

COVID-19 and home confinement: data on physical activity

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Summary

In March 14th 2020, the Spanish Government declared the “State of Emergency” due to the pandemic caused by the COVID-19 and all the population was forced to “shelter-at-home” for two weeks. Citizens had less than 24 hours to prepare for the self-quarantine. The goal of the present was to assess Spanish citizens’ physical activity practice at the end of the first week of the home quarantine. A total of 1858 Spanish citizens, 674 males and 1184 females (M = 40.18, SD = 15.84 years) agreed to participate. The study is descriptive in nature, based on an on-line questionnaire conducted seven days after the mandatory shelter-at-home health order issued by the Spanish Government. It included The International Physical Activity Questionnaire, Anthropometric parameters, Sociometric and COVID-19 information. Global results showed that the vast majority of the confined population was below the World Health Organization recommendations on Vigorous Physical Activity, Moderate Physical Activity or a combination. Physical activity practice was dependent on personal factors such as gender, age or weight, but also on contextual factors such as living with a dependent person or the type of house (square meters, having a balcony or a backyard). Insufficient physical activity has been considered a prominent risk factor for non-communicable diseases, mental health and, consequently, quality of life. Mandatory shelter-at home orders like the ones issued due to COVID-19 could be repeated in the future. National authorities should consider the findings from the present study to prevent citizens from putting their health at jeopardy while in confinement.

Key words:

Pandemic. Quarantine. Behavior. Exercise. Health.

COVID-19 y confinamiento en casa: datos de actividad física

Resumen

El 14 de marzo de 2020, el gobierno español decretó el “estado de emergencia” debido a la pandemia provocada por la COVID-19 y la población fue forzada a confinarse en sus casas durante dos semanas. Los ciudadanos tuvieron menos de 24 horas para prepararse. El objetivo del estudio fue evaluar la práctica de actividad física de los españoles al final de la primera semana de la cuarentena en el hogar. Un total de 1858 ciudadanos españoles, 674 varones y 1184 mujeres (M = 40.18, SD = 15.84 años) accedieron a participar. El estudio siguió un diseño descriptivo, basado en un cuestionario on-line distribuido siete días después de decretarse por el Gobierno de España la orden de confinamiento de la población. Incluía el *International Physical Activity Questionnaire*, medidas antropométricas, sociométricas e información relacionada con el COVID-19. Los resultados globales mostraron que la amplia mayoría de la población confinada estaba por debajo de las recomendaciones de la Organización Mundial de la Salud de Actividad Física Vigorosa, Actividad Física Moderada o una combinación. La práctica de actividad física dependió de factores personales como el género, la edad o el peso, pero también de factores contextuales como convivir con una persona dependiente o el tipo de casa (metros cuadrados, disponer de un balcón o de un patio). Una insuficiente cantidad de actividad física ha sido considerada como un factor de riesgo importante para el desarrollo de enfermedades no-communicables, para la salud mental y, consecuentemente, para la calidad de vida y los ciudadanos españoles confinados tenían niveles por debajo de los recomendados. Órdenes de confinamiento como las que se han decretado a raíz del COVID-19 podrían repetirse en el futuro. Las autoridades nacionales deberían tener en cuenta los resultados del presente estudio para prevenir que los ciudadanos pongan en riesgo su salud durante el confinamiento.

Palabras clave:

Pandemia. Cuarentena. Comportamiento. Ejercicio. Salud.

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Introduction

December 2019 is considered the beginning of COVID-19 in Wuhan, China. The outbreak was declared a Public Health Emergency of International Concern on January 30th, 2020 by the World Health Organization (WHO). On March 13th, Europe became the epicentre of the pandemic. Finally, in March 14th, The Spanish Government declared the “State of Emergency” and population was forced to “shelter-at-home” for two weeks, except for public service (i.e., health, safety, social assistance, food, transport...). To our knowledge, it was the first time that the vast majority of a country's population had to face two weeks of isolation / confinement at their homes. Other countries like China, Korea, Italy, France, Belgium or India issued similar orders, but in some of them only parts of the country were confined and in others, individuals were allowed to go out on the streets to exercise during different periods of time. In Spain, citizens had to remain indoors 24 hours, and they were only allowed to walk their dogs or buy food (except those who had “essential” jobs, previously mentioned). Therefore, the vast majority of the population was facing two weeks of compulsory home quarantine.

