

Changes in lifestyle resulting from confinement due to COVID-19 and depressive symptomatology: A cross-sectional a population-based study



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ABSTRACT

Background: The measures adopted to control the spread of the COVID-19 pandemic in several countries included mobility and social restrictions that produced an immediate impact on the lifestyle of their inhabitants.

Methods: We assessed the association between the consequences of these measures and depressive symptomatology using a population-based sample of 692 individuals aged 18 or over from an ongoing study in the province of Girona (Catalonia, Spain). Participants responded to a telephone-based survey that included questions related to the consequences of confinement and the Patient Health Questionnaire-9 (PHQ-9) was used to assess depressive symptomatology. Multivariate logistic and linear regressions were used to identify which changes in lifestyle resulting from confinement were independently associated with a possible depression episode and depressive symptomatology.

Results: The prevalence of a possible depressive episode during the confinement was 12.7% (95% CI = 10.3–15.4). An adverse work situation, expected economic distress, self-reported worsening of the mental health and of the dietary pattern, and worries about a relative's potential infection were variables related to an increased risk of having a possible depressive episode. The changes in lifestyle accounted for 32% of the variance of the PHQ-9 score.

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Conclusion: The findings indicate an association of the job situation, the expected negative economic consequences, the perceived worsening of health and habits, and the worries about COVID-19 infection with depressive symptomatology during the confinement.

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1. Introduction

The coronavirus disease 2019 (COVID-19) is caused by a new type of coronavirus called severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) [1]. Since the first reported cases on December 31, 2019 [2], its rapid escalation led the World Health Organization to declare the outbreak a global health emergency on January 30, 2020 [3], and further, in 11 March 11, 2020, to declare a pandemic with more than 118,000 cases in over 110 countries [4]. In order to control the risk of further spread among their population, most countries implemented several public health measures to reduce person-to-person transmission of COVID-19. Although there were some differences among the measures adopted by countries, most of them advocated for isolation of symptomatic patients, quarantine for individuals with history of contact with COVID-19 positive persons, social distancing, face mask use, movement restrictions, business interruptions, all of which disrupted people's lives [5,6]. In early April 2020, more than 3.9 billion people—that is, nearly half of the world's population—in more than 90 countries or territories were asked or ordered to stay home [7].

The restrictive measures adopted to control the spread of the COVID-19 pandemic combined with case detection strategies reduced the basic reproduction number in most countries or territories [8–11]. However, these measures largely affected people's daily activities, including their jobs, education, social interactions, physical activity, and other daily tasks such as buying food and other products of primary necessity [12–15]. In addition, the unprecedented lockdown caused by the COVID-19 pandemic also compromised the economic activity in most countries because some large companies and small business temporarily laid off workers due to work interruption [16].

The COVID-19 pandemic has become a world health threat and has the potential to trigger a wide range of psychological problems and psychiatric disorders in the short and long term among frontline healthcare professionals, but also in other vulnerable groups, and in the general population [15,17–22]. According to a policy brief on COVID-19 and mental health issued by the United Nations in early May 2020, mental health promotion, protection, and care are three important recommended actions that should be implemented to minimize mental health consequences of this pandemic, including a whole-of-society approach. The organization of mental health services for the (immediate) future would ensure widespread availability of emergency mental health, psychological support, and support recovery from COVID-19 [23].

Though there are few large-scale studies, there is a growing number of observational studies from some affected countries that indicate an increase of mental health problems during the acute phase of the pandemic [24,25]. The largest study to date used an online questionnaire publicly accessible nationwide in China, and reported that almost 35% of the respondents experienced psychological distress during the first weeks of the pandemic [26]. Existing evidence from the 2003 outbreak of severe acute respiratory syndrome (SARS) indicates that factors such as physical isolation and distance from loved ones and peers, fear of becoming infected themselves or their relatives, risk of losing their income, and uncertainty about the future, contributed to the upsurge of a wide range of anxious and depressive symptoms among the population [27]. There is a need for more representative and population-based studies about the effect of the specific consequences of confinement (such as social restriction, changes in the job situation, economic distress, and physical activity limitations), on the affective health of the population during the COVID-19 outbreak.

