±0.85, 2.3±0.99 and 2.9±0.74 in Greece. Spanish participants had lower average scores of restraint and external eating compared to Greek participants (P < 0.001), but no difference was seen for emotional eating. In Spain, 13.6%, and 12.3% of the survey respondents reported moderate to severe depressive and anxiety symptoms, respectively, whereas in Greece the respective values were 18.8% and 13.2%. After adjusting for several risk factors, a higher prevalence of anxiety symptoms was observed in Spain compared to Greece (P = 0.001), but no difference was seen for depressive symptoms. **Conclusions:** This study demonstrated high scores of inappropriate eating behaviours and a high frequency of depressive and anxiety symptoms in two Mediterranean countries during the COVID-19 outbreak. Our findings revealed that compared to Greek participants, Spanish participants, that faced more severe COVID-19 pandemic and stricter lockdown

measures, were associated with lower restraint and external eating and increased anxiety symptoms, but not with depressive symptoms or emotional eating.

Highlights

- High scores of restraint, emotional and external eating were observed in Spain and Greece during the COVID-19 outbreak.

- People living in Spain during the COVID-19 outbreak reported lower disturbed eating behaviours compared to Greece.

- The frequency of depressive and anxiety symptoms was high in both Mediterranean countries during the COVID-19 outbreak.

- People living in Spain during the COVID-19 outbreak reported increased anxiety symptoms compared to Greece.

1 Introduction

We currently experience a coronavirus disease 2019 (COVID-19) pandemic (World Health Organization, 2020), which poses risk of psychological distress, social isolation and loneliness due to fear, uncertainty, social distancing and strict lockdown. Under such stressful conditions, disturbances in eating behaviour are common (Casper, 1998). The COVID-19 related quarantine was associated with overeating and consuming food of a poorer quality according to a recent international online survey (BDA, 2020). In the same survey, participants changed their eating behaviours towards an unhealthy food consumption pattern (Ammar et al., 2020). In a more recent study, almost half of surveyed adult Poles reported eating and snacking more during quarantine (Sidor, & Rzymski, 2020). A study conducted among Italian adults revealed that almost half of them modified their dietary habits, and 42% of them attributed this increase to higher anxiety levels (Scarmozzino, & Visioli, 2020).

Unbalanced eating behaviors commonly co-occur with emotional disorders such as depression or anxiety. (Aoun, Nassar, Soumi, El Osta, Papazian, & Rabbaa Khabbaz, 2019). Moreover, the fear and the stress associated with pandemics can contribute to the development of mental health problems (Tracy, Norris, & Galea, 2011). Furthermore, social isolation and loneliness can increase the risk of depressive and anxiety symptoms (Santini et al., 2020). This pandemic has also economic impact, which may lead to higher rates of unemployment and economic losses, which, in turn, are associated with increased risk of depression and anxiety (Wanberg, 2012). During

the first wave of the COVID-19 pandemic, different countries experienced different severity of the pandemic and different levels of restriction measures were used. For example, in China, Italy and Spain there was a strict confinement and high pandemic severity for at least two months. Recent cross-sectional studies using web-based surveys, collected data from these countries and demonstrated a high frequency of depressive and anxiety symptoms (Huang, & Zhao, 2020; Casagrande, Favieri, Tambelli, & Forte, 2020; Munoz-Navarro, Cano-Vindel, Schmitz, Cabello, & Fernandez-Berrocal, 2020; González-Sanguino, Ausín, Castellanos, Saiz, López-Gómez, Ugidos, & Muñoz, 2020; Odriozola-González, Planchuelo-Gómez, Irurtia, & de Luis-García, 2020). However, no previous study has compared eating behaviours and mental health problems between countries with different levels of lockdown measures and degrees of COVID-19 pandemic severity. Therefore, we evaluated eating behaviors, and symptoms of depression and anxiety in Spain, that has experienced greater severity of this pandemic and stricter lockdown measures, compared to another Mediterranean country (Greece) with a lighter lockdown and less severe pandemic.