In a recent review, Brooks *et al.*¹ identified 24 articles describing the psychological impact of a quarantine. They were conducted across 10 countries and they included five different diseases (SARS, M. Ébola, 2009 and 2010 H1N1 influenza pandemic, Middle East respiratory syndrome and Equine influenza), participants ranged from 10 health-care workers to 6231 Korean residents, and isolation conditions were very different. Similar isolation / confinement contexts could be found in a prison², in Antarctic exploration bases³, or in space-mission simulated areas⁴. However, in all these contexts, individuals were prepared to face those confinement conditions, and in most cases, they volunteered to be there. In the compulsory shelter-at-home health order issued in Spain in March, a whole country was involved (47 million people aprox.), individuals were not given much time to prepare (less than 24 hours), and they were forced to accept it. Therefore, they were facing a completely new scenario, which could be repeated in the future. Researchers have the duty to study this phenomenon and provide insights for public health policies.

The positive connections between physical activity (PA) and individuals' physical (i.e., musculoskeletal health and function, diabetes, cardiovascular disease...) and psychological (i.e., depression, anxiety...) well-being have been highlighted in many different studies^{5,6}. The evidence backing up the starring role of PA in the prevention and supervision of chronic diseases has helped move forward the public health agenda with the goal of improving individuals' quality of life and society healthcare system's cost-effectiveness^{7,8}. Unfortunately, recent systematic reviews have pointed out that there is a global pandemic of physical inactivity⁹. Furthermore, the negative trend between 2001 and 2016 increased more in high-income western countries to reach 31% of their population, and in women, who reached a high 42% in Latin America and the Caribbean¹⁰. The World Health Organization¹¹ recommends 150 minutes/week of moderate intensity PA (MPA) or 75 minutes/week of vigorous intensity (VPA) or a combination of both, and it believes that “these recommendations can still be achieved even

at home, with no special equipment, and limited space”. Is this possible under the COVID-19 shelter-at-home mandatory health order in Spain?

Articles published on the COVID-19 crisis have focused on vicarious traumatization¹² or psychological effects¹³. Very little is known about their side-effects like the compulsory shelter-at-home health order issued in Spain. Based on the aforementioned, the goal of this study was to assess Spanish citizens' PA practice at the end of the first week of confinement. The first hypothesis was that it will be below WHO recommendations. The second hypothesis was that it will be different depending on the individual's living conditions.

Material y method

Participants

The present study is descriptive in nature, based on an on-line questionnaire conducted on Friday, April 21st 2020, seven days after the compulsory Shelter-at-Home health order was issued by the Spanish Government. A total of 1858 Spanish citizens, 674 males and 1184 females (M = 40.18, SD = 15.84, age range 16-82 years) from all regions in Spain agreed to participate.

Procedure

First, permission to conduct the study was obtained from the researchers' State Ethics Research Committee (no 2020.165). Second, the research team developed an on-line questionnaire to obtain the needed information. Third, it was distributed via e-mail, WhatsApp, Twitter, Facebook and newspapers. In the first page of the questionnaire, participants were informed that it was completely anonymous, and that they could “stop and exit the questionnaire at any time if you feel emotional discomfort, because participation is voluntary”. The STROBE guidelines for reporting observational studies were followed¹⁴.

Instruments

The International Physical Activity Questionnaire (IPAQ)¹⁵. This tool was designed to assess physical activity (including inactivity) at a cross-national level. The IPAQ has shown sensible measurement properties for the analysis of individuals' physical activity levels between 15 and 65 years of age¹⁶. In this study, the short version of the questionnaire, 7-day recall, was used¹⁷. According to Silsbury, Goldsmith and Rushton¹⁸ the IPAQ-7 is “the most appropriate outcome measure for clinical and research use, as it has excellent reliability and moderate correlation with Accelerometry. The short version makes it efficient for clinicians, also making it more cost-effective”. The Spanish validated version was obtained from www.ipaq.ki.se. It provides information on the time the individual spends in three physical activity intensity levels (walking, moderate and vigorous), and in sedentary activities. The Metabolic Equivalent of Task (MET) was used to indicate physical activity intensity. It represents 3.5 mlO₂/kg.min⁻¹ (energy needed for the basal metabolic rate), and it was grouped in three levels: a) Light (1.6-2.9 METs), b) Moderate (3 – 5.9 METs), and c) High (≥ 6 METs)¹⁹.

