

## Research Article

# Sedentary Behavior Levels in School-age Children During the COVID-19 Pandemic

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**ORCID**Aini Alifatin: <https://orcid.org/0000-0002-2603-7288>**Abstract.**

The stay-at-home policy during the COVID-19 pandemic increased sedentary behavior (watching TV, playing on cell phones, etc.) in school-age children. WHO recommends that sedentary behavior should only be less than 2 hours per day with an energy expenditure of 1.5 (MET) a week. This study aimed to identify and determine the level of sedentary behavior of children during the pandemic. The research design is a retrospective descriptive by tracing the activities carried out by respondents during the past week, with a sample of 71 elementary school children in grades 4, 5, and 6 who took online learning in Tulungagung Regency, East Java, which was selected using a simple random sampling technique. Instruments of sedentary behavior were measured using the Adolescent Sedentary Activity Questionnaire (ASAQ), which was modified by Karaca & Demirci. The results showed that 88,3% did small screen recreation, 76% did educational activities using computers/handphones, 70% didn't travel, and 67% did not engage in cultural activities, such as making handicrafts or playing music, but mostly read books for pleasure 48%. Watching television, and using a computer/cellphone as entertainment, is more interesting in children's minds. High sedentary behavior is also caused by age and available facilities because the development of curiosity and desire to explore is very high at school age. Children's physical activity is very important for overall developmental growth because it optimizes the mastery of skills and attitudes, facilitates cognitive development, controls and coordinates body parts, and develops emotional intelligence, which is important in life.

**Keywords:** sedentary behavior, growth and development, cognitive development, controlling and coordinating body part, developing emotional intelligence

## 1. Introduction

The Covid pandemic and the Stay at the Home policy, are the right decisions in preventing the transmission of Covid. The Covid pandemic has also made people aware of technology drastically. There have been various changes in the service mechanism from what was previously conventional to virtual or online; learning through zoom, online shopping, webinars, and other services that are all easy and affordable with virtual. This change should be grateful for, but on the other hand, there is a behavior of limited activity or lazy to move which is a side effect of these changes. Moore's research, 2020

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states that as many as 71.1% of children do not meet sleep recommendations, 18.2% do not meet physical activity guidelines and 11.3% do not meet screen time. Only 2.6% of children met WHO's 24-hour behavioral recommendations [1]. Schmidt's research, 2020 also stated that the time children watched TV increased by 18.5 minutes/day, children's sleep time increased by 0.65 hours/day, while organized sports activities decreased by 17.7% [2].

Physical activity is very important for the overall development of children. Optimizing the mastery of skills and attitudes can lead to healthier behaviors in life, and also facilitate cognitive development [3]. In school-age children, motor development will play a role in controlling and coordinating body parts, to train motor development, school-age children are trained to do physical activity in the form of games [4]. The physical activity carried out at school will affect emotional intelligence, emotional intelligence plays an important role in the success of life [5].

The study from home policy increases Sedentary behavior due to the absence of school trips. Children's sleep time will change because learning activities are carried out at home, while layer time increases [6]. WHO has recommended physical activity for children for 60 minutes per day with moderate to vigorous activity, but only 3.6% was met from 10% before the pandemic, while sedentary behavior of screen time (watching TV, cellphone, etc.) for < 2 hours/day, actually happened. an increase of 66% from 50% during the pandemic [6]. Sedentary behavior is any behavior that persists with an energy expenditure of 1.5 (MET) per week, when in a sitting or lying position. Children under 5 years spent in a chair, stroller, stroller, or baby carrier normally carried by a caregiver. This includes time spent sitting quietly listening to stories and not moving, in adolescence and adulthood, time spent lying down, watching TV, driving motorized vehicles, and using computers and other screen-based entertainment [7].

The impact of children not doing physical activity includes low physical quality and easily tired in activities [8]. Another impact is the risk of obesity and decreased motor coordination. Children aged 9-10 years, who are 75% sedentary of the time will be at nine times greater risk of experiencing decreased motor coordination compared to children who are physically active [9].

The Covid pandemic and the Stay-at-Home policy have been going on since the beginning of 2020. The behavior of staring at screens and sitting in school lessons through virtual media has certainly become the culture of school-age children. There must be a balance between the behavior of staring at the screen and other physical activities. This study aims to determine the level of sedentary behavior in school-age children during the Covid-19 pandemic.