2 Methods

2.1 Study design and sample

A cross-sectional online survey was conducted among adult individuals living in Spain and Greece. This survey was launched during the last week of April (April 23rd) in Spain and first week of May (May 3rd) in Greece, approximately 1.5 to 2 months after the initiation of the social confinement measures in each country and remained open until the 18th and 20th May, respectively. A brief paragraph at the

beginning of this survey informed the participants about the objectives of the study. The survey took approximately 20 minutes to complete and included questions assessing demographic and anthropometric characteristics, dietary habits, eating behaviours, smoking habits, sleep, physical activity and psychological health status. It was administered through different online platforms and mainstream social-media. In addition, participants of a population-based cohort study in Greece, the Epirus Health Study (https://ehs.med.uoi.gr/), were also invited to complete the online survey. To guarantee anonymity, questions about personal data were avoided. Eligible participants were women and men aged at least 18 years and living in Spain and Greece during the first wave of the COVID-19 pandemic. Ethics approval was obtained from the Ethics Board of the Institutions involved, namely the Ethics Committee at the University of Ioannina.

2.2 Outcomes

The Dutch eating behaviour questionnaire (DBEQ) (Van Strien, Frijters, Bergers, & Defares, 1986) was included in this survey to assess eating behaviours. The DEBQ is a 33-item questionnaire composed by three scales (factors): "restrained eating", "emotional eating" and "external eating". Restrained eating behaviour characterizes the tendency to restrict dietary intake to control body-weight. Emotional eating behaviour is a response that shows a tendency towards overeating in response to negative feelings. External eating behaviour is the tendency to overeat in response to external stimuli such as the sight and smell of food. All items are rated on a five-point Likert scale ranging from 1 (never) to 5 (very often) with higher scores indicating greater endorsement of the eating behaviour. Validated questionnaires were also included in the online survey to assess depression [Patient Health Questionnaire-9

(PHQ-9)] (Kroenke, Spitzer, & Williams, 2001) and anxiety [General Anxiety Disorder-7 (GAD-7)] (Spitzer, Kroenke, Williams, & Löwe, 2006) symptoms. The PHQ includes 9 items on a 4-point Likert scale ranging from 0 (never) to 3 (nearly every day). The total score ranges from 0 to 27, with higher scores indicating more severe depressive symptoms. The following cut-off points were used to classify severity: mild (5-9), moderate (10-14) and severe (15-27). The GAD includes 7 items on a 4-point Likert scale ranging from 0 (never) to 3 (nearly every day). The total score ranges from 0 to 21, with higher scores indicating more severe functional impairments as a result of anxiety. The classification of the anxiety symptoms is as follows: mild (5-9), moderate (10-14) and severe (15-21). **2.3 Other measures**

Information about anthropometric measures (body weight and height) before confinement was collected and the body mass index (BMI) was calculated as weight divided by height squared (kg/m^2). Questions about body weight during COVID-19 pandemic and the perceived weight change were included. Information about demographics, work and smoking status, sleep duration and physical activity was collected. We calculated a physical activity score multiplying minutes per day with days per week of any physical activity. To assess the degree of adherence to Mediterranean diet (MedDiet), a 14-item validated questionnaire was used (Schröder et al., 2011). The survey also asked participants about whether they consumed more pastries and more alcohol during COVID-19 pandemic, whether they felt hungrier and had increased the amount of food and whether they had changed the meal plan or followed the same hours/number of meals. Furthermore, the participants were asked whether they increased the number of binge eating between meals, craving/desire for food, amount of snacks between meals and finally about their general health status.

2.4 Statistical analyses

Descriptive analyses for anthropometric and lifestyle characteristics are presented as means ± standard deviation (SD) for continuous variables, and percentages (%) for categorical variables. The Student's t-test and Chi-square test were used to assess differences in these characteristics according to each country. Linear regression models were fitted to examine the associations of DEBQ factors (restraint, emotional and external eating), PHQ-9 score and GAD-7 score with continuous anthropometric and lifestyle factors as explanatory variables adjusting for age and sex. To account for multiple testing, we adjusted P values of these associations with the use of the Benjamini-Hochberg false discovery rate (FDR) procedure (Benjamini, & Hochberg, 1995). Differences in the three DBEQ factors, PHQ-9 score and GAD-7 score between the two countries were assessed using linear regression models in which the Greek sample was used as reference. Multivariate-adjusted models were performed, including those anthropometric and lifestyle factors that were consistently and significantly associated with each outcome trait in both countries. Statistical analyses were performed using Stata 14.1 (Stata Corp.).