We aimed to assess the relationship between the consequences of the confinement due to the COVID-19 pandemic on the physical and mental health status, on the dietary pattern, on people's daily activities, including their job, social interactions, physical activities, and worries about being infected and the risk of possible depressive episode and depressive symptomatology in the general population aged 18 years or over.

2. Methods

2.1. Subjects

The subjects came from the *Girona Healthy Region Study*, which is an ongoing population-based observational study to identify healthy lifestyle determinants in the general population aged 18 years or over living in the province of Girona (Catalonia). Participants were selected by a stratified random sampling procedure according to the population structure. The inclusion criteria included age equal to 18 years or above, and signature of the informed consent. Subjects with terminal illness, cognitive impairment or dementia, intellectual disability, or institutionalized were not included. The fieldwork of the *Girona Healthy Region Study* started on February 22, 2019 and was temporally interrupted on January 30, 2020. Up to such date of fieldwork interruption we included 930 participants, 847 of whom agreed to be contacted in the future for further health examinations.

After the state of alarm implemented by the Spanish government on March 15, 2020, the *Girona Healthy Region Study* investigators agreed to contact the study participants by telephone to examine the consequences of the population movement restrictions and confinement on health. A specific study protocol for the new objective was developed and approved by the Ethics Committee of the IDIAP Jordi Gol (ref. 20/063-PCV).

2.2. Questionnaires

The telephone-based questionnaire of COVID-19 confinement consequences comprised questions related to current work situation, expected economic difficulties, consequences on physical and mental health, perception of changes in dietary pattern, and sport practice and social contact frequency changes. The specific questions and the response options are reported in Table 1. To assess depressive symptomatology we used the Patient Health Questionnaire-9 (PHQ-9) [28]. The PHQ-9 is a common questionnaire used as depression screening tool in primary care and other medical settings with a cutoff ≥ 10 , which has a sensitivity and specificity of 0.88 and 0.85, respectively, to detect a major depressive episode [29]. The PHQ-9 includes nine questions to quantify the frequency over the last two weeks of nine symptoms derived from diagnostic criteria for a major depressive episode of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) [30]. The PHQ-9 score can range between 0 and 27, higher scores indicate higher severity. The PHQ-9 has a two-factor item structure including an affective and a somatic factor [31]. The affective factor includes the items "little interest or pleasure in doing things", "feeling down, depressed or hopeless", "feeling tired or having little energy", "feeling bad about yourself" and "thoughts of being better off dead"; and the somatic factor includes the items "trouble falling asleep", "poor appetite or overeating", "trouble concentrating on things" and "moving or speaking slowly".

Table 1
The COVID-19 confinement telephone-based questions.

| |
|---|
| 1. Has this situation of confinement affected in any way your employment situation? |
| a) No, my working conditions are the same as before; b) No, I am now working from home; c) No, I'm currently not working due to the lockdown of my company, but I'm still employed; d) Yes, my company has temporarily closed, and I am temporarily laid off; e) Yes, my company has closed, and I have been laid off; f) No, I did not work before confinement; g) No, I'm retired |
| 2. To what extent do you think that this health crisis will affect your home income in the future? |
| a) Not at all; b) Somewhat; c) Considerably; d) A lot |
| 3. With regard to your physical health, you would say that during the confinement: |
| a) It grew worse; b) It did not change; c) It improved |
| 4. With regard to your mental health status, you would say that during the confinement: |
| a) It grew worse; b) It did not change; c) It improved |
| 5. With regard to your daily diet, you would say that during the confinement: |
| a) It grew worse; b) It did not change; c) It improved |
| 6. Have you been able to practice sport during the confinement? |
| a) Less than usual; b) As usual; c) More than usual |
| 7. Have you been able to maintain your social relationships through the phone or video calls during the confinement? |
| a) Less than usual; b) As usual; c) More than usual |
| 8. How worried are you about being infected by coronavirus? |
| a) Not worried; b) Neutral; c) Worried |
| 9. How worried are you that a member of your family may be infected by coronavirus? |
| a) Not worried; b) Neutral; c) Worried |

2.3. Local circumstances of the COVID-19 pandemic and data collection procedure

The state of alarm in Spain was active between March 15 and June 19, 2020, and the data collection was performed between April 8 and May 4, 2020. Under the state of alarm the restrictions included the suspension of all academic activities and Spanish citizens were obliged to stay at home except to purchase food and medicines, to go to work, or to attend emergencies. Moreover, an extraordinary Council of Ministers of the Spanish Government approved a more restrictive lockdown period that included the temporary closure of all the non-essential activities and businesses between March 29 and April 9, and established a recoverable paid leave for affected workers.

