



The Covid-19 epidemic and Sports Consumption: Evidence from England, Hungary, and Nigeria

Authors' contribution:

- A) conception and design of the study
- B) acquisition of data
- C) analysis and interpretation of data
- D) manuscript preparation
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Abstract

The purpose of this study was to compare and identify differences among the populations in Physical Activity engagement, leisure-related activities, sports consumption, sitting time at work, screen time during the Covid-19 (DuCov) period in comparison with the periods before Covid-19 (BeCov) and after Covid-19 (AfCov), in England, Hungary, and Nigeria. A modified version of the IPAQ instrument and validated questionnaire for sports consumption was used to collect data from respondents in these three countries and further categorized based on individual country, sports fans, gender, and combination or comparisons between the countries: England, Hungary, and Nigeria. A reliability test was conducted, and a descriptive analysis and non-parametric t-test were used to determine significance as well as mean rankings. The results show significant differences between the periods BeCov, DuCov, and AfCov and further highlight the extent of the differences through the rankings. Although we found similarities of results from the three countries especially on people's healthy lifestyle through sedentary by increasing daily sitting and daily screen time DuCov period. However, there were also differences on how the respondents from these three countries consumed sport, engaging in leisure-related activities, before, during, and after Covid-19 period. Generally, it can be concluded that the Covid-19 pandemic has drastically reduced PA engagement, leisure-related activities, and sports consumption. However, an improved situation is realized to some extent in the AfCov period.

Keywords: sports consumption, Covid-19, physical activity, screen time, sedentary

Introduction

For decades, sports consumption has been an integral part of society. It is a complex activity in which participating and spectating are interrelated (McDonald et al., 2002). Physical Activity (PA) as an aspect of sports consumption has received wide attention from researchers across the globe, especially during the Covid-19 pandemic (DuCov). The area is well researched and many studies

have identified its importance to human lives as a measure to counteract heart-related illnesses, reduce obesity and stress, discourage sedentary behaviour, change poor eating habits and improve sleep quality (Maddison et al., 2019; Peçanha et al., 2020; Post et al., 2022; Kim et al., 2022; Balatoni et al., 2023). On the other hand, sports consumption in the form of sports spectatorship differs slightly but is not unrelated to actual participation or engagement in sport. Spectators who attend live sports

events in stadia or other sporting arenas bring excitement, enthusiasm, and an encouraging atmosphere to the competing teams or clubs. Bielec & Omelan (2022) concluded that the long closure of sport facilities during the Covid-19 period (DuCov) did not significantly reduce or impact students' levels of PA activity. However, other studies analysed the period before Covid-19 (BeCov) and DuCov on vigorous and moderate PA and found that vigorous walking activity was significantly reduced DuCov, whereas moderate PA activity remained unchanged, and sedentary activity such as sitting increased significantly, mainly among men and young people (Castañeda-Babarro et al., 2020; Hermassi et al., 2021; Elven et al., 2022). Similarly, the decreasing PA level witnessed in DuCov confinements was a result of high PA engagement among adolescents in the BeCov period (Geets-Kesic et al., 2021). It was suggested that both students and employees were perceived to have a decreased level of PA in the DuCov lockdown (De la Rosa et al., 2022). In one study conducted among adolescents, a decrease in PA DuCov compared to BeCov was reported (Kwok et al., 2020). The amount of time spent on moderate intensity PA was reported to have dropped among all categories of people at the reopening or immediately after lockdown confinement (Lee et al., 2022). It was stated that Japanese adults aged 40–60 found their PA level drastically reduced during the first wave of Covid-19 and found it difficult to return to normal fitness activities (Makizako et al., 2021). This study examined the mid-period and end of Covid-19, and reported a global drop in PA DuCov, but the change was dependent on BeCov PA habits. It was further stated that people with a strong PA mindset BeCov experienced a decreasing level of PA, whereby individuals with a poor physical activity mindset BeCov, found themselves in an increased state of PA (Maltagliati et al., 2021). In a Spanish longitudinal study, it was concluded that PA, sleep quality, and body weight had adverse effects among the respondents in relation to the periods BeCov and DuCov. Individuals who maintained active lifestyles were harmed by Covid-19 (Martínez-de-Quel et al., 2020). Despite a low level of PA recorded DuCov, adolescents who were used to participating in organized sports activities were better off than those who were not (Morres et al., 2021). Also, in their effort to describe changes in PA and screen time among children BeCov and DuCov, although there was no change in PA among children, an increase in outdoor play was recorded, thereby decreasing organized PA as well as showing an increase in leisure screen time (Nathan et al., 2021). A qualitative survey found both negative and positive aspects of the Covid-19 lockdown. Most of the respondents managed to maintain their BeCov PA level by substituting the PA activities that are not easily allowed due to lockdown with other routines to keep fit (Petersen et al., 2021). A wide-ranging review found that

there was already an alarming decrease in PA BeCov, and this situation worsened when Covid-19 set in (Rossi et al., 2021). In a rather unusual turn of events, the time spent engaging in PA increased during the lockdown period, especially among women. However, sitting time, anxiety, and alcohol and tobacco consumption increased across all groups. Similarly, the campaign by authorities to promote engaging in PA during lockdown motivated low-active people to engage in PA more DuCov than BeCov (Romero-Blanco et al., 2020; Constandt et al., 2020).

Sports consumption through this means is a lifestyle activity for many people and an activity that brings joy and happiness, which leads to an improvement in quality of life (Ying, 2012; Kith et al., 2014). Not-for-profit sport and fitness clubs significantly encourage sports consumption for individuals to improve their health fitness and well-being. In addition, they play a role in society as promoters of healthy living (Escamilla-Fajardo, Parra-Camacho & Núñez-Pomar, 2021; Fábíán et al., 2024). The role of gender in leisure sports activities has also been studied and women assumed much greater responsibilities, such as housework, DuCov pandemic, which impacted their leisure sports activities (Ada-Lameiras et al., 2024).

The benefits of sports consumption did not remain unchallenged as the Covid-19 epidemic drastically changed the global order in early 2020. There was no sector of society that was unaffected, with the sports industry being among the most badly affected sectors (Parnel et al., 2020; Ratten, 2020; Adamu & Balatoni 2022). Documented studies showed the sharp decline in PA engagements by people during lockdown, as well as increased sedentary behavior, increased screen time, and poor diet (Ács et al., 2020; Baskan & Baskan 2020; Bates et al., 2020). As the situation developed, it created growing fears of the long-term consequences of continuous epidemiological measures on the physical health and well-being of people. To mitigate the Covid-19 situation, sports entrepreneurs, athletes, fans, consumers, and other sports-related companies had to be smart and creative to devise a workable solution to the problem (Gonzalez-Serrano et al., 2023).

This study considered people from England, Hungary, and Nigeria. The choice of these countries was based mostly on selecting one powerful economy with a developed and a vibrant sports industry, followed by an economy with intermediate development and emerging sport industry, and finally a growing economy with growing development and sports industry potential. Due to the global emergency requirement by the World Health Organization, Covid-19 lockdown measures were enforced in these three countries as in many other countries in terms of the use of sport infrastructures and restrictions almost at the same time. In a World Health Organization publication (2022), which provides data on the physical activity of the population in each country, one finds that

only a quarter of the population aged 18 years and over (male: 25%; female: 30%) in Nigeria are inactive, a third of the population in the UK (male: 30%; female: 40%) and even more in Hungary (male: 33%; female: 43%) did not engage in any physical activity. The characteristics of government support for physical activity in these countries also differ significantly. While in the UK programs are in place to support community sports, public open spaces, walking and cycling, and sport for the elderly, only community sports are implemented in Hungary, and none of the above in Nigeria (World Health Organization, 2022).

