

Impact of COVID-19 confinement on the time and intensity of physical activity in the Spanish population

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Research

Keywords: confinement, physical activity, sedentary behaviour, Covid-19

Posted Date: May 6th, 2020

DOI: <https://doi.org/10.21203/rs.3.rs-26074/v1>

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Abstract

Background

The lockdown and social distancing caused by COVID-19 may influence common healthy behaviour. Due to the unprecedented worldwide confinement in which Spain has been one of the most affected with severe rules governing confinement, physical activity and sedentarism may change due to prolonged stays at home. The aim of this study is to evaluate how physical activity and sedentary time have changed during confinement in the Spanish population.

Methods

3800 healthy adults (age ≥ 18 - ≤ 64 years) residing in Spain were asked during confinement. Sociodemographic data and self-reported physical activity data were collected twice by an International Physical Activity Questionnaire-Short (IPAQ-S) between 23rd March and 1st April, and the analysis was carried out considering the achievement of general physical activity recommendations, different age ranges and baseline physical activity levels.

Results

Physical activity decreased significantly during confinement in all population. Vigorous activities and walking time decreased by 16.8% (p-value > 0.001) and 58.2% (p-value > 0.001) respectively, whereas sedentary time increased by 23.8% (p-value > 0.001). The fulfilment of 75 min/week of vigorous activity recommendation decreased by 10.7% (p-value < 0.001) while the amount of people who reached to 150 min/week of moderate activity barely changed (1.4%, (p-value 0.117)). The group that performed more vigorous physical activities before confinement showed the greatest decrease (30.5%, p-value > 0.001). Men reduced more the time in vigorous activity than women (21% vs 9%, respectively) who even increased time in moderate physical activity by 11% (p-value < 0.05) and showed less increase in sitting time than men (35% vs 25.3%, respectively). Young people and students showed the highest decrease in all physical activities.

Conclusions

The Spanish adult population, especially young people, students and very active men, decreased daily physical activity and increased sedentary time during COVID-19 confinement.

Background

On 11th March 2020, the World Health Organization (WHO) (1) declared a global pandemic caused by SARS-Covid-2 virus, which has become a public health emergency of international concern.

The Coronavirus disease (COVID-19) outbreak in Spain has already had a direct impact on more than 46 million people. The Spanish Government declared a state of emergency on 17th March and ordered a lockdown, to restrict travel and cancel non-essential services in order to stop the spread of COVID-19 (2).

Social distancing and confinement are fundamental in tackling the spread of coronavirus. However, the ongoing lockdown across the country has no precedent and it is unknown how that may affect the general population's health and wellbeing. In these circumstances, the sudden and stressful situation in addition to the prolonged stays at home may imply a radical change in lifestyle behaviour such as physical activity, eating habits, alcohol consumption, mental health, quality of sleep, and so on (3–7).

Likewise, there is significant concern about physical activity and sedentary behaviour (8). Due to isolation and limitation in engaging in regular, common activities, COVID-19 has radically modified the determining factors (individual, interpersonal, environmental, regional or national policies and global) (9) of both types of behaviour. Therefore, taking into account the general recommendations for physical activity in adults (at least 150 minutes of moderate or 75 minutes of vigorous intensity activity a week, or a combination of both) (10), the unprecedented confinement situation may give rise to two situations of concern to health whereby sedentary behaviour will increase because 1) the active population may decrease their activity and 2) the inactive population may not be likely to increase their daily physical activity.

Therefore, the aim of this study was to analyse physical activity and sedentary behaviour before and during COVID-19 in a Spanish healthy adult population.

Methods

Healthy adults (age ≥ 18 - ≤ 64 years) living in Spain were asked to participate in this cross-sectional study. Sociodemographic and self-reported physical activity data were asked twice by questionnaire between 23rd March and 1st April, just the week after the state of emergency was declared in Spain and over the following two weeks. The invitation to participate in the study was issued through social media, e-mail and mobile phone from the Physical Activity and Sports Sciences Department, University of Deusto. Moreover, a national sports store (Forumsport S.A.) and a Biomechanical Laboratory (Custom4us) also sent the questionnaire to their customers by e-mail. Ethics approval was obtained from the Deusto University Human Ethics Advisory Group. Informed consent was obtained from participants.