Anthropometric parameters. Participants' height, current weight and weight before the compulsory shelter-at-home health order were requested. Based on this information, individual's body mass index was calculated using the following formula: weight (kg) / [height (m)]² and these categories: underweight < 18.5, normal weight: 18.5-24.9, overweight: 25.0-29.9, and obese: ≥30.0²⁰.

Sociometric information. To obtain a global picture of each individual's isolated context, additional questions were included in the study's questionnaire: How many days have you been shelter-at home? Have you been out on the streets? For what reason? How many square meters does the house where you are living have? Can you step out to a terrace/balcony? Can you step out to a porch/backyard? How many people are currently living in the house, including you?

COVID-19 information. To gather information on the coronavirus pandemic, these questions were included: have you tested positive for COVID-19? Are you living with someone who has tested positive for COVID-19? Do you live with someone diagnosed with a COVID-19 risk condition or related disease? Do you live with any dependent person?

Data analyses

All data were analysed using SPSS version 24.0 (IBM Co. LTD, Chicago, IL, USA). Initial analyses showed that data was not normally distributed. Therefore, non-parametric statistics were used. The Mann-Whitney U test was used to assess group differences. Results included size (n) and frequency (%) for categorical variables. Results were considered significant at *p* < 0.05.

Results

Table 1 shows global results on VPA, MPA, LPA and METs, and individuals who met WHO recommendations of PA weekly practice (VPA, MPA and MVPA) during the compulsory shelter-at-home health order issued in Spain. Globally, participants were far from meeting the recommended 75 minutes/week of VPA, 150 minutes/week of MPA or a combination (MVPA). Based on gender, data showed that only 30% of males and 21.7% of females met the VPA recommendation, 24.9% and 20.9%, respectively,

the MPA recommendation, and these numbers increased to 40.9% and 32.5% for those who reached the minimal amount of MVPA weekly.

Table 2 shows means of all the variables assessed, grouped according to PA practice. Regarding VPA, results in males were significantly higher than females, and they, as average (some scored high and others low), met WHO recommendations for weekly PA practice. VPA levels significantly decreased with age, and it was significantly lower in overweight and obese individuals and those who had lost weight during the confinement. It was significantly higher in those who did not have a dependent person in their homes and those who had been out on the streets during the confinement. Finally, the context where the individuals were enclosed was important, because VPA significantly increased in larger houses, in those with a backyard and among large families (≥5 family members). Regarding MPA, it was significantly higher in males, in older individuals, in those who had lost weight, participants who had been in confinement for a longer time (≥8 days), those who had been on the streets, and those in larger houses, who had a balcony or a backyard. Finally, light PA (LPA) was significantly higher in females, in individuals over 40 years of age, in those who lost weight, in those who lived with a dependent person, and in larger houses with a backyard.

On the other hand, data obtained from those individuals who tested positive on Coronavirus or had someone in the house tested positive were included in Table 2, but they cannot be considered conclusive, because the number of subjects were extremely low. Results should be placed "on hold" until more data are obtained.

Discussion

The goal of this study was to assess Spanish citizens' PA practice at the end of the first week of confinement. Global results showed that the vast majority of the population was below WHO recommendations for VPA, MPA or a combination¹¹. Moreover, PA practice was dependent on personal factors such as gender, age or weight, but also contextual factors such as living with a dependent person or the type of house.

