

Use Of Technological Devices And Physical Activity During Covid-19 Lockdown. Comparison Between Europe And Latin America

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Abstract

Background The COVID-19 pandemic has caused major changes in people's lifestyle, health, and social relationships, especially impacting children and adolescents. The objective of this work has been to know the peculiarities of the use of technological devices and the levels of physical activity (PA) during the pandemic, both in Ibero-American and European countries. **Methods:** To comply with this, a quantitative investigation was carried out with a non-experimental design, descriptive, comparative and correlational (transversal) character. The sample consisted of 2,316 children aged between 3-12 years (M=7.70; SD=2.86). For the analysis and treatment of the data, the statistical software SPSS 25.0 (IBM Corp, Armonk, NY, USA) was used. **Results:** The European participants use more video consoles, computers and tablets, while the Ibero-Americans were the ones who obtained the highest values in the use of TVs. However, in the European countries, higher values were manifested in the time spent on PA, homework, artistic activities, free and family play; while in Ibero-America there were longer times in the use of the mobile phone and sleep. **Conclusions:** From these results, public and educational institutions should establish social and educational policies that guarantee a minimum of information and training for parents so that they can establish strategies at home to promote healthy habits and responsible use of technological means.

Keywords : COVID-19; physical activity; ICT; education; homework; children.

Introduction

The SARS-CoV-2 (COVID-19) pandemic has caused great changes in people's lifestyle, health and social relationships. This situation has impacted children and adolescents, affecting their health, intellectual, physical and emotional development (Bates et al., 2020; Łuszczki et

al., 2021; Riazi et al., 2021 Stavridou et al., 2021). The period of confinement has influenced the lifestyle of millions of children, unable to continue carrying out multiple educational activities as they did until the confinement (Zagalaz-Sánchez et al., 2021). The public health emergency response to COVID-19 has involved

physical distancing strategies to reduce the spread (McCormack et al., 2020). The pandemic has been devastating in every way, particularly psychological, as Physical Activity (PA) and an active lifestyle are known to support psychological well-being (Albeal et al., 2022; Schnaiderman et al., 2021; Zaccagni et al., 2021). In the same way, the educational landscape has been altered around the world, since blended learning, which combines the distance and face-to-face model, became an alternative to fully online learning to address the demands that guarantee the student health and education (López-Fernández et al., 2021).

The pandemic, due to its rapid rate of transmission, has led to the recommendation that people should stay at home to avoid social interactions and slow the spread of the disease, thus reducing the pressure on healthcare systems worldwide. This strategy has potential clinical and behavioral implications, and home isolation may likely result in a profound decline in moderate to vigorous PA levels and an increase in sedentary behavior (Peçanha et al., 2020). Society has been facing this pandemic following the recommendations and determinations of the WHO (World Health Organization) and the strategies deployed by government institutions. Among these, social isolation has been shown to be the most important since by isolating, society tends to move less, with the consequent increase in physical inactivity and sedentary lifestyle, affecting their levels of physical fitness (Pinho et al., 2020). In this way, the restrictions of COVID-19, such as the closure of schools and parks, and the cancellation of classes, activities and sports can prevent children from reaching the recommended levels of PA (Dunton et al., 2020).

Measures to combat the spread of the pandemic have concentrated on inviting people to stay at home, which has reduced

opportunities to exercise and, at the same time, shed some light on the importance of physical health (Symons et al., 2021). Thus, the negative effects of social distancing and prolonged school closures on the lifestyle and PA of children during the pandemic have been affected (So et al., 2022). PA is considered a critical component of a healthy lifestyle and the prevention of various diseases. The different restrictions imposed on social interaction and public spaces due to COVID-19 could decrease PA and academic performance in students (Osipov et al., 2021). According to Peçanha et al. (2020) emerging data indicates a substantial decline in global PA levels during the period of social isolation adopted worldwide to contain the spread. Lockdown-induced decreases in PA levels and increases in sedentary behavior can lead to a rapid deterioration in cardiovascular health. Even short-term inactivity (1 to 4 weeks) has been associated with detrimental effects on cardiovascular function and structure, and with increased risk factors. In this critical and unprecedented scenario, PA at home emerges as a clinically relevant intervention to promote health benefits (Peçanha et al., 2020). It is important to continue promoting time outdoors, supporting policies and practices that facilitate mobility and that help families encourage PA in their children (Riazi et al., 2021). For other authors (López-Gil et al., 2021) he pointed out that it is important to assess changes in children's PA, screen time and sleep duration because it helps to understand their healthy behaviors during a period of pandemic restrictions should be a priority.

