

# Physical Activities, Sedentary Behaviour, and Screen Time Related to Nutritional Status of Elementary School Students in Urban Area

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**Abstract.** The lifestyle of urban areas causes the high use of technology and digitalization. This impacts decreasing physical activity levels, increasing sedentary behavior, and high-screen viewing habits. The purpose of this study was to determine the relationship between physical activity, sedentary behavior, and screen time to the nutritional status of children. The research method uses a quantitative approach with a cross-sectional design. The research population was 418 students, and with purposive sampling obtained 105 samples. The research instrument used the PAQ-C and ASAQ questionnaires. Statistical test using spearman rank. All data were analyzed using the SPSS Version 21 program. The results showed no significant relationship between physical activity and sedentary behavior with the nutritional status of elementary school students in urban areas. with sig value.  $0.738 > 0.05$  and sig.  $0.100 > 0.05$ . Meanwhile, there is a significant relationship between screen time and the nutritional status of children in urban areas, with a value of sig.  $0.001 < 0.05$ . Screen time is an indicator that has the most significant relationship to the nutritional status of elementary school students in urban areas.

**Keywords:** Physical Activity, Sedentary Behaviour, Screen Time, Nutritional Status, Elementary Student, Urban Area

## 1 Introduction

The development of digital technology and the ease of internet access have positively impacted various fields, such as employment, health services, and the process of implementing education [1]. In addition to the positive impact, there are also negative impacts, such as a less active child's lifestyle because they spend much time playing with gadgets. This kind of activity triggers sedentary behaviour [2]. An unhealthy lifestyle is one of the factors that increase the risk of cardiovascular disease [3].

Urban areas are settlements, centralization, and distribution of government services, social services, and economic activities. Lifestyles in urban areas do not always cause positive health

trends but often have implications for health problems such as obesity and hypertension [4]. Urban areas have adequate technological and complete facilities and infrastructure, making it easier to carry out various activities. The factor that causes the high level of sedentary behaviour in urban areas is accessible facilities. The better facilities cause a person to be lazy in doing physically active activities [5]. Physical activity in urban areas decreases and causes an increase in sedentary behaviour and a high level of screen time [6]. The COVID-19 pandemic factor has also impacted this increase [7].

An inactive lifestyle will cause obesity in children and increase the risk of degenerative diseases [8]. This is undoubtedly dangerous, considering that the growth and development phase determines the quality of life in the future for children. The low level of physical activity, high sedentary behaviour, and screen time in children also impact the low level of physical fitness and basic movement abilities in children [9]. Hence, there is a need for a systematic study that analyzes the relationship between physical activity, sedentary behaviour, and screen time on the nutritional status of children in urban areas.

## 2 Method

This study is a quantitative study with a cross-sectional design. A cross-sectional design was chosen because it can collect data at one particular point. The population in this study were upper-class students at SDN 222 Pasir Pogor, Bandung City, with a total sample of 418 students. The sampling technique used is purposive sampling. Purposive sampling is a sampling technique with specific considerations [10]. This purposive sampling technique is not random, but there are criteria that the researcher has determined. This research was conducted on upper-grade elementary school students with the characteristics of students in the age range of 11-15 years, totalling 105 students.

The research instrument used the Adolescent Sedentary Activity Questionnaire (ASAQ) instrument for students aged 11-15 years to measure sedentary behavior and screen time [11]. Meanwhile, measure students' physical activity levels using the Physical Activity Questionnaire for Children (PAQ-C). Physical Activity Questionnaire for Children (PAQ-C), which is adapted for elementary school-aged children aged 8-14 years [12]. BMI is used to measure nutritional status. Researchers calculated the Body Mass Index according to age (BMI/age) [13]. The data obtained were analyzed using SPSS software version 21. The analysis prerequisite test used the normality and linearity tests [14]. Normality test using Kolmogorov-Smirnov, and linearity test using the Anova test. The statistical analysis technique of the data used the Spearman Rank correlation test with a significance level of  $p < 0.05$  [15].

## 3 Result

The results of the study are the results of data collection by researchers to respondents through the ASAQ and IPAQ-C questionnaires to measure the level of physical activity, sedentary behaviour, and screen time in children. Data on the nutritional status of children was obtained through measurements of height and weight, which were categorized according to the BMI/Age. The data obtained were then analyzed using SPSS version 21. The following is the analysis data.

