COVID-19 CONFINEMENT AND HEALTH RISK BEHAVIORS IN SPAIN

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**Abstract**

The World Health Organization (WHO) declared a world pandemic due to COVID-19. In response, most affected countries have implemented enacted measures involving compulsory confinement and restrictions on free movement, which likely influence citizen´s lifestyles. This study investigates the length of confinement with changes in health risk behaviors (HRBs). An online cross-sectional survey served to collect data about the Spanish adult population regarding health behaviors during the first three weeks of confinement. A large sample of participants (N=2741) (51.8% women; mean age 34.2 years [SD 13.0]) from all Spanish regions completed the survey. Binomial logistic regressions adjusted for socioeconomic characteristics (i.e. gender, age, civil status, education, and occupation), body mass index (BMI), previous HRBs and confinement context (i.e. solitude and exposure to COVID-19) were conducted to investigate associations between the number of weeks confined and a set of six HRBs (physical activity, alcohol consumption, fresh fruits, and vegetable consumption, smoking, screen exposure and sleep hours). When adjusted, we observed significantly lower odds of experiencing a higher number of HRBs than before confinement overall in a time-dependent fashion; OR 0.63; 95%CI: 0.49-0.81 for the second, and OR 0.47; 95%CI: 0.36-0.61 for the third week of confinement. These results were equally consistent in all age and gender subgroup analyses. The present study indicates that changes towards more number of HRBs than before the confinement, as well as each HRB prevalence, except screen exposure, decreased during the first three weeks of COVID-19 confinement, thus the Spanish adult population may adapt to the new situation context by gradually improving health behaviors.

**Keywords:** modifiable risk factors, social isolation, Spain, adults, COVID-19

# Introduction

# Coronavirus disease 2019 (COVID-19) global pandemic has forced many countries to introduce confinement measures to minimize the propagation of the virus (SARS-CoV-2). This is true for Spain, where the confinement period started 15th March of 2020 (1,2). A period of confinement or quarantine implies a radical change in the lifestyle of the population, disrupting usual daily activities (3). Although quarantine will likely slow the spread of SARS-CoV-2 it may also lead to higher health risk behaviors (HRBs), i.e. behaviors with potentially negative effects on health, such as insufficient physical activity, or alcohol consumption above the recommended levels that may lead to higher levels of anxiety, stress, and depression (4,5). According to a review conducted by Leppin and Aro (6), there is no solid theoretical framework underlying similar pandemics (i.e. SARS and Avian influenza) risk perceptions which may influence HRBs; the majority of studies examining risk perceptions and protective behaviors are not model-based, and only preliminary insights are usually provided.

# The period of confinement disrupts the usual daily activities of the people that are confined and, in consequence, it is likely that prolonged homestay and solitude increases sedentary behaviors (sitting, reclining, tv viewing, using mobile devices or playing videogames), and reduces regular physical activity (6,7), with a consequently higher risk for cardiovascular disease, cancer, mortality and poor mental health (8–10), and deprivation of acute mitigating effects over stress and mood (4,11,12). Currently, international guidelines recommend at least 150 minutes per week of physical activity, but it has been suggested that, during the confinement period, physical activity should be increased to at least 200 minutes per week to compensate for the decrease in the normal daily levels (3,13). Furthermore, social isolation per se is associated with low levels of physical activity and poor diet in a population of young European adults (14), although the influence might comprise a wide range of ages since it has also been associated with smoking among older adults (15,16). Also, several studies have linked quarantine to negative psychological effects such as stress, anger, and post-traumatic stress-symptoms (17).

# As the COVID-19 epidemic has been found to increase population levels of perceived stress in China, it would be expected that citizens from other COVID-19 inflicted countries would experience a similar increase (4). Particularly, infection fears, longer quarantine duration, boredom, frustration, inadequate supplies, inadequate information, financial loss, and stigma have been identified as stressors in other quarantine situations, thus, the increase of perceived stress levels could vary in each country depending on the adopted policy regarding COVID-19 pandemic (17). Moreover, there may be an interplay between COVID-19 related stress and social isolation. Indeed, particular aspects of social isolation, such as social disconnectedness, have been shown to increase the risk of perceived social isolation, which consequently predicts both higher anxiety and higher depression symptoms among elderly people (18). This could result in exacerbated stress, anxiety, and depression during the confinement. Consequently, HRB closely related to anxiety and stress, such as sleep quality alcohol consumption, and smoking might be affected during the confinement period (19-21). Furthermore, gender, age, and socioeconomic status differences usually lead to different responses as regards to stress and HRBs; for instance, current evidence suggests that women are more susceptible to anxiety disorders, and tend to smoke more than men to cope with stress (22). Also, the co-occurrence of two or more HRBs has been observed in both adults and older people (23), and higher educational and economic levels seem to inversely relate to this phenomenon across life (24–27). Similarly, age and gender differences have been pointed to as possible reasons for observed differences among the general population (27).

# In this new situation due to COVID-19 confinement, where the general lifestyle is likely to change, there are no studies yet analyzing the association between weeks confined due to COVID-19 and HRBs. Therefore, since there is no certainty about when the confinement is finishing, and how it is going to influence HRBs, this study aims to analyze the association between time-course and HRBs in Spanish adults. This could contribute to informing strategies on how to maintain healthy behaviors among a general population of adults during confinement. Based on previous literature, we hypothesized that a greater length of time in COVID-19 confinement would be associated with unfavorable HRBs.

# 2 Methods

A cross-sectional online survey was conducted to assess associations between time confined and HRBs during the COVID-19 pandemic.

**2. 1. The survey**

A web-form link was used to collect data regarding health behaviors during the period 22nd of March to 5th of April, 2020 (i.e. from the seventh day of enacted national confinement in Spain). The survey was launched on social media on 22 March 2020, together with initial information about the objectives of the study. Adults aged 18 years and over, currently residing in Spain and self-isolating due to COVID-19 were eligible to participate. Convenience sampling was used to select the participants of the study; according to server analytics, 3,150 media users covering all the Spanish regions were offered to participate. Once they accepted, participants were provided with an information sheet about the study aims and the instructions of the survey, gave informed consent to participate, and confirmed whether they were confined. Provided data were anonymous and treated accordingly to Spanish law regarding general data protection. Once the survey was completed, participants were provided with information regarding health behaviors. The present study retrieved data from 2,741 participants mean age 34.2 (SD 13.0) years who completed the survey concerning the following variables: age, gender, civil status, occupation, education, time confined, height, weight, solitude during COVID-19 confinement, exposure to COVID-19, physical activity, screen exposure, sleep time, alcohol consumption, smoking habit, and fresh fruits and vegetable consumption.

