ARBOR Ciencia, Pensamiento y Cultura
Vol. 198, 806, octubre-diciembre, a681 | ISSN: 0210-1963
https://doi.org/10.3989/arbor.2022.806011

HEALTHY HABITS IN CSIC WORKERS DURING COVID-19 LOCKDOWN IN SPAIN

Elena H. De Diego
Institute of Food Science, Technology and Nutrition, Consejo Superior de Investigaciones Científicas (ICTAN-CSIC)
https://orcid.org/00000-0002-2423-8174
elenahdezdediego@gmail.com

Belén Zapatera
Institute of Food Science, Technology and Nutrition, Consejo Superior de Investigaciones Científicas (ICTAN-CSIC)
https://orcid.org/00000-0002-5930-6659
bzapatera@ictan.csic.es

Juana Frías
Institute of Food Science, Technology and Nutrition, Consejo Superior de Investigaciones Científicas (ICTAN-CSIC)
https://orcid.org/00000-0003-0355-3113
Frías@ictan.csic.es

Sonia Gómez-Martínez
Institute of Food Science, Technology and Nutrition, Consejo Superior de Investigaciones Científicas (ICTAN-CSIC)
https://orcid.org/00000-0002-3281-0118
sgomez@ictan.csic.es

Cómo citar este artículo/Citation: De Diego, Elena H.; Zapatera, Belén; Frías, Juana; Gómez-Martínez, Sonia (2022). Healthy habits in CSIC workers during COVID-19 lockdown in Spain. Arbor, 198(806): a681. https://doi.org/10.3989/arbor.2022.806011

Recibido: 9 enero 2022. Aceptado: 13 septiembre 2022.
Publicado: 19 enero 2023.

ABSTRACT: Aim: COVID-19 crisis has caused a deep change in citizen's lifestyle. Previous outbreaks have shown that people under confinement can develop mental health problems and cause effects on physical activity (PA) and changes in the diet habits**.** Subject and Methods: An online questionnaire about healthy habits during the Spanish lockdown was sent to workers from the Spanish National Research Council (CSIC). Results: A general improvement in the dietary patterns, except for the intake of snacks and bakery goods was observed. PA was substantially reduced, mostly in men, unlike the emotional changes, which were greater in women, mainly observed as anxiety and sleep disorders. Additionally, emotional eating (EE) behaviors were detected mainly in women, although the intake related to boredom was observed in both genders**.** Conclusions: Overall, the dietary patterns of CSIC workers followed the general recommendations for COVID-19 lockdown. However, half of the participants decreased their PA practice. Regarding to the emotional changes, emotional eating behaviors were associated with anxiety, especially in women, and boredom for both genders.

KEYWORDS: COVID-19, Spanish lockdown, diet, physical activity (PA), emotional state (ES), emotional eating (EE).

HÁBITOS SALUDABLES DE LOS TRABAJADORES DEL CSIC DURANTE EL CONFINAMIENTO POR LA COVID-19 EN ESPAÑA

RESUMEN: Objeto: la crisis de la COVID-19 ha causado un cambio profundo en el estilo de vida de la ciudadanía. Las olas previas han demostrado que en régimen de confinamiento se pueden desarrollar problemas de salud mental y hay efectos sobre la actividad física y cambios en los hábitos dietéticos. Tema y metodología: se envió a los trabajadores del Consejo Superior de Investigaciones Científicas (CSIC) un cuestionario en línea sobre sus costumbres relacionadas con la salud durante el confinamiento en España. Resultados: en general se observó una mejora en los patrones dietéticos, excepto por la ingesta de aperitivos y de productos de panadería y bollería. La actividad física quedó sustancialmente reducida, especialmente en los hombres, al contrario que los cambios psicológicos, que fueron mayores en las mujeres, manifestados principalmente como ansiedad y desorden del sueño. Además, las conductas de ingesta alimentaria como escape emocional se detectaron principalmente en las mujeres, aunque la ingesta relacionada con el aburrimiento se observó en ambos géneros. Conclusión: los patrones dietéticos de los trabajadores del CSIC siguieron en general las recomendaciones para el confinamiento de la COVID-19, aunque la mitad de los participantes disminuyeron la práctica de actividad física. Con respecto a los cambios psicológicos, las conductas de ingesta alimentaria como escape emocional aparecieron asociadas a la ansiedad, especialmente en las mujeres, y al aburrimiento en ambos géneros.

PALABRAS CLAVE: COVID-19, confinamiento en España, hábitos dietéticos, actividad física, estado de ánimo, ingesta alimentaria como escape emocional.

INTRODUCTION

The current pandemic situation caused by SARS-CoV-2 has caused a deep change in citizen's lifestyle. Measures focused on the protection of public health have been implemented worldwide. In particular, the Spanish government imposed a national lockdown on March 14th, 2020, due to the severity of the situation. For nearly 3 months, Spanish population had to adapt their lifestyles to the new situation of staying at home, in a context where outdoor activities are an essential part of their cultural habits. In addition to this, the stressful environment created by the rising of COVID-19 cases and deaths (Lima *et al*. 2020), the fear of infection, the uncertainty about the near future and the possible socio-economic consequences of the pandemic (Balluerka *et al*. 2020; Garre-Olmo *et al*. 2020), are just some factors that have a psychological impact on the population (Brooks *et al*. 2020).

Indeed, in the previous outbreaks of Severe Acute Respiratory Syndrome (SARS) and the Middle East Respiratory Syndrome Coronavirus (MERS-CoV), psychological symptoms like anxiety (Jeong *et al*. 2016), depression, and post-traumatic stress disorder (PTSD) (Ko *et al*. 2006; Reynolds *et al*. 2008; Lam *et al*. 2009; Mak *et al*. 2009; Yoon *et al*. 2016) were detected in individuals who were isolated, and those symptoms remained for some time (Wu *et al*. 2008; Jeong *et al*. 2016). Regarding COVID-19 pandemic, a study comparing the Spanish and Greek populations during the first outbreak showed that living in Spain was associated with increased anxiety symptoms. Authors attributed these differences to the severe situation and stricter lockdown measures in Spain (Papandreou *et al*. 2020).

The effect of psychological symptoms on lifestyle has been described in traumatic situations, like terrorist attacks (Boscarino, Adams, and Galea, 2006) or natural disasters (Lebeaut, Tran, and Vujanovic, 2020), which were associated with an increased risk of addictive behaviors such as alcohol abuse (García-Álvarez *et al*., 2020). Therefore, it should be considered the potential risk that COVID-19 lockdown may exert on the development of unhealthy habits. Studies conducted during COVID-19 lockdown showed an increase in the consumption of alcohol or comfort foods (Balluerka *et al*., 2020; Sidor and Rzymski, 2020). It has been pointed out those negative emotions such as anxiety or depression, may prompt Emotional Eating (EE) behaviors (Matcht, 2008; Konttinen *et al*. 2010; Clum *et al*., 2014; Ferrel, Watford, and Braden, 2020). EE is defined as the tendency to eat, usually hyper-palatable foods (Macht, 2008; Camilleri *et al*. 2014; Muscogiuri *et al*., 2020), in the response to positive or negative emotions (Cardi, Leppanen, and Treasure, 2015). Some authors indicate that this eating behavior could mediate between depressive symptoms and body mass index (BMI) (Clum *et al*., 2014), waist circumference, and percent body fat (Konttinen *et al*., 2010).

