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Examination of Changes in Sitting Time, Screen Exposure and Physical Activity Behavioral Profile in University Students Participating in Distance Education During the COVID-19 Pandemic

Anıl KAYA*[1] and Nevzat DEMİRCİ[2]

[1]*Mersin University, Faculty of Sports Science, Mersin / Türkiye*

Keywords
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ABSTRACT

It was aimed to examine the changes in sitting time, screen exposure and physical activity behavior profile during the COVID-19 pandemic in university students participating in distance education. Methods: A cross-sectional online survey-based study collected data from voluntary sample of 380 university students (205 girls and 175 boys). Participants selfreported demographic information, physical activity and sitting for a 'typical' week before and during lockdown. Sociodemographic characteristics, physical activity level, screen exposure and sitting time Questionnaire were used as data collection tools. While the time spent actively by 49.74% of the students during the Covid-19 pandemic period, the time spent sitting by 86.32% increased ($p<0.05$). The moderate and vigorous physical activity scores of those whose time spent sitting during the Covid-19 pandemic increased were found to be statistically significantly lower than the other groups ($p<0.001$). It was determined that women's IPAQ levels and Sitting subscale scores were statistically significantly higher than men ($p<0.05$). According to IPAQ, Walking, sitting, Screen Exposure and total physical activity significantly increased during lockdown by MET-min/week, respectively ($P < 0.001$). The proportion of participants engaging in higher amounts of screen time (4–6 h and > 8 h) was higher on weekdays and weekend days during lockdown than before lockdown ($P < 0.001$) (Figure 1). Consequently, it can be said that with the closure of universities during the COID-19 quarantine period, students who did not leave their homes for a long time began to spend most of their time in a sedentary lifestyle, using tablets, computers and phones at home.

1. INTRODUCTION

The coronavirus disease 2019 (COVID-19) pandemic represents one of the greatest threats to public health in more than a century. As of September 2022, more than 6.4 million deaths worldwide have been attributed to COVID-19 [1]. Since the beginning of 2020, more than 100 countries have implemented some form of social distancing measures to reduce the rate of COVID-19 transmission, commonly referred to as 'lockdowns'. The severity of the lockdown varied from country to country and even region to region. Some countries limit the distance people can travel from their homes, while others ban unnecessary outdoor activities [1].

In recent years, advances in urbanization and modernization have led to significant changes in the lifestyles of societies, characterized by high levels of physical inactivity and sedentary behavior [2]. In this context, the coronavirus pandemic (COVID-19), which is considered one of the largest health crises in the world, with unprecedented social and economic consequences, has had a negative impact on this panorama [3,4]. With the emergence of the first cases of COVID-19 in Türkiye, as in most countries around the world, in March 2020, measures were implemented to reduce the spread of the virus, which changed the daily life activities of the entire population [5]. In particular, the Türkiye government focused on intercity movement and public introduced public health measures such as restrictions on access to open places (fitness centres, cinemas, among others), social distancing and dynamic quarantine periods (e.g. while some cities May be completely or completely closed). weekend quarantine, others deparda form hiş status depending on the local

***Corresponding author**
(e-mail) *(anilkaya33@hotmail.com)
ORCID ID: 0000-0001-7118-7798

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epidemiological situation). These measures have led to the complete closure of educational centers, including higher education institutions, forcing the university population to adapt to an essentially virtual learning environment [6], affecting the routines and lifestyles of this group.

It has been reported that the measures taken to prevent the COVID-19 epidemic have some effects on individuals [3]. The isolation method through restriction affects the physical behavior of individuals depending on their cardiorespiratory function and the results of their physical behavior. It negatively affects the risk of disease and the quality of life and sleep [3,8]. It has been shown that the level of physical activity decreases and sitting time increases with the behavior of complying with social isolation rules [9].

As a result, during the COVID-19 pandemic, international studies suggest a decrease in physical activity practices [10] and an increase in sedentary behaviors [11] in the university population. The effects of the pandemic described above are of particular concern because, before the pandemic, it was described that the university population worldwide showed a high prevalence of physical inactivity [12], even much higher than the age-standardized global prevalence [13]. Similarly, a recent systematic review and meta-analysis study shows that sedentary time in this population has increased over the past decade, with an average of nine hours per day of sedentary behavior [14].