**2. 2. Ethics**

The study was conducted following the principles of the World Medical Declaration of Helsinki and was approved by the Ethics Committee of Research in Humans of the University of Valencia (register code 1278789). We reported the study accordingly to the Strengthening the Reporting of Observational Studies in Epidemiology statement (STROBE) (28).

**2. 3. Time confined (exposure)**

Participants were asked about the time they had been isolated due to COVID-19 enacted confinement through the following question: “How long have you been isolated due to COVID-19 enacted confinement?”, and possible answers ranged from one to twenty-one days. Participants were later categorized as follows: first week (1-7 days), second week (8-14 days), and third week (15-21 days).

**2. 4. Health risk behaviors (outcome)**

The outcome variable was estimated through a set of questions concerning six health-related behaviors (i.e. exposure to screens, sleep time, physical activity, fruit and vegetable consumption, alcohol consumption, and smoking habit). Participants were asked with the following questions: “What is your daily number of average hours exposed to screens such as TV, cell phone, and tablet during COVID-19 confinement?”, with possible answers ranging from “0 hours” to “9 or more hours”, “How many hours do you usually sleep a day?, with answers comprising from “less than five hours” to “more than nine hours”, “How many fresh fruit and vegetables do you usually eat daily?, and possible answers ranging from “0” to “more than 5”, “Do you usually smoke?”, and possible answers consisted of “current smoker” or “not a current smoker”, and “How often do you drink alcohol?”, with answers comprising “usual”, “moderate” or “never”. Physical activity was estimated using Physical Activity Vital Sign (PAVS) short version, in which participants answered two questions regarding the number of days and minutes a week they performed PA, with possible answers comprising 0, 1, 2, 3, 4, 5, 6 or 7 days per week and 10, 20, 30, 40, 50, 60, 90 and 150 or more daily minutes; following the PAVS original procedure, weekly minutes of physical activity were calculated by multiplying days with minutes (29,30). All the questions were asked twice to the participants; first, referred to before the confinement status and, second, referred to the confinement status.

We considered HRBs as not achieving the recommendations for each health-related habit. Based on current guidelines and relevant research, each HRB was defined as follows (Table 1): more than two hours of daily screen time (screen exposure), less than six daily sleep hours (sleep time), less than three fresh fruits or vegetables a day (fresh and vegetable consumption), less than 150 weekly minutes of moderate to vigorous physical activity (physical activity), any alcohol consumption (alcohol consumption), and a current smoking habit (smoking habit) (13,31–35). Participants were categorized into those having a higher number of HRBs than before COVID-19 confinement, and participants having equal or fewer HRBs than before COVID- 19 confinement.

\*\*Insert Table 1 here.\*\*

**2. 5. Covariates**

According to previous research (36,37), the present study also estimated age, gender, socioeconomic features (marital status, education, and occupation), as well as self-reported body mass index using World Health Organization (WHO) categories. Moreover, other variables regarding the confinement situation were also controlled: solitude during COVID-19 confinement, and exposure to COVID-19. Self-reported responses were categorized as follows: marital status (“married or having a partner” or “not married neither having a partner”), education (“having a university degree” or “not having a university degree”), occupation (“employed” or “not employed”), solitude during the COVID-19 confinement (“alone while confined” or “not alone while confined”), and COVID-19 exposure (“infected with COVID-19 or close to an infected person” or “not exposed”). Finally, we also controlled for previous HRBs.

**2. 6. Statistical analyses**

Statistical analyses were conducted using Stata version 16.1 (StataCorp, Texas, USA). We computed binomial logistic regression tests to check associations between time confined due to COVID-19 and HRBs during the COVID-19 confinement period in Spain, providing odds ratios (ORs) and 95% confidence intervals (CIs) for the whole sample. We also conducted stratified analyses to assess associations concerning gender, and age (i.e. cut-off point of 45 years old, which is a turning point regarding mental health for Spanish men and women) (38), for each and the sum of all HRBs. Participants with missing data in any study variable were discarded for the study (n=143). Levels of significance were set at p < 0.05.

**3 Results**

The descriptive statistics of the sample are presented in Table 2. A total of 1421 participants (51.8%) are women, and 288 (10.5%) declared to be COVID-19 infected or being exposed to someone who was. At the time of the questionnaire reply, participants had been confined an average of 8.8 days (SD 4.4), and 209 (7.6%) were alone while confined. Overall, the number of participants with a higher number of HRBs in comparison with pre-confinement levels while confined was 729 (26.6%).

\*\*Insert Table 2 here.\*\*

As regards specific HRBs, Table 3 and Figure 1 show the evolution of percentages for each HRB (i.e. participants not meeting the recommended guidelines) before and during the COVID-19 confinement period. Lower participants are meeting the guidelines regarding screen exposure in the course of the confinement period, whereas the percentage of participants meeting the guidelines for the rest of HRBs increases along with the confinement. Particularly, alcohol consumption and insufficient physical activity prevalence are the two which substantially reduce the most with time-course of confinement. Adjusted logistic regression analyses for each HRB (i.e. not complying with recommended guidelines for each health-related behavior) displayed in Table 4 present significant reduced odds for insufficient physical activity for all participants as well as for all subgroup analyses in a dose-response fashion; overall, fruit and vegetable consumption also significantly reduce odds for HRB, with the subgroup of participants aged <45 years showing a similar trend.

\*\*Insert Table 3 here.\*\*

\*\*Insert Figure 1 here.\*\*

\*\*Insert Table 4 here.\*\*

Overall, participants experiencing their second and third week of confinement respectively show significant lower odds for higher HRBs (i.e. healthier lifestyles) in model 1 (Table 5) (OR 0.63; 95%CI: 0.51-0.79) (OR 0.65; 95%CI: 0.51-0.83) than those experiencing one week of confinement; even when fully adjusted, participants experiencing two and three weeks of confinement progressively and significantly decrease odds for higher HRBs (i.e higher number of HRBs in comparison with pre-confinement levels) with respectively OR 0.63; 95%CI: 0.49-0.81, and OR 0.47; 95%CI: 0.36-0.61. Table 5 also shows age and gender subgroup analyses, which display similar significant trends as for the adjusted overall group. Crude analyses for older participants and women in their third week of confinement show no significant association with higher HRBs; when adjusted, both subgroups present significant associations with respectively OR 0.44; 95%CI: 0.20-0.99, and OR 0.55; 95%CI: 0.36-0.83.