The first hypothesis was that participants' physical activity would be below WHO recommendations¹¹ and results confirmed it. Globally, Spanish citizens confined in their houses were far from the recommended

Table 1. Physical activity during confinement.

	n	%	VPA	MPA	LPA	METs
Global results	1858	100	61.42	98.20	336.13	1967.75
VPA recommendations met						
Males	199	29.5	230.39	155.92	311.09	3423.84
Females	255	21.5	213.33	146.67	633.82	3372.47
MPA recommendations met						
Males	168	24.9	122.37	325.06	453.42	3770.27
Females	247	20.9	114.82	312.88	555.58	3982.91
MVPA recommendations met						
Males	276	40.9	159.06	224.13	346.93	3311.94
Females	385	32.5	136.61	225.98	442.63	3443.98

N: number; %: percentage; VPA: Vigorous Physical Activity; MPA: Moderate Physical Activity; MVPA: Moderate-to-Vigorous Physical Activity.

Table 2. Variables under study regarding Vigorous Physical Activity (VPA), Moderate Physical Activity (MPA), Light Physical Activity (LPA) and METs.

	n	%	VPA	MPA	LPA	METs
Gender						
Male	674	36.3	76.30 ^a	108.19 ^a	259.75 ^a	1854.58 ^a
Female	1184	63.7	52.98 ^b	92.20 ^b	379.93 ^b	2032.28 ^a
Age						
<25	474	25.5	90.58 ^a	97.71 ^a	243.28 ^a	1908.05 ^a
25-39	418	22.5	62.60 ^b	85.28 ^b	287.30 ^a	1768.52 ^a
40-54	551	29.0	51.64 ^c	101.53 ^c	381.59 ^b	2039.29 ^a
>54	415	22.3	38.96 ^d	107.38 ^c	431.33 ^b	214.89 ^a
BMI						
Underweight	69	3.7	64.85 ^{ab}	66.50 ^a	443.35 ^a	2229.47 ^a
Normal weight	1064	56.9	71.47 ^b	101.01 ^a	327.34 ^a	2021.43 ^a
Overweight	471	25.0	46.94 ^a	95.44 ^a	334.33 ^a	1845.12 ^b
Obese	173	9.5	40.52 ^a	101.15 ^a	346.27 ^a	1865.25 ^b
Weight difference						
Increased > 1kg	94	5.1	49.74 ^a	71.96 ^a	205.32 ^a	1341.79 ^a
Increased 1kg - 0.1kg	299	16.0	53.23 ^a	77.16 ^{ab}	293.82 ^a	1677.97 ^b
No difference	1008	54.4	57.74 ^a	104.90 ^b	355.84 ^b	2039.71 ^c
Decreased 0.1kg-1kg	203	10.9	86.96 ^b	101.94 ^b	290.30 ^a	2056.21 ^c
Decreased > 1 kg	114	6.1	94.99 ^b	119.48 ^b	426.84 ^b	2477.46 ^c
Coronavirus tested						
Negative	1852	99.7	61.55 ^a	98.32 ^a	336.83 ^a	1971.00 ^a
Positive	6	.3	20.00 ^b	13.33 ^b	47.50 ^b	370.08 ^b
Someone Corona positive						
No	1852	99.7	61.56 ^a	98.26 ^a	333.96 ^a	2219.65 ^a
Yes	5	.3	8.00 ^b	50.00 ^b	75.00 ^b	511.50 ^b
Someone at risk						
No	1392	74.9	62.09 ^a	97.08 ^a	323.76 ^a	1960.54 ^a
Yes	466	25.1	59.41 ^a	101.53 ^a	338.20 ^a	1989.46 ^a
Living with dependent						
No	1645	88.5	63.71 ^a	97.08 ^a	323.76 ^a	1960.54 ^a
Yes	213	11.5	43.72 ^b	101.53 ^a	338.20 ^b	1989.46 ^a
Days shelter-at-home						
5 days	611	34.0	60.42 ^a	103.04 ^a	334.52 ^a	1973.09 ^a
6 days	594	32.0	64.50 ^a	95.59 ^a	337.39 ^a	2006.37 ^a
7 days	434	23.4	60.95 ^a	99.76 ^a	348.22 ^a	2031.23 ^a
8 or more days	197	10.6	56.50 ^a	75.61 ^b	292.65 ^a	1637.19 ^a
Out on the streets?						
No	357	19.2	47.34 ^a	73.57 ^a	330.81 ^a	1738.85 ^a
Yes	1501	80.8	64.77 ^b	104.05 ^b	337.38 ^a	2022.20 ^b
House size in M ²						
<70	445	24.0	54.05 ^a	86.95 ^a	297.43 ^a	1761.11 ^a
70-90	522	28.1	61.12 ^{ab}	89.58 ^a	301.34 ^a	1780.25 ^a
91-120	391	21.0	58.78 ^{ab}	109.92 ^b	333.87 ^{ab}	2000.47 ^b
>120	410	22.1	67.69 ^b	108.25 ^b	408.33 ^b	2291.17 ^c
Do you have a balcony?						
No	815	43.9	59.80 ^a	88.23 ^a	310.86 ^a	1840.55 ^a
Yes	1043	56.1	62.68 ^a	105.99 ^b	355.89 ^b	2067.32 ^b
Do you have a backyard?						
No	1409	75.8	58.02 ^a	91.39 ^a	309.44 ^a	1840.88 ^a
Yes	449	24.2	72.05 ^b	119.67 ^b	419.90 ^b	2367.61 ^b
People in the house?						
1	202	10.9	57.61 ^a	110.44 ^a	306.71 ^a	1886.60 ^a
2	502	27.0	57.13 ^a	99.78 ^a	317.16 ^a	1876.81 ^a
3	503	27.1	66.71 ^{ab}	97.62 ^a	361.87 ^a	2099.12 ^a
4	497	26.7	59.76 ^{ab}	91.56 ^a	333.65 ^a	1910.14 ^a
≥5	153	8.2	68.87 ^b	100.48 ^a	362.94 ^a	2141.41 ^a