The UK economy is valued at £2.23 trillion, and according to the UK Department for Business and Trade (2024), the sport and PA industry contributes significantly to UK Gross Domestic Product (GDP). Development in sports, especially their first-tier football professional league – the English Premier League – is number one among the top five leagues in the world in terms of investment, revenue generation, brand, market value, profitability talent, spectatorship, and viewership (Statista, 2024b; Clark, 2024). Based on the survey report released by Public Health England (2021), 80% of people aged 18 years and above made the decision to change their lifestyle in 2021, with 7 out of 10 adults showing an interest and motivation in making healthy lifestyle choices due to the effects of Covid-19, with 40% pledging to eat healthier, 39% to lose weight, and 41% to exercise more. Additionally, a survey conducted in 2016 reported that sports-related contributions to UK GDP total £37.7 billion, with 1.2 million sports-related employees. The most recent result of a 2021 survey has shown that the sports-related GDP contribution for England alone totals £47.7 billion and 1.25 million sport-related jobs across the UK (Dept. for Culture, Media & Sport 2018; Dept. for Culture, Media & Sport 2024).

The Hungarian economy in terms of GDP is moderately strong compared with the two other economies and valued at around \$178.79 billion according to the World Bank (2023). However, their status as a European member state emboldened their position economically because the EU single market economy was around 14.5 trillion Euros, and 2% of the European Union Economy could be said to derive from the sports industry (Koroknay, 2020; European Commission, 2021). A press release by the Hungarian State Secretary of Human Resources (2020) stated that, in terms of lifestyle, Hungary has risen by seven places on the healthy lifestyle ranking within a 10-year period, which is considered one of the indicators of quality of life. In 2010, healthy life expectancy for Hungarians at birth was 58.6 for women and 56.3 for men but has improved to 61.8 for women and 61.4 for men, which is a significant improvement of 3.6 more healthy life years, recognizing the contribution of embracing a healthy lifestyle through physical activity and healthy diet.

Nigeria, on the other hand, is the most populous country in Africa, with a very young sports industry. It was suggested that the country's sport industry would add 3% to Nigeria's GDP – valued at \$432.3 billion – if proper investment and management are realized (Biodun, 2019; World Bank 2020; Adamu & Balatoni 2022). Healthy lifestyle in Nigeria as measured by diet, exercise, and sleep quality has been poor due to socio-economic problems. Food intake is predominantly for survival and pays little attention to the necessary composition of a proper diet; the emergence of Covid-19 did not help matters (Japhet, 2022). Although national policies encourage PA in Nigeria, promotions through campaigns and programs are almost non-existent. Therefore, the possibility of finding fewer active people in society became high (World Health Organization, 2022). Even though the importance of PA and sports consumption DuCov was well documented, our review study identified limited or no similar studies conducted in Nigeria as one of the biggest countries in the African continent (Adamu & Balatoni, 2023).

With the above findings, it is important to examine how sports consumption, PA, and other aspects of a healthy lifestyle evolved DuCov in comparison with BeCov and after-Covid-19 (AfCov) periods in these three countries. There are studies mentioned above that evaluated the changes in PA and other aspects of a healthy lifestyle BeCov and DuCov. However, less attention was given to studying the AfCov period to determine whether the loss in PA time and increased sedentary activities have recovered from the shock of Covid-19, especially with some of the pledges made by individuals in the UK to improve their active and healthy lifestyle. Therefore, our main study objective was to discover the differences or changes in sports consumption, PA, and healthy lifestyle by comparing these periods to deeply understand the situation and to determine significant increases or decreases among the periods and countries with special emphasis on AfCov or the current situation.

We formulated hypotheses based on the expected changes or differences in activities during these periods. These changes differ between countries, genders, sports fans, and between the three countries. The related hypotheses were formulated to validate the scientific investigations as follows:

1. There are changes and declines in Physical Activity and leisure-related activities during Covid-19 but they increased after the Covid-19 period.
2. There are changes and declines in sports consumption during Covid-19 compared to after and before Covid-19.
3. There are variations and reduced daily sitting time at work during Covid-19 period but more sitting time at work before and after Covid-19.

4. Daily screen time of individuals increased during Covid-19 in comparison with pre and post Covid-19 periods.
5. PA, leisure activities, sports consumption, and sitting time at work in the Covid-free period – before Covid-19 and after Covid-19 – would be greater in England compared to Hungary and Nigeria, while vice-versa on screen time. However, due to the prolonged Covid-19 measures witnessed in the UK during Covid-19, we expected both Hungary and Nigeria to have a better result than England. We also expected Hungary to have much better results than Nigeria, for obvious reasons.

Material & Methodology

These surveys took place March 2023–August 2023 in England, Hungary, and Nigeria, respectively. For the England survey, the data was collected across the cities of Manchester, Liverpool, London, and Cambridge. For the Hungarian survey, the data collection was conducted in Debrecen, the second biggest city in Hungary after Budapest, while in Nigeria it was conducted in Kano state, the second biggest city in Nigeria after Lagos in terms of population and the biggest in the northern part of Nigeria.

The questionnaire used was an IPAQ modified by Chopra et al. (2020) to analyze Physical Activity, such as 30 minutes of aerobic activities in a week, leisure-related activity frequency, daily sitting and screen time, and sports consumption was tested using adapted scales developed by Aiken et al. (2018). The items included sports participation in daily life, thoughts about sports consumption, difficulties in stopping sports activities, the urge to engage in activity, addiction to sport, and the psychological aspect of sports consumption. The questionnaire initially contained a total of 92 items, from which 33 items were used for our analysis of the variables. Our independent variable of Covid-19 was unidimensional and our dependent variables such as sports consumption were multi-dimensional, followed by daily sitting time, screen time, leisure activities, etc.

The questionnaires from all three surveys were physically distributed in a printed copy and the respondents were aided with writing materials for self-completion. The anonymity of the respondents was protected and participating in the survey was voluntary. For both the Nigerian and Hungarian surveys, 150 questionnaires were distributed. Most of them were returned completed, some returned invalid, and some returned empty. For the English survey, 100 questionnaires were distributed among the participants.

The completed questionnaires were coded using EvaSys software (VSL Inc., Hungary; <http://www.vsl.hu>)

and then subjected to reliability testing to ensure repeatability and internal consistency. To check the hypotheses, a non-parametric Wilcoxon signed rank test for matched or paired data was conducted to analyze our p-values ($p < 0.05$ was considered significant) and mean ranks, as well as descriptive analysis using SPSS software version 23 (SPSS Inc., Chicago, IL, USA).

In the questionnaire, as defined for IPAQ, physical activity refers to activities that require hard physical effort and last for at least 10 minutes. We considered sport fans to be those who are sports spectators and attend live sporting events in stadia or arenas, or who visits pubs for sports entertainment.

Results

From the perspective of income in Table 1 – the rating is between 1–5 where 1 represents the lowest and 5 the highest indicated – the majority of the respondents earn less income 47.8% in England, 44.1% in Hungary, with a little higher percentage in Nigeria with 58.1%. This implies that respondents in Nigeria were in a relatively higher income bracket than in the other two countries. Overall, however, respondents were in the lower categories.

Table 1. Perceived income level of the respondents

Country	Scales	Frequency	Percent%
Nigeria	1	9	8.6
	2	23	21.9
	3	61	58.1
	4	8	7.6
	5	4	3.8
Hungary	1	27	21.3
	2	17	13.4
	3	56	44.1
	4	18	14.2
	5	9	7.1
England	1	10	10.9
	2	23	25.0
	3	44	47.8
	4	13	14.1
	5	2	2.2

Respondents were asked to position their income within their own country with 1 – lowest 20% and 5 – highest 20%.

Source: Collected data (2023).

Table 2 shows the gender distribution of the respondents from the three countries. This indicates that there was a near equal distribution of gender between males

and females in the English and Hungarian surveys, with slightly more male responses in the Nigerian survey.

Table 2. Gender of the respondents

Country		Frequency	Percent%
Nigeria	Female	42	40.0
	Male	63	60.0
Hungary	Female	64	50.4
	Male	63	49.6
England	Female	44	47.8
	Male	48	52.2

Source: Collected data (2023).

The age distribution shown in Table 3 implies that younger people responded to the survey and were actively involved in sports consumption, especially in the Hungarian and English surveys, followed by Nigeria based on the percentage of the result shown. Considering all three countries, the target populations are comparable with one another in terms of the age distribution of the respondents.

Comparing the three countries, the result showed that 64.1%, 79.5%, and 62.9% of respondents in England, Hungary, and Nigeria, respectively, engaged in one fitness activity or another.