\*\*Insert Table 5 here.\*\*

**4 Discussion**

Our study provides novel data from an unusual setting of free movement restrictions as a result of the COVID-19 pandemic. The most critical finding in this study with a large sample of the Spanish adult population was that the odds of having higher HRBs (i.e. a change towards more number of HRBs than before the confinement) decreased during the confinement due to COVID-19. Contrary to our hypothesis, the prevalence of HRBs improved with longer confinement (i.e. physical activity and consumption of fruit and vegetable increased; tobacco and alcohol consumption decreased, and sleep quality improved), except for the time of screen exposure. Thus, the population gradually adapted their health behavior with time, but also spent more time exposed to screens.

In the case of physical activity, the percentage of people doing less than 150 weekly minutes increased the first week of confinement but decreased the second and third week. This phenomenon might have occurred because the first week of confinement was used to adjust usual routines to the new context and, thereafter, home-based physical activity started to increase. This result agrees with previous research that found home-based physical activity to have a considerably better adherence (long-term maintenance) rate than center-based physical activity (39); interestingly, these values for HRB as regards physical activity gradually decreased whereas prevalence for screen exposure HRB remained very high. This point deserves a closer look and further investigation, since higher amounts of sedentary behavior, measured largely as screen time, have been usually associated with lower physical activity levels (40),

Regarding screen exposure, the percentage of participants dedicating more than two hours of daily screen exposure slightly increased. This is an expected result due to the promotion of both remote work and online education during the COVID-19 confinement (1). The high values found in this study for daily screen time far exceed the recommended levels for adults, which could contribute to experience mental health disorders such as depression (41).

Concerning alcohol and tobacco, the consumption of both decreased during confinement. It seems that during this period, in which health is even more important than usual, people may be trying to have healthier lifestyles. Nevertheless, the values found in the present study were respectively higher and lower for alcohol and cigarette consumption when compared with prior research involving Spanish participants; such different percentages could be due to differences regarding sample characteristics (e.g. overall different age may lead to different healthy habits) as well as assessment tools (e.g. alcohol consumption threshold was considered differently in both studies) (42). The increasing use of new technologies in leisure time as substitutes for alcohol and tobacco consumption might be a possible explanation for this reduction trend (43). Furthermore, longer confinement periods might show different results due to increased stress, especially in very specific populations (e.g., those with impulsive behaviors and/or ex-addicted) (44), as well as in women (22); this may result from either limited access to supplies or from attempts to preserve supplies during the confinement; also, the deprivation of physical social interactions might mitigate both alcohol consumption and smoking habit (45,46). Further research would be required to better understand these points.

The percentage of people sleeping less than six daily hours decreased during the confinement. This is likely to have happened because, during confinement, people do not need to awaken as early to commute to work, or may have less job stress. Both job stress and work overload have been associated with poor sleep quality (47). However, this might especially occur among those with increased social capital as has been recently shown during the COVID-19 virus epidemic in central China (48). Also, it is likely that achieving the weekly recommended amount of physical activity or maintaining the usual meal times helped in improving sleep quality (49,50). Besides, the fact that the HRB regarding sleep time is very low in this study may indicate a moderating influence over the higher anxiety levels associated with the COVID-19 pandemic (i.e. lower sleep deprivation during the Coronavirus confinement might lead to lower anxiety levels) (51, 52).

Concerning fruits and vegetable consumption, the percentage of people eating less than three fresh fruits or vegetables a day decreased during the confinement. This positive result agrees with the food and nutrition recommendations for the Spanish population during the health crisis of COVID-19, which could be related to the fact that enacted confinement and closure of both bars and restaurants might lead to consuming more home-made cooking (53). Furthermore, the general tendency towards healthier behaviors as a whole observed in this study might be partially explained by the positively interrelated behavior domains observed in prior research (i.e. individuals would have decided to lead a healthy lifestyle overall instead of placing emphasis on a single health behavior); in particular, higher physical activity has been observed to correlate with higher fruit and vegetable consumption (54).

Regarding the influence of the control variables over the association between confinement weeks and health risk behaviors, this study found a consistent influence of occupation and exposure to COVID-19 (i.e. those participants employed or exposed to COVID-19 had significantly higher odds for HRBs) (results not published). Thus, those working more hours might have less time to take care of their health (leisure-time physical activity, prepare healthier food, sleep more), and be more exposed to screens due to remote work. This health-related behavior pattern is consistent with findings from previous research, which observed a higher risk of suffering from coronary heart disease and stroke with long working hours (55). Furthermore, socioeconomic features may probably explain a substantial part of the differences found among gender subgroups; for instance, women and higher educated have shown healthier behaviors regarding diet, whereas higher income has been identified as a predictor of higher physical activity levels (56). Also, cultural differences and individual´s perception styles have been underscored to be behind SARS impact perception, which, in turn, might have influenced their ability to deal with HRBs in this new COVID-19 pandemic (57). Besides, those individuals living in the most affected countries and more financially affected due to a virus outbreak (i.e equine influenza) have been suggested to be among the highest stressed and, thereby, more prone to modify their HRBs (58). Consequently, future research focused on at-risk populations such as those with deprived backgrounds or those socially and financially affected by the COVID-19 pandemic is of special interest; research from theoretical framework perspective based on either PEN-3 cultural model or Triandis model of social behavior could contribute to understanding the social circumstances underlying HRBs in this specific context (59, 60).

