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Physical Activity Pattern Before and during the COVID-19 Lockdown among Adolescents in Indonesia

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Abstract

BACKGROUND: Many countries have issued “stay at home” orders to combat the spread of coronavirus disease 2019 (COVID-19), which may have hampered movement in people of all ages. This may impact adolescent physical activity, sedentary behavior, screen time, etc.

AIM: The purpose of this study was to assess changes in physical activity and screen time before and during the first and second COVID-19 lockdown among adolescents in Indonesia.

METHODS: This study was a national web-based survey distributed through social media platforms in Indonesia. A snowball sampling method was used to recruit participants. The final sample included 5650 participants who had provided complete information for the research topic.

RESULTS: Physical activity patterns of adolescents had dramatically shifted during COVID-19 lockdown, with disparities between genders and educational levels. The majority of adolescents had maintained their physical activity levels, with 34.4% of those who engaged in active transportation and 67.3% of those who walked; while, the remaining adolescents had experienced a decrease in physical activity (30.1%–63.1%). Adolescents had maintained their sleeping (about 50%) and screen time (31.4%), but almost 40% had decreased their sleeping time and 60.5% had significantly increased their screen time. Furthermore, when compared to their peers who had maintained their sedentary time before to COVID-19, more adolescents had increased their sedentary time throughout both schooldays and weekends (about 54%).

CONCLUSION: This large-scale nationwide survey could be valuable for stakeholders, when deciding when and how to relax restrictions in the future. In addition, school administrators should be aware of these changes so that in-class and/or extracurricular physical programs can be developed to offset the effects of these changes.

Introduction

The coronavirus disease 2019 (COVID-19) epidemic has impacted daily life globally. Approximately 4,283,453 people have been infected and 144,206 have died since the outbreak was declared on January 2020 (Ministry of Health, 2022). During the pandemic, Indonesia was among the top 20 countries with the highest death rate (519 fatalities per million population) (Ministry of Health, 2022). The Indonesian government has taken many actions to minimize the pandemic’s health and economic consequences. In March 2020, all schools were closed, and employers adopted a work-from-home policy. Many counties worldwide have issued “stay at home” instructions in an effort to control the spread of COVID-19, which may have affected movement patterns in people of all ages. In addition, prolonged national vacations and family gatherings are discouraged [1]. Unfortunately, travel bans and recreational activities have an unavoidable impact on the daily lives and everyday activities of Indonesian citizens. This may have an effect on how adolescents’ physical activity, sedentary behavior, activity, and screen time [2], [3]. Studies undertaken during the COVID-19 epidemic have revealed that children and adolescents engage in less physical activity, spend more time on screens, and sleep for a shorter period of time [2].

In adolescents, physical activity and screen time are related to better physiological, psychological, social, and mental wellbeing [4], [5]. Adolescents between the ages of 13 and 19 are advised by international health organizations to have 60 min of moderate-to-vigorous physical activity each day and 2 h of screen time each day [6], [7]. Following these physical activity guidelines have been linked to improved motor development, cognition, fitness, emotional management, and obesity [7]. Limiting the capacity of early adolescents to satisfy these standards may have long-term effects for their health [3], [8].

Limited studies have shown how the adolescent’s activity patterns have been changed by COVID-19. Study in China reported that youth’s activity patterns had also significantly changed, including the decreased frequency of physical activity and the increased sedentary, sleeping,

and screen time [9]. Another study in Chile found that toddlers and preschoolers with space to play at home and living in rural areas experienced an attenuated impact of the pandemic restrictions on their physical activity levels, screen time, and sleep quality [10]. While, study conducted in Germany among children and adolescents showed that ports activity declined whereas recreational screen time increased [11]. Conversely, in Canada, about two thirds of men and women reported exercising outdoors and more women reported exercising indoors compared with men [12]. However, lifestyle changes and the degree to which lockdown measures have been implemented are different in every country, especially in Indonesia, which has also been severely affected by the COVID-19 at early stages. In addition, there is a lack of data regarding the impact of COVID-19 on movement behaviors in adolescents and from Asian-Indonesia countries.

Understanding the association between COVID-19 factors and young children's movement behaviors is important in guiding decision-making among policymakers, and in educating parents and health professionals. This information would be relevant not only during the pandemic but also when returning to a "new normal." The purpose of this study was to assess changes in physical activity and screen time before and during the first and second COVID-19 lockdown among adolescents in Indonesia.

