



## **Dynamics of Screen Time and Physical Activity Patterns: A Study Based on Gender and Type of Sport**

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### **ABSTRACT**

The use of digital devices has become increasingly prevalent among school-aged adolescents, potentially leading to reduced levels of physical activity. This study aimed to analyze the dynamics of screen time among student athletes enrolled in the Pusat Pembinaan dan Pelatihan Atlet Pelajar (PJPAP) Central Java program, viewed from gender and type of sport perspectives. Screen time was defined as the total duration of digital device use within a 24-hour period, including activities related to learning, entertainment, and communication over the past month. This study employed a quantitative approach with a cross-sectional design. The participants consisted of 25 student athletes (13 males and 12 females) who engaged in structured training six days per week. Data were collected using a structured screen time questionnaire and analyzed using the Shapiro–Wilk normality test, independent t-test, and one-way ANOVA. The results indicated that the average daily screen time of male athletes was 3.47 hours, while female athletes averaged 3.05 hours per day. The independent t-test showed a significant difference in screen time based on gender ( $p = 0.028$ ). Meanwhile, the one-way ANOVA across five sport disciplines revealed no significant differences in screen time ( $F = 2.413$ ;  $p = 0.078$ ). These findings suggest that gender influences screen time patterns among student athletes, whereas differences in sport disciplines do not significantly affect the duration of digital device use.

**Keyword:** *Screen Time, Physical Activity, Gender, Student Athletes, Sport Type*

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### **INTRODUCTION**

The development of digital technology over the past two decades has brought significant changes to human behavioral patterns, including in the fields of education and sport (Syafuruddin, 2023). This transformation has facilitated the implementation of sustainable education models, enhanced student engagement, and improved training methodologies. The use of digital devices among students has increased substantially, particularly following the expansion of online learning systems and social media platforms (Pinto & Leite, 2020). Survey data indicate that 19.3% of children and adolescents and 14.4% of young adults in Indonesia experience gadget addiction, with approximately 2,933 children reporting an increase in daily

online duration from 7.27 hours to 11.6 hours, representing a rise of 59.7% (Drama et al., 2024). Although a large proportion of digital device use is associated with learning and communication activities, a considerable amount is dominated by digital entertainment such as streaming services, online games, and social media. Devices such as smartphones, computers, and televisions have become inseparable from daily life, offering ease of access to information, online learning, and social interaction (Waspada & Dahlan, 2023).

This phenomenon presents new challenges, particularly for students who are also athletes, as excessive digital activity may interfere with physical recovery, training concentration, and sleep quality. Prioritizing sleep quality is essential for optimal physical outcomes (Craven et al., 2022). Increased screen time also raises concerns regarding both physical and mental health, especially among adolescents (Giedd, 2020). The World Health Organization has emphasized that sedentary behavior, including excessive screen exposure, constitutes a risk factor that can affect physical fitness, sleep quality, and emotional balance in children and adolescents (WHO, 2020). The World Health Organization recommends that individuals aged 5–17 years engage in moderate-to-vigorous physical activity for at least 60 minutes per day and limit recreational screen time to no more than two hours daily. Similar recommendations highlight the importance of balancing physical activity, rest, and social interaction in adolescent life (Sampasa-Kanyinga et al., 2022).

Student athletes possess characteristics that differ from those of students in general. They are required to follow intensive physical training routines that demand high levels of fitness and disciplined recovery (Stringer et al., 2025). Structured training schedules, performance targets, and achievement expectations place student athletes in conditions that require self-control, consistency, and healthy lifestyle behaviors (Ahn & Kim, 2022). At the same time, student athletes are part of the digital generation, characterized by high dependence on technological devices. Their strong attraction to the digital environment, which offers instant entertainment and virtual social interaction, can be difficult to regulate and may shift time that should otherwise be allocated for rest and recovery (Sánchez-Riaño et al., 2022). An imbalance between physical activity and digital device use has the potential to disrupt training performance, recovery processes, and even increase the risk of chronic fatigue (Tyas et al., 2024). Consequently, screen time management has become an increasingly important aspect of student athlete development programs to ensure sustained performance and long-term health.