Moreover, physical activity (PA) has become a paramount concern due to the confinement situation. For instance, Spanish citizens were not allowed to exercise outdoor for at least seven weeks, which implied that PA had to be adapted to be practiced at home. This fact may have impaired exercising, as several investigations have recently shown (Balluerka *et al*., 2020; Garre-Olmo *et al*., 2020; López-Bueno *et al*., 2020; Rodríguez-Pérez *et al*., 2020). Additionally, PA during the lockdown should have compensated for the decrease of the activities of daily living (Jiménez-Pavón, Carbonell-Baeza, and Lavie, 2020). Short- term physical inactivity and a positive energy balance can increase risk factors for developing metabolic syndrome, owing to reduced insulin sensitivity, increased total body, central fat and a proinflammatory status (Martínez-Ferrán, Sanchis-Gomar, and Pareja Galeano, 2020). Overall, habit changes have been detected in Spanish population during the lockdown, observing differences in sociodemographic and living conditions (Navas-Martín *et al*., 2021). In a society where Non-Communicable Diseases (NCDs) are responsible for almost 70% of all deaths in the world (https://www.who.int/health-topics/noncommunicable-diseases#tab=tab_1), is necessary to pay attention to these circumstances which could lead to the establishment of unhealthy habits in a long term. In particular, it is interesting to evaluate how citizens adapt their lifestyle to this exceptional situation from a working level perspective, due to the significant changes that the confinement causes in this specific area.

Therefore, the aim of this study was to determine the effect of the COVID-19 lockdown on workers' lifestyle from Spanish National Research Council (CSIC), the largest public research institution in Spain. In most cases, CSIC workers had to adapt to work from home, which led to a new situation since the telecommuting was not established. Consequently, assessing lifestyle changes under such special situations, especially on dietary patterns, PA practice and emotional changes becomes necessary.

MATERIAL AND METHODS

To investigate the healthy habits of CSIC workers, a survey was sent during the lockdown applied in Spain from March 14th, 2020. The questionnaire had an online *Google docs* format, and it was approved by CSIC Ethics Committee. Participation was shared through the CSIC institutional mailing list, reaching only the internal CSIC staff and not external services, and responses were accepted from April 20th to June 14th, 2020. Participation in the online questionnaire was voluntary and anonymized, being necessary for a previous acceptance of the participant.

The survey consisted of 39 questions structured into 4 sections: socio-demographic characteristics, dietary patterns, physical activity, and emotional state during confinement (Figure 1).

Socio-demographic characteristics: gender, age, height, weight, training in nutrition and dietetics, current work modality, cohabitants, living conditions, and the presence of COVID-19 symptoms were asked. Body Mass Index of the respondents was also calculated with the self-reported height and weight.

Changes in dietary patterns: perception of changes in eating and consumption habits during the confinement (shopping activities, availability of food and meals per day) and 14 questions about food group consumption were asked. Participants had to indicate an increase, decrease, or no change in the intake of water, energetic drinks, alcoholic beverages, fruits and vegetables, wholegrain cereals, legumes, fish, dairy products, red and cured meat, pre-cooked products, fast food, savory snacks, sweet snacks and bakery products.

Two score systems were created to evaluate the consumption of food considered a more or less healthy food. For the healthy food score, points addressed to intake of fruits and vegetables, pulses, fish and whole-grain cereals were assigned, obtaining 2 points if the consumption increased, 1 point if it did not change and 0 points if it decreased. Then the total number of points was divided between the highest rating that it could be obtained, resulting in a score from 0 to 1, where 0 meant the participant decreased the consumption of all the considered healthy food, while 1 meant an improvement of its intake. For the unhealthy food score, the following food groups were included: energetic drinks, alcoholic beverages, savory and sweet snacks, bakery products, red and cured meat, pre-cooked products and fast food. The score was calculated using the same procedure, but 2 points were assigned when the intake of these products decreased, and 0 points were assigned if its consumption increased. Thus, the higher the score was the lower intake of these non-recommended products, and vice versa. Therefore, higher scores in both indicators meant better dietary changes.

Changes in physical activity (PA): practice during the confinement, changes in usual routine, motivation and factors that increase motivation were inquired.

Changes in emotional states (ES): anxiety, boredom, sadness, irritability, and sleep disorders were asked through Likert scale questions, rating from 1-5 (1 no change, 5 complete change). Checkbox type questions were used to evaluate the attitudes and strategies adopted to cope with emotional changes.

An *Emotional Eating Score* (EE score) was created by the inclusion of those items associated with overeating [*"It is difficult for me to control the amount of hyper-palatable food (sweets, fried snacks, etc.) that I eat", "I eat more because of anxiety, boredom, etc.", "Snacking"*]. One point was assigned when each item was not checked, thus the higher punctuation, the lesser emotional eating behaviors were followed.

Statistical analyses were conducted using IBM SPSS Statistics for Windows, Version 26.0. (IBM Corp. Released 2019, Armonk, NY, USA). To explore personal and sociodemographic characteristics, dietary patterns, physical activity and emotional state, frequencies, percentages (%) and means with standard deviations were employed. For the analysis of the variables, Chi-square was applied when comparing categorical variables and ANOVA to test differences between the means of groups. Correlations between continuous variables were calculated using Pearson correlation.

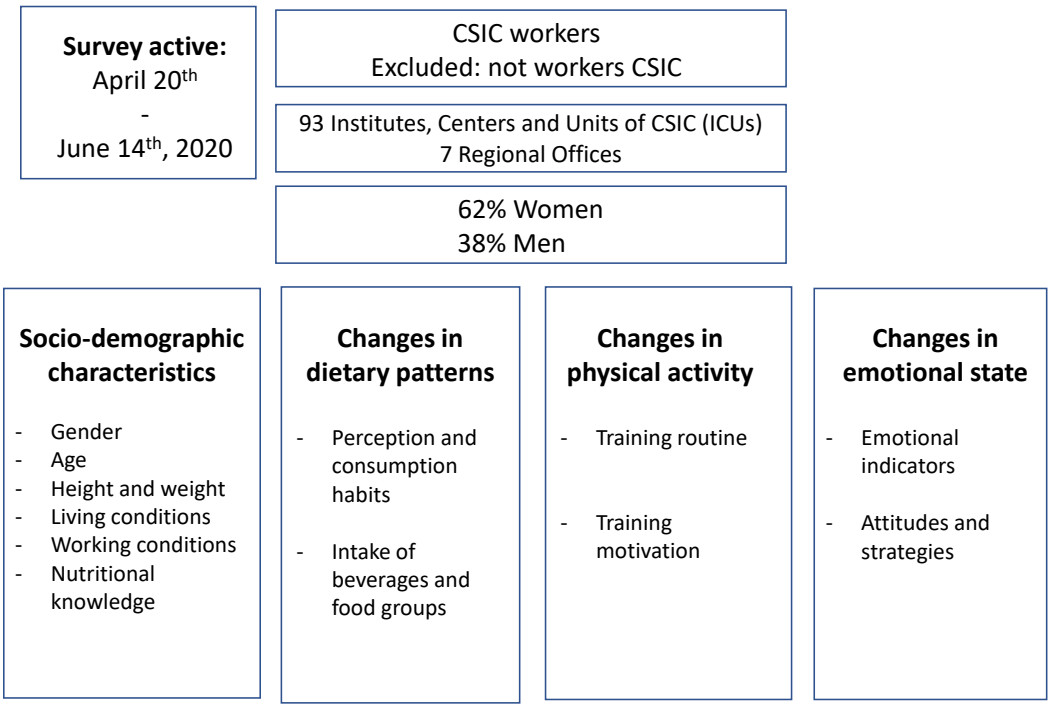

Figure 1. Flow chart of the study characteristics and sections of the questionnaire.