The respondents were asked whether they were sport fans/spectators and 58.7%, 62.2%, and 73.3% from England, Hungary, and Nigeria, respectively, confirmed that they were.

Table 3. Age of the respondents

Country	Scales	Frequency	Percent%
Nigeria	Under 18	17	16.2
	18-20	9	8.6
	21-30	23	21.9
	31-50	47	44.8
	51-60	4	3.8
	61-70	4	3.8
	Above 80	1	1.0
Hungary	Under 18	1	.8
	18-20	43	33.9
	21-30	75	59.1
	31-50	7	5.5
	51-60	1	.8
England	Under 18	3	3.3
	18-20	13	14.1
	21-30	47	51.1
	31-50	21	22.8
	51-60	8	8.7

Source: Collected data (2023).

Table 4 reflects the feedback of the respondents from the three countries when they were asked if they gained weight in the post-Covid-19 period (currently). The results suggest that respondents in all three countries think they gained weight.

Table 4. Anthropometric question on whether the respondents gained weight currently.

Country		Frequency	Percent
Nigeria	No, my weight is stable	27	25.7
	No, I think I lost weight	21	20.0
	Yes, I think I gained some weight	47	44.8
	I don't know	10	9.5
Hungary	No, my weight is stable	41	32.3
	No, I think I lost weight	23	18.1
	Yes, I think I gained some weight	51	40.2
	I don't know	12	9.4
England	No, my weight is stable	25	27.2
	No, I think I lost weight	25	27.2
	Yes, I think I gained some weight	38	41.3
	I don't know	4	4.3

Source: Collected Data (2023).

To analyze the questions, Wilcoxon signed rank test among respondents BeCov, DuCov, and AfCov epidemic in the three countries were used. Only the most important data that were statistically different in the analysis for the three periods from the three different countries are presented.

The tests have shown differences in the England survey when comparing the three periods among the variables. The results showed differences in moderate- or vigorous-intensity aerobic activities of the respondents BeCov compared to DuCov.

It also went further to identify the differences between the two periods in which the respondents engaged more or less in vigorous-intensity exercise, and the result showed that the respondents in England participated more in this activity DuCov than BeCov, as evidenced by the mean rankings. Similarly, for daily screen time watching TV, social media, and video games of the respondents in the England, the survey indicated significant differences among the periods when comparing BeCov and DuCov, with the result showing more engagement in the activity DuCov than BeCov.

For the Hungarian study, the results show significant differences among the BeCov, DuCov, and AfCov periods. There were significant differences in 30 minutes of moderate or vigorous intensity exercise engagement by the respondents in comparison to the periods DuCov and AfCov, as well as BeCov & AfCov, respectively. It also indicated that the respondents participated more in these routine activities AfCov than DuCov and, similarly, participated more AfCov than BeCov, as the mean ranking shows.

Likewise, on leisure-related activities, significant differences were obtained between all the periods, BeCov and DuCov, DuCov and AfCov, and BeCov and AfCov, respectively. The mean ranking shows that the Hungarian respondents engaged less in leisure-related activities DuCov compared to BeCov. They also engaged in more leisure activities AfCov compared to DuCov, and more in AfCov compared to BeCov.

Correspondingly, the respondents' lives center around sports consumption. The results show significant differences in comparisons BeCov and DuCov, and DuCov and AfCov. They identify that their lives centered around sports consumption less DuCov than BeCov period. They also centered around sports consumption more AfCov than DuCov, and more AfCov compared to BeCov.

On thinking about sport all the time, a significant difference was found in the DuCov and AfCov comparison, indicating that the respondents thought more about sports consumption AfCov compared to DuCov. Furthermore, on the difficulty of respondents in stopping watching, reading, or talking about sport, comparisons of DuCov and AfCov, and BeCov and AfCov found significant dif-

ferences, respectively, showing that it was more difficult to stop watching, reading or talking about sport AfCov than DuCov and more difficult to stop AfCov than BeCov.

Comparisons of respondents' urge to consume sport DuCov and AfCov, and BeCov and AfCov were significantly different and showed that the urge was stronger AfCov compared to DuCov and stronger AfCov than BeCov. The Hungarian respondents indicated that they could not live without sports consumption and the responses showed differences in the comparison of periods between DuCov and AfCov, and BeCov and AfCov, implying that they could not live without sports consumption more AfCov than DuCov, and similarly could not do so more AfCov than BeCov.

A significant difference was also detected in the responses received on whether the respondents were completely preoccupied sports consumption DuCov and AfCov, and BeCov and AfCov. The result indicates that they were completely preoccupied sport consumption more in AfCov than DuCov and more in AfCov than BeCov.

Finally, on the daily screen time the respondents spent watching television, using mobile phones, social media networks, and videogames, the comparison shows significant differences in the periods BeCov and DuCov, as well as DuCov and AfCov, indicating that they engaged in such activities more DuCov than BeCov and more DuCov than AfCov.

The Nigerian survey results show significant differences in leisure activities when comparing DuCov and AfCov, indicating that the respondents engaged in leisure activities more AfCov than DuCov. Similarly, on thinking about sport all the time, the DuCov and AfCov period comparison showed that they thought about sport more AfCov than DuCov. This showed that the respondents thought more about sport AfCov than BeCov.

When the respondents were asked if consuming sport was something they could not live without, a significant difference was found when comparing DuCov and AfCov period. They further identified that they could not live without sports consumption more AfCov than DuCov.

While the respondents' daily sitting time at work was significant when comparing BeCov and DuCov, and DuCov and AfCov, respectively, and explained that their daily sitting at work decreased DuCov compared to BeCov. At the same time, there was more sitting time at work AfCov than DuCov. Screen time was assumed to vary between periods. It was found to be significantly different BeCov and DuCov, DuCov and AfCov, which was further explained by the mean ranking that the screen time increased DuCov compared to BeCov and similarly increased more DuCov than AfCov.

Considering the results from the three independent surveys, we found striking similarities between respondents' daily screen time. The results of the three surveys all showed significantly increased daily screen time DuCov

than in other periods. While this was expected since people were restricted from movement, their daily screen time was expected to rise especially when considering the ages of the population that took part in the surveys and with growing digitization and easy access to technology. Where this development of increased daily screen time could have provided relief for people, especially during the lockdown period, it was a great concern for their active well-being for fear of a sedentary lifestyle.

Differences were observed in the results between the three countries. In England, the respondents were able to achieve more moderate- or vigorous-intensity exercise DuCov than BeCov, whereas the other two countries did not record any significant result. Additionally, on the daily sitting time at work, while England and Hungary did not show any change, the Nigerian survey differed. Their daily sitting time at work was higher both BeCov and AfCov when compared to DuCov period. This might be connected with the traditional working culture of physical presence in various work environments compared to both England and Hungary, where the new concept of working from home became prevalent during the pandemic period.

When we analyzed the data collected from the general population, we also decided to analyze the segment of the data collected from sports fans only to understand how deeply they were affected by the forced closure of sports facilities and curtailing of other activities during Covid-19. The aim was to check the similarities and dissimilarities of the two sample populations. The results for English sports fans showed that AfCov fans' urge to consume sport was strong compared to DuCov. Whereas in the general English population the result did not show any significant difference in this construct. This was to say that sports fans may have enjoyed the freedom of reopening sport activities after the pandemic lockdown and their desire to consume sport is more than DuCov. The English sport fans' daily sitting time at work increased AfCov compared to the other two periods, while in the general population no significant changes or differences were seen. This may be attributed to the normalization of working hours and physical presence at workplaces after the pandemic. There were similarities found in daily screen time from both sports fans and the general population. They all recorded an increase in screen time activities DuCov compared to other periods.

In contrast, when comparing the results from the Nigerian sport fans with the general Nigerian population, we identified many similarities in daily sitting time at work, daily screen time, and leisure-related activities.

In Table 5 we compared the three countries to obtain reactions from the respondents of the paired countries.