## 2. Material and methods

The research design used in this study is a descriptive retrospective by tracing the activities carried out by respondents during the past week, with 5 active days and two days off. The population in this study was 87 elementary school children in grade 4 to grade 6, who were doing online learning in the district of Tulungagung, East Java. By using Isaac's formula, a sample count of 71 students was obtained, and they were randomly selected using simple random sampling. The researcher asked for a list of students' names from the homeroom teachers of grades 4 to 6 who were conducting online learning due to the Covid-19 pandemic, and then the researchers conducted a lottery, and samples were taken so that there were 71 respondents.

The instrument of sedentary behavior was measured using the Adolescent Sedentary Activity Questionnaire (ASAQ) which has been modified by Karaca & Demirci [10]. This questionnaire uses a ratio scale that measures screen recreation, education, travel, and hobbies. The ASAQ questionnaire was used to record all sedentary activities / sedentary behavior of respondents during the past week, with 5 effective days and 2 school holidays. In this sedentary behavior instrument, there are 11 questions. Where respondents can answer questions by writing down the number of minutes in carrying out the activities contained in the item questions. Test the validity of the Adolescent Sedentary Activity Questionnaire (ASAQ) conducted on 50 respondents at other elementary schools who have the same characteristics, using correlation coefficient analysis on 11 question items, and the results obtained  $r > 0.159$  and declared valid on all question items. The reliability test on the sedentary behavior instrument proved reliable with an  $r$  alpha value of 0.791.

The research procedure was carried out by starting with an application for permission from the parents of the students who were selected as respondents. Furthermore, the researcher coordinated with school administrators, namely the principal and teachers to fill out the questionnaire directly, where students were met at the school in groups and take turns, to avoid transmission, based on randomly selected names. The researcher asked the respondents to answer the questionnaire completely, honestly, and completely.

Data analysis in this study uses a frequency distribution, to describe how the frequency of the variables. Based on the frequency tabulation, researchers identified the level of children's sedentary behavior during the pandemic.

### 3. Results

#### 3.1. Respondent characteristic

In this section, the results of research on the characteristics of respondents in grades 4 to 6 will be presented, consisting of gender, age, grade, weight, height, and Feeding Frequency looks at table 1.

TABLE 1: Respondent characteristics.

Category	Total	Percentage
<b>Gender</b>		
Female	33	46%
Male	38	54%
<b>Age</b>		
a) 10-year-old	16	23%
b) 11-year-old	27	38%
c) 12-year-old	23	32%
d) 13-year-old	4	6%
e) 14-year-old	1	1%
<b>Grade</b>		
a) 4	21	29%
b) 5	29	41%
c) 6	21	30%
<b>Weight</b>		
a) Underweight	45	63%
b) Normal	15	21%
c) Overweight	6	9%
d) Obese	5	7%
<b>Height</b>		
a) Stunted	30	42%
b) norm	31	44%
c) Height	10	14%
<b>Feeding Frequency</b>		
Twice	6	9%
Threetimes	59	83%
Four times	6	8%

In table 1 of the 71 respondents based on gender characteristics, 38 people (54%), based on age characteristics, dominated by men aged 11 years as many as 27 children (38%) and aged 12 years as many as 23 children (32%), while based on education level, all respondents have elementary school education with the majority of 5th graders being 29 children (41%). When viewed from the characteristics of weight, height, and

eating patterns, the most results were dominated by underweight classification as much as 63% (45 children), while eating 3 times a day as many as 59 children (83%).

### 3.2. Sedentary behavior

In this section, the results of the study will be presented in the form of a distribution table of the frequency of sedentary behavior in school-age children during the pandemic. There are 11 questions about sedentary behavior consisting of 4 questions about screen recreation, 3 questions about education, 1 question about travel, and 3 questions about hobbies that will be analyzed by each component.

#### 3.2.1. Small Screen Recreation

Screen Recreation consists of 4 questions, namely, period of time / length of watching television, period of time / length of watching movies / DVD / video, period of time using computer / cellphone as entertainment, and period of time sitting while playing cellphone. The results of the study are presented in table 2.

TABLE 2: Sedentary behavior: children's small screen recreation during the pandemic.