Methods

Study design and sample

This study was a national web-based survey distributed through social media platforms in Indonesia. The inclusion criteria were: (1) Living in Indonesia, (2) aged 12–19 years old, and (3) willing to participate in this study. Respondent who are not in school at the time of data collection were excluded from this study. A convenience sampling method was used to recruit participants.

Measures

The International Physical Activity Questionnaire (IPAQ)-Short form was used to collect data on physical activity and screen time in Indonesia [13]. Hours per day were used to show how much time people spent on active transportation (e.g., cycling) for commuting, moderate physical activity, vigorous activity, and walking, as well as how long they spent sedentary and sleeping, and how much time they spent watching TV and using computers. Reliability ranged from moderate to excellent, with the lowest intra-class coefficient for men's leisure-time PA (ICC = 0.54) and the highest for women's transport-related PA (ICC = 0.91) [13]. This tool was created in Google form for participants to fill out easier.

In our study, we looked at four sociodemographic factors: Place (urban and rural areas), gender (men and women), age group, and geographic location (Java Island and out of Java Island). We had difference geographic location based on the island, which the majority of participants come from Java Island rather than using province (34 provinces).

Procedure

The study was approved by the university affiliated Ethical Review Board (III/098/KEPK/STIKep/PPNI/Jabar/IV/2020). An online survey was initially disseminated to numerous educational groups on WhatsApp, Instagram, and Facebook including student in junior and high school. At least one educator in each Indonesian region had sent the survey to their students using social media platforms. Potential participants were directed to a customized URL where they may read more extensive information about the study before giving their informed consent to take part in it on the internet. Inform consent was provided at the first page of survey and the have to tick a box to indicate that they agreed to participate in this study. In addition, those who had completed the survey were enjoined to pass it on to others. All participants had to fill out data based on three period of times, pre-pandemic period (January and March 2020), during the first lockdown (March to June 2020), and during the second lockdown (May to August 2021). The data were collected from May to August 2021.

Data analysis

The mean and standard deviation (SD) for continuous variables and frequency and percentages for categorical variables are shown in the table. We utilized ANOVA repeated measure to assess the significance of changes in item responses from pre-lockdown, first lockdown, and second lockdown. All statistical analysis was done using IBM SPSS Statistics 23.0, with statistically significant defined as $p < 0.05$.

Results

The survey has been accessed by 6230 Indonesian adolescents between the ages of 13 and 17 who have two different levels of education. 6200 of them have agreed to participate and signed the consent form. Each of Indonesia's 20 provinces has a participant. A total of 550 people were excluded from the analysis because they did not give enough information about their demographics and physical activity. The final sample

included 5650 participants who had provided complete information for the research topic. In this study, people who gave complete data were more likely to be older than people who did not give complete data (16.6 [SD = 3.1] vs. 15.3 [SD = 5.26]; p = 0.001). There were 57.8% females among the 5650 participants, 55.3% senior high school students, 60.5% living on Java Island, and 60.6% living in metropolitan areas. There was a statistically significant difference between males and females in terms of geographic location and urbanity (Table 1).

Physical activity patterns of adolescents had dramatically shifted during COVID19 lockdown, with disparities between genders and educational levels as well as across schools (Table 2). During the first and second lockdown periods, significant declines in the frequency of active transportation, vigorous physical activity, moderate physical activity, and walking were found (p < 0.05). The average time spent sedentary increased throughout both school days and weekends, as did the average amount of sleep and screen time (p < 0.001). These changes were also seen in all of the different groups (junior and senior high school students).

