

ORIGINAL ARTICLE

Physical Activity and Sedentary Behavior in University Student During Online Learning: The Effect of Covid-19 Pandemic

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ABSTRACT

Introduction: Covid-19 pandemic forcing many people to do more activities from home. This study aims to report students' physical activity (PA) and sedentary behavior (SB) during online learning as the impact of the Covid-19 pandemic. **Methods:** Data were obtained from reports of 377 students through online surveys using the International Physical Activity Questionnaire Short Version (IPAQ-SF), translated into Indonesian. Data were analyzed using descriptive statistics and crosstab to describe the level of PA and t-test to see differences in PA & SB based on gender. **Results:** The results showed that of the 379 respondents, 10.1% were included in the light PA level, 51.2% moderate, and 38.5% vigorous PA level. Total MET PA per week between male and female students was significant ($p = 0.034$), as was vigorous PA ($p < 0.001$). There was no difference between male and female students ($p > 0.05$). The average student spends nearly 9 hours of sitting time a day. **Conclusion:** In conclusion, this study reveals that, first, during online learning in the Covid-19 pandemic, student PA was moderate to vigorous. Second, gender has an impact on differences in PA, but not on SB. The third conclusion is that students spend a long time sitting during online learning. These results indicate the university's need for an effective intervention strategy to improve an active lifestyle for all students, especially during online learning.

Keywords: Covid-19, online learning, physical activity, WHO guideline

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INTRODUCTION

The Covid-19 pandemic affects all aspects of people's lives (1) around the world. In addition to impacting health, the Covid-19 pandemic also impacts social, economic, and mental aspects (2). All social activities are limited, and most must be done from home, including learning activities (3). The world of education in tertiary institutions is one of the most affected by this pandemic (4). Online learning is a step taken by universities so that learning activities can continue (5). It means that the number of student screen time is greater than before. In the past few years, screen time in adolescence has increased, while physical activity has decreased (9). In normal learning conditions, students can spend more than 9 hours sitting and physically inactive per day (6). Meanwhile, online learning, which requires

students to deal with many electronic screen devices, is predicted to increase screen time. Previous research on adolescence found that between 2002 and 2010, the use of electronic screens such as computers increased sharply (7). Meanwhile, during the Covid-19 lockdown, cyber activities (internet) have increased, especially in accessing social media (8). It means that screen time has increased during the Covid-19 pandemic.

High screen time is closely related to mental health, such as anxiety, depression, psychopathological symptoms, and poor sleep quality (10–12). Apart from being closely related to mental health, screen time is also closely related to the risk of overweight and obesity (7) and high sedentary behavior (13). Meanwhile, sedentary behavior is closely related to cardiovascular disease (14), cardiometabolic disease (15), morbidity, and mortality (16,17). Low physical activity and high sedentary behavior lead to the emergence of non-communicable diseases such as heart disease, stroke, high blood pressure, type-2 diabetes, obesity, and cancer, leading to many deaths (14,18–21). Meanwhile,

cardiovascular comorbidities are the cause of the high mortality rate in Covid-19 patients (22).

Apart from the high screen time and sedentary behavior, students' physical activity during the Covid-19 pandemic was also threatened to decline. Students used to walk from class to class, from one building to another, even climbing stairs to change lessons, but now it's only done by following a link on a computer. Previous research has tried to reveal the impact of a pandemic on physical activity. Reviews related to the effects of Covid-19 on physical activity have been discussed based on comprehensive theory (23). Other studies have revealed a decrease in various steps in various cities and countries during a pandemic (24). However, research related to the impact of the pandemic on decreased physical activity and increased sedentary behavior towards students is still limited, especially in Indonesia. Therefore, this study aims to reveal students' physical activity and sedentary behavior during online learning during the Covid-19 pandemic.

MATERIALS AND METHODS

Study Design

A cross-sectional study approach was used to determine students' physical activity (PA) and sedentary behavior (SB) during online learning as the impact of the Covid-19 pandemic. This study was conducted according to the ethical clearance guaranteed by the ethics committee for research of the Centre of Research and Community Service, Universitas Pendidikan Indonesia. No. B-0846/UN40.LP/PJ.00.00/2021

Setting

Data were collected from several faculties and departments at Universitas Pendidikan Indonesian over four months from July to October 2020, during which online learning was implemented. In Indonesia, large-scale social restrictions (PSBB) or lockdown have been imposed in other countries since March 2020. During PSBB, several restrictions have occurred, including school restrictions.

