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Sedentary Living, Screen Time, and Physical Activities in Medical Students during the Coronavirus (Covid-19) Pandemic

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Abstract

The Ministry of Health of Indonesia has established large-scale social restrictions (LSSR) to limit the transmission of Covid-19, which inherently causes an increase in screen time levels and the physical activity level of students. This study aims to compare the level of screen time and physical activity before and during LSSR. This cross-sectional study was involved 206 medical students of the Atma Jaya School of Medicine and Health Sciences. Data were collected using a questionnaire and the International Physical Activity Questionnaire (IPAQ) – long form. A paired t-test, Wilcoxon signed-rank test, and McNemar test were used to compare the level of screen time and physical activity before and during LSSR. The mean screen time, sedentary time on weekday and weekend were significantly increased (Δ0.6, Δ1.7, Δ1.3 hours, respectively, all $p<0.001$), while total calorie of physical activity reduced (Δ-435, $p<0.001$). The number of students with higher screen time and sedentary time was also raised (Δ12.1%, Δ19.4%, Δ14.6%, respectively, all $p<0.001$), while the number of students with sufficient physical activity was significantly diminished (Δ-13.6%, $p<0.001$). There was a shift in the use of application types. The most significant change was Line usage, which had decreased by almost half (from 80 to 43). The pandemic situation greatly affected the students' physical activity behaviour to be more sedentary and changed the use of application type.

Keywords: *Covid-19 pandemic, large-scale social restriction, online-based learning, screen time, physical activity*

Introduction

In December 2019, the first report of Coronavirus Disease 2019 (Covid-19) came from Wuhan, People's Republic of China (PRC), and since then has spread worldwide. By September 6, 2020, the data showed that at least 213 countries reported 27,095,634 confirmed cases and 884,304 deaths. Along with its devastating impacts, WHO has declared Covid-19 as a global pandemic that must be handled urgently. In Indonesia, the first case of Covid-19 was confirmed on March 2, 2020 (Hermesauto, 2020). Since then, the number of cases has rapidly multiplied to 678,125 per December 2020 (Covid-19, n.d.).

The Indonesian Ministry of Health acknowledged the stagnancy of Covid-19 improvements in the nation and decided to limit various community activities and establish large-scale social restrictions to reduce its transmission (Covid-19, 2020). Crowded places such as shopping centres, offices, and educational facilities were shut down, thus forcing various community activities to be operated online. This large-scale social restriction (LSSR) also affects medical students' learn-

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ing methods, which shifted from face-to-face learning to small group discussions through online platforms (Rose, 2020), which also negatively affects the physical activity level of the students. Thus, it will further increase sedentary and the amount of screen time (Nagata, Magid, & Gabriel, 2020).

In a report by We Are Social and Hootsuite, in January 2019, Indonesia was ranked fifth based on the amount of time per day spent using the internet, with an average of 8 hours 36 minutes per day (Coconuts Jakarta, 2019). The current intense use of electronic media certainly contributes to numerous life aspects, including physical activity. Research suggests an inverse relationship between the use of electronic media and the level of physical activity. The higher the use of electronic media, the lower the level of physical activity (Sandercock, Ogunleye, & Voss, 2012; Spengler, Mess, & Woll, 2015).

With the precautions set by the government to combat Covid-19, screen time will undeniably increase at an alarming rate, and along with that, it will affect the rates of physical activity. There have been no studies to evaluate sedentary screen time and medical students' physical activities during online-based learning to the best of our knowledge. Therefore, this study aimed to evaluate whether LSSR affected screen time and physical activity in medical students.

Methods

Study design

This cross-sectional study was conducted at the School of Medicine and Health Sciences, the Atma Jaya Catholic University of Indonesia, in February and June 2020. Preclinical students of the School of Medicine and Health Sciences, the Atma Jaya Catholic University of Indonesia, were recruited. Participants gave their informed consent. The exclusion criteria were set as follows: 1) unable to do physical activity optimally because of health problems or physical limitations; 2) have a mobile phone that did not work correctly or was not compatible with applications required for this study. Ethical approval had been obtained from the Ethical Review Committee of the School of Medicine and Health Sciences - Atma Jaya Catholic University of Indonesia (No: 28/01/KEP-FKUAJ/2020) before this study was carried out.