Strengths of the current study consist of examining a wide and large sample of Spanish adults (i.e. participants representing all the Spanish regions) with a good distribution of males and females, and the analysis of a wide set of variables, including novel variables such as weeks isolated or exposure to COVID-19. Besides, a dose-response fashion remains consistent overall and in subgroup analyses. A key limitation of this study was that data were self-reported and, in turn, potentially introducing self-reporting and recall bias into the findings. Moreover, since a convenience sampling method was used to recruit participants, there is the possibility of selection bias. Second, due to the observational nature of the study, the results do not allow us to infer any causality. Third, the definition for each HRB was based on both current institutional guidelines and relevant research. However, it should be noted that utilizing different definitions or cut points might lead to different results. Last, because the young population is overrepresented in this study, different results might be obtained with an older sample of participants. The authors recommend that future studies analyze the association between weeks confined due to COVID-19 and changes in health risk behaviors in other countries where the population is confined too, in order to check if the trend found in this study is specific to Spain or is an international trend.

**5 Conclusion**

The results of this study consistently showed that changes towards more HRBs of Spanish adults (PA, alcohol, tobacco, sleep time, and consumption of fruits and vegetables) progressively decreased during COVID-19 confinement. The only habit that increased was that of screen exposure time. These results make to rethink the current system of work and education and suggest that a progressive adaptation to a system with more remote work and more online education may be beneficial for the improvement of people's health.

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**Author contributions**

RLB, GFLS, JAC, LS, and JOC contributed conception and design of the study; RLB organized the database; RLB and GFLS performed the statistical analysis; RLB and GFLS wrote the first draft of the manuscript; JOC, LLA, JC, LS, LA, MT and JAC wrote sections of the manuscript. All authors contributed to manuscript revision, read and approved the submitted version.

**Conflicts of Interest**

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

**6 References**

1. Real Decreto 463/2020, de 14 de marzo, por el que se declara el estado de alarma para la gestión de la situación de crisis sanitaria ocasionada por el COVID-19. (2020). https://www.boe.es/buscar/doc.php?id=BOE-A-2020-3692 [Accessed March 22, 2020]

2. Gobierno de España. 2020. https://www.lamoncloa.gob.es/ Accessed March 22, 2020.

3. Jiménez-Pavón D, Carbonell-Baeza A, Lavie CJ. Physical exercise as therapy to fight against the mental and physical consequences of COVID-19 quarantine: Special focus in older people. Prog Cardiovasc Dis [Internet]. 2020;1862(2):183135.

4. Wang C, Pan R, Wan X, Tan Y, Xu L, Ho CS, et al. Immediate psychological responses and associated factors during the initial stage of the 2019 coronavirus disease (COVID-19) epidemic among the general population in China. Int J Environ Res Public Health. 2020;17(5).

5. Chen P, Mao L, Nassis GP, Harmer P, Ainsworth BE, Li F. Wuhan coronavirus (2019-nCoV): The need to maintain regular physical activity while taking precautions [Internet]. Vol. 9, Journal of Sport and Health Science. Elsevier B.V.; 2020. p. 103–4.

6. Leppin A, Aro AR. Risk perceptions related to SARS and avian influenza: Theoretical foundations of current empirical research. Int J Behav Med. 2009;16(1):7–29.

7. Lin CY, Park JH, Hsueh MC, Sun WJ, Liao Y. Prevalence of total physical activity, muscle-strengthening activities, and excessive TV viewing among older adults; and their association with sociodemographic factors. Int J Environ Res Public Health. 2018;15(11):1–9.

8. Takagi H, Hari Y, Nakashima K, Kuno T, Ando T. Meta-analysis of the Relation of Television-Viewing Time and Cardiovascular Disease. Am J Cardiol [Internet]. 2019;124(11):1674–83.

9. Lee IM, Shiroma EJ, Lobelo F, Puska P, Blair SN, Katzmarzyk PT, et al. Effect of physical inactivity on major non-communicable diseases worldwide: An analysis of burden of disease and life expectancy. Lancet [Internet]. 2012;380(9838):219–29.

10. Chekroud SR, Gueorguieva R, Zheutlin AB, Paulus M, Krumholz HM, Krystal JH, et al. Association between physical exercise and mental health in 1·2 million individuals in the USA between 2011 and 2015: a cross-sectional study. The Lancet Psychiatry [Internet]. 2018;5(9):739–46.

11. Fleming KM, Campbell M, Herring MP. Acute effects of Pilates on mood states among young adult males. Complement Ther Med [Internet]. 2020;49(January):102313.

12. Szabo A. Acute psychological benefits of exercise performed at self-selected workloads: Implications for theory and practice. J Sport Sci Med. 2003;2(3):77–87.

13. World Health Organization.(2010). Global recommendations on physical activity for health. https://www.who.int/dietphysicalactivity/factsheet\_recommendations/en/ [Accessed March 22, 2020].

14. Hämmig O. Health risks associated with social isolation in general and in young, middle and old age. PLoS One. 2019;14(7).

15. Shankar A, McMunn A, Banks J, Steptoe A. Loneliness, Social Isolation, and Behavioral and Biological Health Indicators in Older Adults. Heal Psychol. 2011;30(4):377–85.

16. Kobayashi LC, Steptoe A. Social isolation, loneliness, and health behaviors at older ages: Longitudinal cohort study. Ann Behav Med. 2018;52(7):582–93.

17. Brooks SK, Webster RK, Smith LE, Woodland L, Wessely S, Greenberg N, et al. The psychological impact of quarantine and how to reduce it: rapid review of the evidence. Lancet [Internet]. 2020;395(10227):912–20.

18. Santini ZI, Jose PE, York Cornwell E, Koyanagi A, Nielsen L, Hinrichsen C, et al. Social disconnectedness, perceived isolation, and symptoms of depression and anxiety among older Americans (NSHAP): a longitudinal mediation analysis. Lancet Public Heal [Internet]. 2020;5(1):e62–70.

19. Xiao H, Zhang Y, Kong D, Li S, Yang N. The Effects of Social Support on Sleep Quality of Medical Staff Treating Patients with Coronavirus Disease 2019 (COVID-19) in January and February 2020 in China. Med Sci Monit. 2020;26:e923549.

20. Weera MM, Gilpin NW. Biobehavioral Interactions Between Stress and Alcohol. Alcohol Res. 2019;40(1).

21. Slopen N, Kontos EZ, Ryff CD, Ayanian JZ, Albert MA, Williams DR. Psychosocial stress and cigarette smoking persistence, cessation, and relapse over 9-10 years: A prospective study of middle-aged adults in the United States. Cancer Causes Control. 2013;24(10):1849–63.