**Tabel 3.1** Description of the research sample

Class	Gender		Total Students
	Female	Male	

4	16	19	35
5	21	13	34
6	19	17	36
Total			105

In table 3.1, it can be seen that the number of students who filled out the questionnaire was 105 students. 35 students from 4th grade, consisting of 16 girls and 19 boys. 34 students from 5th grade, consisting of 21 girls and 13 boys. And 36 students from 6th grade, consisting of 19 girls and 17 boys. After comprehending the description of the research sample, the results of measuring children's physical activity in the following frequency distribution.

**Tabel 3.2** Frequency distribution Students' level of physical activity

Score Range	Category	Frequency	%
> 3,984	Very high	4	3%
3,223 – 3,984	High	27	25%
2,463 – 3,223	Normal	39	37%
1,702 – 2,463	Low	33	31%
< 1,702	Very low	2	2%
<b>Total</b>		105	100%

According to table 3.2, the physical activity of elementary school students in urban areas that are in the "very high" category is 3% (4 people), "high" is 25% (27 people), "enough" is 37% (39 people), "low" by 31% (33 people) and "very low" by 2% (2 people). Generally, the level of physical activity is in the "enough" category. Next is the sedentary behaviour data.

**Tabel 3.3** Average Student's Sedentary Behavior

No	Day	Grade 4	Grade 5	Grade 6	Average
1	Weekday	2:57	3:48	2:57	3:14
2	Weekend	2:58	3:59	3:48	3:35
Total average		2:57	3:53	3:22	3:24

According to table 4.2, the average sedentary behaviour of 4th-grade students on weekdays is 2 hours 57 minutes and on holidays 2 hours 58 minutes. The average of 5th-grade sedentary behaviour on weekdays is 3 hours 48 minutes, and on holidays, 3 hours 59 minutes. The average sedentary behaviour for 6th grade on weekdays is 2 hours 57 minutes, and on holidays, 3 hours 48 minutes. The following table shows the frequency distribution of sedentary behaviour on weekdays and weekends.

**Tabel 3.4** Frequency Distribution Table for Students' Sedentary Behaviour Category

Weekday				Weekend			
Time	Category	Frequency	%	Time	Category	Frequency	%
> 5 Jam	High	4	4%	> 5 Jam	High	8	8%
2-5 Jam	Moderate	96	91%	2-5 Jam	Moderate	92	88%

< 2 Jam	Low	5	5%	< 2 Jam	Low	5	5%
N		105	100%	N		105	100%

According to the data in table 3.4, the categories of sedentary behaviour of elementary school students in grades 4, 5 and 6 at SDN 222 Pasir Pogor on weekdays are "very high" 4% (4 students), "moderate" 91% (96 students) and "low" by 5% (5 students). While on weekends, the category of "very high" was 8% (8 students), "moderate" was 88% (92 students), and "low" was 5% (5 students) of the total sample of 105 students. The conclusion is that the sedentary behaviour of students is in the moderate category and has increased sedentary behaviour on weekends. Next is the screen time level for students.

**Tabel 3.5** Average Student's Screen Time

No	Day	Grade 4	Grade 5	Grade 6	Average
1	Weekday	4:03	1:47	1:26	2:25
2	Weekend	1:31	1:38	1:50	1:39
Total average		2:57	2:47	1:42	1:38

According to table 3.5, the average screen time of 4th graders on weekdays is 4 hours 3 minutes and on holidays, 1 hour 31 minutes. The average screen time for class 5 on weekdays is 1 hour 47 minutes, and on holidays 1 hour 38 minutes. The average screen time for grade 6 on weekdays is 1 hour 26 minutes, and on holidays 1 hour 50 minutes. The following table shows the screen time-frequency distribution on weekdays and weekends.

