

ORIGINAL ARTICLE

Screen Time and Its Impact on Physical Fitness in Children: A Cross-Sectional Study

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ABSTRACT

Introduction: Rapid advances in digital technology have led to an increase in screen time among children, which is thought to affect their physical activity. However, the direct relationship between screen time and physical capacity in children still needs to be studied further

Objectives: This study aims to determine the relationship between screen time duration and physical activity in children aged 10-11 years

Methods: This study used a cross-sectional design with a sample of 44 children aged 10-11 years. Physical capacity was measured using the Incremental Shuttle Walk Test (ISWT), while screen time duration was obtained through questionnaires. Spearman's correlation analysis was used to test the relationship between variables

Results: This study showed no significant relationship between screen time duration and children's physical capacity as measured by the Incremental Shuttle Walk Test (ISWT) with a correlation coefficient of 0,076 dan $p=0,625$

Conclusions: High screen time does not have a direct impact on children's physical capacity in the context of this study. However, it is important to continue to encourage adequate physical activity in order to maintain children's health and fitness optimally

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Introduction

Rapid advances in digital technology have changed the way children learn, play, and interact. One notable phenomenon is the increase in screen time, which is the amount of time children spend using screen-based devices such as televisions, smartphones, tablets, and computers. Screen time can include educational and recreational activities, but it is mostly dominated by entertainment, social media, and digital games (McArthur et al., 2022). This increase is triggered by the availability of portable devices with easier internet access, so that even preschoolers are accustomed to spending a considerable amount of time in front of screen (Veldman et al., 2023). Several studies suggest that excessive screen time has a negative impact on children's physical activity and body mass index (BMI) (Nasrallah et al., 2025), unhealthy lifestyle and increased long-term cardiovascular risk (Wieprecht et al., 2025). The World Health Organization (WHO) has established recommendations regarding physical activity and screen time. For children under the age of 5, the WHO recommends that screen time should not exceed one hour per day, with less being better. According to the recommendations of the pediatricians' association, screen time for elementary school children should be limited to less than 2 hours per day. The latest global guidelines emphasize that high screen time is a form of sedentary behavior associated with various poor health outcomes in children and adolescents, while sufficient daily physical activity



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>60 minutes/day of moderate to vigorous intensity for ages 5-17 is associated with better health outcomes (Bull et al., 2020).

Children's physical activity is an important indicator that reflects the body's ability to perform daily activities efficiently. Physical activity includes cardiorespiratory fitness, muscle strength, flexibility, balance, and basic motor skills. Research shows that good physical capacity in children is associated with a lower risk of metabolic diseases, good bone health, and optimal cognitive abilities (Yuan et al., 2024). On the other hand, physical capacity, including cardiorespiratory fitness, muscle strength and endurance, speed/agility, and motor skills, is the foundation of long-term health and functional performance in children. The more physically active a person is, the better their cardiorespiratory fitness. A systematic review shows that aerobic athletes tend to have better lung function (FEV1) than non-athletes (Agung Ratih Kusumadewi Wiraputri & Nyoman Gede Wardana, 2021). Research (Suci & Boki, 2018), Physiotherapy students concluded that there is a significant positive relationship between physical activity and cardiorespiratory fitness. Other studies have also concluded that there is a significant positive relationship between physical activity and cardiorespiratory fitness (Qhuzairi et al., 2025). Physical activity in children aged 9-12 years is significantly correlated with cardiorespiratory fitness (Gumilang et al., 2023).

The study conducted (Nasrallah et al., 2025), excessive screen time has a negative impact on children's physical activity and Body Mass Index (BMI). Excessive screen time is associated with a decrease in physical activity in children of all ages, from toddlers to teenagers, leading to health risks such as obesity and musculoskeletal disorders (Rachmania & Ludyanti, 2022; Wieprecht et al., 2025). Several studies found no association between screen time and physical activity levels in children and adolescents aged 10-15 years (Aisya Yafis Iqlima et al., 2024; Dahlgren et al., 2021). Research (Prakoso et al., 2024), conclude that screen time does not directly affect physical fitness, but it can reduce students' physical activity and fitness. For elementary school-aged children through adolescence, the American Academy of Pediatrics also recommends limiting screen time so that it does not replace adequate physical activity and sleep. Unfortunately, global data shows that most children and adolescents do not meet these recommendations, with the prevalence of excessive screen time reaching more than 60% in the international population (McArthur et al., 2022). Although existing literature shows a negative correlation between screen time and physical capacity, the instruments used to measure physical capacity have not been consistent. Most studies measure daily physical activity rather than physical capacity, which is more objectively measured through standard fitness tests (Yuan et al., 2024).