Sociodemographic data (age, height, weight, sex, whether working and/or studying) and self-reported physical activity was requested twice, one week before and one or two weeks since confinement started, by the IPAQ-S validated in Spanish (11). The IPAQ-S asked about three specific types of activity undertaken

during the previous 7 days in the four domains (leisure time, work, household activities and transport), and items were structured to provide separate scores for walking, moderately intense and vigorously intense activities. The IPAQ also contained a question to identify the time spent on sedentary activity.

The primary outcome was the change in time and intensity of physical activity and the sedentary time from prior to the confinement situation and after it. The secondary outcome was the change in the percentage number of participants who fulfilled general physical activity recommendations according to age, gender, working status and baseline physical activity levels.

4160 healthy subjects answered the questionnaire, although 360 were not included due to exclusion criteria: not resident in Spain, age ≥ 65 and extreme scores in vigorous, moderate and walking activities (≥ 6 hours per day 7 days a week).

Data analysis

A univariate analysis with paired t-tests was used to compare the differences in primary and secondary outcomes before and during confinement. A Chi² frequency test was used to assess differences in the amount of physical activity between groups. The subgroup analysis was performed by groups of different ages (18 - ≤ 24 ; $>25 - \leq 34$; $>35 - \leq 44$; $>45 - \leq 54$; $>55 - \leq 64$), gender, working status (students, active workers, people that study and work, and those that reported they did nothing), and physical activity categorized by the following four groups for vigorous activity groups 0 to ≤ 75 , >75 to ≤ 150 , >150 to ≤ 225 , >225 min/week, and 0, 0 to ≤ 150 , >150 to ≤ 300 , >300 to ≤ 450 , >450 min/week for moderate activity. Statistical analysis was performed using the SPSS Data Analysis Version 23 (SPSS Inc., Chicago, IL).

Results

Table 1 shows the demographic characteristics of 3800 participants who were mostly male, (54%) active workers (78%) and age 42.7 ± 10.4 years (mean \pm SD).

Table 1
Demographic characteristics of 3800 healthy subjects before confinement.

n = 3800	
Before confinement	
Age year	42.7 \pm 10.4
Height cm	171 \pm 8
Weight Kg	71 \pm 12
Male / Female	2054 (54) / 1746 (46)
Workers	2956 (78)
Students	267 (7)
Study-Work	374 (10)
Nothing	203(5)
Data are presented as mean \pm SD, n (%)	

During confinement, the amount of time spent on moderate and vigorous activities by all the population decreased by 2.6% (p-value 0.102) and 16.8% (p-value > 0.001) respectively. In addition, walking time was reduced by 58.2% (p-value > 0.001) whereas sedentary time increased by 23.8% (p-value > 0.001) (Table 2).

Table 2
Physical activity data before and during confinement in all the population and different subgroups.