**Tabel 3.6** Frequency Distribution Table for Student's Screen Time Category

Weekday				Weekend			
Time	Category	Frequency	%	Time	Category	Frequency	%
>2:22	Very high	36	34%	>2:22	Very high	10	10%
1:52 - 2:22	High	7	7%	1:52 - 2:22	High	17	16%
1:22-1:52	Normal	43	41%	1:22-1:52	Enough	52	50%
0:52 - 1:22	Low	18	18%	0:52 - 1:22	Low	19	17%
< 0:52	Very low	0	0%	< 0:52	Very Low	8	8%
N		105	100%	N		105	100%

According to the data in table 3.6, the screen time category of elementary school students in grades 4, 5 and 6 at SDN 222 Pasir Pogor on weekdays with the "very high" category of 34% (36 students), "high" 7% (7 students) "enough" at 41% (43 students), "low" at 18% (18 students), and very low at 0%. While on weekends the category "very high" by 10% (10 students), "high" by 16% (17 students), "enough" by 50% (52 students), "low" by 17% (19 students), and "very low" by 8% (8 students). It can be concluded that the screen time level of students on weekdays is higher than on weekends. Next is the result of research data on the level of nutritional status in children.

**Tabel 3.7** Student Nutritional Status

Score Range	Student Nutritional Status	Frequency	Per cent
-3 SD sd < -2 SD	Thinness	11	10%
-2 SD sd +1 SD	Normal	76	72%

+1 SD sd +2 SD	Overweight	8	8%
<+ 2 SD	Obese	10	10%
<b>N</b>		105	100%

According to table 3.7, it can be seen that students whose nutritional status is "Thinness" by 10% (11 students), "normal" by 72% (72 students), "overweight" by 8% (8 students), and "Obese" by 10% (10 students). The average nutritional status of children in this study was normal, as much as 72%.

### Normality test

The normality test results using the SPSS version 21 for the variables of physical activity, screen time, sedentary behaviour, and body mass index are as follows.

**Tabel 3.8** Normality Test Result using *Kolmogorov-Smirnov*

Variabel	Kolmogorov-Smirnov	
	<i>p</i>	<i>Sig.</i>
Physical Activity	0,011	0,05
Sedentary Behaviour	0,000	0,05
Screen Time	0,000	0,05
Body Mass Index	0,000	0,05

According to table 3.8, the normality test results of all research variables show that the data is not normally distributed because  $p < \text{Sig. } 0.05$ .

### Linearity Test

The results of the linearity test of data using SPSS version 21 for the variables of physical activity, sedentary behaviour screen time, and body mass index are as follows.

**Tabel 3.9** Linearity Test Results

Variable	ANOVA	
	<i>Deviation Of Linearity</i>	<i>Sig.</i>
X1.Y	0,987	0,05
X2.Y	0,767	0,05
X3.Y	0,511	0,05

Keterangan:

- X : Physical activity
- X2 : Sedentary behaviour
- X3 : Screen Time
- Y : Nutritional health status

Table 3.9 shows that all deviation of linearity values ( $p > \text{Sig. } 0.05$ ) means all data is linear.

### Statistic test

The results of the linearity test using SPSS version 21 can be seen in the following table:

**Tabel 3.10** Spearman Rank Statistics Test Results

Variable	N	Spearman's rho	
		Sig. (2-tailed)	Correlation Coefficient
X1.Y	105	0,738	-0,024
X2.Y	105	0,100	0,161
X3.Y	105	0,001	0,331

Table 3.10 shows no significant relationship between physical activity and sedentary behaviour with the nutritional status of elementary school students in urban areas. With sig value.  $0.738 > 0.05$  and sig.  $0.100 > 0.05$ . Meanwhile, there is a significant relationship between screen time and the nutritional status of children in urban areas, with a value of sig.  $0.001 < 0.05$ .

## 4 Discussion

### The Correlation between Physical Activity and Nutritional Status

The results of the Spearman rank correlation test analysis showed no correlation between physical activity and the nutritional status of students. The value of the correlation coefficient is negative, i.e.,  $-0.024$ . Thus, the conclusion is that physical activity is not a factor affecting nutritional status. Further factors that affect body mass index are genetic, environmental, and socio-economic.

The low level of physical activity carried out by adolescents can affect adolescent weight gain. Obese adolescents have low activity levels because they have an inactive habit of just sitting at home after school without doing any activities [16]. Someone who is less active in activities or has a sedentary lifestyle tends to be obese, affecting the condition of a person's body. Physical activity is one of the factors that affect nutritional status. The lighter the intensity of physical activity, the more it can affect nutritional status and even cause obesity [17].