At the beginning of the fieldwork there were 149,690 confirmed cases of COVID-19 and an increase of 6180 cases from the previous day. In such date there were 16,720 confirmed deaths, and an increase of 642 deaths from the previous day. At the end of the fieldwork there were 221,025 confirmed cases of COVID-19 and an increase of 884 cases from the previous day. In such date there were 25,740 confirmed deaths, and an increase of 177 deaths from the previous day.

The work team of four nurses that performed the fieldwork of the *Girona Healthy Region Study* and two junior researchers received training on administration of the telephone-based questionnaire, including a virtual briefing session to harmonize the questionnaire administration procedures. The first part of the telephone conversation included a brief presentation of the survey objectives and of the statement on data protection. After verbal acceptance to participate by the subjects, the interviewers read aloud each question and the response options. Candidates were classified as not-located if they did not respond to the telephone calls in five occasions performed in different day-time frames during the study fieldwork period.

2.4. Statistical analysis

A descriptive analysis of the study variables was carried out using absolute and relative frequencies for qualitative variables, and central tendency and dispersion measures for quantitative variables. A bivariate analysis was performed to assess differences between participants'

characteristics below and above the PHQ-9 cutoff score using the Student's *t*-test or the Chi-square test.

The following multivariate analyses were performed to quantify the association between the consequences of the confinement and the risk of depressive episode or depressive symptomatology. First, a multivariate logistic regression analysis was adjusted setting the score of the PHQ-9 as dependent variable (depressive episode vs. no-depression defined by the cutoff) and variables on side effects of the confinement as independent variables. Further, three multivariate linear regression analyses were adjusted to explore the dimensionality of depressive symptomatology using the global PHQ-9 score and the affective and somatic factors as dependent variables. For each linear regression model adjusted, we assessed homoscedasticity, normal distribution of residuals, absence of multicollinearity, and absence of extreme values. Homoscedasticity was determined with the Levene's test of variance homogeneity for the residuals of the predicted score for the stratified regression model according to the grouping by quartiles of the predicted score. The normal distribution of the residuals was determined by visual inspection of the histogram. The presence of multicollinearity was evaluated with the Variance Inflation Factors (VIFs) which must not be above 10 [32]. Cook's distance was calculated to identify possible influential cases defined as values equal to or above 1 [33].

Results are expressed as absolute numbers and percentages, means, standard deviations, standard errors, odd ratios, standardized regression coefficients, and 95% confidence intervals (CI). All statistical analyses were conducted using STATA 12 SE (STATA Corp. College Station, TX, USA), and an alpha level for statistical significance of 0.05 (two-tailed) was employed.

3. Results

3.1. Sample description

The sample consisted of 692 participants that agreed to respond the telephone-based questionnaire and represented 90.4% of the contacted candidates. Fig. 1 shows the flow chart of the enrollment. Their mean age was 50.2 years (SD = 16.3; range = 18.9–90.9), 54.8% were women, and the mean number of days confined at home since the restrictive lockdown period was 35.1 days (SD = 10.9; range = 1–62). There were no differences by age or gender between participants and persons who refused (50.2 ± 16.3 vs. 48.1 ± 18.1, *p* = 0.313; and 54.8% vs. 60.0% of women, *p* = 0.402). Candidates who were not located were slightly younger than study participants (50.2 ± 16.3 vs. 46.1 ± 17.0, *p* = 0.032), and had a similar gender distribution (54.8% vs. 56.1% of women, *p* = 0.819).

Regarding the work situation of the subjects during confinement, 21.4% (95% CI = 18.3–24.6) were working, 18.0% (95% CI =

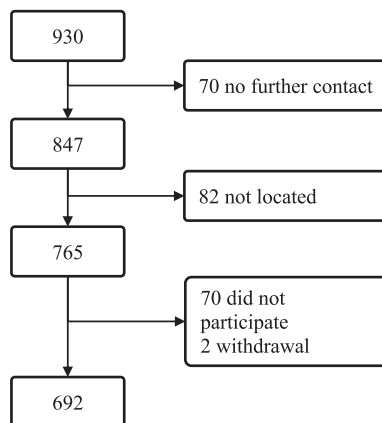


Fig. 1. Study participation flow-chart.