Figure 1 depicts the shift in physical activity patterns that occurred before and during the COVID-19 lockdown period (first and second lockdown). The majority of adolescents had maintained their physical activity levels, with 34.4% of those who engaged in active transportation and 67.3% of those who walked; the majority of the remaining adolescents had experienced a decrease in physical activity, with 30.1% of those who walked, and 63.1% of those who engaged in active transportation. Adolescents had maintained their sleeping (about 50%) and screen time (31.4%), but almost 40% had decreased their sleeping time and 60.5% had significantly increased their screen time. Furthermore, when compared to their peers who had maintained their sedentary time before to COVID19, more adolescents (about 30%) had increased their

Table 1: Baseline characteristics of participants before and during coronavirus disease 2019 lockdown (*n* = 5650)

Variable	Percentage or mean ± SD								
	Junior school students				Senior high school				Total participants (*n* = 5650)
	Male (*n* = 1076)	Female (*n* = 1450)	Total (*n* = 2526)	p	Male (*n* = 1305)	Female (*n* = 1819)	Total (*n* = 3124)	p	
Age (years)	14.8 ± 1.2	14.5 ± 1.3	14.3 ± 1.2	0.132	17.5 ± 1.5	17.8 ± 2.3	17.2 ± 2.1	0.453	16.6 ± 3.1
Geographical location									
Java Island	760 (70.6)	920 (63.5)	1680 (66.5)	0.001	745 (57.1)	996 (54.8)	1741 (55.7)	0.001	3421 (59.9)
Out of Java Island	316 (29.4)	530 (36.5	841 (33.5)		560 (42.9)	823 (45.2)	1383 (44.3)		2229 (40.1)
Urbanicity									
Urban	620 (57.6)	900 (62.1)	1520 (60.2)	0.001	845 (74.7)	1059 (58.2)	1905 (61.0)	0.001	3425 (61.6)
Nonurban	456 (42.4)	550 (37.9)	1006 (39.1)		460 (25.3)	750 (41.8)	1219 (39.0)		2135 (38.4)

SD: Standard deviation.

Table 2: Physical activity patterns of adolescents before, during the first lockdown, and during the second coronavirus disease 2019 lockdown (unit: h/day)