3 Results

3.1 Characteristics of the study participants

The characteristics of the 1841 participants (1002 in Spain and 839 in Greece) in the present online survey are shown in **Table 1**. The majority of responders lived in North (85.4%) followed by Central (9.5%), and South (4.8%) of Spain during the survey. Similarly, most of the Greek responders lived in North (58.2%) and Central (20.0%) Greece. The mean±SD of restraint, emotional and external eating was 2.5±0.79, 2.1±0.81 and 2.6±0.65 in Spain, whereas 2.7±0.85, 2.3±0.99 and 2.9±0.74 in Greece.

The respective values for PHQ-9 and GAD-7 scores were 5.0±4.8 and 4.6±4.4 in Spain, and 5.6±5.3 and 4.4±4.9 in Greece. In Spain, 13.6%, and 12.3% of the survey respondents exhibited moderate to severe depressive and anxiety symptoms, respectively, while in Greece the respective values were 18.8% and 13.2%. . Compared with Spain, participants living in Greece, during the confinement, were more likely to have higher DEBQ derived factors, a higher frequency of depressive symptoms, a higher BMI and have reported anincrease in their weight during confinement, while they were younger, less physically active and adhered less to the MedDiet (**Table 1**). Participants living in Greece were also more likely to be current smokers and to have increased cigarette consumption during the pandemic. They were also more likely to perceive a weight gain during pandemic, to consume more pastries, to feel hungrier, to have increased the amount of food they consumed and amount of snacks they consumed between meals, and to have an increased craving/desire for salty foods. Furthermore, participants in Greece perceived that their health got worse during pandemic. On the contrary, participants living in Spain reported a worse meal planning during pandemic while they followed same hours/number of meals.

3.2 Association of anthropometric/lifestyle factors with eating behaviours and depressive/anxiety symptoms

After correction for multiple testing, out of 21 factors, 12 and 11 factors (i.e. anthropometry, dietary habits, physical activity) were associated with cognitive restrain of eating in Spain and Greece, respectively (**Table 2**). Further analyses revealed that 17 and 14 factors (i.e. anthropometry, dietary habits, alcohol consumption and PHQ/GAD) were associated with emotional and external eating in

Spain, whereas 19 and 16 factors (anthropometric, dietary habits, alcohol consumption and PHQ/GAD) were associated with emotional and external eating in Greece (**Table 3**). Out of the 22 anthropometric/lifestyle factors initially examined, 21 and 20 factors including anthropometry, dietary habits, emotional/external eating, smoking status and sleep duration were associated with the PHQ-9 score in the Spanish and Greek survey, respectively (**Tables 2 and 3**). Regarding anxiety symptoms, 18 and 20 factors related to anthropometry, dietary habits, emotional/external eating and sleep duration were associated with the GAD-7 score in Spain and Greece, respectively (**Tables 2 and 3**). **3.3 Association of living in Spain vs. Greece with eating behaviours and depressive/anxiety symptoms**

The multiple linear regression analysis coefficients (Beta) and 95% confidence intervals (CI) are presented in **Table 4**. After adjusting for the factors that were consistently associated with each DBEQ factor, inverse associations were found between living in Spain vs. Greece and restraint eating [Beta=-0.33, (95% CI, -0.41– -0.024, P < 0.001)] as well as external eating [Beta=-0.13, (95% CI, -0.19– -0.06, P < 0.001)]. A positive association between anxiety symptoms and living in Spain was observed [Beta=0.76, (95% CI, 0.30–1.21, P = 0.001)]. No significant associations by country were observed for emotional eating or depressive symptoms.

4 Discussion

Using an online survey during the COVID-19 pandemic, we observed that compared to Greek participants, responders living in Spain reported lower average scores of restraint and external eating and a higher score of anxiety symptoms. To the best of our knowledge, the present study is the first to compare eating behaviours and mental

health problems in two countries with different confinement strictness strategies and different levels of COVID-19 pandemic.