22. Torres OV, O’Dell LE. Stress is a principal factor that promotes tobacco use in females. Prog Neuro-Psychopharmacology Biol Psychiatry. 2016;65:260–8.

23. Francisco PMSB, Assumpção D de, Borim FSA, Senicato C, Malta DC. Prevalence and co-occurrence of modifiable risk factors in adults and older people. Rev Saude Publica. 2019;53:86.

24. John U, Hanke M, Freyer-Adam J. Health risk behavior patterns in a national adult population survey. Int J Environ Res Public Health. 2018;15(5).

25. Noble N, Paul C, Turon H, Oldmeadow C. Which modifiable health risk behaviours are related? A systematic review of the clustering of Smoking, Nutrition, Alcohol and Physical activity ('SNAP’) health risk factors. Prev Med (Baltim) [Internet]. 2015;81:16–41.

26. Mawditt C, Sacker A, Britton A, Kelly Y, Cable N. Social influences on health-related behaviour clustering during adulthood in two British birth cohort studies. Prev Med (Baltim) [Internet]. 2018;110(January):67–80.

27. Mawditt C, Sacker A, Britton A, Kelly Y, Cable N. The clustering of health-related behaviours in a British population sample: Testing for cohort differences. Prev Med (Baltim) [Internet]. 2016;88:95–107.

28. von Elm E, Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandenbroucke JP. The strengthening the reporting of observational studies in epidemiology (STROBE) statement: Guidelines for reporting observational studies. Epidemiology. 2007;18(6):800–4.

29. Greenwood JLJ, Joy EA, Stanford JB. The Physical Activity Vital Sign: A Primary Care Tool to Guide Counseling for Obesity. J Phys Act Heal. 2010;7(5):571–6.

30. Coleman KJ, Ngor E, Reynolds K, Quinn VP, Koebnick C, Young DR, et al. Initial validation of an exercise “vital sign” in electronic medical records. Med Sci Sports Exerc. 2012;44(11):2071–6.

31. Miller V, Mente A, Dehghan M, Rangarajan S, Zhang X, Swaminathan S, et al. Fruit, vegetable, and legume intake, and cardiovascular disease and deaths in 18 countries (PURE): a prospective cohort study. Lancet. 2017;390(10107):2037–49.

32. Ma Y, Li MD. Establishment of a strong link between smoking and cancer pathogenesis through DNA methylation analysis. Sci Rep [Internet]. 2017;7(1):1–13.

33. Theodoratou E, Timofeeva M, Li X, Meng X, Ioannidis JPA. Nature, Nurture, and Cancer Risks: Genetic and Nutritional Contributions to Cancer. Annu Rev Nutr. 2017;37(1):293–320.

34. Grøntved A, Hu FB. Television Viewing and Risk of Type 2 Diabetes, Cardiovascular Disease, and All-Cause Mortality A Meta-analysis. JAMA Netw Open [Internet]. 2011;305(23):2448–55.

35. Madrid-Valero JJ, Martínez-Selva JM, Ribeiro do Couto B, Sánchez-Romera JF, Ordoñana JR. Age and gender effects on the prevalence of poor sleep quality in the adult population. Gac Sanit. 2017;31(1):18–22.

36. Fernandez-Navarro P, Aragones MT, Ley V. Leisure-time physical activity and prevalence of non-communicable pathologies and prescription medication in Spain. PLoS One. 2018;13(1):1–13.

37. López-Sánchez GF, Grabovac I, Pizzol D, Yang L, Smith L. The association between difficulty seeing and physical activity among 17,777 adults residing in Spain. Int J Environ Res Public Health. 2019;16(21).

38. Ministerio de Salud. Encuesta Nacional de Salud España 2017. Informe monográfico de Salud Mental. Ens 2017-2018. 2017. p. 21–5.

39. Ashworth NL, Chad KE, Harrison EL, Reeder BA, Marshall SC. Home versus center based physical activity programs in older adults. Cochrane Database Syst Rev. 2005;(1).

40. O’Donoghue G, Perchoux C, Mensah K, Lakerveld J, Van Der Ploeg H, Bernaards C, et al. A systematic review of correlates of sedentary behaviour in adults aged 18-65 years: A socio-ecological approach. BMC Public Health [Internet]. 2016;16(1).

41. Wang X, Li Y, Fan H. The associations between screen time-based sedentary behavior and depression: a systematic review and meta-analysis. BMC Public Health. 2019;19(1):1–9.

42. Peacock A, Leung J, Larney S, Colledge S, Hickman M, Rehm J, et al. Global statistics on alcohol, tobacco and illicit drug use: 2017 status report. Addiction. 2018;113(10):1905–26.

43. Gil-Madrona P, Aguilar-Jurado MÁ, Honrubia-Montesinos C, López-Sánchez GF. Physical activity and health habits of 17-to 25-year-old young people during their free time. Sustain. 2019;11(23):1–13.

44. Clay JM, Parker MO. Alcohol use and misuse during the COVID-19 pandemic: a potential public health crisis? Lancet Public Heal [Internet]. 2020;2667(20):30088–8.

45. Knudsen HK, Ducharme LJ, Roman PM. Job stress and poor sleep quality: Data from an American sample of full-time workers. Soc Sci Med. 2007;64(10):1997–2007.

46. Seid AK. Social interactions, trust and risky alcohol consumption. Health Econ Rev [Internet]. 2016;6(1):1–9.

47. Shiffman S, Kirchner TR, Ferguson SG, Scharf DM. Patterns of intermittent smoking: An analysis using Ecological Momentary Assessment. Addict Behav. 2009;34(6–7):514–9.

48. Xiao H, Zhang Y, Kong D, Li S, Yang N. Social Capital and Sleep Quality in Individuals Who Self-Isolated for 14 Days During the Coronavirus Disease 2019 (COVID-19) Outbreak in January 2020 in China. Med Sci Monit. 2020;26:e923921.

49. Potter GDM, Skene DJ, Arendt J, Cade JE, Grant PJ, Hardie LJ. Circadian rhythm and sleep disruption: Causes, metabolic consequences, and countermeasures. Endocr Rev. 2016;37(6):584–608.