The hypothesis raised has been that due to mobility restrictions, sedentary habits among children have increased. This study is one of the few that compares the levels of physical activity and use of technological devices in children between two continents. Ibero-America and Europe have been chosen given the greater possibilities of being able

to carry out surveys to families and that they were representative samples. For all these reasons, this study aims to find out the peculiarities of the use of technological devices and PA levels during the pandemic, both in European and Ibero-American countries.

Methodology

Study design and participants

For this study, a descriptive, comparative, cross-sectional design was used, with a single measurement for a single group. The sample consisted of 2,316 children aged between 3-12 years ($M=7.70$; $SD=2.86$). The sampling was for convenience, inviting families with children in the Early Childhood and Primary education stage to participate during the COVID-19 pandemic. An online survey was created and distributed on each continent using a snowball sampling strategy. This online survey was completed by parents (mother/father/ responsible guardian). The survey was open from April 2020 to September 2020. Regarding gender, the distribution of the sample was homogeneous, representing 52.4% boys ($n=1,214$) and 47.6% girls ($n=1,102$). Regarding the context, 54.7% ($n=1,268$) of the sample represents Europe and 45.3% ($n=1,048$) Latin America.

In the questionnaire, PA is understood as any bodily movement that implies a higher metabolic cost than the resting state. Thus, walking is PA, playing at carrying objects is also, helping to sweep or order the room as well. It is not PA to be sitting, lying down or at rest. Logically, the questionnaire is not the best way to collect data on levels of PA, but since it is an international study, carried out during a period of confinement and a large sample, it was not feasible to use accelerometers or another device that could give us more real information on the PA levels.

Data collection instrument and variables

An in-house questionnaire (ad-hoc) was used to record the sex and age of the children, the origin of the answers (Europe and Latin America) and the educational level of the parents (categorized into "basic studies", "studies means", "higher studies" and "postgraduate"). The questionnaire on Equipment and Use of Information and Communication Technologies in Households (TIC-H2019) prepared by the National Institute of Statistics (INE) was used following the recommendations of the Statistical Office of the European Union (EUROSTAT) to know the means and technological resources available to families at home during confinement, as well as the time of use, expressed in minutes, of children under 12 years of age. The lifestyle was found to be associated with the actions that could be carried out at home during the confinement, where the relatives indicated the time expressed in minutes that their children dedicated to daily activities such as PA practice, homework, playing instruments, performing artistic activities, housework, playing with the family, reading and free play. All these issues were specified and exemplified, to bring this reality closer to the context of the study subjects. For the degree of psychosocial well-being, a Likert-type scale with 10 response options was used (where 1 = "null" and 10 = "extremely maximum"). The degree of happiness, energy, tiredness/fatigue, self-esteem and creativity during confinement were recorded, allowing the sum of the state in general to be established, as well as the average values of a degree of positive and negative psychosocial well-being.

Procedure

Through the Google Forms platform, a questionnaire called "Boys, girls and confinement" was created. It was disseminated electronically through social

networks, in order to reach the population under study (relatives residing in Europe and Latin America with children under 12 years of age), as well as contacting various education professionals who had access to sufficient families to ensure good dissemination of the instrument. The questionnaire was activated during the various periods of confinement established in Latin America and Europe. This questionnaire was translated by the members of the research and a review of styles was carried out through different groups of experts of the mother tongue of each country. Among all the responses received, a total of 237 questionnaires were eliminated because they were not correctly completed or because they belong to another educational stage.

By completing the form, all participants gave their consent to work with the data anonymously. Throughout the investigation, the ethical principles reflected in different documents and official treatises on research ethics were taken into account, thus guaranteeing the anonymity of the participants, the confidentiality of the data reflected in the questionnaires and other ethical considerations related to research in education.

Ethical aspects

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and official treatises on research ethics were taken into account, thus guaranteeing the anonymity of the participants, the confidentiality of the data reflected in the questionnaires and other ethical considerations related to research in education (American Psychological Association, 2020; Paz-Maldonado, 2018).

Analysis of data

A descriptive analysis is carried out to determine the sociodemographic characteristics and behaviors during the pandemic, applying means (M), standard deviations (SD) and frequencies (%). To establish the differences between the variables, the ANOVA of one factor was used, using Pearson's Chi-square statistical indicator, to establish the differences. For the analysis and treatment of the data, the statistical software SPSS 25.0 (IBM Corp, Armonk, NY, USA) was used.

Results

Regarding the number of devices by country, Table 1 established the parameters related to the number of technological devices in relation to the area of residence of the participants, highlighting that the European participants use more video consoles, computers and tablets, while the Ibero-Americans were those who obtained the highest values in the use of TVs (Table 1).