Comparison of the present online survey with recent pre-COVID-19 studies including community samples from (Bailly, Maitre, Amanda, Hervé, & Alaphilippe, 2012; Dakanalis, Zanetti, Clerici, Madeddu, Riva, & Caccialanza, 2013; Nagl, Hilbert, de Zwaan, Braehler, & Kersting, 2016; Wang, Ha, Zauszniewski, & Ross, 2018) showed that our survey responders reported higher mean scores of restraint (range of mean value in pre-COVID-19 studies: 1.8-2.2), emotional (range of mean value in pre-COVID-19 studies: 1.1-2.0) and external eating (range of mean value in pre-COVID-19 studies: 1.8-2.6), supporting the notion that eating behaviours may be affected during the COVID-19 lockdown. Furthermore, in our study, the Spanish population reported lower restraint and external eating behaviours than the Greek. The Spanish population may have had less concern about body weight and less access to food cues due to their lower BMI and stricter confinement measures. On the other hand, the Greek population reported a higher BMI and a greater weight gain in addition to an increased number of binge eating between meals and craving for food during the COVID-19 outbreak. Restrained eating has been previously linked to a greater weight gain (Klesges, Isbell, & Klesges, 1992), and paradoxically, some restrained eaters also display a propensity toward overeating (Lowe, 1993) and binge eating (Tuschl, 1990). External eating is also associated with weight gain and overeating (Burton, Smit, & Lightowler, 2007) and it has been suggested to be due to a lack of control over food (Vainik, Neseliler, Konstabel, Fellows, & Dagher, 2015) or a general tendency to eat in response to external and other cues.

Emerging studies conducted in China, Italy and Spain with severe COVID-19 pandemic and very strict confinement measures have shown a high frequency of depressive or anxiety symptoms among adults (Huang, & Zhao, 2020; Casagrande, Favieri, Tambelli, & Forte, 2020; Munoz-Navarro, Cano-Vindel, Schmitz, Cabello, & Fernandez-Berrocal, 2020; González-Sanguino, Ausín, Castellanos, Saiz, López-Gómez, Ugidos, & Muñoz, 2020; Odriozola-González, Planchuelo-Gómez, Irurtia, & de Luis-García, 2020). A recent online cross-sectional study using the Center for Epidemiology Scale for Depression and GAD-7 collected data from 7236 Chinese adults and demonstrated a high depressive (20.1%) and anxiety (35.1%) symptomatology (Huang, & Zhao, 2020). A more recent web-based cross-sectional survey examined the psychological impact of the COVID-19 outbreak on anxiety (GAD-7) among 2291 Italian adults (Casagrande, Favieri, Tambelli, & Forte, 2020). The results revealed that one out of three responders reported a high frequency of generalized anxiety symptoms. In three very recent online cross-sectional studies conducted in Spain, the reported frequency of depressive and anxiety symptoms ranged from 18.7% to 34.2% and from 20.8% to 21.6%, respectively (Munoz-Navarro, Cano-Vindel, Schmitz, Cabello, & Fernandez-Berrocal, 2020; González-Sanguino, Ausín, Castellanos, Saiz, López-Gómez, Ugidos, & Muñoz, 2020; Odriozola-González, Planchuelo-Gómez, Irurtia, & de Luis-García, 2020). High levels of depression and anxiety have also been reported during other epidemic emergencies (James, Wardle, Steel, & Adams, 2019; Lee, Chi, Chung, & Chou, 2006). In our study, the levels of these mental health conditions were also high with 13.6% and 18.8% of participants presenting moderate to severe depressive symptoms in Spain and Greece, respectively, and a 12.3% (Spain) and 13.2% (Greece) presenting moderate and severe anxiety symptoms. According to the National Health