Variable	Mean ± SD					
	Junior high school			Senior high school		
	Male (*n* = 1076)	Female (*n* = 1450)	Total (*n* = 2526)	Male (*n* = 1305)	Female (*n* = 1819)	Total (*n* = 3124)
Engaging in active transport						
Before-COVID-19	3.76 ± 0.87	2.44 ± 1.41	2.61 ± 1.13	4.02 ± 1.35	3.38 ± 1.52	3.44 ± 1.22
First lockdown	2.22 ± 0.24	1.06 ± 1.02	1.63 ± 0.88	2.36 ± 1.15	1.23 ± 1.24	1.89 ± 0.54
Second lockdown	1.89 ± 0.13	1.15 ± 0.54	**1.20 ± 0.31**	1.76 ± 0.24	1.11 ± 0.73	**1.15 ± 0.31**
Vigorous physical activity						
Before-COVID-19	1.76 ± 0.61	1.21 ± 0.35	1.34 ± 0.46	2.22 ± 0.61	1.27 ± 0.61	1.64 ± 0.25
First lockdown	0.69 ± 0.25	0.32 ± 0.12	0.56 ± 0.11	1.04 ± 0.23	0.60 ± 0.10	0.75 ± 0.18
Second lockdown	0.45 ± 0.11	0.41 ± 0.17	**0.37 ± 0.10**	0.89 ± 0.27	0.24 ± 0.03	**0.47 ± 0.08**
Moderate physical activity						
Before-COVID-19	2.01 ± 0.43	1.46 ± 0.15	1.34 ± 0.61	3.43 ± 0.51	1.54 ± 0.11	2.26 ± 0.27
First lockdown	1.56 ± 0.22	0.62 ± 0.19	0.88 ± 0.17	2.01 ± 0.11	0.65 ± 0.14	1.35 ± 0.14
Second lockdown	0.86 ± 0.10	0.51 ± 0.24	**0.49 ± 0.18**	1.03 ± 0.32	0.24 ± 0.12	**0.53 ± 0.11**
Walking						
Before-COVID-19	2.84 ± 1.39	1.18 ± 0.10	1.31 ± 0.79	3.84 ± 1.31	2.44 ± 1.33	2.61 ± 1.68
First lockdown	1.01 ± 0.51	0.89 ± 0.46	0.82 ± 0.26	1.31 ± 0.16	1.02 ± 0.21	1.02 ± 0.29
Second lockdown	1.45 ± 0.72	1.03 ± 0.28	**0.86 ± 0.31**	1.76 ± 0.23	0.77 ± 0.23	**0.65 ± 0.10**
Sedentary time						
School day						
Before-COVID-19	3.36 ± 1.44	3.79 ± 1.38	3.65 ± 1.72	3.44 ± 1.20	3.99 ± 1.15	3.45 ± 1.07
First lockdown	4.18 ± 2.10	4.36 ± 2.05	4.30 ± 2.00	4.97 ± 1.14	5.56 ± 2.26	4.86 ± 1.73
Second lockdown	5.32 ± 2.71	5.72 ± 2.34	**5.66 ± 2.03**	5.11 ± 1.43	5.58 ± 2.37	**5.10 ± 2.26**
Weekend						
Before-COVID-19	4.76 ± 1.62	5.11 ± 3.12	4.84 ± 2.02	4.32 ± 1.26	4.35 ± 3.41	4.44 ± 2.14
First lockdown	6.52 ± 3.17	6.88 ± 2.79	6.13 ± 2.48	6.49 ± 2.09	6.11 ± 2.11	6.11 ± 2.32
Second lockdown	6.71 ± 3.04	6.09 ± 3.18	**6.04 ± 2.75**	6.08 ± 2.11	6.01 ± 3.09	**6.00 ± 2.36**
Sleep time						
School day						
Before-COVID-19	7.37 ± 3.25	6.85 ± 2.10	6.57 ± 2.03	6.47 ± 2.90	6.24 ± 3.37	6.29 ± 2.18
First lockdown	5.26 ± 2.09	5.15 ± 2.17	5.21 ± 2.10	5.04 ± 2.18	5.25 ± 2.06	5.36 ± 1.72
Second lockdown	6.40 ± 3.65	6.07 ± 2.11	**6.33 ± 2.08**	5.22 ± 1.23	6.11 ± 1.82	**5.60 ± 1.10**
Weekend						
Before-COVID-19	7.44 ± 2.34	7.08 ± 2.34	7.16 ± 2.37	6.21 ± 2.25	6.89 ± 1.25	7.16 ± 2.37
First lockdown	4.39 ± 1.64	5.13 ± 2.52	4.72 ± 2.15	5.35 ± 1.70	5.22 ± 2.52	5.29 ± 1.24
Second lockdown	5.62 ± 2.13	5.79 ± 2.33	**5.23 ± 1.16**	5.51 ± 1.42	5.40 ± 1.26	**5.27 ± 1.52**
Screen time						
Before-COVID-19	5.26 ± 1.31	5.40 ± 2.24	5.17 ± 1.81	5.35 ± 1.31	5.40 ± 2.59	5.27 ± 1.36
First lockdown	6.56 ± 1.37	6.37 ± 2.61	6.32 ± 1.72	7.14 ± 2.35	6.92 ± 2.16	7.04 ± 1.56
Second lockdown	6.32 ± 1.94	6.54 ± 2.39	**6.21 ± 1.62**	6.26 ± 1.72	6.56 ± 1.34	**6.35 ± 1.32**

Bold shows significance difference. COVID-19: Coronavirus disease 2019, SD: Standard deviation.

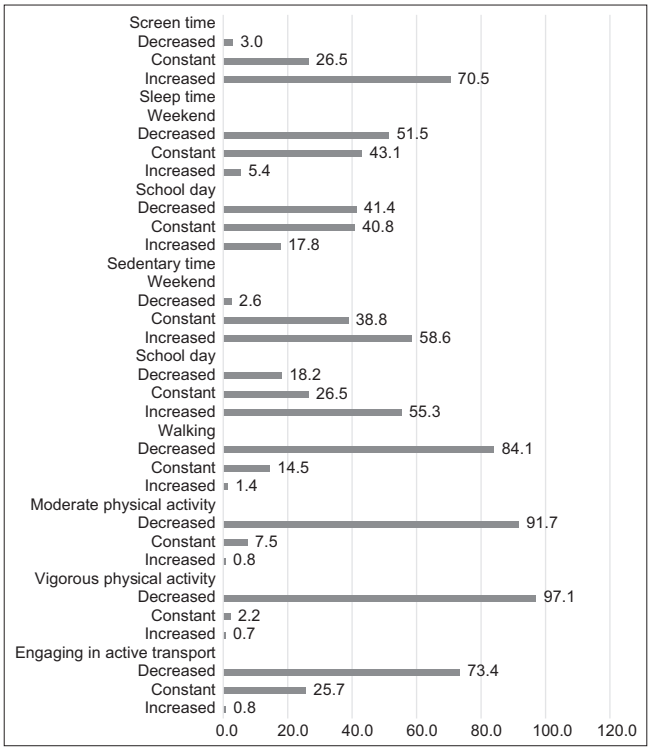

Figure 1: Changes in physical activity patterns of adolescents before, during the first lockdown, and during the second COVID-19 lockdown

sedentary time throughout both schooldays and weekends (about 54%).