According to the World Health Organization (WHO), a person who meets the recommendation of 150-300 minutes of moderate-intensity physical activity or 75-150 minutes of vigorous-intensity physical activity per week is considered physically active [15]. On the other hand, those who spend more than four hours a day on activities such as driving, sitting, lying down, or spending time in front of a screen can also be classified as sedentary. In this respect, being physically active and being inactive are not mutually exclusive opposites; On the contrary, it is possible to follow the recommendations as a result of current lifestyles [16]. College students who are physically active and have short periods of time sitting been reported to have a lower prevalence of stress and depressive symptoms [17], a lower risk of mental health problems, and better sleep quality [18]. Studies conducted on COVID-19 report that the pandemic has had a negative impact on physical activity levels and sedentary time and increased screen time, which is associated with poorer mental health in the adult population [19]. These findings also apply to the university students population. One type of sedentary activity that has increased significantly during Covid-19 is screen time (screen exposure); Students studying from home are increasingly using online platforms, and in many countries, it has been determined that they participate in educational processes and courses through distance education [20].

In this context, in this study; It was aimed to examine the changes in sitting time, screen exposure and physical activity behavior profile during the COVID-19 pandemic in university students participating in distance education.

2. MATERIALS AND METHODS

2.1. Design and Participants

After deciding to fill in the questionnaire, information about the study was made to the university population and participants using online Google Forms and communicated via e-mail and WhatsApp. The surveys obtained from the participants were made ready and attention was paid to the protection of all personal data. Inclusion criteria in the questionnaire used in the research process, high school (only students university from randomly different section were allowed to be included), age (only students aged 18-23 were allowed to be included), and voluntary participation consent form were completed. After the data obtained from the questionnaires were collected, the forms were verified by making comparisons, and forms containing incorrect or incomplete information or conflicting information were excluded from the study. When making a selection, no distinction was made between the answers (the same answers to all questions using the same scale) and the information was deemed unreliable if it gave uniform responses to all questions considered to be related. Finally, A total of 380 students, 205 girls and 175 boys, participated in the study. An online questionnaire consisting of socio-demographic data and physical activity habits was applied to the students. Respondents were asked to answer the questions of the self-administered online questionnaire (completed in less than 5 minutes), informing them that they could stop compiling at any time without the obligation to justify the decision. The work was carried out in accordance with the Declaration of Helsinki and the current privacy law and the data were processed. By applying to the Ethics Committee, "Ethics Committee Approval" was obtained with the decision dated 07.02.2023 and numbered 454.

2.2. *Data collection*

Participants performed a study of approximately 15 minutes. The online survey process examining the impact of the quarantine included information on sociodemographic characteristics, physical activity level, screen exposure and sitting time.

2.2.1. International Physical Activity Questionnaire (IPAQ)

PA, ST, and SE were all reported as daily hours and minutes prior to and during lockdown. Specifically for PA, daily MPA and VPA were both reported (e.g., before going into lockdown or since going into lockdown, on average how many hours and minutes a day do you spend in: VPA (described as large increases in breathing or heart rate), MPA (described as small increases in breathing or heart rate), SE and ST), and the participants were categorized as meeting public health recommendations (150 min/week of MPA; or 75 min/week of VPA; or, an equivalent combination of MVPA throughout the week) [21]. In accordance with theGlobal Physical Activity Questionnaire [22], participants who reported >960 min/day of PA, were removed from the analysis.

2.2.2. Sitting Time and Screen Exposure

For the sitting question, participants reported their sitting time separately for weekdays and weekend days and were able to select < 4 h, 4–6 h, 6–8 h, 8–10 h or > 10 h per day for each question. Participants were grouped as engaging in low (<8 hours/day) or high sitting (<8 hours/day) before and during lockdown. This threshold was used based on evidence that sitting <8 hours/day is associated with a significant increase in the risk of chronic disease and all-cause mortality [23,24]. Screen time was measured using the question "How much time do you spend on screen-based activities (on any device and excluding work activity) on a typical day during weekdays and weekends?". Participants could select either < 2 h, 2–4 h, 4–6 h, 6–8 h or >8 h.