There is a lack of research that integrates objective measurements of screen time and physical capacity with rigorous quantitative methods. Studies on the impact of screen time after the Covid-19 pandemic and changes in physical activity patterns are still few and need further exploration. On the other hand, evidence shows that based on WHO guidelines on physical activity and sedentary behavior, sedentary behavior in children and adolescents is associated with adverse health effects, namely increased cardiometabolic risk, poor fitness, poor social behavior, and reduced sleep duration (World Health Organization (WHO), 2020). In addition, increased screen time among children is a global phenomenon with widespread impacts. If not managed properly, this habit can reduce children's physical capacity and contribute to long-term health problems, such as obesity, posture disorders, and poor cardiovascular fitness. Physical capacity is an important asset for optimal growth and the formation of a healthy lifestyle into adulthood. Understanding the extent to which screen time is related to physical capacity can form the basis for early intervention. Current public health policies often emphasize limiting screen time, but scientific evidence directly linking screen time to children's physical capacity, particularly through standardized measurements, is still limited. Most studies rely heavily on parents' reports of their children's physical activity, which are prone to bias.

This study aims to assess the relationship between screen time and physical activity in children, based on a screen time questionnaire and the Incremental Shuttle Walk Test (ISWT) to



assess children's physical activity. Previous studies have used questionnaires to assess physical activity and cardiorespiratory fitness using the Step Test. No one has used ISWT as an instrument to determine fitness levels in assessing physical activity by looking at cardiorespiratory fitness levels.

The hypothesis of this study is that there is a relationship between screen time and physical activity. Children who spend more time in front of digital screens are less physically active and, as a result, are at greater risk of health problems. Through this study, we hope to raise awareness of the importance of limiting screen time and encouraging a more active lifestyle in children.

Methods

This study uses a correlational research design with a cross-sectional approach to explore the relationship between screen time and physical activity in children. This method was chosen because it allows for the simultaneous measurement of screen time and physical activity.

The population of this study was school children at SDK Santo Yusup Tropodo, Waru, with the following inclusion criteria: children aged 10-12 years, in good health based on information provided by the children, and willing to be respondents. The sample size for this study was 44 respondents, and the sampling technique used was simple random sampling. The measuring instruments used in this study were a screen time questionnaire and the Incremental Shuttle Walk Test (ISWT).

Univariate analysis of categorical data scales used proportions in the form of percentages, such as age, gender, height, weight, and body mass index (BMI). The data from the screen time questionnaire and Incremental Shuttle Walk Test (ISWT) were analyzed using descriptive statistics and percentages. Statistical analysis was performed using SPSS 24.0. The assumption of data normality was tested using the Shapiro-Wilk technique and obtained a sig. value of 0.00 ($p < 0.05$), indicating that the data was not normally distributed, thus requiring a non-parametric analysis approach. The relationship between screen time and physical activity measured using the Incremental Shuttle Walk Test (ISWT) was analyzed using Spearman's rho correlation test. Statistical significance is defined as $p < 0,05$.

Results

This study was conducted in July 2025

Table 1. Characteristics of Respondens

Variabel	Frekuensi	Prosentase (%)
Gender		
Male	23	52,3
Female	21	47,7
Age		
10 years	34	77,3
11 years	12	22,7
Height (cm)		
Min	126	-
Max	157	-
Mean	143,57	-
Standart deviasi	8,228	-
Body weight (kg)		
Min	21	-
Max	60	-
Mean	36,75	-
Standart deviasion	11,096	-



Variabel	Frekuensi	Prosentase (%)
Body Mass Index (kg/m²)		
Underweight	19	43,2
Normal weight	20	45,5
Over weight	5	11,4

Table 1 presenting descriptive data including gender, age, height (cm), weight (kg), and body mass index (BMI). Based on the table, the types of male and female kalem are relatively balanced, namely 23 children (52.3%) are male, and 21 children (47.7%) are female. The majority of respondents were 10 years old, namely 34 children (77.3%), followed by 12 children aged 11 years old (22,7%). The average height of respondents was 143.57 cm, and the average weight of respondents was around 36.75 kg, with a fairly wide range (21-60 kg). Most respondents were in the normal category, namely 20 children (45.5%), followed by 19 children (43.2%) in the underweight category and 5 children in the overweight category (11,4%).

Table 2. Distribution of Screentime frequency

Screentime	Frequency	Percentage (%)
1 hours	5	11,4
2-3 hours	21	47,7
>3 hours	18	40,9

Table 2 presenting screen time frequency distribution data, respondents with 1 hour of screen time per day numbered 5 children (11.4%), 2-3 hours of screen time per day numbered 21 children (47.7%), and more than 3 hours per day numbered 18 children (40,9%). Based on the data, most respondents spent 2-3 hours per day on screen time.

Table 3. Distribution of Physical Activity frequency

Physycal Activity	Frequency	Percentage (%)
Low	7	15,9
Below average	17	38,6
Above average	18	40,9
High	2	4,5

Table 3 present data on the frequency distribution of children's physical activity as measurement by ISWT. The majority of respondents were in the above average category, namely 18 children (40.9%) and Below average, namely 17 children (38.6%), followed by the Low category with 7 children (38.6%), and the High category with 2 children (4,5%).

Table 4. The relationship between screen time and physical activity in children

	N	Screentime	
		Koefisien correlation (ρ)	P
Physycal Activity	44	0,076	0,625

Table 4 presenting data on the correlation between screen time and physical activity measured using ISWT. Based on the table, the correlation coefficient (ρ) was found to be 0.076, and the p-value was 0.625, indicating no significant relationship between screen time and physical capacity based on ISWT.