The results showed a significant difference in moderate- or vigorous-intensity aerobic PA from England and Hungary, suggesting that the English respondents engaged more in moderate- or vigorous-intensity exercise than their Hungarian counterparts BeCov. Similarly, significant results on leisure-related activities between England and Hungary, as well as between England and Nigeria, showed that again the English respondents engaged more than Hungarians and Nigerians in these activities BeCov. For the daily sitting time at work, the comparison between English and Hungarian and between English and Nigerian respondents showed significant differences indicating that the Hungarians' and the Nigerians' sitting time at work BeCov was more than that of the English.

The result in Table 5 also shows comparisons DuCov among the countries. Significant differences in moderate- or vigorous-intensity aerobic PA between England and Hungary and between England and Nigeria were found, indicating that the English respondents were participating in aerobic activities DuCov more than the Hungarians and the Nigerians. Additionally, the same pattern with leisure-related activities was found between the countries, namely, the respondents in England were more physically engaged in leisure activities DuCov than those in Hungary and Nigeria. Furthermore, the Hungarians had significant more daily sitting time at work DuCov than the Nigerians.

Similarly, we found significant changes AfCov between Hungary and Nigeria compared together, as well as England and Nigeria, on moderate- or vigorous-intensity aerobic PA and the ranking proceeded to explain that both Hungary and England are more engaged than Nigeria AfCov or in the current situation. Also, a significant difference was found between England and Nigeria on leisure-related activities; namely, the English respondents are more engaged in leisure-related activities than the Nigerians AfCov. The respondents from England and Hungary were asked if their lives center around sports consumption, and a significant difference was found which indicated that the Hungarians believe their lives revolve around sport consumption AfCov more than the respondents in England. Also, when asked if consuming sport is something they cannot live without, the responses provided significant differences between the two countries, and again the Hungarians cannot do without engaging in this activity more than the English respondents AfCov. Furthermore, we found that the Hungarians are more completely preoccupied with sports consumption AfCov than the English and Nigerian respondents. Finally, a significant difference was observed between Hungary and Nigeria on daily screen time, where the Hungarians had more screen time on television, mobile phones, social media, and video games AfCov than the Nigerians.

Table 5. Countries comparisons on situations before, during, and after Covid-19 period.

Constructs	Periods	EH (p)	E (rank)	H (rank)	Ties	HN (p)	H (rank)	N (rank)	Ties	EN (p)	E (rank)	N (rank)	Ties
30 min. moderate or vigorous intensity aerobic PA.	B	0.007*	51	24	17	0.446	43	39	23	0.174	47	26	19
	D	<0.001*	53	18	21	0.350	35	39	31	<0.001*	50	20	22
	A	0.565	30	35	27	0.018*	52	25	28	0.049*	42	25	25
leisure related activities (grocery shopping, walking in park, gardening)?	B	0.047*	40	28	24	0.162	53	27	25	0.002*	51	21	20
	D	0.004*	48	22	22	0.138	46	30	29	<0.001*	53	18	21
	A	0.565	37	32	22	0.078	56	26	23	0.007*	44	24	24
life centers around the consumption of sport.	B	0.858	30	36	26	0.483	46	38	21	1.000	35	35	22
	D	0.282	29	30	33	0.571	37	42	26	0.987	34	33	25
	A	0.043*	30	43	19	0.151	44	34	27	0.863	31	40	21
Thinking about sport all the time.	B	0.341	25	38	29	0.257	46	34	25	0.611	34	40	18
	D	0.480	28	36	28	0.295	41	34	30	0.807	34	35	23
	A	0.515	34	44	14	0.843	37	41	27	0.156	28	37	27
Difficult to stop watching, reading, or talking about sport.	B	0.906	33	44	15	0.488	42	43	20	0.808	39	36	17
	D	0.599	30	35	27	0.136	35	47	23	0.062	31	45	16
	A	0.433	29	42	21	0.906	39	38	28	0.306	26	42	24
Urge to consume sport is strong.	B	0.413	31	37	24	0.889	40	40	25	0.418	37	41	14
	D	0.737	33	38	21	0.258	36	43	26	0.348	32	41	19
	A	0.055	29	45	18	0.076	47	34	24	0.861	30	37	25
Consuming sport is something I cannot live without.	B	0.951	34	32	26	0.933	42	39	24	0.962	34	33	25
	D	0.968	36	40	16	0.705	40	35	30	0.851	33	37	22
	A	0.010*	24	48	20	0.149	43	32	30	0.369	34	41	17
Completely taken with sport consumption	B	0.105	30	44	18	0.138	47	32	26	0.521	30	41	21
	D	0.870	31	43	18	0.824	37	39	29	0.949	30	34	28
	A	0.001*	20	52	20	0.039*	46	32	27	0.194	26	42	24
Daily sitting time at work?	B	0.009*	25	44	23	0.907	47	37	21	0.003*	23	45	24
	D	0.361	31	36	25	0.013*	49	27	29	0.188	40	29	23
	A	0.267	31	40	21	0.567	41	40	24	0.179	32	43	17
Break from sitting	B	0.178	37	31	24	0.513	32	36	37	0.156	39	31	22
	D	0.118	42	33	17	0.310	36	35	34	0.213	45	35	12
	A	0.311	35	32	25	0.334	38	39	28	0.561	34	30	28
Screen time spent daily watching TV, social media, mobile phones, and video games?	B	0.561	29	33	30	0.108	41	30	34	0.073	40	26	26
	D	0.930	28	25	39	0.202	36	28	41	0.116	33	26	33
	A	0.441	29	33	30	0.030*	43	29	33	0.088	40	25	27

Number of respondents: 92

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Note: **EH**: England compared to Hungary, **HN**: Hungary compared to Nigeria, **EN**: England compared to Nigeria; **B**: Before Covid-19 period, **D**: During Covid-19 period, **A**: After Covid-19 period; **E**: England, **H**: Hungary, **N**: Nigeria, **Ties**: Interaction point.

Source: Collected Data 2023.

Table 6 compares the two sexes from all the countries to obtain an insight into their physical activity and sports consumption DuCov and AfCov. In the England survey, the moderate- to vigorous-intensity exercise showed significant difference among the female respondents comparing the two periods of DuCov and AfCov. The result indicates that the female respondents of the England study participated more in exercise DuCov than AfCov. However, their male counterparts in the England survey did not show any significant differences in this activity in DuCov and AfCov.

On daily sitting time at work, the male respondents showed significant differences between DuCov and AfCov. It was further suggested that the male participants engaged in daily sitting at work more AfCov than DuCov. In contrast, the female respondents in the English survey did not indicate any significant difference between the two periods. Similarly, on daily screen time on TV, video games, phones, and social media, the male respondents' results showed significant differences between DuCov

and AfCov. The participants engaged or spent more time with their mobile gadgets DuCov lockdown than AfCov.

In the Hungarian survey, the results of the female respondents on difficulties in stopping watching, reading, or talking about sport, the urge to consume sport, and consuming sport as something they cannot live without all indicated significant differences DuCov compared with AfCov. The results explained further that the female respondents of the Hungarian survey had these feelings, attitudes, and urges more AfCov than DuCov. Interestingly, none of these behaviors were observed from their male counterparts.

For the Nigerian gender analysis, leisure-related activities, thinking about sport, sports consumption inevitabilities, and being completely preoccupied with sports consumption were all male-dominated as significant differences were found in all these activities and thoughts. The results were extended to describe that these changes were witnessed more AfCov compared to DuCov. Whereas the female respondents' results in the Nigerian survey simply did not record any significant differences in these aspects.

Table 6. Gender comparisons during, and after Covid-19 England, Hungarian, and Nigerian surveys.