Source: Own elaboration.

RESULTS

Socio-demographic characteristics

A total of 2.219 responses were collected during the 8 weeks the survey was active (April 20th -June 14th, 2020). Since the goal of the study was to determine the healthy habits of CSIC workers during the lockdown, all the responses of participants who did not work at the organization were excluded. In addition, this study aimed to explore the relationship between the effect of the lockdown and the healthy habits in a specific work group, not being expected to show representative results.

As a result, 2.084 participants from 93 Institutes, Centers and Units of CSIC (ICUs) and 7 regional offices were included for further analysis. The sample represents 20% of the 10,541 CSIC workers (Consejo Superior de Investigaciones Científicas, 2020), who mostly telecommuting during the lockdown, in contrast to those working on-site (3%) or both telecommuting and on-site (16%). Since the majority of the participants worked from home during this period, no association was studied to compare this group with those that were allowed to work on-site.

About 62% of the participants were women and significant differences ($p<0.001$) between gender were found for age, BMI and nutritional knowledge (Table 1). Additionally, a positive correlation between age and BMI ($r= 0.025$; $p<0.001$) was found.

	Total	Women	Men
Age (years) (Mean ± SD)	44.5 ±12.4	43.6 ±12.1#	46.1 ±12.7
Height (cm) (Mean ± SD)	168.6 ±8.8	164.0 ±6.3#	176.1 ±6.8
Weight (kg) (Mean ± SD)	68.7 ±13.8	62.4 ±11#	78.7 ±11.8
BMI (kg/m2) (Mean ± SD)	24.1 ±3.9	23.2 ±3.9#	25.4 ±3.5
Gender (%)	100	61.7	38.3
Telecommuting (%)	81	82.6*	78.3
No nutritional knowledge (%)	47.3	44.8**	51.3
BMI: Body Mass Index.			
# Significant differences between gender data by ANOVA t-test (p<0.001); *Significant differences between gender by Chi-Square test (*p<0.05, **p<0.001) are shown in bold.			

Table 1. Socio-demographic characteristics of CSIC participants
Source: Own elaboration from the collected data.

Concerning the living conditions during the COVID-19 lockdown, from 1,660 participants who provided their living condition, 42% lived alone. In addition, nearly half of the sample (45%) had no terrace, stairs or garden in their home.

CHANGES IN DIETARY PATTERNS, PHYSICAL ACTIVITY AND EMOTIONAL STATE

During the lockdown, 33% of the participants increase the preparation of traditional meals, 18% increased meal planning and 15% used shopping lists. 70% of the participants did not change the number of meals per day, where the most common behavior was 3 meals per day.

Almost half of the participants (45.3%) perceived changes in their diet during the confinement (Table 2). From those, 35% expressed that their eating habits had worsened, exhibiting a higher BMI average in this group in relation to participants with a different perception (25.1 ±4.61; 23.6±3.73; 24.3±3.59 kg/m^2 perceived worsening, no change and perceived improvement, respectively; p<0.001). Moreover, women expressed proportionally worse eating habits during the lockdown than men (18.7 and 11.5%, respectively; p<0.001). Concerning age, 21% of the participants under 35 years old expressed that they changed their eating behavior negatively.

Overall, changes in diet were detected (Table 2), observing a rise in the number of participants who increased their consumption of pulses, fruits and vegetables, fish, dairy products, just as no recommended products like savory snacks and bakery goods. Conversely, several participants reduced the intake of red and cured meat, precooked products and fast food.

No significant differences in BMI and nutritional knowledge were detected for healthy and unhealthy scores, result that it should be highlighted. Nevertheless, the group that perceived worse eating habits during the lockdown obtained significant lower marks in the healthy score (0.49 ±0.17; 0.534 ±0.123; 0.651 ±0.157 (perceived worsening, no change and perceived improvement, respectively); p<0.001) and unhealthy score (0.386 ±0168; 0.544 ±0.149; 0.651 ±0.175 (perceived worsening, no change and perceived improvement, respectively; p<0.001). Additionally, a positive correlation between both scores (r=0.205; p<0.001) was found. Moreover, participants who increased their PA were significantly younger than those who reduced it (42.7±12.7 and 45.4±11.8 y, respectively; p<0.001).

Regarding the relationship between dietary patterns and PA, it was observed that, those who had increased their training during the lockdown obtained higher eating scores than those who reduced their PA, for both healthy (0.584 ±0.154 vs. 0.547 ±0.16 (increased vs. decreased PA); p<0.001) and unhealthy scores (0.576 ±0.184 vs. 0.529 ±0.182 (increased vs. decreased PA); p<0.001).

All emotional markers were positively correlated with each other (p<0.001), and a strong correlation between anxiety (anx.), irritability (irr.) and sadness (sad.) was detected (r=0.578 (anx.-irr.), 0.626 (anx.-sad.) and 0.569 (irr.-sad.). Additionally, a negative correlation between age and all emotional indicators was also found (p<0.001).

		Total	Women	Men
Perceived changes in eating behavior (*%)*	*Worsening*	15.9	**18.7*****	**11.5**
	Improvement	29.4	**28.3*****	**31.1**
Water *(%)*	*Lower intake*	20.7	**23.5*****	**16.2**
	Higher intake	17.0	**18.3*****	**15.1**
Energetic drinks *(%)*	*Lower intake*	16.5	16.6	16.3
	Higher intake	13.1	14.1	11.4
Alcoholic drinks *(%)*	*Lower intake*	23.2	23.1	23.5
	Higher intake	19.7	18.5	21.5
Fruits and vegetables *(%)*	*Lower intake*	7.30	7.90	6.10
	Higher intake	28.4	27.4	30.1
Wholegrain cereals *(%)*	*Lower intake*	8.10	**9.30***	**6.30**
	Higher intake	9.40	**8.40***	**10.9**
Pulses *(%)*	*Lower intake*	5.50	6.40	4.00
	Higher intake	28.1	27.5	29.0
Fish *(%)*	*Lower intake*	17.4	16.7	18.6
	Higher intake	21.1	22.4	18.9
Dairy products *(%)*	*Lower intake*	4.75	4.30	5.50
	Higher intake	16.0	15.8	16.2
Red and cured meat *(%)*	*Lower intake*	24.8	24.4	25.3
	Higher intake	8.45	9.50	6.80
Pre-cooked products *(%)*	*Lower intake*	40.6	42.5	37.6
	Higher intake	4.90	4.50	5.40
Sweet snacks *(%)*	*Lower intake*	24.3	**23.3*****	**26.0**
	Higher intake	20.4	**23.7*****	**14.9**
Savory snacks *(%)*	*Lower intake*	21.0	**20.2****	**22.2**
	Higher intake	27.0	**29.9****	**22.3**
Bakery products *(%)*	*Lower intake*	21.0	**19.6*****	**23.3**
	Higher intake	26.6	**31.9*****	**18.1**
Fast food *(%)*	*Lower intake*	34.3	33.5	35.6
	Higher intake	5.60	6.40	4.40
Healthy food score (*Mean ± SD)*		0.561 ± 0.156	0.557 ± 0.156	0.567 ± 0.156
Unhealthy food score (*Mean ± SD)*		0.550 ± 0.182	**0.541 ± 0.185**$^{\#}$	**0.566 ± 0.176**
Changes in physical activity *(%)*	*Decreased PA*	50.8	**48.8***	**54.0**
	Increased PA	33.3	**35.5***	**29.7**
Changes of emotional state (*Mean ± SD)*	*Anxiety*	2.72 ± 1.31	**2.92 ± 1.30**$^{\#\#}$	**2.39 ± 1.25**
	Boredom	2.52 ± 1.31	2.56 ± 1.31	2.46 ± 1.30
	Sadness	2.55 ± 1.26	**2.75 ± 1.25**$^{\#\#}$	**2.23 ± 1.22**
	Irritability	2.51 ± 1.25	**2.63 ± 1.27**$^{\#\#}$	**2.31 ± 1.20**
	Sleep disorders	2.84 ± 1.44	**2.99 ± 1.44**$^{\#\#}$	2.59 ± 1.40