Survey conducted by the Ministry of Health in Spain approximately 6.7% of the general population showed anxiety and depression (Ministerio de sanidad Consumo y Bienestar, 2017). In Greece, data from a nationally representative sample of 4894 individuals showed that 4.1% of the study population had anxiety and 2.9% depression (Skapinakis, Bellos, Koupidis, Grammatikopoulos, Theodorakis, & Mavreas, 2013). Pre-COVID-19 studies using community-based samples and the same assessment tools used in our study, revealed frequency rates of moderate to severe depression symptoms ranging from 4.2% to 6.0% in Spain (Calvó-Perxas, Garre-Olmo, & Vilalta-Franch, 2015; Arias-de la Torre, Vilagut, Martín, Molina, & Alonso, 2018) and from 2.9% to 5.0% in Greece (Karekla, Pilipenko, & Feldman, 2012; Siarava, Hyphantis, Katsanos, Pelidou, Kyritsis, & Markoula, 2019). Previous pre-COVID-19 research on anxiety has shown frequency rates of symptoms ranging from 7.2% to 7.8% in Spain (Montorio-Cerrato, Nuevo-Benítez, Losada-Baltar, & Márquez-González, 2001; Navarro-Mateu, Tormo, Salmerón, Vilagut, Navarro, Ruíz-Merino, Escámez, Júdez, Martínez, Kessler, & Alonso, 2015). The frequency rates observed in our study during the COVID-19 outbreak are much higher than these previous reports. These differences could be partially explained by differences in the study populations, being less representative in our study. It was recently proposed that the epidemic diffusion of COVID-19 contributes to increased depressive and anxiety symptoms, not only as an immediate medical consequence of the infection but through the impact of confinement measures (Brooks et al., 2020). Interestingly, the population living in Spain showed a higher score of anxiety symptoms compared to Greece after controlling for several confounders. High anxiety during the pandemic is worrying because a recent study found that COVID-19 related anxiety was strongly associated with disability, distress and passive suicidal ideation (Lee, 2020). On the

other hand, we did not observe any significant association of living in Spain vs. Greece with depression symptoms. Interestingly, we observed associations of increased scores of restraint, emotional and external eating with PHQ-9 and GAD-7 scores which is in agreement with previous reports (Aoun, Nassar, Soumi, El Osta, Papazian, & Rabbaa Khabbaz, 2019).

Our study has limitations that need to be acknowledged. First, the adoption of the online survey limits the sample representativeness, although it currently represents the best solution for data collection during virus outbreaks (Geldsetzer, 2020). This aspect should be considered in the interpretation of the results. Second, due to the cross-sectional design, causation cannot be inferred, and therefore both directions of associations are plausible. Third, the lack of pre-COVID-19 data on the participants precludes inference that the potential relationship of the high scores of disturbed eating behaviours and the high frequency of the mental health problems during the COVID-19 pandemic are a true result of the pandemic or the associated lockdown.. Fourth, although we adjusted for several potential confounders, residual confounding cannot be ruled out.

In summary, this study revealed high scores of inappropriate eating behaviours and a high frequency of depression and anxiety symptoms in two Mediterranean countries with different confinement strictness strategies and different degrees of COVID-19 pandemic severity. Our findings also suggest that living in Spain compared to Greece during this pandemic is associated with lower restraint and external eating behaviours, but increased anxiety symptoms. These results could inform the development of new preventive strategies aimed to reduce the levels of disturbed eating behaviours and mental health problems during the COVID-19 pandemic. Further prospective studies

are needed to confirm our findings in different populations with different degrees of

COVID-19 pandemic severity.

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Table 1 General characteristics of the study population by country

	Spain (n=1002)	**Greece** (n=839)	**P value**
Restraint eating behaviour	2.5±0.79	2.7±0.85	<0.001
Emotional eating behaviour	2.1±0.81	2.3±0.99	<0.001
External eating behaviour	2.6±0.65	2.9±0.74	<0.001
Depression (PHQ-9)	5.0±4.8	5.6±5.3	0.012
Anxiety (GAD-7)	4.6±4.4	4.4±4.9	0.448
Moderate to severe depression symptoms (%)	13.6	18.8	0.002
Moderate to severe anxiety symptoms (%)	12.3	13.2	0.540
Sex (% women)	70.3	66.7	0.096
Age (years)	46.1±13.3	42.4±11.7	<0.001
BMI before lockdown (kg/m²)	24.8±4.2	25.6±5.0	<0.001
Smoking (%) No Former	 69.8 12.0	 64.7 9.3	 <0.001