2.4. Statistical Analysis

SPSS 25 (Statistical Package for the Social Sciences, version 25) statistical program was used when evaluating the findings obtained in our research. Descriptive statistics include minimum, maximum, mean, median, standard deviation for numerical variables; For categorical variables, they were given as numbers and percentages. To compare numerical data, the Mann Whitney U Test was used in two independent groups and the Kruskal Wallis Test was used in more than two groups. Pre- and post-pandemic measurements and scale scores were analyzed with the Wilcoxon Signed-Rank Test. A value of $p<0.05$ was considered significant.

3. RESULTS

According to the findings; the median age of the students was 21, the average age was 20.58±1.77, the median height was 168 cm, and the average height was 168.73±10.88 cm. The median body weight of the students before Covid-19 was 68 kg, with an average of 68.94±13.15 kg, and the median body weight after Covid-19 was calculated as 75 kg, with an average of 74.59±15.02 kg. 53.95% (n=205) of the students included in the study were women (175) and men. 17.11% (n=65) were in nursing, 15.26% (58) were in medicine, and 15.00% (n=57) were in education faculty. 45.26% (n=172) had Covid-19 and 47.37% (n=180) were in quarantine.

During the Covid-19 pandemic, the time spent actively decreased by 49.74% (n=189) of the students. The time spent sitting by 86.32% of the students (n=328) increased. In particular, during the quarantine both females and males underwent weight gain. It was determined that there was an increase in the overweight and obese status of the participants during the Covid-19 process (<0.001 ***) (Table 1).

The moderate physical activity score of those who increased their active time during the Covid-19 pandemic was found to be statistically significantly higher than all other groups ($p<0.001$). The moderate and vigorous physical activity scores of those whose time spent sitting during the Covid-19 pandemic increased were found to be statistically significantly lower than the other groups ($p<0.001$) (Table 2.)

It was determined that women's IPAQ levels and Sitting subscale scores were statistically significantly higher than men ($p<0.05$). The IPAQ Walking subscale score was found to be statistically significantly lower in the Faculty of Economics and Administrative Sciences than in the students of the faculty of nursing and medicine ($p<0.01$). IPAQ Sitting subscale score was lower in students of the faculty of fine arts than students of the faculty of science and literature, education, economics and administrative sciences, nursing and engineering. The scores of medical faculty students were found to be lower than nursing and engineering students. The difference between the groups was statistically significant ($p<0.01$).

Table 1. Descriptive data of the participants' characteristics

Variable		n(380)	%	p/Z-χ2
Gender	Male	175	46,05	
	Famale	205	53,95	
		Ort±Std. Sapma		
Age (Years)		20,58±1,77		
Height (cm)		168,73±10,88		
Weight (kg) before Covid-19		68,94±13,15		a<0,001*
Current weight (kg)		74,59±15,02		-13,896
Faculty	Faculty of Education	57	15,00	
	Science literature	53	13,95	
	Fine Arts	52	13,68	
	Nursing	65	17,11	
	Economics and Administrative Sciences	48	12,63	
	Engineering	47	12,37	
	Medicine	58	15,26	
Have you had Covid-19?	Yes	172	45,26	
	No	208	54,74	
Have you been in quarantine?	Yes	180	47,37	
	No	200	52,63	
The time you spent actively during the Covid-19 pandemic?	Unchanged	17	4,47	
	Decreased	154	40,53	
	I can't do it at all	189	49,74	
Has the Covid-19 process affected the time you spend sitting?	It increased	328	86,332	
	Unchanged	38	10.00	
	Decreased	14	3,68	

aWilcoxon Signed Ranks Test *p<0.001

Table 2. Changes in participants' levels of sitting time and physical activity before and during the COVID-19 quarantine