Subjects & Sampling Methods

This study's minimum sample size was calculated using the formula for population proportion with 95% CI, 5% margin of error, and the predicted prevalence of people using internet-connected devices ≥7 hours a day was 50% (Charan & Biswas, 2013). After calculating the possibility of a sample dropout of 10% and design errors, a sample size of 215 students was needed. Two hundred fifteen students filled out a questionnaire in the first survey. In the second survey, one student was absent, and eight students were excluded because they had limitations that made it difficult for them to perform physical activities. Thus, the number of eligible subjects for analysis was 206 students.

Data collection was done twice with an interval of three months. The first data collection was carried out in February 2020, just before LSSR. The second data collection was conducted in May 2020, 2 months after LSSR. Information sheets containing research objectives and procedures were distributed online to students. The students were then asked to sign an online informed consent form and fill in a self-administered questionnaire containing data on screen time and physical activity.

Measurements

Data measurement was performed using a questionnaire consisting of three sections: 1) demographics, 2) screen time questionnaire, and 3) an international physical activity questionnaire (IPAQ) (long form). The demographic questionnaire records the student's name, student/campus ID, age, gender, year of study, ethnicity, religion, and telephone numbers that can be contacted.

The screen time questionnaire includes several questions that must be filled in based on the results displayed from the built-in screen time application for iOS (Apple) users or the screen time application "Restrain yourself & parental control version 2.2.1 (Iridium Dust Limited)" for non-iOS phone users. The questions in the screen time questionnaire include 1) How long (in hours and/or minutes) has your screen time been during the last seven days, and 2) What are the five applications (with the usage duration) that you used most during the last seven days? The daily usage duration will be calculated and divided based on the screen time into ≥7 hours and <7 hours (Trinh, Wong, & Faulkner, 2015; Ngantcha et al., 2018).

The IPAQ was used to assess a person's metabolic equivalent (MET) from performing various physical activities in the past seven days (International Physical Activity Questionnaire, 2005). This questionnaire is in the English language and consists of five sections, including job-related physical activity; physical transportation activity; housework, house maintenance, caring for the family; recreation, sport, leisure-time physical activity; and time spent sitting; with a total of 27 questions. Students were asked to fill in each question based on the length of time they did an activity in a day and how many days a week they did the activity. Total MET – minutes/week is obtained from multiplying the length of time doing an activity by the number of days doing physical activity and the MET value. MET value for walking is 3.3; for moderate activity is 4.0; for cycling is 6.0, and for vigorous activity is 8.0. However, there are exceptions to the MET value of vigorous yard chores, which is 5.5, and moderate inside chores were 3.0 days (International Physical Activity Questionnaire, 2005). After calculation, the total physical activity MET in minutes/week is obtained and categorized as <600 MET for insufficient physical activity, and ≥600 MET for sufficient physical activity (Wu, Fisher-Hoch, Reininger, & McCormick, 2016; Poggio et al., 2016). Based on the IPAQ questionnaire, data on sedentary time were also obtained, which were further categorized into ≥7 hours/day or <7 hours/day (Ku, Steptoe, Liao, Hsueh, & Chen, 2018).

Statistical Analysis

Numerical data were presented as mean ± standard deviation, while categorical data as frequency (percentage). The comparison of numeric data between February and May was assessed using the dependent sample T-test or Wilcoxon signed-rank test based on the data distribution normality. The change of subject number in categorical data was evaluated using the McNemar test. The results are considered statistically significant if $p<0.05$. Data analysis was performed with Stata Statistical Software: Release 12.

Results

The characteristics of the subjects were presented in Table 1. The average age was 19.2 years old. There were more females than males (69.4 vs 30.6%). The mean screen time was above

the recommended maximal screen time (7.3 hours/day). The mean calorie for physical activity was 1235 calories. The sedentary time between weekday and weekend were almost similar (8.3 vs 8.4). Most subjects spent seven hours or more in screen time and being sedentary during weekdays and weekends. However, most subjects had sufficient physical activity (54.9%)