50. Altena E, Baglioni C, Espie CA, Ellis J, Gavriloff D, Holzinger B, et al. Dealing with sleep problems during home confinement due to the COVID-19 outbreak: practical recommendations from a task force of the European CBT-I Academy. J Sleep Res. 2020;0–3.

51. Pires GN, Bezerra AG, Tufik S, Andersen ML. Effects of acute sleep deprivation on state anxiety levels: a systematic review and meta-analysis. Sleep Med. 2016;24:109–18.

52. Nollet M, Wisden W, Franks NP. Sleep deprivation and stress: a reciprocal relationship. Interface Focus. 2020;10(3):20190092.

53. Academia Española de Nutrición y Dietética, Consejo General de Colegios oficiales de Dietistas-Nutricionistas, RED de Nutrición Basada en la Evidencia. Recomendaciones de alimentación y nutrición para la población española ante la crisis sanitaria del COVID-19 [Internet]. Madrid; 2020. Available from: https://academianutricionydietetica.org/NOTICIAS/alimentacioncoronavirus.pdf

54. Fleig L, Küper C, Lippke S, Schwarzer R, Wiedemann AU. Cross-behavior associations and multiple health behavior change: A longitudinal study on physical activity and fruit and vegetable intake. J Health Psychol. 2015;20(5):525–34.

55. Kivimäki M, Jokela M, Nyberg ST, Singh-Manoux A, Fransson EI, Alfredsson L, et al. Long working hours and risk of coronary heart disease and stroke: A systematic review and meta-analysis of published and unpublished data for 603 838 individuals. Lancet. 2015;386(10005):1739–46.

56. Garza KB, Harris C V., Bolding MS. Examination of value of the future and health beliefs to explain dietary and physical activity behaviors. Res Soc Adm Pharm. 2013;9(6):851–62.

57. Cheng C, Tang CSK. The psychology behind the masks: Psychological responses to the severe acute respiratory syndrome outbreak in different regions. Asian J Soc Psychol. 2004;7(1):3–7.

58. Taylor MR, Agho KE, Stevens GJ, Raphael B. Factors influencing psychological distress during a disease epidemic: Data from Australia’s first outbreak of equine influenza. BMC Public Health. 2008;8:1–13.

59. Iwelunmor J, Newsome V, Airhihenbuwa CO. Framing the impact of culture on health: A systematic review of the PEN-3 cultural model and its application in public health research and interventions. Ethn Heal. 2014;19(1):20–46.

60. Facione NC. The Triandis model for the study of health and illness behavior: a social behavior theory with sensitivity to diversity. ANS Adv Nurs Sci. 1993;15(3):49–58. theory with sensitivity to diversity. ANS Adv Nurs Sci. 1993;15(3):49–58.

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| **Table 1**. Description of each of the health-risk behaviors included in the study. | | |
| **Health-related behavior** | **Description** | **Health-risk behavior score** |
| **Screen exposure** |  |  |
|  | More than two hours of daily screen time | Yes |
|  | Up to two hours of daily screen time | No |
| **Physical activity** |  |  |
|  | Less than 150 weekly minutes of moderate to vigorous physical activity | Yes |
|  | 150 weekly minutes of moderate to vigorous physical activity or more | No |
| **Fresh fruits and vegetables consumption** |  |  |
|  | Less than three fresh fruits or vegetables a day | Yes |
|  | Three or more fresh fruits or vegetables a day | No |
| **Sleep time** |  |  |
|  | Less than six daily sleep hours | Yes |
|  | Six sleep hours or over | No |
| **Alcohol consumption** |  |  |
|  | Any alcohol consumption | Yes |
|  | No alcohol consumption | No |
| **Smoking habit** |  |  |
|  | Current smoking habit | Yes |
|  | No current smoking habit | No |

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| **Table 2.** Characteristics of the study population and health risk behaviors during COVID-19 confinement | | |
| **N=2741** | **n (%)** | **Mean (SD)** |
| Age (y) |  | 34.2(13.0) |
| **Gender** |  |  |
| Men | 1320(48.2) |  |
| Women | 1421(51.8) |  |
| **Marital status** |  |  |
| Married or having a partner | 1216(44.4) |  |
| Not married or having a partner | 1525(55.6) |  |
| **Occupation** |  |  |
| Employed | 1693(61.8) |  |
| Not employed | 1048(38.2) |  |
| **Education** |  |  |
| Holding a university degree | 1680(61.3) |  |
| Not holding a university degree | 1061(38.7) |  |
|  |  |  |
| **Body Mass Index** |  |  |
| Underweight | 81(3.0) |  |
| Normal | 2032(74.1) |  |
| Overweight | 437(15.9) |  |
| Obese | 191(7.0) |  |
| **Alcohol consumption** |  |  |
| Yes | 1368(49.9) |  |
| No | 1373(50.1) |  |
| **Smoking** |  |  |
| Yes | 241(8.8) |  |
| No | 2500(91.2) |  |
|  |  |  |
| **Fruits and vegetables consumption** (piece/day) |  |  |
| <3 | 1383(50.5) |  |
| ≥3 | 1358(49.5) |  |
|  |  |  |
| **Sleep time** (h/day) |  |  |
| ≤6 | 115(4.2) |  |
| >6 | 2626(95.8) |  |
|  |  |  |
| **Screen time** (h/day) |  |  |
| >2 | 2678(97.7) |  |
| ≤2 | 63(2.3) |  |
| **WHO PA recommendations guidelines** |  |  |
| <150 weekly minutes | 1219(44.5) |  |
| ≥150 weekly minutes | 1522(55.5) |  |
| **Exposure to COVID-19** |  |  |
| Yes | 288(10.5) |  |
| No | 2453(89.5) |  |
| **Alone while COVID-19 confinement** |  |  |
| Yes | 209(7.6) |  |
| No | 2532(92.4) |  |
|  |  |  |
| **Number of previous health risk behaviors** |  |  |
| 0-2 | 1314(47.9) |  |
| 3 | 876(32.0) |  |
| 4-6 | 551(20.1) |  |
| **Health risk behaviors while COVID-19 confinement** |  |  |
| More than before confinement | 729(26.6) |  |
| Equal | 1247(45.5) |  |
| Less than before confinement | 765(27.9) |  |
|  |  |  |
| **Week of COVID-19 confinement** |  |  |
| First | 1591(58.1) |  |
| Second | 615(22.4) |  |
| Third | 535(19.5) |  |
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| **Table 3.** Percentage of participants with each health risk behavior previous and during the COVID-19 confinement. | | | | | | | | | | |
|  | **Previous COVID-19**  **confinement** |  | **Week 1** |  | **Week 2** |  | **Week 3** |  |  |  |
|  | **n(%)** | **Diff. (1-Previous)** | **n(%)** | **Diff.(2-1)** | **n(%)** | **Diff.(3-2)** | **n(%)** |  | **Diff.(3-1)** | ***P\**** |
| **Screen** | 2274(83.0) | 14.7 | 1554(97.7) | -0.8 | 596(96.9) | 1.8 | 528(98.7) |  | 1.0 | 0.132 |
| **Sleep** | 172(6.3) | -1.3 | 80(5.0) | -2.6 | 15(2.4) | 1.3 | 20(3.7) |  | -1.3 | 0.021 |
| **Alcohol** | 1932(70.5) | -17.1 | 850(53.4) | -6.9 | 286(46.5) | -3.2 | 232(43.3) |  | -10.1 | <0.001 |
| **PA** | 963(35.1) | 17.1 | 831(52.2) | -11.9 | 248(40.3) | -14.1 | 140(26.2) |  | -26.0 | <0.001 |
| **Fruits** | 1352(49.3) | 3.5 | 839(52.8) | -4.0 | 300(48.8) | -3.2 | 244(45.6) |  | -7.2 | 0.011 |
| **Smoke** | 382(13.9) | -4.0 | 157(9.9) | -2.3 | 47(7.6) | -0.7 | 37(6.9) |  | -3.0 | 0.059 |
| \*Chi-square test among confinement weeks  PA: Physical activity | | | | | | | | | | |