Table 2. Perceived changes in dietary patterns, physical activity and emotional state during the lockdown

Emotional eating

The effect of the emotional changes on the dietary patterns was asked, showing gender differences (p<0.001), where a greater proportion of women declared that emotional changes influenced negatively their eating habits (33% women vs. 25% men).

In fact, women ticked proportionally more the attitudes related to emotional eating: *"I have lost my appetite due to anxiety, sadness..."* (10.1% vs. 4.8%; p<0.001), *"It is difficult for me to control the amount of hyperpalatable food (sweets, fried snacks, etc.) that I eat*" (20.1% vs. 14.5%; p<0.01), *"I eat more because of anxiety, boredom,*

ARBOR Vol. 198, 806, octubre-diciembre 2022, a681 | ISSN: 0210-1963 https://doi.org/10.3989/arbor.2022.806011

etc." (31.7% vs. 27.0%; p<0.05). Besides, a greater proportion of women adopted more *"snacking"* behaviors (22.2%) than men (16.2%) during the lockdown (p<0.01).

A negative correlation between EE score and changes on ES has been observed, especially for boredom (r= -0.269; p<0.001), anxiety (r= -0.246; p<0.001) and irritability (r=-0.219; p<0.001). As well, EE score showed a positive correlation with the healthy score (r=0.114; p<0.001) and unhealthy score (r=0.338; p<0.001). In fact, more emotional eating behaviors were found for a higher intake of savory snacks, bakery products and sweet snacks (p<0.001), as shown in Table 3.

		Savory snacks			Sweet snacks			Bakery products		
		Lower intake	No change	Higher intake	Lower intake	No change	Higher intake	Lower intake	No change	Higher intake
EE score	Total	0.881±0.24	0.853±0.27	0.537±0.39***	0.876±0.24	0.841±0.28	0.468±0.38***	0.866±0.26	0.826±0.29	0.595±0.39***
	Women	**0.882±0.22**	**0.848±0.27**	**0.507±0.38*****	**0.886±0.22**	**0.830±0.29**	**0.450±0.38*****	**0.855±0.27**	**0.816±0.29**	**0.593±0.39*****
	Men	0.879±0.25	0.860±0.26	0.602±0.31***	0.862±0.26	0.858±0.26	0.513±0.40***	0.882±0.25	0.839±0.28	0.604±0.31***
Anxiety	Total	2.72±1.35	2.52±1.29	3.10±1.22***	2.71±1.34	2.54±1.27	3.22±1.25***	2.67±1.34	2.62±1.29	2.95±1.28**
	Women	2.92±1.37	2.72±1.30	3.26±1.17**	**2.91±1.34**	**2.72±1.27**	**3.39±1.20*****	2.89±1.35	2.83±1.31	3.09±1.24
	Men	**2.43±1.26**	**2.23±1.22**	**2.76±1.25***	**2.43±1.28**	**2.28±1.21**	**2.78±1.28***	2.36±1.27	2.35±1.22	2.57±1.31
Boredom	Total	2.44±1.30	2.31±1.24	2.99±1.33***	2.50±1.30	2.34±1.27	3.04±1.29***	2.37±1.29	2.43±1.29	2.83±1.31***
	Women	**2.46±1.33**	**2.34±1.23**	**3.00±1.32*****	**2.48±1.33**	**2.35±1.25**	**3.10±1.28*****	**2.43±1.32**	**2.45±1.28**	**2.81±1.33****
	Men	2.41±1.25	2.27±1.24	2.99±1.36***	2.53±1.27	2.33±1.29	2.88±1.30*	2.30±1.24	2.40±1.31	2.88±1.28***

EE: Emotional Eating; Results expressed in mean ± SD; *Significant differences between consumption changes ANOVA Bonferroni Post Hoc test (*p<0.05; **p<0.01; ***p<0.001) are shown in bold.

Table 3. Emotional eating score, anxiety and boredom levels according to hyperpalatable food consumption

Source: Own elaboration from the collected data.

DISCUSSION

The COVID-19 pandemic has brought about a global health crisis which led to the application of severe restrictive measures on the general population like confinement. Previous outbreaks like SARS o MERS showed that people under isolation can develop psychological disorders (Ko *et al*., 2006; Reynolds *et al*., 2008; Lam *et al*., 2009; Mak *et al*., 2009; Jeong *et al*., 2016; Yoon *et al*., 2016) which may lead to other health problems, as alcohol dependence (Wu *et al*., 2008), besides the possible effect on physical activity and diet. For this reason, health organizations (https://www.euro.who.int/en/health-topics/health-emergencies/coronavirus-covid-19/publications-and-technical-guidance/food-and-nutrition-tips-during-self-quarantine; Academia Española de Nutrición y Dietética y el Consejo General de Colegios Oficiales de Dietistas-Nutricionistas, 2020) specifically established health and nutrition recommendations for a self-quarantine situation during the COVID-19 outbreak.

According to our study conducted with workers telecommuting from CSIC, it seems that these recommendations, in general, were followed, since a tendency for a greater intake of fruits, vegetables, pulses, and a decreased consumption of pre-cooked meals, red and cured meat, and fast food was identified. Our findings correspond with similar studies during the COVID-19 confinement in Spanish adults (Laguna *et al*., 2020; López-Moreno *et al*., 2020; Pérez-Rodrigo *et al*., 2020; Rodríguez-Pérez *et al*., 2020) and other Mediterranean countries (Scarmozzino and Visioli 2020). Some authors reported an increase in the consumption of fruits, vegetables and pulses during confinement that was related to motivations of health or weight control, lower price and long shelf-life (in the case of pulses and canned goods), whereas the decrease in non-perishable ready meals was associated its unhealthy profile (Laguna *et al*., 2020) and more available time for cooking (Laguna *et al*., 2020; Scarmozzino and Visioli, 2020).