SUBGROUP ANALYSIS	Before confinement	During confinement	p-value	Before confinement	During confinement	p-value	Before confinement	During confinement	p-value	Before confinement
	Time in vigorous activities			Time in moderate activities			Walking time			Sitting
Total (n = 3800)	219 ± 196	182 ± 184	< 0.001	149 ± 174	145 ± 170	0.102	282 ± 253	116 ± 189.3	< 0.001	(n = 36 6.1 ± 3
Women (n = 1746)	175 ± 176	159 ± 174	< 0.001	133 ± 160	144 ± 159	< 0.05	302 ± 260	122 ± 199.3	< 0.001	(n = 16 6.3 ± 3
Men (n = 2054)	256 ± 204	202 ± 190	< 0.001	163 ± 185	145 ± 179	< 0.001	265 ± 247	110 ± 180.1	< 0.001	(n = 19 ± 3.1
Workers (n = 2956)	212.1 ± 189.9	177.3 ± 179.4	< 0.001	143 ± 169.17	142.2 ± 170.6	0.811	269.3 ± 246.2	113.70 ± 182.7	< 0.001	(n = 28 6.2 ± 3
Students (n = 267)	295.5 ± 221.0	223.7 ± 199.1	< 0.001	171.1 ± 191.8	143.5 ± 157.1	< 0.05	298.8 ± 246.1	98.8 ± 189.7	< 0.001	(n = 26 6.4 ± 2
Study-Work (n = 374)	223.6 ± 196.8	193.2 ± 195.2	< 0.001	157.4 ± 177.1	144 ± 160.6	0.141	301.3 ± 249.5	106.1 ± 179.6	< 0.001	(n = 36 6.3 ± 4
Nothing (n = 203)	213.9 ± 228.4	179.6 ± 201.1	0.013	198 ± 208.8	184.6 ± 190.4	0.316	403.3 ± 326.3	186.6 ± 267.2	< 0.001	(n = 19 4.4 ± 2
Age categories										
18 - ≤24 (n = 264)	300 ± 206.6	246 ± 189.1	< 0.001	180 ± 197.3	149 ± 154.6	< 0.05	321 ± 281.8	94 ± 182.6	< 0.001	(n = 25 6.6 ± 4
≥ 25 - ≤34 (n = 670)	244 ± 197.9	201 ± 193.6	< 0.001	139 ± 150.3	145 ± 159.4	0.345	280 ± 244.2	97 ± 161.1	< 0.001	(n = 65 6.4 ± 3
≥ 35 - ≤44 (n = 1361)	209 ± 189.9	175 ± 174.5	< 0.001	141 ± 176.6	140 ± 173.5	0.830	253 ± 235.8	108 ± 186.8	< 0.001	(n = 13 ± 3.9
≥ 45 - ≤54 (n = 1158)	202 ± 184.4	171 ± 183.3	< 0.001	150 ± 172.7	142 ± 170.7	0.121	285 ± 256.1	125 ± 197.8	< 0.001	(n = 11 6.1 ± 3
≥ 55 - <65 (n = 347)	199 ± 126	155 ± 186.1	< 0.001	169 ± 191.7	162 ± 184.3	0.405	354 ± 284.1	160 ± 213.2	< 0.001	(n = 33 5.7 ± 3
PA categories										
0 - ≤75 (n = 962)	16 ± 23.7	71 ± 124.7	< 0.001	101 ± 138.1	127 ± 153.9	< 0.001	291 ± 269.1	127 ± 211.8	< 0.001	(n = 93 6.4 ± 3
> 75 - ≤150 (n = 711)	115 ± 21.6	125 ± 116.2	< 0.05	119 ± 120.9	121 ± 132.8	0.596	248 ± 219.5	93 ± 155.7	< 0.001	(n = 69 6.5 ± 4
> 150 - ≤225 (n = 550)	188 ± 16.4	172 ± 134.2	< 0.01	136 ± 146	128 ± 156.6	0.231	256 ± 226.2	93 ± 153.8	< 0.001	(n = 52 6.2 ± 3
> 225 (n = 1577)	400 ± 170.7	278 ± 203	< 0.001	196 ± 208	171 ± 193.7	< 0.001	299 ± 264.1	126 ± 197.5	< 0.001	(n = 15 5.7 ± 3
Data are presented as n, mean ± SD. *Some variables pertaining to sedentary time have missing values, as follows: Total (n = 113); Women (n = 52); Men (n = 5); Study-Work (n = 13); Nothing (n = 4);										
Age categories 18 - ≤24 (n = 6); ≥25 - ≤34 (n = 15); ≥35 - ≤44 (n = 38); ≥45 - ≤54 (n = 45); ≥55 - <65 (n = 9); PA categories 0 - ≤75 (n = 25); >75 - ≤150 (n = 13 (n = 53).										