Physical activity is when the muscles and the body's movement activities are carried out to produce energy [18]. Most of the energy expended depends on how strenuous the activity is. The low physical activity of students because of the high sedentary activity carried out by students affects obesity [19]. The school environment is one of the factors that affect physical activity. Physical activity is promoted by various games that can be found in schools [20]. Physical activity will increase if the facilities and teacher assistance to students are also good [21].

One factor in increasing students' physical activity is the facilities and infrastructure every school must own. The factors for low physical activity are lack of knowledge, motivation and availability of supporting facilities to conduct activities [22]. Increased physical activity can reduce the risk of degenerative diseases.

### The Correlation between Sedentary Behaviour and Nutritional Status

According to the Spearman rank test analysis, there is no correlation between sedentary behaviour and body mass index. Low activity can cause a high risk to the child's health [23]. Sedentary behaviour and lack of physical activity become one health problem in one-third of adolescents to adulthood. A sedentary lifestyle can only spend more than 4 hours sitting [24]. This lifestyle tends to expend less energy. Hence there is no balance between energy intake and energy output, resulting in obesity [25].

Sedentary activity is formed from a person's habits and lifestyle related to the activities he does in daily life. Several factors that increase sedentary behaviour, such as technological advances, age, and gender, affect sedentary behaviour because children prefer to spend their time watching television, adequate social and economic status and long working hours [26].

The increase in sedentary activity is due to more time for sedentary behaviour than other activities [27]. One of them is technological advances that provide comforts such as watching television and videos, using cell phones for lifestyle, and socio-cultural background [28]. The impact of COVID-19 is one of the factors for lifestyle changes, especially in Indonesia. Large-scale lockdowns have increased sedentary behaviour among Indonesian youth [29]. COVID-19 disrupts daily activities, especially during the lockdown, including lifestyle changes in food consumption and physical activity [30].

The effects of the COVID-19 pandemic have led to unhealthy activities, such as lack of physical activity, increased consumption of alcohol and cigarettes, as well as causing sleep disturbances and high screen time. The high duration of television viewing in sedentary behaviour can affect body mass index, resulting in social problems with the surrounding environment [31].

### **The Correlation between Screen Time and Nutritional Status**

Based on the analysis of the Spearman rank test, there is a significant relationship between screen time and the nutritional status of students. This means that the higher the screen time, the higher the effect on the nutritional status of students. Increased screen time is caused by sitting, standing or lying while screen time, which affects the imbalance of incoming energy and causes unbalanced nutritional status [32]. High screen time viewing caused by consuming high-energy snacks such as biscuits, crackers, and isotonic drinks can cause obesity [33].

Several factors influence the high screen time activity in adolescents, i.e., parents' social and economic factors, parental education and location of residence because the ratio of students who live in urban areas spends more time in front of the television, computer or playing PlayStation [34]. This high screen time is one of the new phenomena that impact the emergence of more nutritional status [35]. Screen time belongs to the category of light sedentary activity [36]. The screen time viewing done by students limits the recommended exposure limit to one day, which is < 2 hours [37].

Excessive screen time causes health problems such as reduced sleep time. The cause of reduced sleep time is the light from the screen and an increase in energy intake [38]. Adolescents who sleep less than 8 hours per day tend to have a high fat intake, consuming high-calorie foods that impact obesity. One of the effects of increased screen time is ignoring the surrounding environment, neglecting sleep time and decreasing student achievement [39]. Prolonged screen time exposure has a detrimental effect on sleep quality, leading to the risk of academic decline, obesity and depression [40].

The high activity of screen time here shows that the influence of electronic media on students' daily habits is enormous. If the screen time is not carried out following the recommendation, which is < 2 hours a day, it can cause changes in eating habits [41]. Another impact of excessive

screen time is addiction, believing that screen time is an activity that must be done so that children do not have time to interact with the environment [42].

## **5 Conclusion**

The study results show no correlation between physical activity and nutritional status because the direction of the correlation is opposite. The correlation value between physical activity and the nutritional status of students is negative. In contrast, for the variable of sedentary behaviour and the nutritional status of students, there is no significant correlation, but the correlation between variables is positive. Meanwhile, for the screen time results with the nutritional status of students, there is a significant correlation, and the direction of the correlation is positive, and the strength of the correlation is sufficient to affect the nutritional status of students. The conclusion is that the increase in the nutritional status of students is much influenced by the duration of the high screen time of students.

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