Previous studies have demonstrated that excessive screen time contributes to increased sedentary behavior and reduced effective sleep duration (Roswita et al., 2024). Screen-based activities such as gaming, social media use, and video consumption are typically performed in

prolonged passive positions, thereby limiting opportunities for active physical movement (Dan et al. 2024). Night-time device use may disrupt circadian rhythms through exposure to blue light, which suppresses melatonin production and negatively affects recovery and bodily regeneration processes (Skarzhinskaya & Sarafanova, 2020). However, most existing studies have focused on the general adolescent population rather than on student athletes, who possess distinct training demands, time discipline, and recovery requirements. In Indonesia, empirical research examining the relationship between screen time and physical activity among young athletes remains limited. In addition, gender and type of sport may influence screen time habits. Several studies have reported that male adolescents tend to spend more time on digital gaming activities, whereas female adolescents more frequently engage in social media use for communication and entertainment, typically with shorter durations (Svensson et al., 2022). This pattern suggests that social and cultural factors play a role in shaping digital device use behaviors. Furthermore, characteristics of different athletic disciplines, such as sprinting, jumping, or throwing, may influence daily routines, training duration, and leisure time, which could contribute to variations in screen time (Wong et al., 2021).

Based on these research gaps, this study offers novelty by specifically examining the dynamics of screen time among student athletes through the perspectives of gender and type of sport. This study does not merely focus on the duration of digital device use but also describes the daily behavioral patterns of student athletes in their interactions with technology amid the demands of physical training and academic activities. Understanding screen time in this population cannot be achieved solely by observing usage duration but also requires examining how technology is integrated into their daily lives.

Therefore, this study aims to analyze the dynamics of screen time among student athletes enrolled in the Pusat Pembinaan dan Pelatihan Atlet Pelajar (PJPAP), a student athlete development and training program in Central Java, Indonesia, by examining differences based on gender and type of sport. This study seeks to provide a comprehensive empirical overview of screen time behavior among student athletes, which may serve as a reference for coaches, educators, and program managers in developing more balanced and informed strategies for digital device management that align with training demands, recovery needs, and academic and psychological development.

## **METHOD**

This study employed a quantitative approach with a descriptive–comparative design aimed at examining differences in average screen time based on gender and type of sport among student athletes. A cross-sectional design was applied, in which data were collected at a single point in time to describe screen time behavior during a specific period. This design was considered appropriate as it allows for the observation of variations in digital device use without applying experimental treatment to the participants.

The study was conducted within the Pusat Pembinaan dan Pelatihan Atlet Pelajar (PJPAP), a student athlete development and training program in Central Java, Indonesia, located in Surakarta. PJPAP provides long-term training for student athletes with disabilities across five athletic disciplines, namely sprint, middle-distance running, jumping, throwing, and wheelchair racing.

Data collection was carried out in November 2025. The participants consisted of the entire population of active student athletes enrolled in the PJPAP program, totaling 25 individuals aged 14–18 years. The sample included 13 male and 12 female athletes. As all active athletes were involved, this study applied a total population approach, thereby eliminating sampling bias and ensuring comprehensive representation of screen time behavior within the program.

Data was collected using the Questionnaire for Screen Time (QueST), which was adapted into a digital format. The QueST instrument measures daily screen exposure duration across several activity categories, including academic learning or assignments, video viewing, gaming, and social media use. Screen time duration was calculated in hours per day and summed to obtain total daily screen time.

The QueST questionnaire used in this study was adapted from previous research to ensure relevance to the current study population and consistency with the measured variables. Content validity was assessed through expert judgment. Reliability testing using Cronbach's alpha yielded a coefficient of 0.86, indicating high internal consistency of the instrument.

Data analysis was performed using SPSS version 26. Descriptive statistics were used to summarize mean values and variability of screen time. The Shapiro–Wilk test was applied to assess data normality due to the sample size being fewer than 50 participants. Differences in screen time based on gender were analyzed using an independent t-test, while differences across the five sport disciplines were examined using one-way analysis of variance (ANOVA). The level of statistical significance was set at  $\alpha = 0.05$ , in accordance with standard practices in comparative research involving adolescent and athlete populations.