Variable		Vigorous physical activity (MET-min/week)		Moderate intensity physical activity (MET-min/week)	
		Mean±Std.	p/Z-χ2	Mean±Std	p/Z-χ2
Gender	Male	236,57±996,1	a0,480	81,69±417,92	a0,665
	Famale	108,57±523,1	-0,707	69,52±370,1	-0,433
Faculty	Faculty of Education	289,96±913,97		141,61±681,48	
	Science literature	126,04±413,72		80±237,78	
	Fine Arts	44,77±182,47		23,85±66,87	
	Nursing	81,23±192,61		48,74±122,12	
	Economics and Administrative Sciences	124,17±706,7	b0,203 8,513	52,08±190,26	b0,674 4,019
	Engineering	448,51±1633,52		149,53±741,14	
	Medicine	100±558,26		39,66±89,32	
The time you spent actively during the Covid-19 pandemic?	Unchanged	374,12±1048,71	b0,126	327,06±574,5	b0,001**
	Decreased	174,08±984,1	5,722	93,79±569,68	17,038
	I can't do it at all	134,39±468,96		43,6±102,89	
Has the Covid-19 process affected the time you spend sitting?	It increased	154,15±792,77		65,9±397,34	
	Unchanged	270,95±790,19	b<0,001**	144,42±414,81	b<0,001**
	Decreased	200±265,79	21,118	103,14±100,54	15,674

aMann Whitney U Test *p<0,05 **p<0,01bKruskal Wallis Test

There was a statistically significant difference in the IPAQ Walking and Sitting subscale scores of those whose time spent actively during the Covid-19 pandemic period compared to other groups ($p<0.05$). It was found to be significantly low ($p<0.05$) (Table 3).

According to IPAQ, the average Severe MET score of the students participating in the study was 167.52±779.03, the average moderate MET score was 75.13±392.36, the walking MET average score was 318.44±676.49, the sitting MET average score was 3377, It was found to be 13±2299.59, while the total MET score average was found to be 3938.21±2881.49 (Figure 2.) As shown in Fig 2, the proportion of participants engaging in higher amounts of screen time (4–6 h and > 8 h) was higher on weekdays and weekend days during lockdown than before lockdown ($P < 0.001$) (Figure 1).

Table 3. Changes in participants' levels of sitting time and physical activity before and during the COVID-19 quarantine

Variable		Walking (MET-min/week) Meanest	p/Z-χ2	Sitting (MET-min/week) Mean±Std	p/Z-χ2
Gender	Male	332,55±702,19	a0,145	3294±2791,77	a0,021*
	Famale	306,4±655,24	-1,459	3448,1±1779,23	-2,304
Faculty	Faculty of Education	289,96±913,97		3481,58±1746,17	
	Science literature	260,58±478,77		3233,21±1572,76	
	Fine Arts	185,31±130,36		2265,58±1519,08	
	Nursing	359,95±491,92		4206,46±4101,22	
	Economics and Administrative Sciences	190,09±310,82	b0,001** 23i453	3583,13±1592,5	b<0,001** 49,355
	Engineering	489,73±1000,47		3940,85±1789	
	Medicine	322,89±332,84		2845,86±1325,93	
The time you spent actively during the Covid-19 pandemic?	Unchanged	927,88±1086,49	b0,014* 10,593	3965,29±7308,97	b0,015* 10,477
	Decreased	304,61±867,78		3158,18±1377,98	
	I can't do it at all	260,68±373,15		3333,33±1848,78	
Has the Covid-19 process affected the time you spend sitting?	It increased	278,34±629,01	b0,044* 6,231	3274,85±1673,77	b0,766 0,534
	Unchanged	658,26±1018,11		4194,47±5232,71	
	Decreased	335,66±246,91		3555±1875,52	