Screen recreation sedentary behavior levels	Frequency	Percentage
<b>Period / Length of Watching Television</b>		
< 2 hours/day	3	4%
>2 hours/day	68	96%
<b>Period/Time of Watching Movies /DVD /Video</b>		
Do not do these activities	36	51%
< 2 hours/day	12	17%
>2 hours/day	23	32%
<b>Period/Long Use of Computer /Hp as Entertainment</b>		
Do not do these activities	1	1%
<2 hours/day	9	13%
>2 hours/day	61	86%
<b>Period / Length of Sitting While Playing HP</b>		
Do not do these activities	1	1%
<2 hours/day	11	16%
>2 hours/day	59	83%

In table 2: Period of watching television, most children 96% (68), watch >2 hours/day. In the activity of watching movies/DVDs/videos, most of the children did not do these activities as many as 36 children (51%) and as many as 12 children (17%) watched

TV for <2 hours/day, but as many as 23 children (32%) had periods time/length of watching movies/DVD/video > 2 hours/day. In the behavior of using computers/mobile phones as entertainment, most of the children 86% (61) used computers/mobile phones as entertainment for >2 hours/day, but only 10 children (14%) used computers/mobile phones for entertainment with a period of time <2 hour/day. In the behavior of sitting while playing with cellphones, a total of 59 children (89%) did it with a period of > 2 hours/day, while the rest, only 12 children (17%) did it with a period of < 2 hours/day. In general, the majority (88.3%) of children during the pandemic did small screen recreation for > 2 hours/day.

### 3.2.2. Education

The behavior of educational activities consists of 3 questions that discuss the period/length of using a computer / cellphone for task purposes, the period of time / length of doing assignments not using a computer/ cellphone, and the period of the course/tutoring that will be discussed in each question, as listed in table 3.

TABLE 3: Sedentary behavior: The time per period process of children’s education during the pandemic.

Educational behavior during a pandemic	frequency	Percentage
<b>Time/long Period of Computer/Hp for Tasks</b>		
Do not do these activities	2	3%
<2 hours/day	12	17%
>2 hours/day	57	80%
<b>Time/long Period Tasks Without Using a computer/Hp</b>		
Do not do these activities	31	43%
<2 hours/day	9	13%
>2 hours/day	31	44%
<b>The period of the course/tutoring</b>		
Do not do these activities	18	25%
<2 hours/day	2	3%
>2 hours/day	51	72%

In table 3.2.2 there are 57 children (80%), using computers/mobile phones for tasks with a period of >2 hours/day, while the remaining 14 children (20%) use computers/mobile phones for tasks for <2 hours/ day or not to do. In the statement about the period for doing tasks without using a cellphone/computer, 31 children (43%) stated that they did not do it, meaning that they continued to use a computer/cell phone when doing assignments. < 2 hours, and only 42% (31 children) who do tasks without a computer/mobile for > 2 hours/day. In course activities/lessons per day, there are 20

children (28%) who do not do and do courses/lessons with a period/course length <2 hours/day, while the remaining 35 children (72%) take courses/lessons with a period of > 2 hours/day. In general, most children (76%) do educational activities using computers/mobile phones, for > 2 hours/day during the pandemic.

### 3.2.3. Travel

The trip consists of 1 question about the period sitting in the vehicle (car, train, bus) per day, as listed in table 4.

TABLE 4: Period/Long Sitting in Car/Train/Bus.

Sitting time Period	Time/long	Frequency	Percentage
Do not do these activities		50	70%
<2 hours/day		6	8%
>2 hours/day		15	22%

In table 3.2.3 there are 15 children (22%) spending time sitting in the car/train/bus for > 2 hours/day, however 56 children (78%) travel only < 2 hours/day during the pandemic or do not even travel journey, So most of the children (70%) during the pandemic, don't travel.

### 3.2.4. Cultural Activities

Cultural Activities consist of 3 questions that discuss the time/long period of making handicrafts, the time/long period of playing musical instruments, and reading books as entertainment, which will be discussed in each question, as listed in table 5.

In table 3.2.4 there are 11 children (15%), who spend less time making handicrafts per day for <2 hours/day, and 49 children (69%) do not, while the remaining 16% (11 children) do crafts. hands for > 2 hours/day. In the activity of playing musical instruments, there are 14 children (20%), who spent time playing musical instruments/day for >2 hours/day while the remaining 57 children (80%) played music for <2 hours or did not play musical instruments/day. In the activity of reading books as entertainment, 13 children (20%) did not do it and 23 children (32%) did it for < 2 hours/day, while the remaining 35 children (48%) read books as entertainment for > 2 hours/day. In general, most children (67%) do not engage in cultural activities, such as making handicrafts or playing music, but mostly read books for pleasure (48%).

TABLE 5: Period cultural activities.