**RESULT**

Table 1 presents the descriptive statistics of screen time among student athletes participating in the PJPAP Central Java program. The results show that the average daily screen time was 3.26 hours, with a minimum value of 2.30 hours and a maximum value of 4.50 hours per day. This average exceeds the World Health Organization’s recommendation, which suggests limiting recreational screen time for adolescents to no more than two hours per day.

**Table 1.** Descriptive Statistics of Screen Time among Student Athletes in the PJPAP Central Java Program

<b>Variable</b>	<b>N</b>	<b>Min</b>	<b>Max</b>	<b>Mean</b>	<b>Deviation Standard</b>
Screen time (hours/day)	25	2.3	4.5	3.26	0.65

When examined by gender, male student athletes demonstrated a higher average screen time (3.51 hours per day) compared to female student athletes (3.02 hours per day). This descriptive pattern indicates a tendency for male athletes to engage in longer daily screen exposure than their female counterparts.

Prior to conducting inferential statistical analyses, data normality was assessed using the Shapiro–Wilk test due to the sample size being fewer than 50 participants. The results of the normality test are presented in Table 2. The analysis yielded a significant value of  $p = 0.618$  ( $> 0.05$ ), indicating that the screen time data were normally distributed. Therefore, parametric statistical tests were considered appropriate for further analysis.

**Table 2** Results of the Shapiro–Wilk Normality Test

<b>Variable</b>	<b>Statistics</b>	<b>df</b>	<b>Sig.</b>
Screen time	0.972	25	0.618

An independent t-test was conducted to examine differences in screen time between male and female student athletes. The results of this analysis are shown in Table 3. The test revealed a significant difference in screen time based on gender, with a significant value of  $p = 0.028$  ( $< 0.05$ ). This finding indicates that male and female student athletes differed significantly in their average daily screen time.

**Table 3** Results of the Independent t-Test of Screen Time Based on Gender

<b>Gender</b>	<b>N</b>	<b>Mean</b>	<b>Deviation Std</b>	<b>t</b>	<b>df</b>	<b>Sig. (2 tailed)</b>
Male	13	3.51	0.58	2.324	23	0.028
Female	12	3.02	0.47			

Differences in Screen Time Based on Type of Sport

Descriptive analysis was first conducted to examine average screen time across different sport disciplines, including sprint, middle-distance running, jumping, throwing, and wheelchair racing. As shown in Table 4, the mean screen time values across sport types ranged from 2.73 to 3.56 hours per day.

**Table 4** Mean Daily Screen Time Based on Type of Sport among Student Athletes in the PJPAP Central Java Program

Type of Sport	N	Mean (hours/day)	Deviation Std
Sprint	8	3.41	0.55
Middle Distance	5	3.00	0.47
Jumping	4	2.73	0.34
Throwing	5	3.56	0.63
Wheelchair Racing	3	3.22	0.48
Total	25	3.26	0.65

Subsequently, a one-way analysis of variance (ANOVA) was performed to determine whether differences in screen time existed among the five sport disciplines. The results of the ANOVA are presented in Table 5. The analysis yielded an F value of 2.413 with a significance level of  $p = 0.078 (> 0.05)$ , indicating that there were no statistically significant differences in screen time based on type of sport.

**Table 5** Results of the One-Way ANOVA of Screen Time Based on Type of Sport

Source of Variation	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.654	4	0.414	2.413	0.078
Within Groups	3.436	20	0.172		
Total	5.090	24			

## Discussion

To analyze differences in screen time across sport types among student athletes in the PJPAP Central Java program, a one-way analysis of variance (ANOVA) was conducted across five athletic disciplines, namely sprint, middle-distance running, jumping, throwing, and wheelchair racing. The results indicated no statistically significant differences in average screen time among the five sport categories. This finding suggests that the type of sport practiced by student athletes does not significantly influence their screen time behavior. Although each athletic discipline has distinct characteristics in terms of training intensity, duration, and physical demands, patterns of digital device use appear to be relatively homogeneous across sport types. This condition indicates that non-sport-related factors, such

as social habits, entertainment preferences, and academic activities involving digital devices, may play a more dominant role in shaping screen time behavior among student athletes, as previously reported in studies on adolescent media use (Jastrow et al., 2022; Spengler et al., 2015)