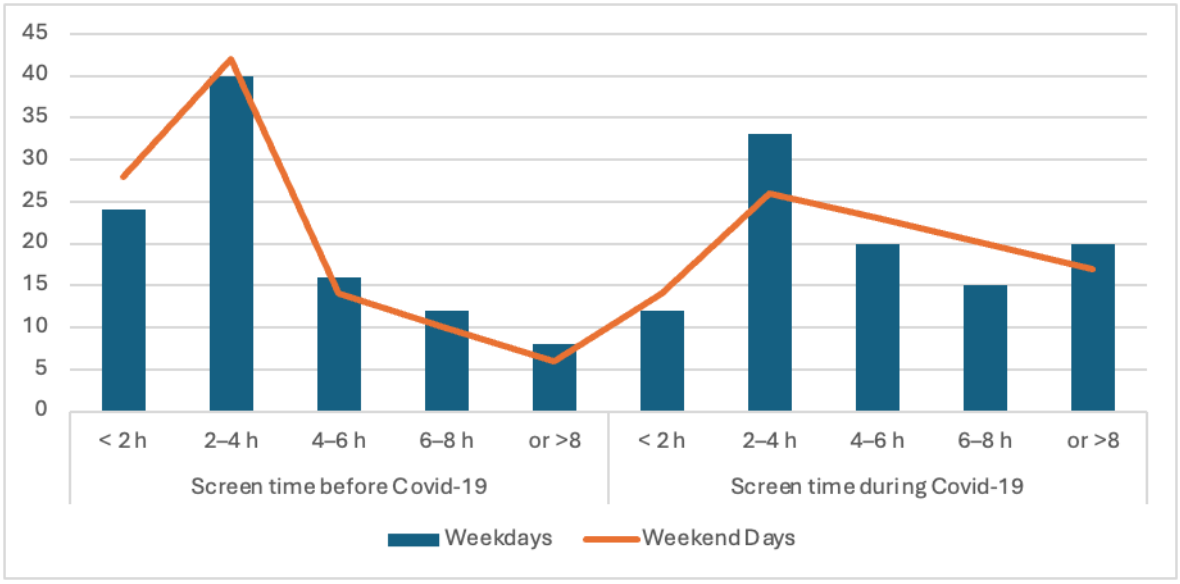

Figure 1. Changes in participants' levels of screen exposure before and during the COVID-19 quarantine