Regarding fulfilment of physical activity recommendations, the number of subjects who failed to complete 75 minutes of vigorous intensity per week before confinement increased by 10.7% (p-value < 0.001) during lockdown. (Table 3). In addition, the most active population (> 225 min/week of vigorous activity) decreased their activity significantly by 7.7% (p-value < 0.001). Nevertheless, fulfilment of 150 minutes of moderate activity per week barely changed (1.4%, p-value 0.117).

Table 3
Subgroup analysis in different ranges of physical activity levels before and during COVID-19.

Subgroup categories (time; min/week)	Before confinement	During confinement	p-value
Vigorous activity			
0 - ≤75	962 (25.3%)	1369 (36%)	< 0.001
>75 - ≤150	711 (18.7%)	650 (17.1%)	0.068
> 150 - ≤225	550 (14.5%)	495 (13%)	0.066
> 225	1577 (41.5%)	1286 (33.8%)	< 0.001
Moderate activity			
0 - ≤150	2453 (64.6%)	2509 (66%)	0.117
> 150 - ≤300	837 (22%)	776 (20.4%)	0.087
> 300 - ≤450	274 (7.2%)	329 (8.7%)	< 0.05
> 450	236 (6%)	186 (4.9%)	< 0.05
Data are presented as n (%)			

In the subgroup analysis, the most active subjects showed the highest decrease in vigorous activity time (30.5%, p-value < 0.001) (Table 2). However, the less active population increased the time they spent on these activities by 34% and this trend is also evidenced in the case of moderate activities. Furthermore, walking time declined similarly for all physical activity levels, while in terms of sedentary time the most active group showed the highest increase (40.3%, p-value < 0.001).

Men showed a higher decrease in vigorous activities than women (21% and 9%, respectively) and both reduced walking time to a similar extent (58.5% men, 59.6% women) (Table 2). However, sedentary time showed a higher increase in men (35%, p-value < 0.001) than in women (25.3%, p-value < 0.001) and accordingly, men significantly reduced moderate activities by 8.2% (p-value < 0.001) while women increased these activities by 11% (p-value < 0.05).

The students' group showed the highest decrease in moderate (16.1% p-value 0.05), vigorous (24.3%, p-value 0.001) and walking activities (66.9% p-value 0.001), whereas unemployed or non-students were the most sedentary during confinement (47.7, p-value < 0.001) (Table 2). The adult population (age ≥ 55 - <65 years) decreased the amount of time they spent on vigorous activities the most (22,1%) whereas for moderate activities and walking time it was the youngest subjects (18 - ≤24 years) who also evidenced the greatest increase in sedentary time (47.7% p-value 0.001).

Discussion

Physical activity decreased significantly during confinement in all the population where vigorous and walking activities declined the most and moderate activities barely changed. There were more inactive people who failed to fulfil the 75 min/week of vigorous activities during lockdown, and sedentary time also increased considerably. The impact on active and sedentary behaviour was particularly high in men, young people, students and the physically very active population.

To our knowledge, there are no previous studies that have analysed the effect of confinement caused by a pandemic on physical activity. Thus, it is difficult to assess whether the population we studied has reduced the amount of physical activity to a smaller or larger extent. The only available data we found about physical activity during confinement comes from an activity tracker, where it has been shown that in Europe the country with the greatest step count decrease recorded was Spain, with 38% less, followed by Italy with 25%. This reduction is similar to the falling trend in walking time shown in our study. In this regard, other studies carried out in similar lockdown situations (confinement during seasons with adverse weather conditions – cold winter or heat waves) also reported physical activity decrease during confinement, whereas sedentary time increases because poor or extreme weather becomes an environmental barrier to going outdoors (13–16).