Constructs	England		Hungary		Nigeria	
	M	F	M	F	M	F
30 min. moderate- or vigorous-intensity PA.	0.792	0.042*	< 0.001*	0.001*	0.779	0.226
Leisure-related activities (grocery shopping, walking in park, gardening)?	0.270	0.139	< 0.001*	0.009*	0.016*	0.067
Life centers around the consumption of sport.	0.450	0.672	0.035*	0.002*	0.445	0.862
Thinking about sport all the time.	0.118	0.403	0.100	0.101	0.004*	0.061
Difficult to stop watching, reading, or talking about sport.	0.110	0.623	0.079	0.039*	0.972	0.837
Urge to consume sport is strong.	0.064	0.702	0.094	< 0.001*	0.753	0.500
Consuming sport is something I cannot live without.	0.518	0.458	0.210	< 0.001*	0.050*	0.453
Completely preoccupied with sports consumption	1.000	0.572	0.002*	< 0.001*	0.018*	0.691
Daily sitting time at work	0.002*	0.189	0.920	0.130	0.015*	0.004*
Break from sitting	0.906	0.985	0.465	0.538	0.892	0.620
Screen time spent daily watching TV, social media, mobile phones, and video games	0.003*	< 0.001*	< 0.001*	0.016*	0.001*	0.007*

M: male; **F:** female; * - significant difference

Source: Collected data (2023).

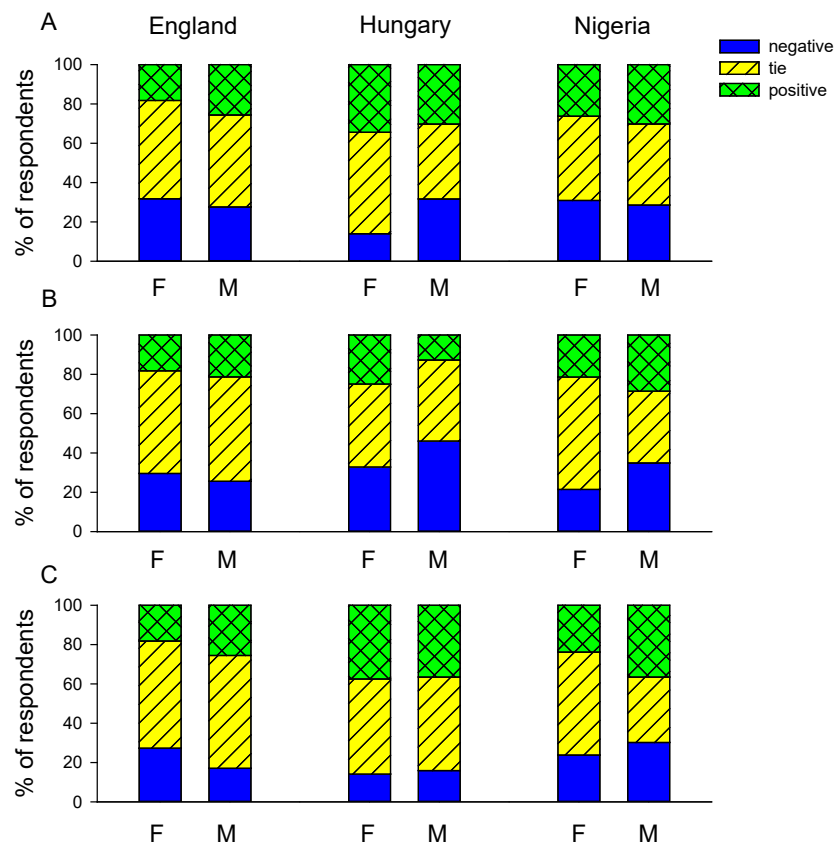


Figure 1. How sports consumption has changed in the three countries during the three periods (before, during, and after Covid-19). (A) BeCov compared to AfCov, (B) BeCov compared to DuCov, and (C) DuCov compared to AfCov for females (F) and males (M), respectively. “Negative” refers to the consumption being greater in the former period than in the latter, while “positive” refers to the opposite trend, i.e., consumption being greater in the latter period than in the former. “Tie” signifies no difference between the two periods.

For females, significant differences were only found in the Hungarian survey, where sports consumption was greater after Covid-19 than either before ($p < 0.017$) or during ($p < 0.002$) the pandemic. Interestingly, sports consumption did not prove to be significantly different between BeCov and DuCov ($p > 0.3$), most likely due to the large proportion of inactive individuals in the BeCov period. For males, again, only the Hungarian survey showed significant differences. However, in this case, BeCov and AfCov did not prove to be significantly different ($p > 0.6$), while DuCov consumption was significantly lower than either BeCov ($p < 0.001$) or AfCov ($p < 0.035$).

Discussion

This study examined engagement in physical activity in three selected countries: England, Hungary, and Nigeria. These countries represent three different economic statuses in relation to the Covid-19 epidemic and consequent restrictions. We compared the periods BeCov, DuCov,

and AfCov both within and in between the countries. We also considered how sports fans perceive these periods and looked for differences between the responses of male and female respondents.

The respondents from all three surveys – England, Hungary, and Nigeria – had or shared similar age and gender distributions (Table 2 and Table 3, respectively), and both English and Hungarian participants sought benefits in physical activity engagement to keep themselves fit and healthy even in times of crisis.

We hypothesized significant changes or decline in vigorous-intensity Physical Activity DuCov and an increase AfCov. The study in England identified the differences between DuCov & BeCov and supported our hypothesis indicating a decline DuCov compared to BeCov, which is in line with a number of studies (Castañeda-Babarro et al., 2020; Hermassi et al., 2021; Elven et al., 2022; Wang et al., 2023; Macedonia et al., 2024). Our findings did not show an increase in Physical Activity AfCov for English respondents. However, this deviates from those of other similar studies that showed an increase in physical activity

AfCov compared to DuCov (Hurter et al., 2022; Wang et al., 2023). While the Hungarian survey did not show any significant differences between DuCov and BeCov, increased Physical Activity AfCov was found due to more access to fitness centers (Balatoni & Adamu, 2023). While we expected these variations to occur, it further explains how damaging the Covid-19 period was to the physical well-being of people, as a significant number of the respondents admitted to having gained weight (Table 4). Interestingly however, the Nigerian survey did not show any significant changes in physical activity between these three periods.

Our findings for leisure-related activities in the Hungarian survey supported our hypotheses and signified changes among the periods BeCov, DuCov, and AfCov, with the expected decline in leisure-related activities DuCov compared to the other periods. Similarly, the Nigerian survey demonstrated an increase in leisure activities AfCov compared to DuCov. These findings are in line with other related studies on leisure-related activities, such as housekeeping and leisure-related travel which were found to have decreased DuCov and increased AfCov (Gurgel et al., 2024; Seiffer et al., 2024; Ecke et al., 2025; Wang & De Vos 2025).

We adapted the six constructs from Aiken et al. (2018) to evaluate sports consumption as thinking about sport all the time, life centers around sport consumption, difficulty stopping watching, reading, or talking about sport, urge to consume sport, cannot live without sport, and completely preoccupied with sports consumption. In Hungary, based on the six constructs, we predicted lower sports consumption DuCov compared to AfCov and BeCov. The results supported all six on either or two of the period combinations. Similarly, the Nigerian survey on sports consumption showed that it was smaller DuCov than BeCov and AfCov. However, these constructs were developed long before the event of Covid-19, and there is no evidence of a study conducted to seek changes in sports consumption BeCov, DuCov, and AfCov. Therefore, our study is probably the first to adapt it in this context.

We also predicted a decrease in sitting time at work DuCov and an increase afterward, and anticipated that it was more than BeCov. The Nigerian study proved our hypothesis, as it has shown a significant decrease in sitting time as the Covid-19 period and lockdown set in. This could be due to the fact that most organizations, offices, and other places of work were closed from daily operations to comply with government directives on stay-at-home orders. However, this finding parts ways with the study of Dillon et al. (2021) on occupational sitting by home-based office workers DuCov, as a high percentage of agreement of self-reported sedentary behaviour at group level was found. Surprisingly however, the surveys in England and Hungary did not prove any significant differences in sitting time during the three periods.

Our hypothesis on increased screen time DuCov compared to BeCov and AfCov was also validated, as the surveys from all three countries supported our prediction. Due to prolonged sitting at home, people were left with little option but to spend more time in front of the screens of televisions, mobile phones, social media, and video games to reduce the burden of being isolated. The increased sitting time and screen time contributed to a more sedentary lifestyle DuCov compared to BeCov and AfCov, being significant from all categories such as sex, sports fans, and the combination of all countries. These results are in line with previously conducted studies (Romero-Blanco et al., 2020; Nathan et al., 2021; Bielec & Omelan, 2022).