Current	18.2	26.0	
Sleep duration (h) (%) 6-9 >9 <6	83.7 2.9 13.4	80.2 3.5 16.3	0.145
Physical activity during	5.8±4.8	2.7±2.7	<0.001
MedDiet score during	9.1±1.9	7.5±2.1	<0.001
Weight change during (kg)	0.5±2.3	0.8±3.2	0.020
Perception of weight increase during Yes (%)	38.4	39.8	<0.001
Work during (%) No before No during Yes	13.1 21.3 65.6	15.9 27.4 56.7	0.001
Smoking increased during (%) No Do not smoke Less than 5 cigarettes per day Between 5-10 cigarettes per day More than 10 cigarettes per day	51.6 38.6 6.9 2.3 0.5	14.1 73.4 5.7 4.3 2.5	<0.001
Consume more pastries during (%) No Less than 3 pieces per week More than 3 pieces per week	69.4 19.7 10.9	62.2 12.6 25.2	<0.001
Consume more alcohol during (%) No Lee than 4 drinks per week More than 4 drink per week	81.2 13.3 5.5	78.9 13.7 7.4	0.227
Meal plan has changed during (%) I plan better I plan the same I plan worse	11.6 52.3 36.1	21.1 45.2 33.7	<0.001
Follow same hours/number of meals during (%) Yes	59.8	51.7	<0.001
Do you feel hungrier during (%) Less Same More	16.6 52.4 31.0	18.4 46.0 35.6	0.023
Has the amount of food increased during (%) Decreased Same	74.3	63.1	<0.001

Increased	14.3	18.8	
	11.4	18.1	
Increased the number of binge eating between meals during (%) No			
Due to being nervous	57.8	54.2	<0.001
Due to increase in hunger	14.7	10.9	
Due to other reasons	4.9	6.9	
Due to getting bored			
	3.9	5.4	
	18.7	22.5	
Increased craving/desire for food during (%) No			
Other foods	55.2	44.6	<0.001
Sweet foods	4.8	9.9	
Salty foods	29.0	29.3	
	10.9	16.2	
Increased amount of snacks between meals during (%) Yes	34.1	40.8	<0.001
How is health compared to before (%) Worse	0.9	4.6	<0.001

Abbreviations: PHQ-9, Patient Health Questionnaire-9; GAD-7, General Anxiety Disorder-7;BMI, body mass index; MedDiet, Mediterranean diet.

Table 2 Associations of anthropometric/lifestyle factors with cognitive restraint, emotional and external eating and depression/anxiety symptoms in Spain (n=1002)

	Restraint	Emotional	External	PHQ-9	GAD-7
MedDiet score during	0.03 (0.01)*	-0.009 (0.01)	-0.01 (0.01)	-0.19 (0.01)*	-0.07 (0.07)
BMI before lockdown (kg/m^2)	0.04 (0.006)*	0.05 (0.006)*	0.02 (0.004)*	0.10 (0.03)*	0.09 (0.03)*
Weight change during	0.005 (0.01)	0.08 (0.01)*	0.05 (0.008)*	0.32 (0.06)*	0.16 (0.06)*
Restraint eating behaviour	NA	NA	NA	0.89 (0.18)*	1.08 (0.17)*
Emotional eating behaviour	NA	NA	NA	2.08 (0.17)*	1.59 (0.16)*
External eating behaviour	NA	NA	NA	1.71 (0.23)*	1.22 (0.21)*
Work during	0.05 (0.03)	0.03 (0.03)	0.04 (0.02)	-0.46 (0.18)*	-0.51 (0.16)*
Smoking	-0.05 (0.03)	-0.03 (0.03)	-0.01 (0.02)	0.40 (0.18)*	0.28 (0.17)