Discussion

The results of the Spearman' rho correlation test show that there is no significant relationship between screen time and physical capacity in children ($r=0.067$; $p=0.625$). The very



low correlation coefficient value, which is close to zero, indicates that the relationship between these two variables is very weak, so that changes in screen time duration are not significantly related to changes in children's physical capacity. In this study, the largest group consisted of children with 2-3 hours of screen time per day (47.7%), followed by children with more than 3 hours of screen time (40.9%). This condition indicates that exposure to gadgets and screen media is a dominant part of children's daily activities. The results of physical capacity measurements using the Incremental Shuttle Walk Test (ISWT) showed that most children were in the above average category (40.9%), indicating that the majority of children had moderate physical capacity. This means that even though most children have a fairly high amount of screen time, no direct effect on their physical capacity was found. These findings are consistent with several studies that found no association between screen time and physical activity levels in children and adolescents aged 10-15 years (Aisya Yafis Iqlima et al., 2024; Dahlgren et al., 2021). According to a study conducted by (Carson et al., 2016), children can have high screen time but still meet daily activity recommendations, so that their physical capacity remains good.

This section should discuss the implications of the findings in the context of existing research and highlight the limitations of the study. Research (Prakoso et al., 2024), conclude that screen time does not directly affect physical fitness, but it can reduce students' physical activity and fitness. Another study in Sweden showed no association between self-reported screen time and objectively measured physical activity in a population of children and adolescents aged 10-15 years ($r = 0,04$, $p = 0,78$) (Dahlgren et al., 2021). Longitudinal studies abroad show that following guidelines for physical activity and screen time has a positive impact on children's health, but this relationship is complex and requires long-term observation (Martin et al., 2022). In other words, screen time has the potential to reduce the level of physical activity that is essential for maintaining and improving children's physical capacity, although a direct relationship with physical capacity has not always been found to be significant in cross-sectional studies. These findings reinforce that screen time is not the only factor that determines physical capacity. Other factors such as parents' socioeconomic status, physical activity patterns, and social context greatly influence levels of physical inactivity (Männikkö et al., 2020).

The results of the study show that most children aged 10-11 years have a screen time duration of between 2-3 hours per day (47.7%) and more than 3 hours per day (40,9%). This study also found no significant relationship between screen time duration and children's physical capacity. By comparison, a recent national study in Indonesia by the Central Statistics Agency in 2024 noted that gadget and internet use among young children is increasing, with approximately 37.02% of children aged 1-4 and 58.25% of children aged 5-6 using mobile phones and accessing the internet. According to UNICEF data, every half second a child in the world accesses the internet for the first time (Wisnubroto, 2025). This study highlights that excessive screen time in early childhood can have a negative impact on gross motor development, language skills, and social-emotional development (Eva & Aulia, 2024), and research (Fadhli et al., 2022), which shows a negative relationship between screen time and gross motor skills in preschool-aged children.

This study found that the majority of children had above-average physical capacity (40.9%), followed by below-average (38.6%), which means that the majority of children's physical capacity was in the moderate category. This shows that even though most children have a relatively high amount of screen time, their physical capacity is not directly affected in this measurement. So the time spent on screen time using mobile phones is not related to the time spent on physical activity (Dahlgren et al., 2021).

Implications for school policy, it is necessary to develop screen time restriction policies that are balanced with encouraging regular physical activity among children, especially considering that high screen time can have a negative impact on physical activity patterns even though physical capacity does not appear to be directly affected. Supervision and education for parents are also important in regulating children's screen time at home, supporting school policies to



create healthy lifestyles. The importance of school policy collaboration and the role of parents in limiting screen time while increasing children's physical activity for optimal health and development.

This study has limitations, namely its cross-sectional design, which only observes relationships at a single point in time and therefore cannot demonstrate a causal relationship between screen time and physical capacity. The relatively small sample size and focus on a single school also limit the generalizability of the results to a broader population. Measuring screen time based on questionnaires and self-reports by children leads to recall bias and data inaccuracy.

Conclusion

The conclusion of this study is that there is no significant relationship between screen time duration and children's physical capacity as measured using Incremental Shuttle Walk Test (ISWT). The majority of children have a fairly high amount of screen time (2-3 hours or more per day), but their physical capacity varies and is not directly related to screen time. These findings indicate that in the context of this study, screen time does not have a direct impact on children's physical fitness. However, high screen time should still be considered as part of a sedentary lifestyle that has the potential to reduce overall physical activity.

Research suggestion, longitudinal research is needed to gain a more comprehensive understanding of the relationship between these variables. This would involve monitoring children's screen time, physical activity, and physical capacity continuously over time. A longitudinal approach allows for the observation of changes in physical capacity development and the cumulative impact of screen time and physical activity behavior. Further research may also include interventions for screen time management and increased physical activity to assess their effectiveness.

Ethics approval and consent to participate

This study has obtained ethical approval no. 015/Stikes Vinc/KEPK/IV/2025.

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