Period	Frequency	Percentage
<b>Time/long period of making handicrafts</b>		
Do not do these activities	49	69%
<2 hours/day	11	15%
>2 hours/day	<b>11</b>	16%
<b>Time/long Period of Playing Musical Instruments</b>		
Do not do these activities	46	65%
<2 hours/day	11	15%
>2 hours/day	14	20%
<b>Time/long Period reading Book for entertainment</b>		
Do not do these activities	13	<b>20%</b>
<2 hours/day >2 hours/day	23 35	32% 38%

## 4. Discussion

Based on the results of data analysis, the respondent's sedentary behavior is > 2 hours/day. Most activities in school-age children are watching television and playing games. Children aged 7-12 years, on average, spend 3.1 hours/day doing activities watching television, playing the computer, and playing video games. This is supported by the results of research [11]. Which states that children aged 6-12 years have the pleasure of watching television due to the child's development, curiosity, and desire to explore very high. When watching television, the senses that play a major role are sight and hearing. Television content is also the largest source of media exposure among 8- to 12-year-old children (followed by playing video games, listening to music, and reading) and among 13- to 18-year-old children (followed by listening to music, playing video games, and using social media) in the United States [12]. The influx of electronic media and child-focus has dramatically increased screen-based sedentary activity. As documented in developing countries, the introduction of video, computer, tablet, and internet games, concomitant with child boredom with cell phones with built-in games, is rapidly Replacing the time that children would have otherwise spent on more physically active pursuits. Seemingly, as screen time increases significantly, physical activity continues to decline. For a long time, the time spent watching TV has been treated as a representative measure of screen time [13]. However, TV time alone is not an adequate representative measure of screen time. Many other devices like computers, tablets, mobile phones, and games have now become a common part of the youth lifestyle [14]. Therefore, a more inclusive investigation is necessary when assessing sedentary behavior as a whole, and particularly screen time among



youth. Research reports a significant increase not only in TV time; but in other types of screen time as well. All of which appear to be the driving trend in recent years. Such behavior, especially watching TV, has also been linked to unhealthy eating habits. Researchers need unhealthy eating practices to the biological effects of prolonged sitting while watching TV and reduced physical activity or a combination of these factors to overweightness and obesity among youth [15]. However, Screen Time (SCT) is not the only contributor to Sedentary Behavior. Hoffman's research [15], explains that the amount of screen time does not differ in children who sit a lot and have low activity and moderate activity. All three have high Sedentary Time, so SCT cannot be used as the only intervention for predicting or changing children's sedentary behavior.

In addition, the majority of respondents read books for entertainment and all respondents watch television, this is due to the easy television viewing facilities and lots of viewing for children which causes children's reading activities to decrease. School-age children prefer something with pictures and sounds, namely watching television. This is in line with research [11], which states that children aged 6-12 years prefer to watch television because the messages received are more efficient in memory and easier to understand by children compared to messages through reading when reading books. On average, children aged 6-12 years watch television for 2-3 hours/day, while the time spent reading books is <1 hour/day. This is supported by research [16], which states that the existing facilities in the environment around children greatly affect sedentary behavior, children prefer to take advantage of easy facilities such as watching television compared to reading books with a percentage of watching television as much as 75% and read books as much as 44%.

This study also shows that sedentary behavior in the form of travel (sitting in a car/train/bus) shows that only 22% of respondents travel/day during the Covid-19 pandemic and 32% of respondents watch television/DVD/video with a period of 32%. > 2 hours/day, this is because during the Covid-19 pandemic the government in Indonesia implemented online learning which requires children to stay at home so they don't travel and don't do hobbies because the majority of children spend time playing with gadgets. This is supported by research [18], which states that specific students spend less time on transportation when done with online teaching, this will result in children spending more time watching TV, DVDs, and computers will increase significantly. significant during the Covid-19 pandemic.

## 5. Conclusion

Based on the results of exposure to sedentary behavior consisting of small layer recreation, travel education, and hobbies, it is concluded that; on-screen the majority of respondents spend > 2 hours/day recreation; Likewise, the majority of respondents use cellphones/computers for education/study purposes as well > 2 hours/day. On sedentary behavior in the form of travel (sitting in a car/train/bus) and hobbies, the majority of respondents did not travel during the Covid- 19 pandemic.

## 6. Authors' Contributions

AA is the project leader in this research. LH is in charge of data collection. all authors work together in the data processing. AA assessed, verified, and analyzed the data and wrote the manuscript. AA is the main contributor to the writing of the script. scriptsthors read and approved the final manuscript.

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