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ASSOCIATION OF SCREEN TIME WITH BMI AND ACADEMIC PERFORMANCE AMONG CHILDREN AGED 6-17 YEARS IN TIRANA

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Abstract: Excessive engagement with screen-based devices has emerged as a significant behavioral risk factor in childhood, contributing to sedentary lifestyles and increasing rates of overweight and obesity. Although extensive international research has documented these associations, evidence from Balkan countries remains limited, particularly regarding the combined relationship between screen exposure, body mass index (BMI), and academic performance. The aim of this study was to assess the relationship of daily screen time with BMI status, and academic achievement in schoolchildren aged 6 to 17 years in Tirana, Albania. The research was a descriptive analytical, cross-sectional and observational study conducted in 2025, with 600 pupils selected through a multi-stage probabilistic sampling procedure from public schools. The data collection instrument was a structured questionnaire, designed based on international literature. Variables included socio-demographic characteristics, sleep duration, physical activity, BMI, academic performance, and screen exposure. Screen time was categorized as ≤2 hours/ day and >2 hours per day, while BMI was determined in three categories: underweight, healthy weight, and overweight / obese. Nonparametric tests such as Chi-Square, Mann Whintey U and binary logistic regression were used in the analysis. The level of statistical significance was set at 0.05. Overall, 26.3% of participants reported more than two hours of daily screen exposure. Schoolchildren who spent more than 2 hours/ day on screens were significantly more likely to belong to higher BMI categories. Chi-square analysis demonstrated a significant relationship between daily digital use and BMI categories ($\chi^2 = 23.743$, df = 2, p = 0.000). Watching TV during a meal was significantly related to higher BMI. (χ^2=8.500; p=0.014). Pupils with normal BMI achieved significantly better academic results than their overweight/obese peers (p<0.001). Furthermore, prolonged screen time was independently associated with poorer academic outcomes ($\chi^2 = 35.033$, df = 2, p<0.01). Binary logistic regression indicated that age (OR=1.323; 95%CI: 1.232-1.422; p=0.000) and male gender (OR=2.098; 95%CI: 1.377-3.196; p= 0.000) were associated with higher odds of excessive time spent using a device such as a computer, television, or iPad (>2 hours per day). An increased BMI was a risk factor (OR=1.059; 95%CI: 0.999-1.123; p=0.054). Longer sleep duration (≥9 hours/night) was a protective factor (OR=0.547; 95%CI: 0.352-0.848; p=0.007), and regular physical activity reduced the odds of excessive screen time (OR=1.681 for non-active participants; 95%CI: 1.002-2.818; p=0.049). These results emphasize interrelationship between sedentary behavior, weight status, sleep patterns, and educational attainment. Comprehensive public health strategies aimed at moderating screen exposure and promoting healthier daily routines are warranted to improve both physical health and academic performance among schoolchildren.

Keywords: *Screen time; Body mass index; Academic performance; Childhood obesity; Sedentary behavior*
Field: Medical sciences and Health

1. INTRODUCTION

Over the past two decades, children's lifestyles have undergone profound changes characterized by a substantial increase in sedentary behaviors, particularly screen-based activities. Television viewing time, using smartphones, tablets, computers have progressively replaced active play and outdoor movement in many settings (Tremblay et al., 2011). Accumulated evidences from systematic reviews indicates that prolonged sedentary exposure is consistently related to unfavorable health indicators in pediatric populations (Carson et al., 2016; Stiglic & Viner, 2019).

The growing prevalence of childhood obesity and overweight is closely linked to changes in lifestyle. Globally, shifts toward energy-dense diets and reduced physical activity have contributed to what has been described as a nutritional and behavioral transition (Popkin et al., 2012). Empirical studies

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demonstrate that greater exposure to television and other screen-based media is positively associated with higher BMI in schoolchildren (Hancox et al., 2004; Mitchell et al., 2013). This relationship appears to operate through multiple mechanisms, including reduced energy expenditure, increased snacking during screen viewing, and not being active (Pearson et al., 2014; Sisson et al., 2010).

Sleep patterns represent an additional pathway linking screen exposure and weight status. According to various international studies, long screen time correlates with fewer hours of sleep and less favorable dietary behaviors (Börnhorst et al., 2015). Experimental and epidemiological findings further support the role of insufficient sleep as an independent contributor to weight gain in children and adolescents (Chaput & Tremblay, 2012). In response, integrated movement guidelines recommend limiting recreational screen time while promoting adequate sleep and daily physical activity as complementary components of obesity prevention strategies (Tremblay et al., 2016).

Beyond metabolic and behavioral outcomes, screen time may influence cognitive functioning and school-related performance. Evidence suggests that excessive exposure to digital media is associated with reduced psychological well-being and attention-related difficulties (Stiglic & Viner, 2019). Given the importance of sustained concentration and cognitive engagement for academic success, high levels of recreational screen use may indirectly compromise educational achievement.