15.2–21.1) were working from home, 6.1% (95% CI = 4.4–8.2) were on a temporary lockdown, 12.8% (95% CI = 10.3–15.4) were temporarily laid off, 3.1% (95% CI = 1.9–4.6) had a definite laid off, 13.5% (95% CI = 11.0–16.2) did not work before the confinement, 24.1% (95% CI = 20.8–27.4) were retired, and 7 subjects (1.0%) were on sick leave or on maternity/paternity leave. The last group was not included in the further multivariate analyses due to its low sample size. Of all participants, 12.2% (95% CI = 9.8–14.8) expected that the COVID-19 outbreak would affect their household economy a lot, 23.3% (95% CI = 20.1–26.5) expected a considerable effect, 33.3% (95% CI = 29.7–36.9) expected to be somewhat affected, and 31.2% (95% CI = 27.8–34.8) did not consider the health crisis a threat for their economic situation in the future. With regard to the effect of confinement on their health status and their lifestyle, 38.4% (95% CI = 34.7–42.1) indicated that the current situation had worsened their physical health, 31.2% (95% CI = 27.8–34.9) their mental health, and 19.4% (95% CI = 16.5–22.5) their daily diet. Moreover, 60.9% (95% CI = 57.1–64.5) of individuals stated that they practiced sport less frequently, and 13.7% (95% CI = 11.2–16.4) had less social contact. Finally, 21.8% (95% CI = 18.7–25.0) of participants expressed worries about the risk of being infected, and 51.8% (95% CI = 48.0–55.6) about their relatives' risk. The mean score of the PHQ-9 was 4.1 (SD = 4.4; range = 0–24), and the prevalence of subjects with a score above the cutoff for suspected depression was 12.7% (95% CI = 10.3–15.4), 10.1% (95% CI = 7.0–14.1) among men and 15.2% (95% CI = 11.7–19.2) among women. Table 2 shows the work situation and the effect of confinement on health and lifestyle stratified by PHQ-9 cutoff score.

3.2. Variables associated with depressive episode

Results of the binary multivariate logistic regression analysis showed that work situation, expected future economic consequences,

Table 2
Characteristics of study participants regarding confinement consequences according to the PHQ-9 score.

| | PHQ-9 score < 10 (n = 604) | PHQ-9 score ≥ 10 (n = 88) | p value |
|--|----------------------------|---------------------------|---------|
| Female, n (%) | 322 (53.2) | 58 (64.4) | 0.046 |
| Age groups, n (%) | | | <0.001 |
| 18–24 | 40 (71.4) | 16 (28.6) | |
| 25–44 | 200 (89.7) | 23 (10.3) | |
| 45–64 | 235 (85.1) | 41 (14.9) | |
| 65+ | 129 (92.9) | 10 (7.1) | |
| Job situation, n (%) ^a | | | <0.001 |
| Working | 142 (97.2) | 4 (2.8) | |
| Working from home | 110 (89.4) | 13 (10.6) | |
| Lockdown | 38 (90.5) | 4 (9.5) | |
| Temporarily laid off | 71 (81.6) | 16 (18.4) | |
| Laid off | 15 (71.4) | 6 (28.6) | |
| Not working | 64 (69.6) | 28 (30.4) | |
| Retired | 151 (92.6) | 13 (7.4) | |
| Other | 5 (71.4) | 2 (28.6) | |
| Future economic consequences, n (%) ^b | | | <0.001 |
| Not at all | 204 (94.9) | 11 (5.1) | |
| Somewhat | 208 (90.8) | 21 (9.2) | |
| Considerably | 131 (81.8) | 29 (18.2) | |
| A lot | 59 (71.1) | 25 (28.9) | |
| Worsening physical health, n (%) | 215 (35.6) | 50 (58.1) | <0.001 |
| Worsening mental health, n (%) | 160 (26.4) | 56 (65.1) | <0.001 |
| Worsening dietary pattern, n (%) | 101 (16.7) | 33 (38.4) | <0.001 |
| Diminished sport practice, n (%) | 362 (59.8) | 58 (68.2) | 0.137 |
| Diminished social activities, n (%) | 81 (13.5) | 13 (15.3) | 0.644 |
| Infection worries, n (%) | 115 (19.0) | 36 (40.4) | <0.001 |
| Relatives' infection worries, n (%) | 292 (48.3) | 67 (76.1) | <0.001 |

^a 10 missing values.