Regarding PA, several studies conducted in Spanish population (Balluerka *et al*., 2020; Garre-Olmo *et al*., 2020; López-Bueno *et al*., 2020; Rodríguez-Pérez *et al*., 2020) found out that ~50% of the people exercised less during COVID-19 lockdown, results matching with those presented here. It is worth noting that the participants with worse eating scores, women and young people, were the ones who declared an increase in their PA routine during the confinement. This trend was also observed by García-Tascón *et al*. (2020), who hypothesized that men are more likely to exercise for social, ludic and competitive reasons, while women prefer non-competitive and relaxed sports and, hence, they were able to adapt exercise at home easily. These statements are in line with the study conducted by Sánchez-Sánchez *et al*. (2020), who indicated that men invested more time in exercising before the lockdown than women, whereas during confinement, men have decreased more their training routine than women. Therefore, it seems that men adapted worse their PA practice at home.

Another relevant possible effect of the COVID-19 pandemic over the population is the emotional changes that this situation may trigger. Psychological symptoms such as anxiety, depression or poor sleep quality, have been described during the COVID-19 outbreak in adults (Balluerka *et al*., 2020; Chacón-Fuertes, Fernández Hermida, and García Vera, 2020; DiRenzo *et al*., 2020; Garre-Olmo *et al*., 2020; Ingram, Maciejewski, and Hand, 2020; Jiménez-Pavón, Carbonell-Baeza, and Lavie, 2020; Moccia *et al*., 2020; Ozamiz-Etxebarria *et al*., 2020; Rajkumar, 2020; Beck *et al*., 2021), as well as in previous outbreaks like SARS in 2003 (Hawryluck *et al*., 2004; Ko *et al*., 2006; Wu *et al*., 2008; Lam *et al*., 2009; Mak *et al*., 2009) or MERS-CoV in 2012 (Jeong *et al*., 2016; Yoon *et al*., 2016). Several factors related to the emotional impact caused by COVID-19 pandemic on the population have been described. For instance, the concern for oneself infection or their relatives (Balluerka *et al*., 2020; Wang *et al*., 2020) or an adverse work situation, especially for those whose economy may be compromised (Garre-Olmo *et al*., 2020), could be the origin of emotional alterations. In this sense, CSIC participants did not jeopardize their job during the COVID-19 crisis, but they experienced emotional changes, especially sleep disorders and anxiety. According to Garre-Olmo *et al*. (2020), changing work conditions, including telecommuting, is associated with depressive symptoms, which was the situation of the majority of our participants. Moreover, young participants experienced more changes in ES than older workers did. Similar results have been reported in other studies (Balluerka *et al*., 2020; ; DiRenzo *et al*., 2020; Ozamiz-Etxebarria *et al*., 2020; Qiu *et al*., 2020; Beck *et al*., 2021). The effect of overload information or *infodemic* could be a possible explanation to this behavior, which has been pointed out as a cause of anxiety and depression (DiRenzo *et al*., 2020; Gao *et al*., 2020), especially in young people who are usually more exposed to social media (Qiu *et al*., 2020). Lastly, women have shown more anxiety, sadness, sleep disorders and irritability than men have. Even though, Ozamiz-Etxebarria *et al*. (2020) described more depressive symptoms in men and similar levels of stress and anxiety in relation to gender. However, other studies reported more emotional changes in women (Balluerka *et al*., 2020; DiRenzo *et al*., 2020; López-Moreno *et al*., 2020; Qiu *et al*., 2020; Wang *et al*., 2020; Beck *et al*., 2021). For instance, Navas-Martín *et al*. (2021) highlighted the greater impact on habit changes, especially those related to home care, in women and people living with children. According to Moscoso-Sánchez (2020), this could be related to the women's triple role (reproductive, housekeeping and work outside the home) that still prevails.

Furthermore, some authors linked psychological behaviors such as emotional eating (Nonogaki, Nozue and Oka, 2007; Rodríguez-Martín and Meule 2015; Ferrell *et al*., 2020; Yilmaz and Gökmen, 2020); or alcohol use (Boscarino, Adams, and Galea, 2006; Wu *et al*., 2008; Lebeaut, Tran, and Vujanovic, 2020; Sallie *et al*., 2020) as strategies to cope with stressful situations. In fact, after the SARS outbreak Wu *et al*. (2008) reported an association between individuals who were in quarantine, with later alcohol abuse or dependence symptoms. Our results showed that 23% of the participants decreased their alcohol consumption while 20% increased it during the confinement, in accordance with other recent studies (Balluerka *et al*., 2020; López-Moreno *et al*., 2020; Sallie *et al*., 2020). Additionally, the mean age of those who increased their alcohol consumption (45.4±11.3y) was higher than those who decreased it (40.2±13.6y), findings concurring with those presented by Sallie *et al*. (2020), who postulated that older individuals, parents with children, essential workrs, people with depressive and anxiety symptoms or an impulsive personality might have a greater risk for alcohol misuse.

Concerning EE, our results showed a greater intake of snacks during the lockdown, which is in line with consumer reports from grocery stores (Los españoles confinados picotean hasta un 50% más; El ticket medio recupera la estabilidad. ¿Cómo evolucionan las compras de alimentación y bebidas en el confinamiento?) and other in-

vestigations (Laguna *et al*., 2020; Naja and Hamadeh, 2020; Ruiz-Roso *et al*., 2020; Sánchez-Sánchez *et al*., 2020; Scarmozzino and Visioli, 2020; Sidor and Rzymski, 2020) during the same situation. This could be related to the fact that negative emotions can trigger the intake of energy-dense food, such as snacks or sweets (Macht, 2008; Camilleri *et al*., 2014; Clum *et al*., 2014; Charbonnier *et al*., 2015). Additionally, women showed an overall greater consumption of these products in our study, as it has been recently reported (Balluerka *et al*., 2020; Pérez-Rodrigo *et al*., 2020). This behavior could be associated with higher anxiety levels experienced in women, who increased their savory and sweet snacks intake during the lockdown. In fact, it seems that emotional changes have a greater influence on eating behaviors in women, as 33% of them in our study declared that emotions exert a negative effect on their diet vs. 25% of men. These findings are supported by the results of López-Moreno *et al*. (2020).

Diverse hypotheses correlate specific eating behaviors with higher levels of stress and negative emotions. Physiologically, food intake is suppressed under stress-induced psychological changes due to the activation of the sympathetic nervous system, which may interfere with digestion processes such as gastrointestinal transit or by delaying glucose absorption (Tsigos *et al*., 2000). However, overeating behavior under negative emotions or stress conditions has well been reported. The reason for these mixed behaviors is a complex problem still unresolved and may involve physiological, behavioral, emotional and cognitive mechanisms (Macht, 2008; DiRenzo *et al*., 2020; Muscogiuri *et al*., 2020). Thus, food-induced emotion may affect the control of food choice, where energy-dense foods usually rich in fat and sugar, would evoke positive affective responses causing a greater intake, whereas bitter compounds would provoke the opposite effect (Charbonnier *et al*., 2015). Another class of emotion-induced changes that could trigger overeating is the impairment of cognitive eating controls. Lastly, a learning perspective could be the motive in which eating would be used as a strategy to regulate emotions. In this case, the learning process would involve the negative emotions as the stimuli and eating palatable food as the operant behavior, which would result in a reduction of the negative emotions due to the mood-elevating effect of this kind of food. The repetition of this behavior may reinforce it and might be used to cope with negative emotions (Rodríguez-Martín and Meule, 2015). For instance, in the study of DiRenzo *et al*. (2020) about the relationship between eating habits, mental and emotional mood among the Italian population, almost half of the participants claimed that they used food when they felt anxious as a tool to feel better.