Table 1. Subjects characteristics

Variables		Mean (SD) or frequency (%)
Age		19.2±1.0
Gender	female	143 (69.4%)
	male	63 (30.6%)
Screen time (hours/day)		7.3±2.5
Physical activity (calorie/day)		1235.9±162.1
Sedentary time (hours/day)	weekday	8.3±3.4
	weekend	8.4±4.1
Screen time	≥7 hours/day	106 (51.5%)
	<7 hours/day	100 (48.5%)
Physical activity	Insufficient	93 (45.1%)
	Sufficient	113 (54.9%)
Sedentary (weekday)	≥7 hours/day	130 (63.1%)
	<7 hours/day	76 (36.9%)
Sedentary (weekend)	≥7 hours/day	124 (60.2%)
	<7 hours/day	82 (39.8)

Table 2 describes the change of screen time, physical activity, and sedentary time after three months. The paired t-test showed the mean screen time, sedentary time on a weekday, and the weekend was significantly increased (Δ0.6, Δ1.7, Δ1.3 hours, respectively, all p<0.001). The Wilcoxon test showed that the total calorie of physical activity was significantly reduced (Δ-435, p<0.001).

Table 2. The change of mean value of the variables within 3 months

	1st survey (February 2020)	2nd survey (May 2020)	p
Screen time (hours/day)	7.3±2.5	7.9±2.9	<0.001
Physical activity (calorie)	1235.9±162.1	800.0±159.9	<0.001
Sedentary time weekday (hours/day)	8.3±3.4	10.0±3.3	<0.001
Sedentary time weekend (hours/day)	8.4±4.1	9.7±3.6	<0.001

Table 3 shows the change of subject number in categorical variables. The McNemar test results showed the number of subjects that had 7 hours or more screen time, sedentary time on weekdays and weekends was significantly increased (Δ12.1%, Δ19.4%, Δ14.6%, respectively, all p<0.001) within three months. The number of students with sufficient physical activity within three months was significantly diminished (Δ-13.6%, p<0.001).

Table 3. The change of subject number in categorical variables.

		1st survey (February 2020)	2nd survey (May 2020)	p
Screen time	≥7 hours/day	106	131	<0.001
	<7 hours/day	100	75	
Physical activity	≥600 METs	113	85	<0.001
	<600 METs	93	121	
Sedentary time weekday	≥7 hours/day	130	170	<0.001
	<7 hours/day	76	36	
Sedentary time weekend	≥7 hours/day	124	154	<0.001
	<7 hours/day	82	52	

Legend: METs - metabolic equivalents

Figure 1 describes the most used subjects before (A) and during the pandemic (B). The Line was the most popular application before the pandemic, but the users dropped to almost half (Δ-37). Other applications (YouTube, Instagram, Twitter, etc.) were more consistent and tended to be changed slightly.

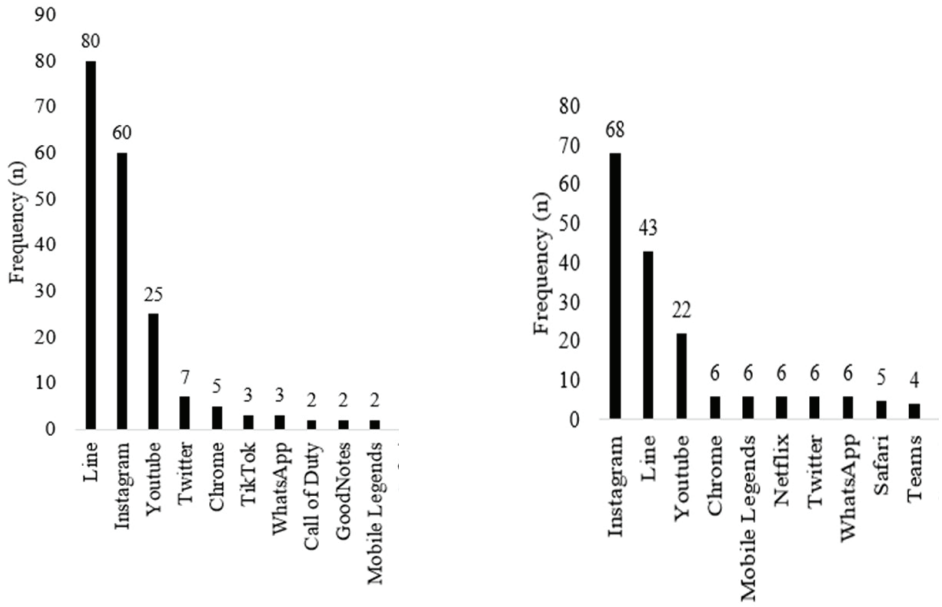

FIGURE 1. The top 10 most used application in February (A) and in May (B)