Participants filled out questionnaires about physical activity and sedentary behavior during the past week. The questionnaire submitted into the google form is distributed to students via the WhatsApp message application. If there are not understood questions, participants will contact the data collector through the contact number provided. After the data is collected, the researcher will check and verify the respondents' questionable answers.

Participant

Participants were recruited using the snowball sampling technique by distributing a google form questionnaire through the WhatsApp group message application. Three hundred seventy-seven students participated in

this study, with an age range between 17-22 years (M + SD: 19.37 + 0.85 years; 36% males & 64% females). This population was chosen because it is the age that uses the most electronic devices, especially smartphones (25,26).

Measurement

Age and gender data and socio-demographic information, including course and residence, were collected from participants. Physical activity and sedentary behavior were measured subjectively using the validated Indonesian version of the International Physical Activity Questionnaire-Short Form (IPAQ-SF) (27). The questionnaire asks about activities in the last seven days that have been carried out. Outcomes from IPAQ measurements are (a) vigorous-intensity PA, (b) moderate-intensity PA, (c) walking time, (d) sitting time, and (e) total physical activity in total metabolic equivalent of task (MET) per week.

Statistical Method

The data presented are mean (M) and standard deviation (SD) for the continuous variable and percentages for categorical variables. Cross tabulation was used to see the amount and percentage of physical activity levels based on gender. An independent sample t-test was used to analyze the differences between PA and SB. All statistical analysis process is using with the statistical software package for social science (SPSS).

RESULTS

As shown in Table I, participants were aged > 17, and < 23 years (M + SD; 19,39 + 0.89). The sample consisted of 379 people, 36% male, and 64% female. About 10,3% of students are included at the light PA level, 51,2% at the moderate PA level, and more than 38,5% at the vigorous PA level. Table 1 shows that 183 of 137 (48%) of all participants, 82 of 137 (60%) males, and 101 of 242 (42%) females meet the WHO physical activity guidelines with an accumulation of 75 min/week for vigorous physical activity, 150 min/week moderate physical activity, or a combination of moderate to vigorous physical activity.

Table I. Participants characteristics in PA and SB

	<i>Total</i>	<i>Male</i>	<i>Female</i>
n (%)	379 (100)	137 (36)	242 (64)
Age (Mean ± SD)	19.39 ± 0.89	19.23±1.02	19.48±0.79
PA Level by Gender			
Light, n (%)	39 (10.3)	12 (3.2)	27 (7.1)
Moderate, n (%)	194 (51.2)	74 (19.5)	120 (31.7)
Vigorous, n (%)	146 (38.5)	51 (13.5)	95 (25.1)
Meet WHO PA Guidelines, n (%)	183 (48)	82 (60)	101 (42)

According to aTble II, total MET PA per week between male and female students differed significantly ($p < 0.05$), where male students (3415.2 ± 3350.1) were higher than female students (2812.83 ± 2150.64). There are also significantly different of vigorous PA between males (74.46 ± 65.37) and females (51.73 ± 56.54) students. Meanwhile, there was no significant difference ($p = 0.103$) between male (82.96 ± 62.87) and female (72.82 ± 54.95) students for moderate PA and walking time ($p = 0.260$), males (73.18 ± 65.16) and females (66.06 ± 55.29). All students spent an average of nearly nine hours sitting in one day (8.89 ± 1.74). There are significant different for sitting time ($p < 0.001$), between males (9.3 ± 1.82) and females (8.15 ± 1.28).