Regarding the effect of boredom on EE, Koball *et al*. (2012) pointed out that boredom should be considered in a separate dimension of EE, since the eating response, which triggers is different from the response activated by other emotions. This may explain why our results did not show gender differences when participants felt bored. Laguna *et al*. (2020) suggested that the lockdown forced the population to transfer the usual leisure activities to home, which would raise the intake of snacks and homemade bakery. In fact, higher levels of boredom were associated with the intake of bakery goods and all kinds of snacks (Muscogiuri *et al*. 2020). Moreover, according to consumer reports (Cotos 2020; https://www.revistainforetail.com/noticiadet/el-ticket-medio-recupera-la-estabilidad/738fe8425e3be42b8b685a0751b23265) the sales of products related to homemade bakery and appetizers remarkably increased, reaching even to be sold out during the confinement.

This study presents some limitations as the possible bias owing to the self-reported data. In addition, this kind of online questionnaires cannot be excessively longer because of the risk of a low engagement level.

Our study was designed to explore the effect of the lockdown during the first and more severe period. For this reason, the data cannot be considered representative, not being possible, for instance, to determine in a deeper level the gender differences regarding the home care. A longer study targeting the same population in different stages of the pandemic, as the inclusion of other variables, would have contribute to establish stronger and additional correlations.

The strength of this study is the large representation of all CSIC centers and the notable number of participants considering the total CSIC workers.

CONCLUSIONS

The COVID-19 health crisis and the *ad doc* lockdown measures implemented in Spain seem to cause a negative effect on CSIC workers' lifestyles, especially from a psychological status point of view. This work shows the effects

of the lockdown on a specific population, which did not have risk of losing their jobs, but had to change their working conditions to a telecommuting mode.

Despite emotional changes were detected, a general improvement in the dietary patterns was identified, probably owing to an increased health concern and more available time for cooking. However, the intake of unhealthy products such as snacks and bakery goods seem to have increased during the confinement, especially in women. This consumption could be associated with greater emotional changes in women, particularly for anxiety, and the strategies adopted by them to cope with these emotional alterations. In this way, emotional eating behaviors, like snacking, lack of control over the consumption of hyperpalatable food and intake related to emotions, have been associated with greater levels of anxiety. In addition, it should be highlighted that in a context where food is undoubtedly involved in Spanish leisure activities, it is not surprising the link of boredom and a greater intake of snacks and bakery products.

Moreover, the mobility restrictions established during confinement had a great effect on the practice of physical activity that was reduced in almost half of the population. In addition, it seems that men adapted their PA practice worse to the confinement situation, possibly due to the type of sport practiced before the pandemic.

Further investigations are needed to determine the long-term effects of COVID-19 lockdown on the population's lifestyles. Therefore, our study provides initial information about how the lockdown influenced this specific population and then develop future interventions to mitigate it.

ACKNOWLEDGMENTS

The authors thank all the anonymous individuals for their participation in this COVID-19-specific research and all the CSIC workers involved in the dissemination of the online questionnaire.

REFERENCES

Academia Española de Nutrición y Dietética y Consejo General de Colegios Oficiales de Dietistas-Nutricionistas. (2020). Recomendaciones de alimentación y nutrición para la población española ante la crisis sanitaria del COVID-19. Available at https://academianutricionydietetica.org/NOTICIAS/alimentacioncoronavirus.pdf

Balluerka Lasa, Nekane; Gómez Benito, Juana; Hidalgo Montesinos M.ª Dolores, Gostiosaga Manterola, Arantxa; Espada Sánchez, José Pedro; Padilla García, José Luis; Santed Germán, Miguel Ángel (2020). Las consecuencias psicológicas de la COVID-19 y el confinamiento. Informe de investigación. Available at https://www.ub.edu/web/ub/ca/menu_eines/noticies/docs/Consecuencias_psicologicas_COVID-19.pdf

Beck, Francois; Léger, Damien; Fressard, Lisa; Peretti-Wattel, Patrick; Verger, Pierre (2021). COVID-19 health crisis and lockdown associated with high level of sleep complaints and hypnotic uptake at the population level. *Journal of Sleep Research* 30 (1), e13119.

Boscarino, Joseph; Adams, Richard; Galea, Sandro (2006). Alcohol use in New York after the terrorist attacks: a study of the effects of psychological trauma on drinking behavior. *Addictive Behaviors* 31 (4): 606-621.

Brooks, Samantha; Webster, Rebecca; Smith, Louise; Woodland, Lisa; Wessely, Simon; Greenberg, Neil; Rubin, Gedeon James (2020) The psychological impact of quarantine and how to reduce it: rapid review of the evidence. *The Lancet* 395 (10227): 912-920.

Camilleri, Géraldine; Méjean, Caroline; Kesse-Guyot, Emmanuelle; Andreeva, Valentina; Bellisle, France; Hercberg, Serge; Péneau, Sndrine (2014). The associations between emotional eating and consumption of energy-dense snack foods are modified by sex and depressive symptomatology. *The Journal of Nutrition* 144 (8): 1264-1273.

Cardi, Valentina; Leppanen, Jenni; Treasure, Janet (2015). The effects of negative and positive mood induction on eating behavior: a meta-analysis of laboratory studies in the healthy population and eating and weight disorders. *Neuroscience & Biobehavioral Reviews* 57: 299-309.

Chacón-Fuertes, Fernando; Fernández Hermida, José Ramón; García Vera, M.ª Paz (2020). La psicología ante la pandemia de la COVID-19 en España. La respuesta de la organización colegial. *Clínica y Salud* 31 (2): 119-123.

Charbonnier, Lisette; van der Laan, Laura; Viergever, Max A.; Smeets, Paul A. M. (2015). Functional MRI of Challenging Food Choices: Forced Choice between Equally Liked High- and Low-Calorie Foods in the Absence of Hunger. *PLoS One* 10 (7), e0131727.

Clum, Gretchen A.; Rice, Janet; Broussard, Marsha; Johnson, Carolyn C.; Webber, Larry S. (2014). Associations between depressive symptoms, self-efficacy, eating styles, exercise and body mass index in women. *Journal of Behavioral Medicine*. 37 (4): 577-586.

Consejo Superior de Investigaciones Científicas (CSIC) (2020). Datos de Institutos y Centros 2019. Ministerio de Ciencia e Innovación, Gobierno de España. Available at https://www.csic.es/es/el-csic/informacion-corporativa/el-csic-en-cifras

Cotos, Carlos (2020). Los españoles llenan más sus cestas en el confinamiento. *Kantar*. Available at https://www.kantar.com/es/inspiracion/coronavirus/los-espanoles-llenan-mas-sus-cestas-en-el-confinamiento

Di Renzo, Laura; Gualtieri, Paola; Cinelli, Giulia; Bigioni, Giulia; Soldati, Laura; Attinà, Alda; Bianco, Francesca Fabiola *et al*. (2020). Psychological aspects and eating habits during COVID-19 home confinement: Results of EHLC-COVID-19 Italian Online Survey. *Nutrients* 12 (7), 2152.