Sleep duration <6h)	0.10 (0.03)*	0.09 (0.03)*	0.03 (0.03)	1.56 (0.20)*	1.60 (0.19)*
Physical activity during	-0.01 (0.005)*	0.002 (0.005)	0.006 (0.004)	0.03 (0.03)	-0.002 (0.03)
Perception of weight increase during	0.09 (0.03)*	0.26 (0.02)*	0.15 (0.02)*	1.04 (0.15)*	0.70 (0.14)*
Consume more pastries during	-0.01 (0.03)	0.28 (0.03)*	0.18 (0.03)*	1.23 (0.21)*	0.75 (0.20)*
Consume more alcohol during	-0.04 (0.04)	0.17 (0.04)*	0.15 (0.03)*	1.46 (0.26)*	1.20 (0.24)*
Meal plan has changed during	0.01 (0.04)	-0.11 (0.04)*	-0.01 (0.03)	-0.56 (0.22)*	-0.24 (0.21)
Follow same hours/number of meals during	0.03 (0.02)	0.10 (0.02)*	0.07 (0.02)*	1.03 (0.15)*	0.59 (0.14)*
Do you feel hungrier during	0.09 (0.03)*	0.29 (0.02)*	0.16 (0.02)*	1.40 (0.16)*	0.94 (0.15)*
Has food increased during	0.08 (0.04)*	0.22 (0.03)*	0.17 (0.03)*	1.26 (0.21)*	0.73 (0.19)*
Increased the number of binge eating between meals during	0.03 (0.03)	0.37 (0.04)*	0.25 (0.02)*	1.09 (0.19)*	0.78 (0.18)*
Increased craving/desire for food during	0.07 (0.02)*	0.22 (0.02)*	0.14 (0.01)*	1.06 (0.11)*	0.67 (0.10)*
Smoking increased during	0.01 (0.03)	0.07 (0.03)*	0.007 (0.02)	0.90 (0.19)*	0.67 (0.17)*
Increased amount of snacks between meals during	0.05 (0.01)*	0.21 (0.01)*	0.12 (0.01)*	0.87 (0.08)*	0.63 (0.08)*
How is health compared to before	0.05 (0.02)*	0.10 (0.02)*	0.08 (0.01)*	1.31 (0.10)*	1.06 (0.10)*
PHQ-9	0.02 (0.005)*	0.06 (0.005)*	0.03 (0.004)*	NA	NA
GAD-7	0.03 (0.006)*	0.05 (0.005)*	0.02 (0.004)*	NA	NA

Values presented as beta estimates (standard error of the mean) and each regression was adjusted for age and sex.
*Significant after false discovery rate (Benjamini-Hochberg) correction.

Abbreviations: MedDiet, Mediterranean diet; BMI, body mass index; PHQ-9, Patient Health Questionnaire-9; GAD-7, General Anxiety Disorder-7.

Table 3 Associations of anthropometric/lifestyle factors with cognitive restraint, emotional and external eating and depression/anxiety symptoms in Greece (n=839)

	Restraint	**Emotional**	**External**	**PHQ-9**	**GAD-7**
MedDiet score during	0.05 (0.01)*	-0.10 (0.01)*	-0.09 (0.01)*	-0.37 (0.08)*	-0.33 (0.08)*
BMI before lockdown (kg/m^2)	0.003 (0.006)	0.06 (0.007)*	0.03 (0.005)*	0.13 (0.03)*	0.09 (0.03)*
Weight change during	-0.02 (0.009)*	0.09 (0.009)*	0.05 (0.007)*	0.34 (0.05)*	0.17 (0.05)*
Restraint eating behaviour	NA	NA	NA	-0.26 (0.21)	-0.09 (0.19)