^b 4 missing values.

perception of worsening mental health and dietary pattern, and being worried about a relative's potential infection were variables related to an increased risk of clinically significant depressive episode (Table 3).

3.3. Variables associated with depressive symptomatology

All the requirements to apply multivariate linear regression analyses were met on the direct and derived scores of the PHQ-9. The Levene's test for the residuals of each quartile PHQ-9 scores did not reject the assumption of homogeneity of the variances. The largest mean VIF value was 1.97. No extreme values were observed, as the highest Cook's distance was 0.151. The coefficient of determination was 0.35 for the PHQ-9 total score, 0.27 for the PHQ-9 affective factor score, and 0.32 for the somatic PHQ-9 factor score. Although there were common significant variables among the three models (not working, future economic consequences, worsening of physical and mental health, worsening of dietary pattern, and personal and relatives' infection worries), there were also specific significant variables for the affective (days of confinement) and the somatic (aged 65 and over, temporarily laid off, laid off, retired, diminished sports practices) factors of the PHQ-9. Table 4 reports the regression coefficients and their related standard errors for each model.

4. Discussion

4.1. Major findings

To our knowledge, this is the first study that has used a population-based sample to examine the relationship between the changes in lifestyle resulting from confinement due to COVID-19 and the risk of depressive episode or depressive symptomatology in general population aged 18 years and over. Our results indicate that the confinement has produced important negative consequences on the person's lifestyles. The strict measures adopted to control the COVID-19 spread have modified the work situation in 65.2% of the subjects that were working before the outbreak. Furthermore, a large proportion of the subjects expected economic

Table 3
Binomial multivariate logistic regression model for PHQ-9 ≥ 10 points.

| | Odds ratio | 95% Confidence interval | p value |
|------------------------------|------------|-------------------------|---------|
| Women | 1.57 | 0.85–2.89 | 0.141 |
| Age groups | | | |
| 18–24 | reference | – | – |
| 25–44 | 0.32 | 0.12–0.86 | 0.025 |
| 45–64 | 0.63 | 0.25–1.60 | 0.338 |
| 65+ | 0.43 | 0.08–2.14 | 0.307 |
| Job situation | | | |
| Working | reference | – | – |
| Working from home | 4.40 | 1.15–16.87 | 0.030 |
| Lockdown | 2.91 | 0.56–15.10 | 0.204 |
| Temporarily laid off | 5.21 | 1.34–20.18 | 0.017 |
| Laid off | 6.08 | 1.14–32.37 | 0.034 |
| Not working | 10.16 | 2.68–38.38 | 0.001 |
| Retired | 3.45 | 0.65–18.14 | 0.143 |
| Future economic consequences | | | |
| Not at all | reference | – | – |
| Somewhat | 1.11 | 0.47–2.60 | 0.804 |
| Considerably | 1.93 | 0.82–4.54 | 0.128 |
| A lot | 2.94 | 1.11–7.76 | 0.029 |
| Worsening physical health | 1.71 | 0.92–3.18 | 0.088 |
| Worsening mental health | 2.82 | 1.58–5.02 | <0.001 |
| Worsening dietary pattern | 2.44 | 1.33–4.47 | 0.004 |
| Diminished sports practices | 1.43 | 0.76–2.67 | 0.261 |
| Diminished social activities | 1.06 | 0.50–2.26 | 0.871 |
| Infection worries | 1.49 | 0.76–2.92 | 0.244 |
| Relatives' infection worries | 2.27 | 1.15–4.47 | 0.018 |
| Days of confinement | 1.01 | 0.98–1.04 | 0.415 |

Table 4
Multivariate linear regression models for PHQ-9 scores (total and factors scores) [Coef. (Std. Err.)]