El ticket medio recupera la estabilidad. ¿Cómo evolucionan las compras de alimentación y bebidas en el confinamiento? *InfoRetail*. Available at https://www.revistainforetail.com/noticiadet/el-ticket-medio-recupera-la-estabilidad/738fe8425e3be42b-8b685a0751b23265

Ferrell, Emily; Watford, Tanya; Braden, Abby (2020). Emotion regulation difficulties and impaired working memory interact to predict boredom emotional eating. *Appetite* 144, 104450.

Gao, Junling; Zheng, Pinpin; Jia, Yingnan; Chen, Hao; Mao, Yimeng; Chen, Sohong; Wang, Yi; Fu, Hua; Dai, Juming (2020). Mental health problems and social media exposure during COVID-19 outbreak. *PlosOne* 15 (4), e0231924.

García-Álvarez, Leticia; de la Fuente-Tomás, Lorena; Sáiz, Pilar Alejandra; García Portilla, M.ª Paz; Bobes, Julio (2020). ¿Se observarán cambios en el consumo de alcohol y tabaco durante el confinamiento por COVID-19? *Adicciones* 32 (2): 85-89.

García-Tascón, Marta; Sahelices-Pinto, César; Mendaña-Cuervo, Cristina; Magaz González, Ana María (2020). The Impact of the COVID-19 Confinement on the Habits of PA Practice According to Gender (Male/Female): Spanish Case. *International Journal of Environmental Research and Public Health* 17 (19), 6961.

Garre-Olmo, Josep; Turró-Garriga, Oriol; Martí-Lluch, Ruth; Zacarías Pons, Lluis; Alves Cabratosa, Lía; Serrano Sarbosa, Domènech; Vilalta Franch, Joan; Ramos, Rafel (2020). Changes in lifestyle resulting from confinement due to COVID-19 and depressive symptomatology: A cross-sectional a population-based study. *Comprehensive Psychiatry* 104, 152214.

Hawryluck, Laura; Gold, Wayne; Robinson, Susan; Pogorsky, Stephen; Galea, Sandro; Styra, Sima (2004). SARS control and psychological effects of quarantine, Toronto, Canada. *Emerging Infectious Diseases* 10 (7), 1206.

Ingram, Joanne; Maciejewski, Greg; Hand, Christopher (2020). Changes in diet, sleep, and physical activity are associated with differences in negative mood during COVID-19 lockdown. *Frontiers in Psychology* 11, 2328.

Jeong, Hyunsuk; Yim, Hyeon; Song, Yeong-Jun; Ki, Moran; Min, Yung-Ah; Cho, Juhee; Chae, Jeong-Ho (2016). Mental health status of people isolated due to Middle East Respiratory Syndrome. *Epidemiology and Health* 38.

Jiménez-Pavón, David; Carbonell-Baeza, Ana; Lavie, Carl J. (2020). Physical exercise as therapy to fight against the mental and physical consequences of COVID-19 quarantine: Special focus in older people. *Progress in Cardiovascular Diseases* 63 (3), 386.

Ko, Chih-Hung; Yen, Cheng-Fang; Yen, Ju-Yu; Yang, Ming-Jen (2006). Psychosocial impact among the public of the severe acute respiratory syndrome epidemic in Taiwan. *Psychiatry and Clinical Neurosciences* 60 (4): 397-403.

Koball, Afton M.; Meers, Molly R.; Storfer-Isser, Amy; Domoff, Sarah E.; Musher Einzenman, Dara R. (2012). Eating when bored: Revision of the emotional eating scale with a focus on boredom. *Health Psychology* 31 (4): 521-524.

Konttinen, Hanna; Silventoinen, Karri; Sarlio-Lähteenkorva, Sirpa; Männistö, Satu (2010). Emotional eating and physical activity self-efficacy as pathways in the association between depressive symptoms and adiposity indicators. *The American Journal of Clinical Nutrition* 92 (5): 1031-1039.

Laguna, Laura; Fiszman, Susana; Puerta, P.; Chaya, C.; Tárrega, A. (2020). The impact of COVID-19 lockdown on food priorities. Results from a preliminary study using social media and an online survey with Spanish consumers. *Food Quality and Preference* 86, 104028.

Lam, Marco Ho Bun; Wing, Yun-Kwok; Yu, Mandy, Wai Man; Leung, Chi-Ming; Ma, Ronald C. W.; Kong, Alice P. S.; So, W. Y.; Fong, Samson Yat-Yuk; Lam, Siu-Ping (2009). Mental morbidities and chronic fatigue in severe acute respiratory syndrome survivors: long-term follow-up. *Archives of Internal Medicine* 169 (22): 2142-2147.

Lebeaut, Antoine; Tran, Jana K.; Vujanovic, Anka A. (2020). Post-traumatic stress, alcohol use severity, and alcohol use motives among firefighters: The role of anxiety sensitivity. *Addictive Behaviors* 106, 106353.

Lima, Carlos Kennedy Tavares; de Medeiros Carvalho, Poliana Moreira de Medeiros; de Araújo Araruna Silva Lima, Igor; de Oliveira Nunes, José Victor Alexandre; Saraiva, Jeferson Steves; de Sousa, Ricardo Inácio; daSilva, Claúdio Gleidiston Lima; Neto, Modesto Leite Rolim (2020). The emotional impact of Coronavirus 2019-nCoV (new Coronavirus disease). *Psychiatry Research* 287, 112915.

López-Bueno, Rubén; Calatayud, Joaquín; Andersen, Lars L.; Balsalobre Fernández, Carlos; Casaña, José; Casajús, José A.; Smith, Lee; López Sánchez, Guillarmo F. (2020). Immediate impact of the COVID-19 confinement on physical activity levels in Spanish adults. *Sustainability* 12 (14), 5708.

López-Moreno, Miguel; Iglesias López, María Teresa; Miguel, Marta; Garcés Rimón, Marta (2020). Physical and Psychological Effects Related to Food Habits and Lifestyle Changes Derived from COVID-19 Home Confinement in the Spanish Population. *Nutrients* 12 (11), 3445.

Los españoles confinados picotean hasta un 50% más. *Kantar*. https://www.kantarworldpanel.com/es/Noticias/Los-espaoles-confinados-picotean-hasta-un-50-ms.

Macht, Michael (2008). How emotions affect eating: a five-way model. *Appetite* 50 (1): 1-11.

Mak, Ivan Win Chi; Chu, Chung Min; Pan, Pey Chyou; Gar Chung Yiu, Michael; Lee Chan, Veronica (2009). Long-term psychiatric morbidities among SARS survivors. *General Hospital Psychiatry* 31 (4): 318-326.

Martínez-Ferrán, María; de la Guía-Galipienso, Fernando; Sanchis-Gomar, Fabián; Pareja Galeano, Helios (2020). Metabolic Impacts of Confinement during the COVID-19 Pandemic Due to Modified Diet and Physical Activity Habits. *Nutrients* 12 (6), 1549.

Moccia, Lorenzo; Janiri, Delfina; Pepe, Maria; Dattoli, Luigi; Molinaro, Marzio; de Martin, Valentina; Chieffo, Daniela; Janiri, Luigi; Fiorillo, Andrea; Sani, Gabriele; di Nicola, Marco (2020). Affective temperament, attachment style, and the psychologi-

cal impact of the COVID-19 outbreak: an early report on the Italian general population. *Brain, Behavior, and Immunity*, 87: 75-79.