Emotional eating behaviour	NA	NA	NA	1.62 (0.17)*	1.20 (0.16)*
External eating behaviour	NA	NA	NA	1.18 (0.23)*	0.94 (0.22)*
Work during	0.04 (0.03)	0.04 (0.04)	0.06 (0.03)	-0.58 (0.20)*	-0.53 (0.19)*
Smoking	-0.08 (0.03)*	-0.07 (0.04)	-0.01 (0.03)	0.82 (0.20)*	0.77 (0.19)*
Sleep duration <6h)	-0.05 (0.04)	0.10 (0.05)*	0.0001 (0.03)	2.40 (0.22)*	1.70 (0.21)*
Physical activity during	0.07 (0.01)*	-0.04 (0.01)*	-0.04 (0.009)*	-0.27 (0.06)*	-0.23 (0.06)*
Perception of weight increase during	-0.07 (0.03)*	0.27 (0.03)*	0.12 (0.02)*	1.18 (0.18)*	0.35 (0.17)*
Consume more pastries during	-0.08 (0.03)*	0.34 (0.04)*	0.21 (0.03)*	1.55 (0.20)*	0.95 (0.19)*
Consume more alcohol during	0.11 (0.05)*	0.23 (0.06)*	0.22 (0.04)*	0.25 (0.30)	0.52 (0.28)
Meal plan has changed during	0.19 (0.04)*	-0.10 (0.04)*	0.02 (0.03)	-1.97 (0.23)*	-0.14 (0.22)*
Follow same hours/number of meals during	0.09 (0.02)*	0.24 (0.03)*	0.18 (0.02)*	0.46 (0.14)*	0.33 (0.13)*
Do you feel hungrier during	0.06 (0.03)	0.43 (0.03)*	0.27 (0.02)*	1.47 (0.19)*	0.88 (0.18)*
Has food increase during	0.12 (0.04)*	0.41 (0.04)*	0.25 (0.03)*	1.45 (0.22)*	0.98 (0.20)*
Increased the number of binge eating between meals during	-0.02 (0.04)	0.51 (0.04)*	0.31 (0.03)*	1.34 (0.24)*	0.67 (0.23)*
Increased craving/desire for food during	0.06 (0.02)*	0.28 (0.02)*	0.21 (0.02)*	0.88 (0.13)*	0.66 (0.12)*
Smoking increased during	-0.03 (0.04)	0.10 (0.04)*	0.06 (0.03)	1.22 (0.22)*	1.14 (0.21)*
Increased amount of snacks between meals during	-0.01 (0.02)	0.21 (0.02)*	0.09 (0.01)*	0.82 (0.01)*	0.36 (0.09)*
How is health compared to before	0.01 (0.02)	0.12 (0.02)*	0.07 (0.02)*	1.47 (0.13)*	1.30 (0.12)*
PHQ-9	-0.007 (0.005)	0.06 (0.006)*	0.02 (0.004)*	NA	NA
GAD-7	-0.003 (0.006)	0.05 (0.007)*	0.02 (0.005)*	NA	NA

Values presented as beta estimates (standard error of the mean) and each regression was adjusted for age and sex.
*Significant after false discovery rate (Benjamini-Hochberg) correction.

Abbreviations: MedDiet, Mediterranean diet; BMI, body mass index; PHQ-9, Patient Health Questionnaire-9; GAD-7, General Anxiety Disorder-7.

Table 4 Association of living in Spain compared to Greece with cognitive restraint, emotional and external eating and depression/anxiety symptoms

	Beta	**Standard error**	**95% Lower CI**	**95% Upper CI**	**P value**

Restraint	-0.33	0.04	-0.41	-0.24	<0.001
Emotional	-0.01	0.04	-0.09	0.07	0.779
External	-0.13	0.03	-0.19	-0.06	<0.001
PHQ-9	0.21	0.25	-0.27	0.70	0.392
GAD-7	0.76	0.23	0.30	1.21	0.001

Regression for Restraint was adjusted for age, sex, MedDiet score, physical activity, belief in weight increase during, has food increased during, increased craving/desire for food during.

Regression for Emotional was adjusted for age, sex, BMI before, weight change, sleep duration, perception of weight increase during, consume more pastries during, consume more alcohol during, meal plan has changed during,follow same hours/number of meals, do you feel hungrier during, has food increased during, increased the number of binge eating between meals during, increased craving/desire for food during, smoking increased during, increased amount of snacks between meals during,how is health compared to before, PHQ-9 score and GAD-7 score.

Regression for External was adjusted for age, sex, BMI before, weight change, perception of weight increase during, consume more pastries during, consume more alcohol during, follow same hours/number of meals, do you feel hungrier during, has food increased during, increased the number of binge eating between meals during, increased craving/desire for food during, increased amount of snacks between meals during, how is health compared to before, PHQ-9 score and GAD-7 score.

Regression for PHQ-9 was adjusted for age, sex, MedDiet score, BMI before, weight change, emotional, external, smoking, work, sleep duration, perception of weight increase during, consume more pastries during, meal plan has changed during, follow same hours/number of meals, do you feel hungrier during, has food increased during, increased the number of binge eating between meals during, increased craving/desire for food during, smoking increased during, increased amount of snacks between meals during,how is health compared to before.

Regression for GAD-7 was adjusted for age, sex, BMI before, weight change, emotional, external, work, sleep duration, belief in weight increase during, consume more pastries during, follow same hours/number of meals, do you feel hungrier during, has food increased during, increased the number of binge eating between meals during, increased craving/desire for food during, smoking increased during, increased amount of snacks between meals during, how is health compared to before.