Table 1 Number of technological devices in the home according to area of residence

Group statistics					
	Europe and Ibero-America	N	Media	Desv. Deviation	Desv. Average Error
How many televisions are there in the home?	Ibero-America	1048	2.19	1.107	.028
	Europe	1268	1.98	1.048	.041
	Ibero-America	1048	.65	1.005	.025

How many game consoles are there at home?	Europe	1268	.87	1.396	.054	
How many computers are there at home?	Ibero-America	1048	1.70	1.090	.028	
	Europe	1268	1.89	1.041	.040	
How many tablets are there at home?	Ibero-America	1048	.72	.869	.022	
	Europe	1268	1.21	.926	.036	
ANOVA						
		Sum of squares	DT	Root mean square	F	Sig.
How many televisions are there in the home?	Between groups	47.228	6	7.871	7.588	.000
	Within groups	683.590	659	1.037		
	Total	730.818	665			
How many game consoles are there at home?	Between groups	10.312	6	1.719	.881	.508
	Within groups	1285.839	659	1.951		
	Total	1296.152	665			
How many computers are there at home?	Between groups	80.056	6	13.343	13.711	.000
	Within groups	641.272	659	.973		
	Total	721.327	665			
How many tablets are there at home?	Between groups	8.663	6	1.444	1.693	.120
	Within groups	561.907	659	.853		
	Total	570.571	665			

For Table 2, the differences were recorded according to the minutes spent using these technological devices and the time they performed PA at home. Thus, in the European countries, higher values were manifested in the time spent on PA, doing homework, artistic activities (such as painting, photography, handicrafts or playing an instrument), free play and family play. While in Ibero-America there were longer times in the use of the mobile phone

and sleep despite the fact that the number of technological devices has been somewhat higher in European homes. Thus, the differences were recorded according to the area of residence, taking into account the time dedicated to the use of technological devices and the daily actions carried out during confinement (Table 2). In the European areas, the highest values were manifested in the time spent performance of PA ($M = 35.16 \pm 37.281$), use of tablets (M

= 27.77 ± 48.209), performance of school homeworks (M = 116.165 ± 95.2803), artistic activities (M = 49.696 ± 50.5684), playing with the family (M = 84.015 ± 71.3778) and free play (M = 93.755 ±

78.5964). While in Ibero-America there were longer times in the use of computers (M = 43.19 ± 75.429) and mobile phone (M = 45.33 ± 81.698).

Table 2 Time spent using technological devices and actions that could be carried out during confinement depending on the area of residence

Group statistics					
	Europe and Ibero-America	N	Media	Desv. Deviation	Desv. Average Error
How many minutes, on average a day, do you currently do physical activity at home?	Ibero-America	1048	23.68	30.148	.761
	Europe	1268	35.16	37.281	1.445
How many minutes, on average a day, do you play the video console?	Ibero-America	1048	22.961	51.1048	1.2898
	Europe	1268	23.170	48.2091	1.8681
How many minutes, on average a day, do you watch television?	Ibero-America	1048	76.01	76.919	1.941
	Europe	1268	84.59	66.684	2.584
How many minutes, on average a day, do you spend on the computer?	Ibero-America	1048	43.19	75.429	1.904
	Europe	1268	36.17	72.897	2.825
How many minutes, on average a day, do you spend with the tablet?	Ibero-America	1048	20.28	49.200	1.242
	Europe	1268	27.77	48.209	1.868
How many minutes, on average a day, do you spend with the mobile phone?	Ibero-America	1048	45.33	81.698	2.062
	Europe	1268	22.43	54.301	2.104
How many minutes, on average a day, do you spend on homework?	Ibero-America	1048	92.139	94.3690	2.3817
	Europe	1268	116.165	95.2803	3.6920
How many minutes, on average a day, do you spend playing a musical instrument for personal enjoyment?	Ibero-America	1048	7.23	22.738	.574
	Europe	1268	8.36	21.549	.835
How many minutes, on average a day, do you spend doing artistic activities (painting, photography or crafts) for personal enjoyment?	Ibero-America	1048	29.551	45.0993	1.1382
	Europe	1268	49.696	50.5684	1.9595
	Ibero-America	1048	24.734	35.9324	.9069