Table II. PA and SB differences by gender

	Total	Male	Female	t	P
Subjectively Measured Physical Activity					
	3030.57 (2659.11)	3415.2 \pm	2812.83 \pm	2.13	0.034
	59.95	3350.1	2150.64	3.55	0.000
MET PA (M \pm SD)	76.48	74.46 \pm 65.37	51.73 \pm 56.54	1.64	0.103
Vigorous PA (min/week)	68.63	82.96 \pm 62.87	72.82 \pm 54.95	1.13	0.260
Moderate PA (min/week)	8.89 \pm 1.74	73.18 \pm 65.16	66.06 \pm 55.29	7.19	0.000
Walking time (min/ week)		9.3 \pm 1.82	8.15 \pm 1.28		
Subjectively Measured Sedentary Behavior					
Sitting time (hour/day) M \pm SD					

DISCUSSION

This study measured students' physical activity and sedentary behavior during online learning due to the Covid-19 pandemic. The results showed that only 48% of students meet the physical activity recommendations from WHO, while more than 50% of others did not. However, when viewed from the total MET per week, almost 90% were moderate to vigorous physical activity (MVPA). The physical activity and sedentary behavior of male students differed from that of women, especially from the total metabolic equivalent of task (MET) PA and at the vigorous level of PA. Meanwhile, for moderate PA

level and walking time, male and female students spent the same time.

These results indicate a change in students' physical activity patterns and sedentary behavior during online learning due to the Covid-19 pandemic. Participants spent more time sitting while learning activities were carried out online at home. These results are in line with those of previous studies. The study conducted by Gallo et al. (2020) examined energy intake and PA levels in Australian university students (214 males and 295 females) during online learning as impact Covid-19 pandemic. The results show that only less than 30% of both sexes meet sufficient PA levels (28). Another similar previous study by Osipov and colleagues (2021) asses PA levels of 209 university students during the online educational process has found that the Covid-19 pandemic decreased PA level (29).

A similar study in Spain conducted by Sacudo and colleagues (2020) examined PA level and SB of 20 young adults age 22.6 ± 3.4 years, using objective and subjective measurement during Covid-19 lockdown. The result showed the same pattern of changes in PA and SB during Covid-19, where there was a 10% decrease in PA and a high sitting time that reached more than 9 hours a day (30). A similar study conducted by Babarro et al. (2020) in Spain examined PA changed during Covid-19 confinement of 3800 healthy adults age 18–64 years, using an IPAQ questionnaire. The results show that during the Covid-19 period, the average sitting time at 18-24 years was around 9 hours per day (31). Another study by Ammar et al. (2020) regarding the effect of Covid-19 home confinement in thirty-five research organizations from Europe, North Africa, Western Asia, and the Americas on PA show that the negative impact of Covid-19 on all intensity of physical activity and an increase in sitting time between 5 to 8 hours per day (32). Meanwhile, the observational, cross-sectional, pre-post study conducted by Blanco and colleagues (2020) in Mediterranean Spain studies university student PA, and SB changes during confinement Covid-19 of 213 students using IPAQ found a different result. The results found a significant increase in physical activity and sitting time during the lockdown, both for boys and girls (6).

Subsequent findings from this study also revealed that the Covid-19 pandemic did not change the differences in physical activity and sedentary behavior of women compared to men. Previous studies have also shown that men spend more time on MVPA and SB than women in normal conditions (32) and during the Covid-19 pandemic (31). In some cases, teenage boys spend more time playing video games than girls (33). The decrease in physical activity occurs with increasing age, in which men are still more active than women (34). Cultural factors are predicted to be a factor in physical activity involvement in women (35). Culture in Indonesia, which

is still thick with the stigma of feminism and masculinity, is thought to be a factor that impacts differences in physical activity based on gender.

Other results of the study revealed that some students had met the WHO physical activity recommendations and differences in the amount of time spent on PA and SB based on gender. To uncover this problem, data collection in this study used the IPAQ-SF questionnaire on the google form distributed through the WhatsApp group. The respondents answered the questions subjectively related to the activities they had done during the past week. Further research would be needed if the measurements could be carried out objectively using an accelerometer.

CONCLUSION

This study reveals that physical activity and sedentary behavior between male and female students are different during online learning in the Covid-19 period. Some students met the WHO physical activity recommendations, while some others did not. Students spend long periods sitting during online learning as a result of the Covid-19 pandemic. These findings may be essential to make recommendations regarding the importance of maintaining an active lifestyle and reducing sedentary behavior during the Covid-19 pandemic.

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