The results further revealed that the average daily screen time of student athletes in the PJPAP Central Java program exceeded three hours per day, which is above the World Health Organization's recommended limit for recreational screen exposure among adolescents (WHO, 2020). Although student athletes engage in intensive physical training routines, their screen time patterns do not differ substantially from those of adolescents in the general population. This finding supports earlier evidence indicating that participation in structured sports activities does not automatically reduce sedentary digital behavior (Maratus Sholikhah et al., 2025; Schmidt et al., 2020). Despite regular physical activity, student athletes remain closely integrated into digital lifestyles characterized by frequent engagement with social media, online games, and digital content consumption, which has become a defining feature of adolescent daily life in the digital era (Akbar & Hukum, 2025).

A significant difference in screen time was observed based on gender, with male student athletes demonstrating higher screen time duration compared to female student athletes. The results of the independent t-test support this finding. This pattern aligns with previous studies indicating that male adolescents tend to spend more time engaging in digital entertainment activities such as gaming and video consumption, whereas female adolescents are more likely to use digital devices for social communication and interaction, generally with shorter durations (Lee et al., 2017; Svensson et al., 2022). These differences suggest that gender-related preferences and motivations play an important role in shaping screen time behavior, reinforcing evidence that gender is a key determinant of digital media use patterns among adolescents (Chaidirman et al., 2019; Limilia & Prihandini, 2018).

In contrast, differences in screen time based on type of sport were not statistically significant. Student athletes across sprint, middle-distance running, jumping, throwing, and wheelchair racing exhibited relatively similar screen time patterns. This indicates that sport discipline is not a primary determinant of variation in digital device use among student athletes. Instead, screen time behavior appears to be influenced by broader psychosocial and environmental factors that transcend sport-specific characteristics, such as social environment, digital culture, and daily routines (DesClouds & Durand-Bush, 2021). Similar findings have been reported in previous research, which suggests that digital media use is shaped more

strongly by contextual and behavioral factors than by the specific demands of athletic disciplines (Jastrow et al., 2022).

Screen time levels exceeding recommended limits may have implications for sleep quality, recovery processes, and overall physical readiness among student athletes. Prolonged exposure to digital screens has been associated with reduced sleep quality, impaired recovery, and decreased physical fitness (Nakshine et al., 2022). For student athletes, adequate sleep and recovery are essential for supporting training adaptations, physical performance, and mental well-being (Craven et al., 2022; Manalu et al., 2025). Excessive screen exposure, particularly during evening hours, may disrupt emotional regulation, concentration, and sleep patterns, thereby increasing the risk of psychological strain (Xiang et al., 2022). Although this study did not directly assess mental health outcomes, the elevated screen time observed among PJPAP student athletes suggests the presence of potential risks that warrant attention.

Overall, the findings of this study emphasize that screen time among student athletes with disabilities should remain a focus of attention for coaches and program managers. Elevated screen time may interfere with sleep duration, reduce recovery effectiveness, and diminish training readiness on subsequent days (Jafri et al., 2025). These findings highlight the importance of implementing structured screen time management strategies within athlete development environments. Such strategies may include regulating digital device use during evening hours, promoting digital literacy education, and providing non-digital leisure alternatives during free time. Through these approaches, a more balanced integration of digital technology and physical training may be achieved, supporting both performance and long-term well-being of student athletes (Andriyani et al., 2023).

## **CONCLUSION**

This study found that student athletes enrolled in the PJPAP Central Java program exhibited an average daily screen time of 3.26 hours, which exceeds the recommended limit established by the World Health Organization. These findings indicate that sedentary digital behavior remains relatively high despite participation in intensive and structured physical training programs. A significant difference in screen time was observed based on gender, with male student athletes demonstrating longer screen time duration compared to female student athletes. This result supports previous evidence suggesting that digital media use patterns among adolescents are influenced by gender-related preferences.

In contrast, no significant differences in screen time were found based on type of sport, indicating that athletic discipline is not a determining factor in variations of digital device use

among student athletes. Screen time behavior appears to be more strongly shaped by social and behavioral factors rather than by sport-specific training characteristics. Overall, these findings provide empirical evidence that screen time among student athletes remains a relevant concern and should be considered in efforts to promote a balanced integration of physical training, recovery, and responsible digital device use within athlete development programs.

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