How many minutes, on average a day, do you spend doing domestic chores (cleaning, cooking, washing up, making the bed...)?	Europe	1268	22.156	24.0106	.9304
How many minutes, on average a day, do you spend playing as a family?	Ibero-America	1048	55.158	60.7415	1.5330
	Europe	1268	84.015	71.3778	2.7658
How many minutes, on average a day, do you spend reading a book, comic or story?	Ibero-America	1048	19.452	24.1403	.6092
	Europe	1268	28.993	22.9471	.8892
How many minutes, on average a day, do you dedicate to free play?	Ibero-America	1048	73.656	82.3699	2.0788
	Europe	1268	93.755	78.5964	3.0455
How many hours, on average a day, does your child sleep?	Ibero-America	1048	23.649	77.2118	1.9486
	Europe	1268	18.842	65.0000	2.5187

Discussion

With respect to the analysis of sociodemographic and PA aspects, the findings of this study indicate that children residing in European areas show higher values in the time spent on PA, educational tasks, free play and family play; while in Ibero-America there were longer times in the use of the mobile phone and hours of sleep.

In this way, in another study (Cachón-Zagalaz et al., 2021) it was indicated that the use of digital screens is an important part of the daily routine of children at home. The time that children spent sleeping was directly proportional to the time spent on PA and indirectly proportional to the time spent watching screens. The children who slept the most were those from 0 to 3 years old, especially girls who belonged to large families. The PA levels in the sample were low, as were the times dedicated to activities such as music or games. Arevalo et al. (2020) found that during the mandatory isolation period, 75.2% of children did not perform the PA minutes recommended by the WHO and that 82.8% exceeded the time of 60 minutes in front of electronic devices.

According to other researchers (Paredes & Pancca, 2022), 20.7% of children spend more hours in front of a screen, with an average of 6-7 hours a day, 11.5% of children 8-9 hours and 3% spent more than 10 hours, in contrast to girls who represented 13.4%, 5.6% and 1% respectively. Girls showed lower levels of PA (26.2%) compared to boys (6.2%). In sleeping time, 41.3% of the girls slept for 8-9 hours, as opposed to 31.5% of the boys. Following this line, Arufe-Giráldez et al. (2022) detected PA levels lower than those recommended, with an average of 31.81 minutes compared to the recommended 180 minutes, since the period of confinement could have been an obstacle to comply with the WHO recommendations regarding the practice of PA and screens in children under 5 years of age, which could have further aggravated the health of children in relation to pathologies associated with a sedentary lifestyle. The results of another study (Zagalaz-Sánchez et al., 2021) confirmed an influence of the conditions of the house and the place of residence on the daily time dedicated to different educational activities such as reading, PA, playing or using of technological devices between children who

live in small apartments and those who live in large apartments or houses with gardens and those who live in urban and rural environments. According to Sanmiguel-Rodríguez et al. (2022) in European areas, during the confinement period, higher values were obtained in the time dedicated to PA, use of tablets, homework, artistic activities, family games, reading, free play; while in Ibero-America there were longer times in the use of technological devices and in the performance of domestic tasks. Arufe-Giráldez et al. (2020) confirmed in their research a significant number of electronic devices in homes, different times of use for each one, and the existence of various correlations between ICT and children's social and lifestyle habits, such as the overuse of some technological devices to the detriment of PA.

For Lau and Lee (2021) a high use of electronic devices was used without the mediation of parents during the suspension of classes. On the other hand, Tuñón et al. (2022) showed that there was an increase in the exposure of children and adolescents, for more than two hours a day on average, to screens for Internet and/or television use, affecting younger children more, families with a greater number of young people in the home and lower socio-occupational strata. On the other hand, Nagata et al. (2022) indicate that children had a mean of 3.99 hours of screen time per day, with most of the time watching TV shows or movies (1.31 hours), playing video games (1.06 hours), and watching/streaming videos (1.05 hours). On average, children of color use 1.58 hours more screen time per day and Asian children 0.35 hours less screen time per day compared to white children (median 3.46 hours per day); these trends persisted in most modalities. Boys reported more total screen time (0.75 hours more) than girls, which was mainly attributed to video games and video. Girls reported more time texting, social networking and video chatting than boys.

In another investigation (McCormack et al., 2020) it was noted that the majority of children increased the use of television (58.8%), the use of computers or games (56.4%) and the use of devices with screen (75.9%). For McCormack et al. (2020) these behaviors occurred due to the mandatory closure of playgrounds, since 52.7% of children have stopped playing in the park and 53.7% have done so in public spaces. In the same way, the PA of the children in the home increased (48.8%) or remained unchanged (32.9%). Children of parents who were more anxious about COVID-19 had fewer visits to the park and were more likely to spend ≥ 2 h/day with technological devices or playing compared to children of less anxious parents. According to the findings of other authors (Dunton et al., 2020), the most common PA during the lockdown period was free play/unstructured activities such as running (90% of children) and going for a walk (55%). The children sat for approximately 90 minutes related to school and educational issues and more than 8 hours a day related to leisure. Parents of children 9-13 years old compared to children 5-8 years old reported greater decreases in PA and greater increases in sedentary behaviour since the pre-lockdown periods. Children were more likely to engage in PA indoors, and around a third of children used streaming/remote services for activity classes and lessons during the early period of COVID-19 (Dunton et al., 2020). Other researchers (Celis-Morales et al., 2020) indicated that home games had the highest growth since the start of the pandemic. In a study (López-Gil et al., 2021) that analyzed changes in healthy behaviors and compliance with 24-hour movement guidelines in Spanish and Brazilian children during lockdown, he noted that the proportion of the sample that complied with PA and screen time recommendations decreased during confinement due to COVID-19 in both Spanish and Brazilian samples, while sleep duration increased.