We attempted to check the sports fans' addiction to sports consumption DuCov and hypothesized a decline in these activities as compared to the other two periods. It appears that the sports fans in Nigeria think more about sports consumption AfCov than DuCov and, similarly, the urge of the fans in England to consume sport was stronger AfCov than DuCov. However, Hungarian sport fans showed more sensitivity to the situation, as all constructs of sport consumption such as life centers around sports consumption, thinking about sport, difficulty stopping watching, reading, or talking about sport, urge to consume sport, cannot live without sport, and completely preoccupied with sports consumption all received maximum attention and the results showed significant differences, thus supporting our hypotheses.

When we compared the countries (Table 5) to identify which has more (or less) PA engagement, leisure activities, sports consumption, daily sitting time at work, and screen time DuCov and AfCov, our hypothesis was supported, because we found that for the vigorous-intensity aerobic PA the respondents in England engaged more than those in Hungary BeCov. This could be expected as the report made by the UK Department of Business and Trade (2023) recognized the importance of grassroots sport and Physical Activity and the huge contribution it makes to the UK economy and investments made to encourage this sector. The same was found for leisure-related activities before Covid-19, comparing England with both Hungary and Nigeria. The daily sitting time at work BeCov also supported our hypothesis with England being the highest. This could be attributed to the productivity level of the UK economy and the labor demands compared to both Hungary and Nigeria.

Another result comparing Hungary and Nigeria (Table 5) revealed that the Hungarians had more sitting time at work DuCov than the Nigerians. This was expected because European countries were among the first to adopt a work-from-home approach to their employees to reduce the burden of inefficiency or total blackout of economic activities by various organizations. However, Nigerian companies up until AfCov were not fully familiar with the work-from-home concept. Therefore, their sitting time at work could be low due to increased business closures at their work-

places during the Covid-19. We also thought that the enthusiasm of the English towards sports consumption would validate our expectations. However, our hypotheses were not supported on sports consumption, as both Nigerians and Hungarians believe that they are more completely pre-occupied with sports consumption than people in England.

Consistent with our preliminary expectation, time spent in front of a screen – which includes watching TV, texting on a mobile phone, playing a video game, and communicating with friends via social media – differed significantly between DuCov and AfCov in all three countries, regardless of gender; namely, the former was significantly more than the latter (Table 6). However, for English women, vigorous exercise DuCov significantly exceeded that AfCov. A similar finding cannot be drawn for English men and Nigerian women and men. On the other hand, when comparing the three periods, there was no change in overall sports consumption in either the English or Nigerian study for either men or women. In contrast, significant differences in overall sports consumption were observed in the Hungarian sample (Fig.1). These observations are likely to be due to country-specific differences, with England having significant levels of home sport and access to sports facilities, while in Hungary only community sport was prevalent, which was closed during the pandemic, and in Nigeria almost exclusively outdoor sports were available.

Although our study has made a breakthrough, there are clear limitations. There was a possibility of inaccurate recollection of events by the respondents because the data of the study was collected at one time for the three periods. There is also a limitation that the data in Hungary and Nigeria were collected in one city, so even though the number of respondents is relatively high, they might not be seen as representative for the whole country.

Based on the foregoing, it can be concluded that there is a need to increase sports facilities in residential areas in Hungary and Nigeria. In England and Hungary, healthy lifestyle education should be communicated more strongly than at present through government campaigns, starting with children. Corporate social responsibility needs to be further strengthened in all three countries, but it is particularly important to extend it to the area of support for recreational sport. In Nigeria, healthy lifestyle campaign programs should be designed and policies be made to ensure that all citizens, regardless of economic status and education, are aware of the basic physical health information needed to keep themselves healthy.

Conclusions

To conclude, there was a decline in Physical Activity DuCov compared to BeCov in England. In Hungary, there

was no significant difference in PA BeCov compared to DuCov, but an increase in PA was found AfCov. No significant changes in PA were detected in the Nigerian survey when comparing all three periods. However, looking at these data by gender, sometimes a different picture emerges.

This study can be seen as cross-continental and multi-national in nature. It also provided us with a comprehensive and detailed understanding of the phenomenon by analyzing three occasions or periods in three different countries. It would also fill the existing literature gap as it would be the first of its kind to be conducted in Nigeria (see the review by Adamu & Balatoni, 2023) and serves as a study model for Africa. While some related studies were conducted, they did not examine the situation beyond the Covid-19 period. Although a related study by McCarthy, Potts, and Fisher (2021) examined PA beyond Covid-19, our methodological approach was distinct. Our study provided insight into the current situation beyond the Covid-19 period to contribute new findings.

Future studies could use more psychology-inclined constructs to objectively and precisely widen the understanding. Also, since our study focused on finding differences in PA engagements between the three periods, a future study may opt to check how adequate the PA engagement carried out by the participants was, especially with our findings of weight gain across all countries.

Ethics approval and informed consent

Not applicable as participation in the survey was voluntary and anonymous.

Competing interests

The authors declare no conflict of interest.

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References

- Ács, P., Prémusz, V., Pálvölgyi, Á., Trpkovici, M., Elbert, G., Melczer, C., & Makai, A. (2020). Effects of COVID-19 on physical activity behavior among university students: Results of a Hungarian online survey. *Health Problems of Civilization, 14*(3), 174–182. <https://doi.org/10.5114/hpc.2020.98472>