Moscoso-Sánchez, David (2020) El contexto del deporte en España durante la crisis sanitaria de la COVID-19. *Sociología del Deporte* 1 (1): 15-19.

Muscogiuri, Giovanna; Barrea, Luigi; Savastano, Silvia; Colao, Anna Maria (2020). Nutritional recommendations for COVID-19 quarantine. *European Journal of Clinical Nutrition* 74 (6): 850-851.

Naja, Farah; Hamadeh, Rena (2020). Nutrition amid the COVID-19 pandemic: a multi-level framework for action. *European Journal of Clinical Nutrition* 74 (8): 1117-1121.

Navas-Martín, Miguel Ángel; López-Bueno, José Antonio; Oteiza, Ignacio; Cuerdo Vilches, Teresa (2021). Routines, Time Dedication and Habit Changes in Spanish Homes during the COVID-19 Lockdown. A Large Cross-Sectional Survey. *International Journal of Environmental Research and Public Health* 18 (22), 12176.

Nonogaki, Katsunori; Nozue, Kana; Oka, Yoshitomo (2007) Social isolation affects the development of obesity and type 2 diabetes in mice. *Endocrinology* 148 (10): 4658-4666.

Ozamiz-Etxebarria, Naiara; Idoiaga-Mondragon, Nahia; Dosil-Santamaría, María; Picaza Gorrotxategi, Maitane (2020). Psychological symptoms during the two stages of lockdown in response to the COVID-19 outbreak: an investigation in a sample of citizens in Northern Spain. *Frontiers in Psychology* 11, 1491.

Papandreou, Christopher; Arija, Victoria; Aretouli, Eleni; Tsilidis, Kostantinos; Bulló, Mònica (2020). Comparing eating behaviours and symptoms of depression and anxiety between Spain and Greece during the COVID-19 outbreak: Cross-sectional analysis of two different confinement strategies. *European Eating Disorders Review* 28 (6): 836-846.

Pérez-Rodrigo, Carmen; Gianzo Citores, Marta; Hervás Bárbara, Gotzone; Ruiz Litago, Fátima; Casis Sáenz, Luis; Aranceta Bartrina, Javier (2020). Cambios en los hábitos alimentarios durante el periodo de confinamiento por la pandemia COVID-19 en España. *Revista Española de Nutrición Comunitaria* 26 (2), 28010.

Qiu, Jianyin; Shen, Bin; Zhao, Min; Wang, Zhen; Bin, Xie; Yifeng, Xu (2020). A nationwide survey of psychological distress among Chinese people in the COVID-19 epidemic: implications and policy recommendations. *General Psychiatry* 33 (2), 100213.

Rajkumar, Ravi Philip; (2020). COVID-19 and mental health: A review of the existing literature. *Asian Journal of Psychiatry* 52, 102066.

Reynolds, Donna L.; Garay, Jason Robert; Deamond, Sherri L.; Moran, Maura K.; Gold, Wayne.; Styra, ima. (2008). Understanding, compliance and psychological impact of the SARS quarantine experience. *Epidemiology & Infection* 136 (7): 997-1007.

Rodríguez-Martín, Boris C.; Meule, Adrian (2015). Food craving: new contributions on its assessment, moderators, and consequences. *Frontiers in Psychology* 6, 21.

Rodríguez-Pérez, Celia; Molina-Montes, Esther; Verardo, Vito; Artacho, Reyes; García Villanova, Belén; Guerra Hernández, Eduardo Jesús; Ruiz López, María Dolores (2020). Changes in Dietary Behaviours during the COVID-19 Outbreak Confinement in the Spanish COVIDiet Study. *Nutrients*. 12 (6), 1730.

Ruiz-Roso, María Belén; de Carvalho Padilha, Patricia; Mantilla-Escalante, Diana C.; Ulloa, Natalia; Brun, Paola; Acevedo Correa, Diofanor; Arantes Ferreira Peres, Wilza *et al*. (2020). COVID-19 confinement and changes of adolescent's dietary trends in Italy, Spain, Chile, Colombia and Brazil. *Nutrients* 12 (6), 1807.

Sallie, Samantha N.; Ritou, Valentin; Bowden-Jones, Henrietta; Voon, Valerie (2020). Assessing international alcohol consumption patterns during isolation from the COVID-19 pandemic using an online survey: highlighting negative emotionality mechanisms. *BMJ Open* 10 (11), e044276.

Sánchez-Sánchez, Eduardo; Ramírez-Vargas, Guillermo; Avellaneda-López, Ylenia; Orellana Pecino, J. Ignacio; García Marín, Esperanza; Díaz Jiménez, Jara (2020). Eating habits and physical activity of the Spanish population during the COVID-19 pandemic period. *Nutrients* 12 (9), 2826.

Scarmozzino, Federico; Visioli, Francesco (2020). COVID-19 and the Subsequent Lockdown Modified Dietary Habits of Almost Half the Population in an Italian Sample. *Foods* 9 (5), 675.

Sidor, Aleksandra; Rzymski, Piotr (2020). Dietary Choices and Habits during COVID-19 Lockdown: Experience from Poland. *Nutrients* 12 (6), 1657.

Tsigos, Constantine; Kyrou, Ioannis; Kassi, Eva; Chrousos, George P. (2000). Stress: Endocrine Physiology and Pathophysiology. Available at https://www.ncbi.nlm.nih.gov/books/NBK278995/

Wang, Cuiyan; Pan, Riyu; Wan, Xiaoyang; Tan, Yiling; Xu, Linkang; Ho, Cyrus S.; Ho, Roger C. (2020). Immediate psychological responses and associated factors during the initial stage of the 2019 coronavirus disease (COVID-19) epidemic among the general population in China. *International Journal of Environmental Research and Public Health* 17, 1729.

World Health Organization (WHO) (2020a) Noncommunicable diseases https://www.who.int/health-topics/noncommunicable-diseases#tab=tab_1

World Health Organization (WHO) (2020b) Food and nutrition tips during self-quarantine. https://www.euro.who.int/en/health-topics/health-emergencies/coronavirus-covid-19/publications-and-technical-guidance/food-and-nutrition-tips-during-self-quarantine.

Wu, Ping; Liu, Xinhua; Fang, Yunyun; Fan, Bin; Fuller, Cordelia J.; Guan, Zhiqiang; Yao, Zhongling; Kong, Jonhui; Lu, Jin; Litvak, Iva J. (2008). Alcohol abuse/dependence symptoms among hospital employees exposed to a SARS outbreak. *Alcohol & Alcoholism* 43 (6): 706-712.

Yılmaz, Cemile; Gökmen, Vural (2020). Neuroactive compounds in foods: occurrence, mechanism and potential health effects. *Food Research International* 128, 108744.

Yoon, Mi-Kyung; Kim; Soon-Young; Ko, Hye-Sun; Lee, Myung-Soo (2016). System effectiveness of detection, brief intervention and refer to treatment for the people with post-traumatic emotional distress by MERS: a case report of community-based proactive intervention in South Korea. *International Journal of Mental Health Systems* 10 (1), 51.