The time that children spent sleeping was directly proportional to the time they spent on PA and indirectly proportional to the time they spent watching screens. The children who slept the most were those from zero to three years old, especially girls, who belonged to large families. The PA levels of the sample were low, as were the times dedicated to activities such as music or games. The time that children spent sleeping was directly proportional to the time they spent on PA and indirectly proportional to the time they spent looking at screens (Cachón-Zagalaz et al., 2021). Serra et al. (2021) observed a significant increase in excessive use and addiction to technological means, leading to many clinical situations with sleep disturbances. Following these contributions, So et al. (2022) reported lower PA levels, longer sleep duration, and more screen time among participants recruited during school closures than before lockdown. Primary school students in Hong Kong were found to sleep on average an hour longer during school closures. The delayed sleep onset and increased screen time documented during school closures persisted when schools partially reopened. Schnaiderman et al. (2021) observed that children got up and went to bed later and slept 30 more minutes. In addition, the use of screens increased by 3 hours and, however, the time dedicated to PA did not change, but the type of activities did change, predominantly riding a bicycle and walking. In the same way, the results of another study (Albeal et al., 2022) indicated that the majority of children have green areas and parks near their homes, however, they do not use them to practice PA, especially the girls.

Regarding the type of activities mainly carried out in the green areas, those more of a recreational type stand out, such as playing, walking and the use of the bicycle. On the other hand, the sedentary lifestyle increased with the confinement and, in the same way, the home became a single

physical space where school and work activities converge, with few instances for recreation and the possibility of doing PA (Llatas-Torres, 2021). Other authors (Ruíz-Roso et al., 2020) observed a higher prevalence of inactivity in this population, but the reductions in PA and habitual consumption of ultra-processed foods during the pandemic were more pronounced in Latin America than in other regions. Luszczki et al. (2021) identified differences in diet and changes in daily activity patterns (reduced sleep duration with higher quality sleep and reduced PA) noting an increase in the overall use of device use during the pandemic among Polish children and adolescents. For Dong et al. (2020) online learning has been widely promoted to replace traditional face-to-face learning during the COVID-19 pandemic to keep young children learning and playing at home. Parents generally held negative beliefs about the values and benefits of online learning and preferred traditional learning in early childhood settings. They tended to resist and even reject online learning for three key reasons: the shortcomings of online learning, inadequate self-regulation by young children, and their lack of time and professional knowledge to support online learning. In addition, the difficulties caused by the COVID-19 pandemic have made them suffer, so they are more resistant to online learning at home. The results of this research (Dong et al., 2020) suggested that the implementation of online learning during the pandemic has been problematic and challenging for families.

Conclusions and limitations of the study

It is concluded that during the period of confinement in the European areas, higher values were obtained in the time dedicated to PA, school and educational tasks, artistic activities, free play and family play; while in

Ibero-America there were longer times in the use of the mobile phone and hours of sleep. In the same way, European children dedicated more time to free play, family and artistic activities than Ibero-American children despite the fact that the number of technological devices has been somewhat higher in European homes. From these results, public and educational institutions should establish social and educational policies that guarantee a minimum of information and training for parents so that they can establish strategies at home to promote healthy habits and responsible use of technological means.

It is proposed for future research work to analyze the levels of PA and use of technological devices after confinement and check if these values have increased or not. In addition, studies are needed that address this same issue but with a greater comparison of countries or continents and that can help different governments to promote PA more effectively and specifically for each context in the event of a return to lockdown. Therefore, protocols are required to confirm these results with other studies, since one of the limitations of this research was the sample size and that some of the surveys were carried out on third parties, due to the age of the study sample. Also, it is necessary to raise awareness about healthy habits and thus achieve the challenges and objectives set by the WHO in relation to improving the health of the population. In this way, it is intended to validate the questionnaire used, since the questions of the surveys were extracted from different national and international levels.

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