- Adamu, U. G., & Balatoni, I. (2022). The effect of Covid-19 epidemic on the industry of a Sub-Saharan Country: a perspective on sports industry in Nigeria. *Metszetek Cross-sections Social Science Journal*, 11(1), 32–48. <https://doi.org/10.18392/metsz/2022/1/3>
- Adá-Lameiras, A., Antonovica, A., de Esteban Curiel, J., & Aydogan, M. (2024). The impact of health crisis on sports consumption—A longitudinal study. *Journal of Retailing and Consumer Services*, 77, article 103656. <https://doi.org/10.1016/j.jretconser.2023.103656>
- Adamu, U. G., & Balatoni, I. (2023). Effect of Covid-19 on Health Behaviour and Physical Activity on youth – A Review. *Selye E-Studies*, 14(1), 4–23. Retrieved May 20, 2024 from <https://www.academia.edu/108303560/>
- Aiken, K. D., Bee, C., & Walker, N. (2018). From passion to obsession: Development and validation of a scale to measure compulsive sport consumption. *Journal of Business Research*, 87, 69–79. <https://doi.org/10.1016/j.jbusres.2018.02.019>
- Balatoni, I., & Adamu, U. G. (2023). Impact of inflation on sports consumption: A study on fitness facilities. *Tér, Gazdaság, Ember*, 11(4), 61–74.
- Balatoni, I., Szépné, H. V., Kiss, T., Adamu, U. G., Szulc, A. M., & Csernoch, L. (2023). The importance of physical activity in preventing fatigue and burnout in healthcare workers. *Healthcare*, 11(13), 1915. <https://doi.org/10.3390/healthcare11131915>
- Başkan, A. H., & Başkan, A. H. (2021). University Students and Recreation in the Covid-19 Process: Metaphor Analysis. Pakistan. *Journal of Medical and Health Sciences*, 15(4), 1291–1295. <https://doi.org/10.53350/pjmhs211561557>
- Bates, L. C., Zieff, G., Stanford, K., Moore, J. B., Kerr, Z. Y., Hanson, E. D., ... & Stoner, L. (2020). COVID-19 impact on behaviors across the 24-hour day in children and adolescents: Physical activity, sedentary behavior, and sleep. *Children*, 7(9), 138. <https://doi.org/10.3390/children7090138>
- Bielec, G., & Omelan, A. (2022). Physical Activity Behaviors and Physical Work Capacity in University Students during the COVID-19 Pandemic. *International Journal of Environmental Research and Public Health*, 19(2), 891. <https://doi.org/10.3390/ijerph19020891>
- Castañeda-Babarro, A., Arbillaga-Etxarri, A., Gutiérrez-Santamaría, B., & Coca, A. (2020). Physical Activity Change during COVID-19 Confinement. *International Journal of Environmental Research and Public Health*, 17(18), article 6878. <https://doi.org/10.3390/ijerph17186878>
- Chopra, S., Ranjan, P., Singh, V., Kumar, S., Arora, M., Hasan, M. S., ... & Baitha, U. (2020). Impact of COVID-19 on lifestyle-related behaviours—a cross-sectional audit of responses from nine hundred and ninety-five participants from India. *Diabetes & Metabolic Syndrome: Clinical Research & Reviews*, 14(6), 2021–2030. <https://doi.org/10.1016/j.dsx.2020.09.034>
- Clark, D. (2024). *The UK economy – Statistics & Facts (Statista Publication)*. Retrieved May 20, 2024 from <https://www.statista.com/topics/6500/the-british-economy/#topicOverview>
- Constandt, B., Thibaut, E., De Bosscher, V., Scheerder, J., Ricour, M., & Willem, A. (2020). Exercising in times of lockdown: an Analysis of the impact of COVID-19 on levels and patterns of exercise among adults in Belgium. *International Journal of Environmental Research and Public Health*, 17(11), article 4144. <https://doi.org/10.3390/ijerph17114144>
- De la Rosa, A., Monterrosa Quintero, A., Camacho-Villa, M. A., Arc-Chagnaud, C., Andrade, A. G. P., Reyes-Correa, S., Quintero-Bernal, R., & Fuentes-García, J. P. (2022). Physical Activity Levels and Psychological Well-Being during COVID-19 Lockdown among University Students and Employees. *International Journal of Environmental Research and Public Health*, 19(18), article 11234. <https://doi.org/10.3390/ijerph191811234>
- Department for Culture, Media and Sport. (2018). *Sport Satellite Account for the UK 2016*. Society and Culture, Sport and Leisure. Retrieved May 20, 2024 from <https://www.gov.uk/government/statistics/sport-satellite-account-for-the-uk-2016>
- Department for Culture, Media and Sport. (2024). *Sport Satellite Account for the UK 2024: Key findings*. Society and Culture, Sport and Leisure. Retrieved May 20, 2024 from <https://www.gov.uk/government/publications/sport-satellite-account-for-the-uk-2024-research-into-a-new-measure-for-estimating-the-value-of-sport/sport-satellite-account-for-the-uk-2024-key-findings>
- Dillon, K., Hiemstra, M., Mitchell, M., Bartmann, N., Rollo, S., Gardiner, P. A., & Prapavessis, H. (2021). Validity of the occupational sitting and physical activity questionnaire (OSPAQ) for home-based office workers during the COVID-19 global pandemic: A secondary analysis. *Applied Ergonomics*, 97, article 103551. <https://doi.org/10.1016/j.apergo.2021.103551>
- Ecke, L., Vallée, J., Magdolen, M., Burger, L., Chlond, B., & Vortisch, P. (2025). Plunge and Changed Recurrence of Leisure Activities in the COVID-19 Era—An Analysis of Three Years of Panel Data. *Transportation Research Procedia*, 82, 762–778. <https://doi.org/10.1016/j.trpro.2024.12.070>
- Elvén, M., Kerstis, B., Stier, J., Hellström, C., von Heideken Wägert, P., Dahlen, M., & Lindberg, D. (2022). Changes in Physical Activity and Sedentary Behavior before and during the COVID-19 Pandemic: A Swedish Population Study. *International Journal of Environmental Research and Public Health*, 19(5), article 2558. <https://doi.org/10.3390/ijerph19052558>
- European Commission. (2021). *Sport in the European Union*. Retrieved February 2, 2023 from https://ec.europa.eu/assets/eac/sport/library/documents/eu-sport-factsheet_en.pdf
- Fábián, G., Szoboszlai, K., Tóth, A. P., & Fedor, A. R. (2024). The Impact of Poverty on Children’s Well-Being and Health Behavior Based on the Results of Research Conducted in One of Hungary’s Most Disadvantaged Micro-Regions. *Children*, 11, 624. <https://doi.org/10.3390/children11060624>
- Geets-Kesic, M., Gilic, B., Cerkez Zovko, I., Drid, P., Korovljevic, D., & Sekulic, D. (2021). Differential impact of COVID-19 lockdown on physical activity in younger and older adolescents – prospective study. *Medycyna pracy*, 72(6), 633–643. <https://doi.org/10.13075/mp.5893.01180>
- González-Serrano, M. H., Dos Santos, M. A., Sendra-García, J., & Calabuig, F. (2023). Sports entrepreneurship during COVID-19: Technology as an ally to maintain the competitiveness of small