Discussion

This study found that more adolescents increased their sedentary, sleeping, and screen time than their counterparts who decreased their physical activity frequency during COVID-19 lockdown, indicating a substantial change in habits. The findings from this large-sample survey show that the way people in Indonesia do things is changing, which supports the hypothesis that social isolation and stay-at-home instructions in many countries might lowered physical activity and increase sedentary activities and screen time. Furthermore, our findings support earlier research that has found that screen, sleeping, and sports time are reduced [9], [10], [11]. However, a Canadian study found that most adolescents had maintained their exercise levels [12]. Despite the rise in sedentary time in all adolescent groups, we observed that more than half of enrolled adolescents maintained their exercise patterns, such as walking and using public transportation.

The COVID-19 epidemic has resulted in significant changes in lifestyle and social interactions. Most severely affected has been the most vulnerable demographic of adolescents who are in the beginning stages of their physical, cognitive, and emotional growth [14], [15]. We also found that more adolescents slept <7 h. This could be because of the lockdown. A national study conducted in China found that people were less active and more sedentary during the COVID-19 lockdown [16]. There was a dramatic increase in adolescents spending more than 5 h a day on screens during the pandemic. Similarly, to our findings, a considerable rise in screen time of over 6 h per day has been observed since the lockdown, which has been connected to childhood obesity [17], [18]. The differences adolescent behavior across nations may be explained by environmental depending on the degree of restriction and the frequency of COVID-19 infections in certain countries. For example, outdoor exercise was not permitted in Indonesia during the lockdown, whereas only moderate restrictions were imposed in certain European countries during the lockdown [19], [20].

Adolescents were disproportionately affected by pandemic-era restrictions, notably on physical exercise and leisure screen time. This can be explained by the fact that adolescents require more area for play and have easier access to screen-based technologies than children. Adolescents are more likely to be engaged in online school programs, thus schools would be better positioned to avoid physical inactivity during this period. This has implications for how cities are planned. To build healthier and more resilient communities, improving standard areas for leisure public spaces, together with better regulation, should be considered. Parents and other family members are crucial to helping their children develop healthy movement habits; therefore, interventions aimed at the entire family should take this into account.

The results of this research must be interpreted cautiously. First, this study used a convenience sample that may not fully represent Indonesian adolescents. Second, recall bias may exist when recalling events that occurred more than six months ago. Future longitudinal design should be conducted to confirm the study findings. Third, without the assistance of trained professionals, differences in understanding of the same questions among various individuals, particularly across different educational levels, could have an impact on the comparability of results across different education groups. Fourth, it is worth mentioning that the IPAQ form was not intended for the purpose for which it was used in this study, and thus its usefulness in this context and the idea of employing alternative survey instruments should be examined further. Finally, because the length of the questionnaire could affect how well and even how completely people answered, we did not ask any more questions that could have helped us better explain the current findings. Despite these limitations, this online survey has several significant advantages, including the ability to collect a timely and large sample size in a targeted group, which is particularly important in the context of public health emergency [21]. The online questionnaire was

designed well, with questions on each lifestyle before and during COVID-19 lockdown positioned adjacent to each other for easier remembering and comparison. Consequently, their responses can be regarded as solid predictors (at least of perceived lifestyle changes) of their future behavior, which are typically substantially connected with actual behavior changes.

Conclusion

This study found that during COVID-19 lockdown (both first and second phases), more adolescents increased their sedentary, sleeping, and screen time than their counterparts who decreased their physical activity frequency, indicating a substantial change in movement habits. This large-scale nationwide survey could be valuable for stakeholders, when deciding when and how to relax restrictions in the future. In addition, school administrators should be aware of these changes so that in-class and/or extracurricular physical programs can be developed to offset the effects of these changes.

Future studies to explore the impact of increasing sedentary activity and screen time on well-being should be considered.

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