| | PHQ-9 total score | PHQ-9 affective score | PHQ-9 somatic score |
|------------------------------|-------------------|-----------------------|---------------------|
| Women | 0.811 (0.29) * | 0.068 (0.16) | 0.743 (0.17) ** |
| Age groups | | | |
| 18–24 | reference | reference | reference |
| 25–44 | –1.23 (0.60) * | –0.64 (0.34) | –0.58 (0.36) |
| 45–64 | –0.65 (0.59) | –0.18 (0.33) | –0.46 (0.35) |
| 65+ | –1.84 (0.86) * | –0.56 (0.48) | –1.28 (0.51) * |
| Job situation | | | |
| Working | reference | reference | reference |
| Working from home | 0.47 (0.46) | 0.45 (0.25) | 0.01 (0.27) |
| Lockdown | 0.43 (0.65) | 0.18 (0.36) | 0.24 (0.38) |
| Temporarily laid off | 0.77 (0.51) | 0.13 (0.28) | 0.64 (0.30) * |
| Laid off | 1.76 (0.89) * | 0.67 (0.50) | 1.08 (0.53) * |
| Not working | 2.76 (0.54) ** | 1.39 (0.30) ** | 1.37 (0.32) ** |
| Retired | 1.24 (0.67) | 0.41 (0.37) | 0.83 (0.39) * |
| Future economic consequences | | | |
| Not at all | reference | reference | reference |
| Somewhat | 0.52 (0.36) | 0.15 (0.20) | 0.37 (0.21) |
| Considerably | 0.83 (0.41) * | 0.24 (0.23) | 0.58 (0.23) * |
| A lot | 1.97 (0.53) ** | 0.90 (0.29) ** | 1.06 (0.31) ** |
| Worsening physical health | 0.79 (0.32) * | 0.39 (0.18) * | 0.39 (0–19) * |
| Worsening mental health | 2.08 (0.33) ** | 1.23 (0.18) ** | 0.84 (0.19) ** |
| Worsening dietary pattern | 2.07 (0.36) ** | 0.80 (0.20) ** | 1.26 (0.21) ** |
| Diminished sports practices | 0.36 (0.30) | –0.17 (0.17) | 0.54 (0.18) ** |
| Diminished social activities | –0.25 (0.41) | –0.08 (0.23) | –0.17 (0.24) |
| Infection worries | 1.10 (0.39) * | 0.54 (0.22) * | 0.55 (0.23) * |
| Relatives' infection worries | 1.22 (0.32) ** | 0.58 (0.18) ** | 0.54 (0.19) ** |
| Days of confinement | 0.03 (0.01) | 0.02 (0.01) * | 0.01 (0.01) |

* p value <0.05.
** p value <0.005.

distress for their households in the future due to the COVID-19 health crisis. Three out of ten experienced worsening of their physical and mental health, and more than a half reduced the frequency of sport practice and were worried about being infected, either themselves or their relatives. Most of these negative consequences of confinement were more frequent in persons with a PHQ-9 score above the cutoff for a depressive disorder. Unemployment during confinement or negative changes of the work situation, including working from home, or temporary or definite laid off were among the most important predictors of depressive episode or increase of depressive symptomatology. In addition, expecting economic distress for the household was also independently associated with depressive symptoms. These results illustrate the negative effects that the measures addressed to mitigate the COVID-19 pandemic may produce in the most vulnerable, especially those in vulnerable workplaces [34].

4.2. Comparison with other studies

Our findings indicate that the prevalence of symptoms suggestive of depressive episode in the general population aged 18 years or over during confinement ranged between 10.3% and 15.4%, which is slightly below recent estimates in Spain and in other countries, which have reported estimates of around 20% during the pandemic. However, recent published studies that examined the mental health consequences of the COVID-19 outbreak have used other sampling methodologies, including snowball sampling techniques or pre-existing web-based databases [26,35–39]. These studies used convenience samples with an over-representation of women, younger and more educated participants, and underrepresentation of elderly groups. Moreover, data collection procedures were based on online questionnaires and thus duplicates during fieldwork cannot be ruled out. Comparison of the point-prevalence estimated in our study with the results from the European Health Interview Survey in Spain (2014–2015), which used the PHQ-8 to assess depressive episode, shows that the prevalence of

depressive episode during the COVID-19 confinement has increased by 7.3% in women and 6% in men [40].