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| **Table 4.** Adjusted odds ratios (95% confidence interval) for each health risk behavior during COVID-19 confinement in the entire study population and age and gender subgroups (reference group: first week of confinement) | | | | | | | | | | |
|  |  | **Screen exposure** | | | **Physical activity** | | | **Fruit and vegetable consumption** | | |
| **N=2741** | **Week** | **n(%)** | **Model 1a** | **Model 2b** | **n(%)** | **Model 1a** | **Model 2b** | **n(%)** | **Model 1a** | **Model 2b** |
| **All** | First | 1554(97.7) | 1 | 1 | 831(52.2) | 1 | 1 | 839(52.7) | 1 | 1 |
|  | Second | 596(96.9) | 0.74(0.42-1.30) | 0.75(0.40-1.39) | 248(40.3) | 0.63(0.52-0.76) | 0.61(0.49-0.76) | 300(48.8) | 0.84(0.70-1.02) | 0.77(0.58-1.01) |
|  | Third | 528(98.7) | 1.26(0.55-2.90) | 1.38(0.58-3.30) | 140(26.2) | 0.39(0.31-0.49) | 0.43(0.33-0.54) | 244(45.6) | 0.74(0.61-0.91) | 0.71(0.53-0.95) |
| **<45 (y)** | First | 1132(98.0) | 1 | 1 | 541(46.8) | 1 | 1 | 613(53.1) | 1 | 1 |
|  | Second | 482(98.2) | 1.13(0.52-2.47) | 1.23(0.53-2.87) | 174(35.4) | 0.61(0.49-0.76) | 0.61(0.47-0.78) | 242(49.3) | 0.85(0.69-1.05) | 0.80(0.59-1.09) |
|  | Third | 494(99.2) | 2.33(0.80-6.80) | 2.39(0.78-7.25) | 123(24.7) | 0.38(0.30-0.49) | 0.43(0.33-0.56) | 230(46.2) | 0.77(0.62-0.95) | 0.73(0.54-0.99) |
| **≥45 (y)** | First | 422(96.8) | 1 | 1 | 290(66.5) | 1 | 1 | 226(51.8) | 1 | 1 |
|  | Second | 114(91.4) | 0.43(0.19-1.01) | 0.34(0.13-0.92) | 74(59.7) | 0.72(0.48-1.09) | 0.66(0.42-1.04) | 58(46.8) | 0.83(0.26-1.24) | 0.66(0.34-1.28) |
|  | Third | 34(91.9) | 0.34(0.91-1.27) | 0.47(0.10-2.18) | 17(46.0) | 0.43(0.22-0.85) | 0.38(0.18-0.81) | 14(37.8) | 0.56(0.28-1.12) | 0.57(0.19-1.71) |
| **Men** | First | 741(98.9) | 1 | 1 | 358(47.8) | 1 | 1 | 392(52.3) | 1 | 1 |
|  | Second | 251(99.6) | 2.73(0.34-22.04) | 3.06(0.36-26.40) | 95(37.7) | 0.71(0.53-0.96) | 0.65(0.46-0.92) | 120(47.6) | 0.83(0.62-1.11) | 0.80(0.53-1.20) |
|  | Third | 314(98.4) | 0.69(0.22-2.18) | 0.93(0.27-3.21) | 56(17.6) | 0.27(0.19-0.37) | 0.29(0.20-0.42) | 140(43.9) | 0.72(0.55-0.94) | 0.71(0.49-1.04) |
| **Women** | First | 813(96.6) | 1 | 1 | 473(56.2) | 1 | 1 | 447(53.1) | 1 | 1 |
|  | Second | 345(95.0) | 0.63(0.34-1.15) | 0.59(0.30-1.17) | 153(42.2) | 0.59(0.46-0.76) | 0.59(0.44-0.78) | 180(49.6) | 0.86(0.67-1.10) | 0.74(0.51-1.08) |
|  | Third | 214(99.1) | 2.88(0.67-12.33) | 3.23(0.72-14.50) | 84(38.9) | 0.59(0.43-0.80) | 0.59(0.42-0.84) | 104(48.2) | 0.79(0.58-1.07) | 0.67(0.42-1.07) |
| aAdjusted for age and gender (all participants), for gender (<45 y, ≥45 y), and for age (men, women)  bModel 1+ socioeconomic features (marital status, occupation and education), exposure to COVID-19, solitude, body mass index, and previous health risk behavior. | | | | | | | | | | |