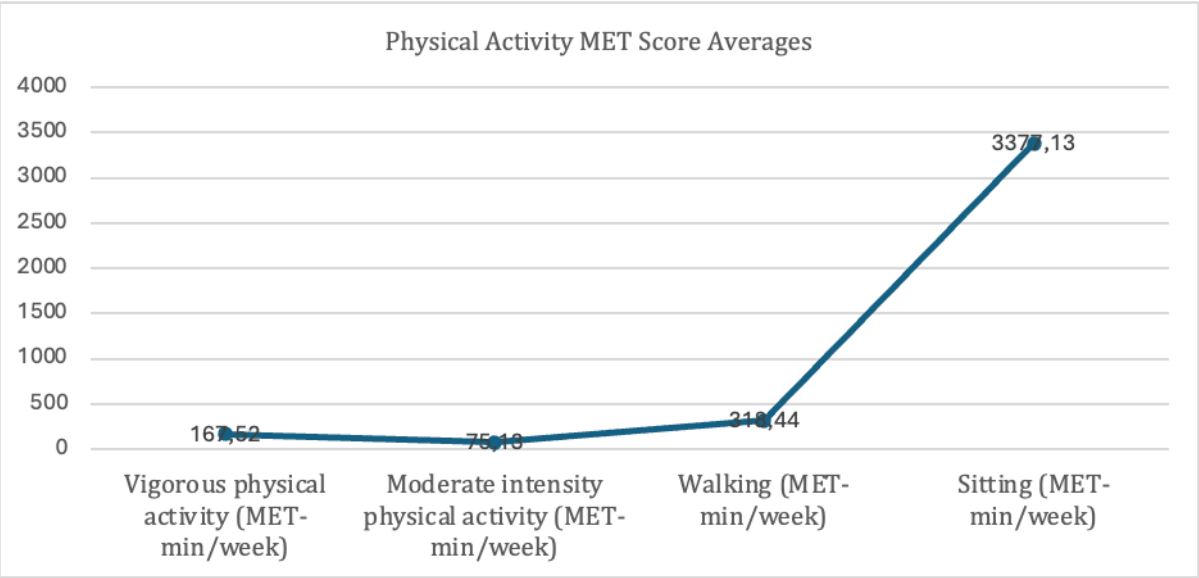

Figure 2. Participants' physical activity MET score averages

4. DISCUSSION

In this study; It was aimed to examine the changes in sitting time, screen exposure and physical activity behavior profile during the COVID-19 pandemic in university students participating in distance education. The main findings were that university students were not physically active and exhibited a sedentary profile during COVID-19, compared to before the COVID-19 outbreak, their screen exposure and sitting time increased, and their physical activity levels decreased. One of the institutions most affected by the changes during the pandemic was the educational institution. The educational institution is of great importance in terms of its duty to ensure the continuity of social integrity. Therefore, changes in the educational institution directly or indirectly affect other social institutions Since the transition to the compulsory distance education model in higher education was urgent, unplanned and rapid, it brought with it many problems [25].

It can be said that the measures taken during the pandemic period and remaining inactive at the desk along with distance education reduced physical activity and increased inactivity. This situation may pose a risk to the physical and mental health of university students in the future. Studies in the literature have found that the level of physical activity is low in university students. Recent studies have also obtained results supporting the negative effect of COVID-19 on physical activity [26]. These results can be attributed to the increase in time spent sitting at home, the closure of sports centers and the restriction of access to public spaces [27]. In a study conducted on medical school students, it was found that 11% of the participants had an adequate level of physical activity according to the UFAA score [28].

Research has further strengthened that physical activity plays an important role in physical health during COVID-19 [29]. In this study, a significant decrease was observed in vigorous and moderate physical activity and walking activities compared to before the pandemic; It was also determined that sitting periods increased. In our study, it was determined that women's IPAQ Sitting subscale score was statistically significantly higher than men. It was determined that the IPAQ walking subscores of nursing and medical faculty students were higher than other faculty students. It was determined that the IPAQ Sitting subscale score was lower in students of the faculty of fine arts than students of the faculty of science and literature, education, economics and administrative sciences, nursing and medicine. In a study involving students from four universities in Ankara, the average IPAQ score was 1786.9 for boys and 1699.2 for girls. Contrary to our study, in a study conducted on students of the Faculty of Medicine, it was determined that only 11% of the students had sufficient physical activity level according to the UFAA score [28]. According to Ercan and Keklicek (2020), it was reported that there was a decrease in the rate of regular and irregular physical activity of university students during the pandemic period and the rate of inactivity increased. In this study, a significant decrease was observed in vigorous and moderate physical activity and walking activities compared to before the pandemic; It was also determined that sitting periods and screen exposure increased.

In our study, it was determined that women's IPAQ Sitting subscale score was statistically significantly higher than men. It was determined that the IPAQ walking subscores of nursing and medical faculty students were higher than other faculty students. It was determined that the IPAQ Sitting subscale score was lower in students of the faculty of fine arts than students of the faculty of science and literature, education, economics and administrative sciences, nursing and medicine. In addition, the IPAQ Walking subscale score of the participants who thought they had adequate and regular nutrition, those who had Covid-19, and those who were in quarantine were statistically significantly higher.

5. Conclusion

The COVID-19 pandemic process, which causes a major health problem worldwide, has affected and continues to affect all humanity in different ways. It seems that university students are most affected by all these negativities. As a result, students' physical activity levels and nutrition and exercise habits were affected due to the measures taken by the competent authorities in many countries during the COVID-19 quarantine period, such as closing schools and social distancing. With the onset of the epidemic, students who did not leave their homes for a long time began to spend most of their time in front of tablets, computers and phones at home with a sedentary lifestyle. As a result, inactive tendencies and unhealthy diets are thought to have negative consequences on the quality of life. Therefore, in times of a health crisis, the government and university administration need to implement measures to reduce sedentary and screen exposure time, as well as encourage this population to maintain adequate levels of physical activity.

Conflict of Interest

No conflict of interest is declared by tehe authors. In addition, no financial support was received.

Ethics Committee

By applying to the Ethics Committee, "Ethics Committee Approval" was obtained with the decision dated 07.02.2023 and numbered 454.

Author Contributions

Study Design, AK, ND; Data Collection, AK, ND; Statistical Analysis, AK, ND; Data Interpretation, AK; Manuscript Preparation, AK, ND; Literature Search, AK, ND. All authors have read and agreed to the published version of the manuscript.

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