- businesses. *Technological Forecasting and Social Change*, 187, article 122256. <https://doi.org/10.1016/j.techfore.2022.122256>
- Gurgel, A. R. B., Guimarães, J. A. C., Brum, P. C., de Lima, A. C. P., Giavina-Bianchi, P., Peres, C. H. M., ... & Levin, A. S. (2024). Impacts of the first wave of the COVID-19 pandemic on leisure and transportation physical activity among healthcare workers. *Preventive Medicine Reports*, 38, article 102587. <https://doi.org/10.1016/j.pmedr.2024.102587>
- Hermassi, S., Sellami, M., Salman, A., Al-Mohannadi, A. S., Bouhafis, E. G., Hayes, L. D., & Schwesig, R. (2021). Effects of COVID-19 Lockdown on Physical Activity, Sedentary Behavior, and Satisfaction with Life in Qatar: A Preliminary Study. *International Journal of Environmental Research and Public Health*, 18(6), article 3093. <https://doi.org/10.3390/ijerph18063093>
- Hungarian State Secretary of Human Resource. (2020, August 14). *Hungary rises seven places on healthy lifestyle list [press release]*. Retrieved January 3, 2023 from: <https://abouthungary.hu/news-in-brief/hungary-rises-seven-places-on-healthy-lifestyle-list>
- Hurter, L., McNarry, M., Stratton, G., & Mackintosh, K. (2022). Back to school after lockdown: The effect of COVID-19 restrictions on children's device-based physical activity metrics. *Journal of sport and health science*, 11(4), 530–536. <https://doi.org/10.1016/j.jshs.2022.01.009>
- Japhet, E. B. (2022, September 11). Food Systems, Nutrition and Lifestyle. *The Guardian Life*. Retrieved January 10, 2023 from <https://guardian.ng/life/food-systems-nutrition-and-lifestyle/>
- Kang, S., Sun, Y., Zhang, X., Sun, F., Wang, B., & Zhu, W. (2021). Is physical activity associated with mental health among Chinese adolescents during isolation in COVID-19 pandemic? *Journal of Epidemiology and Global Health*, 11(1), 26. <https://doi.org/10.2991/jegh.k.200908.00>
- Kim, N. H., Lee, J. M., & Yoo, E. (2022). How the COVID-19 Pandemic Has Changed Adolescent Health: Physical Activity, Sleep, Obesity, and Mental Health. *International Journal of Environmental Research and Public Health*, 19(15), article 9224. <https://doi.org/10.3390/ijerph19159224>
- Kith, N., Csernoch, L., Balatoni, I. (2014). Sport habits in North-Eastern Hungary. *Journal of Health Sciences*, 4(13), 46–59. <http://dx.doi.org/10.5281/zenodo.13135>
- Koroknay, Z. (2020). Economic importance of the Hungarian sports sector in international comparison. *Applied Studies in Agribusiness and Commerce*, 14(1–2), 109–114. <https://doi.org/10.19041/APSTRACT/2020/1-2/14>
- Kwok, Ng., Koski, P., Lyyra, N., Palomaki, S., Mononen, K., Blomqvist, M., Vasankari, T., & Kokko, S. (2021). Finnish late adolescents' physical activity during COVID-19 spring 2020 lockdown. *BMC Public Health*, 21(1), article 2197. <https://doi.org/10.1186/s12889-021-12263-w>
- Lee, Y., Baek, S., & Shin, J. (2021). Changes in Physical Activity Compared to the Situation before the Outbreak of COVID-19 in Korea. *International Journal of Environmental Research and Public Health*, 19(1), 126. <https://doi.org/10.3390/ijerph19010126>
- Macedonia, M., Mathias, B., Rodella, C., Andră, C., Sedaghatgoftar, N., & Repetto, C. (2024). Reduction in physical activity during Covid-19 lockdowns predicts individual differences in cognitive performance several months after the end of the safety measures. *Acta Psychologica*, 250, article 104472. <https://doi.org/10.1016/j.actpsy.2024.104472>
- Maddison, R., Hargreaves, E. A., Wyke, S., Gray, C. M., Hunt, K., Heke, J. I., ... & Marsh, S. (2019). Rugby Fans in Training New Zealand (RUFIT-NZ): A pilot randomized controlled trial of a healthy lifestyle program for overweight men delivered through professional rugby clubs in New Zealand. *BMC Public Health*, 19(1), 1–14. <https://doi.org/10.1186/s12889-019-6472-3>
- Makizako, H., Akaida, S., Shono, S., Shiiba, R., Taniguchi, Y., Shiratsuchi, D., & Nakai, Y. (2021). Physical Activity and Perceived Physical Fitness during the COVID-19 Epidemic: A Population of 40- to 69-Year-Olds in Japan. *International Journal of Environmental Research and Public Health*, 18(9), article 4832. <https://doi.org/10.3390/ijerph18094832>
- Maltagliati, S., Rebar, A., Fessler, L., Forestier, C., Sarrazin, P., Chalabaev, A., Sander, D., Sivaramakrishnan, H., Orsholits, D., Boisgontier, M. P., Ntoumanis, N., Gardner, B., & Cheval, B. (2021). Evolution of physical activity habits after a context change: The case of COVID-19 lockdown. *British Journal of Health Psychology*, 26(4), 1135–1154. <https://doi.org/10.1111/bjhp.12524>
- Martínez-de-Quel, Ó., Suárez-Iglesias, D., López-Flores, M., & Pérez, C. A. (2021). Physical activity, dietary habits and sleep quality before and during COVID-19 lockdown: A longitudinal study. *Appetite*, 158, 105019. article <https://doi.org/10.1016/j.appet.2020.105019>
- McDonald, M. A., Milne, G. R., & Hong, J. (2002). Motivational factors for evaluating sport spectator and participant markets. *Sport Marketing Quarterly*, 11(2), 100–113.
- Morres, I. D., Galanis, E., Hatzigeorgiadis, A., Androutsos, O., & Theodorakis, Y. (2021). Physical Activity, Sedentariness, Eating Behaviour and Well-Being during a COVID-19 Lockdown Period in Greek Adolescents. *Nutrients*, 13(5), article 1449. <https://doi.org/10.3390/nu13051449>
- Nathan, A., George, P., Ng, M., Wenden, E., Bai, P., Phiri, Z., & Christian, H. (2021). Impact of COVID-19 Restrictions on Western Australian Children's Physical Activity and Screen Time. *International Journal of Environmental Research and Public Health*, 18(5), article 2583. <https://doi.org/10.3390/ijerph18052583>
- Parnell, D., Widdop, P., Bond, A., & Wilson, R. (2020). Covid-19 networks and sport. *Managing Sport and Leisure*, 1–7. <https://doi.org/10.1080/23750472.2020.1750100>
- Parra-Camacho, D., & Núñez-Pomar, J. M. (2021). Entrepreneurship and resilience in Spanish sports clubs: A cluster analysis. *International Journal of Environmental Research and Public Health*, 18(10), article 5142. <https://doi.org/10.3390/ijerph18105142>
- Peçanha, T., Goessler, K. F., Roschel, H., & Gualano, B. (2020). Social isolation during the COVID-19 pandemic can increase physical inactivity and the global burden of cardiovascular disease. *American Journal of Physiology-Heart and Circulatory Physiology*, H1441–1446. <https://doi.org/10.1152/ajpheart.00268.2020>

- Petersen, J. A., Naish, C., Ghoneim, D., Cabaj, J. L., Doyle-Baker, P. K., & McCormack, G. R. (2021). Impact of the COVID-19 Pandemic on Physical Activity and Sedentary Behaviour: A Qualitative Study in a Canadian City. *International Journal of Environmental Research and Public Health*, 18(9), article 4441. <https://doi.org/10.3390/ijerph18094441>
- Post, E. G., Rivera, M. J., Doss, D., & Eberman, L. E. (2022). Parent decision-making regarding youth sport participation during the COVID-19 pandemic. *Journal of Community Health*, 47(4), 687–696. <https://doi.org/10.1007/s10900-022-01078-4>
- Public Health England. (2021). *Seven in 10 adults are motivated to get healthier in 2021 due to COVID-19 [Press Release]*. Retrieved January 10, 2023 from <https://www.gov.uk/government/news/seven-in-10-adults-are-motivated-to-get-healthier-in-2021-due-to-covid-19>
- Ratten, V. (2020). Coronavirus disease (COVID-19) and sport entrepreneurship. *International Journal of Entrepreneurial Behavior & Research*, 26(6), 1379–1388. <https://doi.org/10.1108/IJEBR-06-2020-0387>
- Romero-Blanco, C., Rodríguez-Almagro, J., Onieva-Zafra, M. D., Parra-Fernández, M. L., Prado-Laguna, M. D. C., & Hernández-Martínez, A. (2020). Physical Activity and Sedentary Lifestyle in University Students: Changes during Confinement Due to the COVID-19 Pandemic. *International Journal of Environmental Research and Public Health*, 17(18), article 6567. <https://doi.org/10.3390/ijerph17186567>
- Rossi, L., Behme, N., & Breuer, C. (2021). Physical Activity of Children and Adolescents during the COVID-19 Pandemic – A Scoping Review. *International Journal of Environmental Research and Public Health*, 18(21), article 11440. <https://doi.org/10.3390/ijerph182111440>
- Seiffer, B., Rösel, I., Welkerling, J., Schuch, F. B., Sudeck, G., & Wolf, S. (2024). The association of changes in leisure-time physical activity on depressive symptoms during Covid-19 in German adults: A longitudinal study. *Psychology of Sport and Exercise*, 70, article 102562. <https://doi.org/10.1016/j.psychsport.2023.102562>
- Statista. (2024a, July 8). African Countries with the highest Gross Domestic Product (GDP) in 2024. Retrieved July 10, 2024 from <https://www.statista.com/statistics/1120999/gdp-of-african-countries-by-country/>
- Statista. (2024b). *The Big Five – Statistics & Facts. (Statista Research Department Publication)*. Retrieved August 3, 2024 from <https://www.statista.com/topics/5909/-big-five/#topic-Overview>
- UK Department for Business & Trade. (2024). *Sports Economy (Department for Business and Trade Publication) United Kingdom*. Retrieved April 2, 2024 from <https://www.great.gov.uk/international/content/investment/sectors/sports-economy/>
- Wang, Z., Fang, Y., Chan, P. S. F., Yu, F. Y., & Sun, F. (2023). The changes in levels and barriers of physical activity among community-dwelling older adults during and after the fifth wave of COVID-19 outbreak in Hong Kong: Repeated random telephone surveys. *JMIR aging*, 6(1), article e42223. <https://doi.org/10.2196/42223>
- Wang, K., & De Vos, J. (2025). Trends in leisure and shopping travel: From pre- to post-COVID-19 pandemic. *Travel Behaviour and Society*, 39, article 100956. <https://doi.org/10.1016/j.tbs.2024.100956>
- World Bank. (2023). *GDP (current US \$) Hungary (World Bank Group Publication National Account Data and OECD National Accounts Data Files)*. Retrieved January 1, 2024 from <https://data.worldbank.org/indicator/NY.GDP.MKTP.CD?locations=HU>
- World Health Organization. (2022). *Global Status Report on Physical Activity 2022*. Retrieved February 5, 2024 From: https://cdn.who.int/media/docs/default-source/country-profiles/physical-activity/physical-activity-nga-2022.pdf?sfvrsn=4367a2db_5&download=true
- Ying, W. L. (2012). Investigation and analysis on sports consumption of urban residents of Henan Province. *Physics Procedia*, 33, 2020–2026. <https://doi.org/10.1016/j.phpro.2012.05.318>



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