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| **Table 4 (continue).** Adjusted odds ratios (95% confidence interval) for each health risk behavior during COVID-19 confinement in the entire study population and age and gender subgroups (reference group: first week of confinement) | | | | | | | | | | |
|  |  | **Sleep time** | | | **Alcohol consumption** | | | **Smoking habit** | | |
| **N=2741** | **Week** | **n(%)** | **Model 1a** | **Model 2b** | **n(%)** | **Model 1a** | **Model 2b** | **n(%)** | **Model 1a** | **Model 2b** |
| **All** | First | 80(5.0) | 1 | 1 | 850(53.4) | 1 | 1 | 157(9.9) | 1 | 1 |
|  | Second | 15(2.4) | 0.49(0.28-0.86) | 0.40(0.22-0.74) | 286(43.5) | 0.77(0.64-0.93) | 0.89(0.69-1.16) | 47(7.6) | 0.78(0.55-1.09) | 0.99(0.57-1.72) |
|  | Third | 20(3.7) | 0.98(0.58-1.65) | 0.95(0.54-1.65) | 232(43.3) | 0.66(0.54-0.81) | 0.82(0.63-1.08) | 37(6.9) | 0.83(0.56-1.21) | 0.87(0.47-1.59) |
| **<45 (y)** | First | 44(3.8) | 1 | 1 | 610(52.8) | 1 | 1 | 94(8.1) | 1 | 1 |
|  | Second | 7(1.4) | 0.35(0.16-0.79) | 0.38(0.16-0.90) | 232(47.3) | 0.93(0.70-1.25) | 0.94(0.70-1.25) | 31(6.3) | 0.75(0.49-1.14) | 0.77(0.39-1.53) |
|  | Third | 17(3.4) | 0.94(0.53-1.67) | 0.98(0.53-1.82) | 211(42.4) | 0.84(0.63-1.12) | 0.81(0.60-1.08) | 32(6.4) | 0.80(0.52-1.20) | 0.74(0.37-1.46) |
| **≥45 (y)** | First | 36(8.3) | 1 | 1 | 240(55.1) | 1 | 1 | 63(14.5) | 1 | 1 |
|  | Second | 8(6.5) | 0.73(0.33-1.62) | 0.55(0.23-1.33) | 54(43.6) | 0.87(0.48-1.56) | 0.85(0.48-1.53) | 16(12.9) | 0.82(0.45-1.84) | 1.81(0.58-5.65) |
|  | Third | 3(8.11) | 1.00(0.29-3.43) | 1.00(0.25-3.96) | 21(56.8) | 1.46(0.48-4.45) | 1.49(0.49-4.55) | 5(13.5) | 0.95(0.36-2.55) | 1.20(0.21-6.98) |
| **Men** | First | 30(4.0) | 1 | 1 | 428(57.1) | 1 | 1 | 52(6.9) | 1 | 1 |
|  | Second | 5(1.9) | 0.53(0.20-1.39) | 0.49(0.18-1.40) | 120(47.6) | 0.93(0.64-1.37) | 0.93(0.64-1.37) | 19(7.5) | 1.20(0.66-1.93) | 2.10(0.78-5.66) |
|  | Third | 5(1.6) | 0.45(0.17-1.20) | 0.42(0.15-1.20) | 140(43.9) | 1.02(0.70-1.48) | 1.02(0.70-1.48) | 22(6.9) | 1.09(0.64-1.85) | 1.38(0.56-3.41) |
| **Women** | First | 50(5.9) | 1 | 1 | 422(50.1) | 1 | 1 | 105(12.5) | 1 | 1 |
|  | Second | 10(2.8) | 0.48(0.24-0.96) | 0.37(0.18-0.78) | 166(45.7) | 0.88(0.62-1.26) | 0.88(0.62-1.26) | 28(7.7) | 0.62(0.40-0.96) | 0.69(0.34-1.39) |
|  | Third | 15(6.9) | 1.53(0.82-2.85) | 1.46(0.74-2.88) | 92(42.6) | 0.62(0.40-0.94) | 0.62(0.40-0.94) | 15(6.9) | 0.63(0.35-1.18) | 0.59(0.25-1.43) |
| aAdjusted for age and gender (all participants), for gender (<45 y, ≥45 y), and for age (men, women)  bModel 1+ socioeconomic features (marital status, occupation and education), exposure to COVID-19, solitude, body mass index, and previous health risk behavior. | | | | | | | | | | |

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| **Table 5.** Adjusted odds ratios (95% confidence interval) for higher health risk behaviors than before COVID-19 confinement in the entire study population and age and gender subgroups (reference group: first week of confinement) | | | | |
| **N=2741** | **Week** | **n(%)** | **Model 1a** | **Model 2b** |
| **All** | First | 1591(58.1) | 1 | 1 |
|  | Second | 615(22.4) | 0.63(0.51-0.79) | 0.63(0.49-0.81) |
|  | Third | 535(19.5) | 0.65(0.51-0.83) | 0.47(0.36-0.61) |
| **<45 (y)** | First | 1155(53.9) | 1 | 1 |
|  | Second | 491(22.9) | 0.64(0.50-0.83) | 0.69(0.51-0.92) |
|  | Third | 498(23.2) | 0.64(0.50-0.83) | 0.48(0.36-0.64) |
| **≥45 (y)** | First | 436(73.0) | 1 | 1 |
|  | Second | 124(20.8) | 0.60(0.38-0.94) | 0.52(0.32-0.86) |
|  | Third | 37(6.2) | 0.73(0.35-1.52) | 0.44(0.20-0.99) |
| **Men** | First | 749(56.7) | 1 | 1 |
|  | Second | 252(19.1) | 0.72(0.52-1.00) | 0.67(0.46-0.97) |
|  | Third | 319(24.2) | 0.60(0.44-0.83) | 0.41(0.28-0.54) |
| **Women** | First | 842(59.3) | 1 | 1 |
|  | Second | 363(25.6) | 0.57(0.42-0.77) | 0.60(0.42-0.84) |
|  | Third | 216(15.2) | 0.73(0.51-1.05) | 0.55(0.36-0.83) |
| aAdjusted for age and gender (all participants), for gender (<45 y, ≥45 y), and for age (men, women)  bModel 1+ socioeconomic features (marital status, occupation and education), exposure to COVID-19, solitude, body mass index, and previous health risk behaviors. | | | | |



**Figure 1.** Evolution of percentages of each health risk behavior during the COVID-19 confinement