^{a,b,c,d}: Different superscripts in the same column show statistically significant differences at $p < 0.050$; M²: Squared meters; PA: physical activity.

75 minutes/week of VPA, 150 minutes/week of MPA or a combination. Roughly, less than 1/3 of males and 1/5 of females met these criteria, which slightly increased when considering MVPA scores (combination). However, a vast majority were not able to meet the recommendations. Insufficient PA has been considered a prominent risk factor for non-communicable diseases (i.e., diabetes, strokes, osteoporosis...), mental health (i.e., anxiety, depression, mood disorders...) and, consequently, poor quality of life¹⁰. Results showed that Spanish citizens confined in their houses for a week were not exercising as much as needed and this could be considered a serious health risk factor. Experts have warned that mandatory shelter-at-home health orders like the ones issued in many different countries due to COVID-19 could be repeated in the future. Therefore, national authorities should consider the findings from the present study to prevent citizens from putting their health at jeopardy while in confinement. In the Spanish case, citizens had less than 24 hours to prepare for the self-quarantine. Clearly insufficient to collect the needed resources to exercise at home. More time and adequate training and materials are needed.

The second hypothesis was that participants' physical activity would be different depending on the individual's living conditions and results confirmed it. Living with a dependent person, the size and type of house and the number of individuals in the house significantly affected participants' PA practice. Those living with a dependent person had significantly lower VPA and higher LPA, since he/she demands specific care that requires time and energy, deriving it from PA. This is in line with previous studies, which found that physical inactivity is usually high among caregivers²¹. On the other hand, larger houses, balconies and backyards were linked to higher PA, since individuals probably had more space and better conditions to exercise. Linked to housing, larger number of individuals living in the same house was also connected with higher VPA. Large families tend to live in bigger houses with more room for exercise. To our knowledge, this is the first study to assess the associations between housing conditions and PA. Previous researchers studied the influence of the neighbourhood social environment²², but not the inside of the homes. Results from the present study suggest that houses design can promote or reduce inhabitants' PA, and it should be considered.

In conclusion, the shelter-at-home health order issued by the Spanish Government prevented that vast majority of individual from meeting the WHO recommendations of VPA and MPA with all the health-derived consequences. Individuals' weekly practice was dependent on personal factors such as gender, age or weight, but also contextual factors such as living with a dependent person or the type of house. Situations like this one could be repeated in the future, and national authorities should consider the findings from the present study to prevent citizens from putting their health at jeopardy withstanding a quarantine at home.

The present study is not without limitations. The first one is that data is preliminary and the second one is the use of self-reported PA measures. However, there is a need to understand as fast as possible this Public Health Emergency and its impact on human behaviour.

Conflict of interest

The authors do not declare a conflict of interest.

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