Sedentary time increased considerably, most likely due to the exchange between common daily active behaviour (walking, cycling or transport to work, etc.) and the prolonged stay at home. Young people and students spend more time seated during confinement and this may be due to the forced e-learning which encourages sedentary behaviour related to excessive time in screen-based activities (17). Likewise, according to the socio-ecological model (9), in a comparable framework where social or environmental barriers promote an inactive lifestyle (social isolation, loneliness and, when season changes) have been reported more sedentary behaviour and less time being spent on light, moderate and vigorous physical activities (18–20). Hence, an involuntary prolonged stay at home may encourage sedentary behaviour as well as during confinement caused by COVID-19.

The most active subjects showed the highest decrease in vigorous activity time and this may be explained by two main reasons: the forced sudden inaccessibility to community resources (e.g. sports facilities, urban trails, parks, green spaces, etc.) and the lack of time to react during the first weeks of confinement to gather fitness resources in order to continue engaging in regular activities at home.

Regarding moderate activities, our data showed that it barely changed in all the population and this could be attributed to the fact that some people might have been maintaining the minimum recommended time doing alternative activities at home. In this regard, the less active population increased vigorous and moderate activities during confinement and that could be related to the promotion of such activities by health institutions, fitness centres, the Internet and television by posting daily online workout routines. Thus, there are people that have found new ways of being more active during this lockdown.

Active behaviour changed according to gender. Both genders reduced walking time to a similar extent, although men showed a higher decrease in vigorous activities that may be related to the greater physical inactivity prevalence reported in women over the years. (21–24). According to sedentary behaviour, sitting time showed a higher increase in men who also significantly reduced moderate activities while women increased these activities. This could be attributed to the gender gap by historically proven female inequality in household and child care tasks, in which where men have shown a low level of involvement in Spain (25–27).

Regarding fulfilment of physical activity recommendations, the global age-standardized prevalence among the non-active population was 27.5% in 2016 (22). According to the Eurobarometer (Eurobarometer, 2014), 33.6% of the Spanish adult population did not attain minimum levels of physical activity, and 36% spent most of the day sitting down (National Health Surveys in Spain, n.d.). In our population, our inactive population before confinement is lower (25.3% according to 75 min/week vigorous physical activity) in comparison to Eurobarometer. That may be explained by the fact that the population recruited for the study was particularly more active as shown in the data for people undertaking > 225 min/week of vigorous activities, and this could be attributed to the fact that the questionnaire was shared by institutions related to sport, exercise and biomechanics. Therefore, it is to be expected that we recruited a population that is commonly more active than the general population.

A limitation of the current study is that we selected the IPAQ- Short version instead of the IPAQ-Long one because of concerns that the length of the questionnaire would result in significant participant burden. In addition, although the questionnaire collects data about the last 7 days, in our study we requested information beyond a week, which may be justified due to the unprecedented situation and the lack of time available to manage more appropriate study design and methods. Another limitation would be the cross-sectional design of the study, since directionality of the associations cannot be established.

On the other hand, one of the strengths of the study is that the questionnaire was sent just when the population started confinement (during the first two weeks), so it is likely the participants had their common activities in mind before confinement in a fresh and realistic form. To our knowledge, this is the first study carried out on a confined large sample size, which may be useful in designing different strategies in order to reduce sedentarism and increase physical activity by the confined population.

Conclusions

In conclusion, healthy adults reduced daily physical activity and increased sedentary time during COVID-19 confinement in Spain. The impact was particularly high in men, young people, students and the very active population. Strategies should be employed to increase physical activity and decrease sedentary behaviour.

Abbreviations

WHO
World Health Organization
COVID
Coronavirus Disease
IPAQ
International Physical Activity Questionnaire

Declarations

Ethics approval and consent to participate

Ethics approval was obtained from the Deusto University Human Ethics Advisory Group. Informed consent was obtained from participants.

Consent for publication

Not applicable

Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests

Funding

Not applicable

Authors' contributions

ACB designed the study and ACB and AAE provided substantial contributions in writing the manuscript. ACB, BG and AC had full access to the data and carried out statistical analysis. All authors read and approved the final manuscript.

Acknowledgements

The authors gratefully acknowledge those who participated in this study and ForumSport and Custom4us for helping to disseminate the questionnaire.

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