Discussion

This study might be one of the very few that evaluated the change of activity behaviour during the Covid-19 pandemic. The change towards more screen time, sedentary time, and sufficient physical activity will develop health problems in the future. Obesity, type 2 diabetes, hypertension, and other physical inactivity-related diseases will increase. Our study showed that daily screen time, which is sedentary time, increased significantly after three months during a pandemic while physical activity was reduced. Also, the number of subjects with higher screen time and sedentary time, and insufficient physical activity dramatically increased.

A previous study also examined the impact of the pandemic on physical activity and sedentary behaviour. A study by Dunton et al. (2018) also reported decreased physical activity and increased sedentary behaviour in children. That study did not report how much increase in sedentary time and decreased physical activity between early and during the pandemic. They considered that reduced space to play might cause reduced physical activity and increased sedentary behaviour. The lack of available space to play or other activities might also be one of the causes, in addition to adherence to LSSR policy and self-limitation to avoid contact with others.

It is indeed a paradox for people to reduce their physical activity during the Covid-19 pandemic, whereas exercise has been recommended to continue. Exercise has been recognized to impact cardiovascular function, coagulation and fibrinolytic balance, cellular oxidative stress, and immune system (Pinckard, Baskin, & Stanford, 2019; Lippi & Maffulli, 2009; Narasimhan & Rajasekaran, 2016; Dorneles, Dos Passos, Romão, & Peres, 2020). This beneficial effect of exercise, of course, can enhance the immunity to viral infection, relieve symptoms, and accelerate the recovery from Covid-19 infection.

Reduced physical activity and high sedentary time during the Covid-19 pandemic will lead to increased risk of some diseases such as diabetes, coronary heart disease, and even mortality (Huang et al., 2020; Patterson et al., 2018; Stamatakis et al., 2019). Moreover, Covid-19 is also associated with a detrimental effect on lung damage, coagulation imbalance, cardiac and kidney injury (Liu et al., 2020; Tang, Li, Wang, & Sun, 2020; Chen et al., 2020). Insufficient physical activity also increases obesity and puts obesity at higher risk of hospitalization due to Covid-19 (Dietz & Santos-Burgoa, 2020). Thus, diminishing physical activity must be avoided during the pandemic.

With a lack of available space for being physically active, WHO's recommendation for sufficient physical activity is still achievable, especially for young college students. They can use their internet-connected devices to participate in exercise through an available application, internet-delivered exercise, or online exercise class (Tate, Lyons, & Valle, 2015). Using their internet-connected devices, students can monitor and motivate themselves to stay healthy by doing appropriate physical activity.

This study indicated that most students use mobile phones for social applications, followed by entertainment applications. Also, there was a shift of most used applications, but the applications used were slightly changed in general. This indicated that the use of internet-connected devices to improve their physical activity was still lacking. Therefore, a more intensive action to encourage students to use their internet-connected devices to maintain their healthy physical activity is required.

Some advantages of this study were noted. It was held at the right time, at which the situation in the two surveys was different, although not following the initial purpose. As subjects, college students could ensure that the information provided was more valid and reliable.

Nevertheless, some limitations existed. First, the study should involve a larger sample of varied ages and work background. This fact can confirm whether different ages and jobs will have a different response in the pandemic situation. Second, the anthropometric change, such as weight and body mass index, could not be measured due to social distancing. The anthropometric change will affirm the effect of LSSR on the increased obesity prevalence.

The large-scale-social restriction (LSSR) does impact sedentary behaviour and physical activity in medical students col-

lege. Screen time and sedentary time sharply increased while physical activity dramatically decreased. Students with higher screen time and sedentary time also increased, whereas students with sufficient physical activity significantly decreased. The LSSR puts medical college students at higher risk of inactivity-related diseases.

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Conflict of Interest
The authors declare that there are no conflicts of interest.

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