Regarding the consequences of the confinement related to depressive episode or to the increase of depressive symptoms, our findings indicate that variables related to finances, including work changes or expected financial distress showed the strongest association. Previous studies on the consequences of the containment measures adopted during the SARS and Ebola outbreak also identified an important relationship of financial worries with symptoms of psychological disorders [41,42]. A recent study conducted in Saudi Arabia during the early stage of the COVID-19 outbreak found an association of the low family monthly income and depressive symptomatology [43]. We also found a linear association of an adverse work situation with the somatic symptoms of depression severity. Self-reporting of worsening physical and mental health and a worse dietary pattern during confinement were also related with depressive symptomatology. However, the direction of the association between depressive symptoms and self-reporting of worsening physical and mental health and dietary pattern is indeed challenging to ascertain due to the cross-sectional design of our study. Surprisingly, the decrease of social contact was low and was not related to depressive symptomatology. In fact, 58.8% of participants reported an increase of social contact during confinement through the use of phone or video calls. This finding is consistent with previous results from a study about mental health and quality of life in Hong Kong residents during the SARS outbreak in which the authors reported increased social and family support [44]. Emotional symptomatology of depression was related to the number of days of confinement since the restrictive lockdown period in our study. This is in line with previous results indicating that the number of days or an extension of a quarantine, no matter how small, is likely to exacerbate any sense of frustration or demoralization, which in turn may increase current depressive symptomatology or symptoms of post-traumatic stress disorder in the future [45,46]. Likewise, we observed that the somatic symptomatology of depression was associated with the decrease in the frequency of sport practice caused by the confinement situation. These results are also biologically plausible, because sedentarism and lack of exercise have been related to depression. In a revision, 66 out of 76 cohort studies found that physical inactivity increased the risk of depression [47]. Worries about the family members' risk of contracting COVID-19 increased the depressive symptomatology. A recent study in China found that 75% of respondents were either somewhat or very worried about infection of other family members, and this concern was related with a measure of stress [37].

4.3. Strengths and limitations

This study has three relevant strengths to take into account. First, to the best of our knowledge, this is one of the first epidemiological studies to assess the impact on the affective health of the movement restriction and social distancing measures adopted to control the COVID-19 pandemic. The population-based sampling frame and the achieved high participation rate prevent a selection bias and provide valid external generalization of the results. Second, the fieldwork was conducted during the state of alarm in Spain, which is particularly important because this prevents a recall bias of the participants about their situation including their physical and mental health status during the confinement period. Third, data was collected by trained personnel, diminishing the risk of information bias. However, this study has limitations that should be noted when interpreting the main findings. First, it is an observational and cross-sectional study, which precludes causal inferences among the variables analyzed. Second, we did not include questions on socioeconomic and educational level in the telephone-based interview, which are factors that could have influenced the results. Moreover, we did not include information related to the health characteristics, such as chronic medical illness or previous mental health disorders, nor information regarding the COVID-19 infection history of the

participants. Third, it should be noted that depressive episode was assessed through the PHQ-9, which is a screening tool, instead of using a validated standardized interview such as the Structured Clinical Interview for DSM-5 [48].

4.4. Conclusion

The risk factors for a possible depressive episode during confinement included negative changes in the work situation, including working at home and being temporarily or permanently laid off, unemployment before the confinement, expecting economic difficulties in the future, perceived worsening of mental health and of the dietary pattern, and concern for the family members' infection risk. In addition, perceived worsening of physical health, reduction of the frequency of sport practice, worries about becoming infected, and number of days of confinement were variables that contributed to increase the risk of depressive symptomatology. Our findings suggest that financial support for workers and other measures addressed to keep working positions may help to prevent mental health inequalities in the most vulnerable people. A recent study suggest that prevention measures including the frequent practice of hand hygiene, wearing face masks and organizational measures addressed to improve the workplace hygiene were associated with less psychiatric symptoms in employees [15]. Further studies are needed to track the course of depressive symptomatology experienced during the control of the COVID-19 pandemic to understand better the negative impact of outbreaks of infectious diseases on people's mental health.

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Declaration of Competing Interest

All authors declare that they have no competing interest.

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