At the European level, surveillance data indicate that a substantial proportion of children exceed recommended daily screen limits while failing to reach the appropriate hours of physical activity per day (Whiting et al., 2021; Whiting et al., 2022). Regional monitoring through the WHO COSI initiative continues to document concerning levels of sedentary behavior across participating states (World Health Organization Regional Office for Europe, 2020, 2025). In Albania, recent national reports highlight increasing concerns regarding childhood overweight and lifestyle-related behavioral risks, particularly following the COVID-19 pandemic (UNICEF Albania, 2023, 2025). However, empirical research simultaneously examining screen time, BMI, and academic performance within the Albanian school context remains limited.

Addressing this gap is important for informing targeted public health and educational interventions. The aim of this study was to assess the relationship of daily screen time with BMI status, and academic achievement in schoolchildren aged 6 to 17 years in Tirana, Albania.

2. METHODOLOGY

The research was a descriptive analytical, cross-sectional and observational study conducted in Tirana, Albania, between September and December 2025. The study population was children aged 6 to 17 years in public schools in the city of Tirana. The sample size of the study was 600, selected probabilistically, in multiple stages. Participants with medical conditions affecting growth or physical activity were excluded. A multi-stage probabilistic sampling method ensured representativeness across administrative areas. Public schools were randomly selected, and classes within these schools were randomly chosen. Pupils were proportionally recruited according to class size. The data collection instrument was a structured questionnaire, designed based on international literature. Variables included socio-demographic characteristics, BMI, screen time (television, smartphone, tablet, computer), physical activity, sleep duration, academic performance. Anthropometric measurements were obtained using standardized procedures. Given weight and height data, BMI (kg/m²) was calculated, which was classified into three categories: underweight, healthy weight, and overweight/ obese. Screen time was categorized as ≤2 hours/day and >2 hours per day (Tremblay et al., 2016). Academic performance was assessed using pupils' self-reported grades. Pupils were asked to report their most recent school grades, which were then classified into three categories: very good (9-10), good (7-8.9), and fair/poor (<7). Sleep duration was categorized as <9 and ≥9 hours per night. The statistical package used for data processing and analysis was IBM SPSS Statistics version 27. Descriptive analysis included absolute number and percentages. Nonparametric tests such as Chi-Square, Mann Whintey U were used in the analysis. The level of statistical significance was set at 0.05. Binary logistic regression was used to identify independent predictors of screen time >2 hours per day.

The data collection questionnaire was approved by the Ethics Committee of the University of Medicine, Tirana, within the framework of the third cycle of studies (approval: September 17, 2025; Protocol No. 2002). Before completing the questionnaire in children, parental consent was obtained. All data were anonymized to ensure confidentiality.

3. RESULTS

The analysis presents data for 600 participants. As shown in Table 1, 53.2% were girls and 46.8% were boys. 40.2% were aged 14-17, 32.2% were aged 10-13 and 27.7% were aged 6-9. The majority of children attended schools in urban or semi-urban areas (68.3%). Concerning lifestyle factors, 26.3% of participants reported screen time exceeding 2 hours/day. More than half of the children (51.9%) engaged in 1-2 hours of physical activity daily, while 38.4% reported less than 1 hour/day. Sleep duration was <9 hours/night in 61.2% of participants.

More than half of the participants (58.1%) reported eating meals while watching television. In terms of academic performance, 57.7% achieved very good grades, whereas 8.8% had fair or poor performance.

Regarding BMI status, 53.2% had normal weight, 36.8% were underweight, and 10.0% were overweight or obese. BMI values ranged from 11.9 to 38.3 kg/m², giving a range of 26.4 kg/m². The mean BMI was 20.12 ± 3.73 kg/m², indicating moderate variation in body mass among the participants. The minimum value (11.9 kg/m²) reflects the presence of participants with very low BMI, while the maximum value (38.3 kg/m²) indicates participants with overweight or obesity. The standard deviation of 3.73 kg/m² demonstrates considerable variability in body mass among the study population.

Table 1: Socio-demographics, Lifestyle, Academic, and BMI Characteristics of Participants

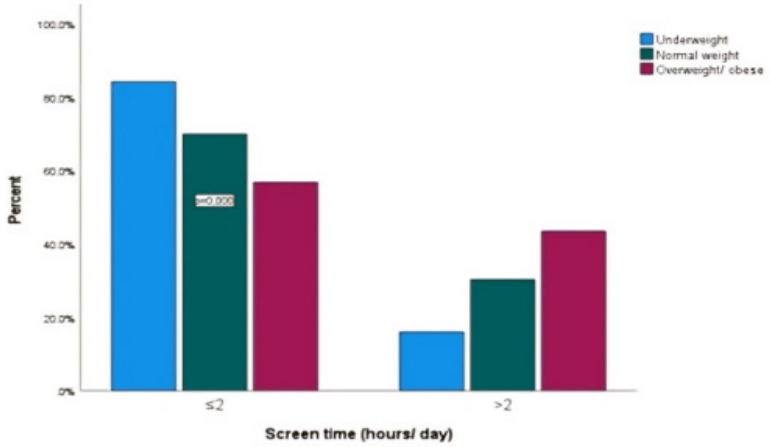
Variable	Category	Absolute number	Percentage (%)
Gender	Boys	281	46.8
	Girls	319	53.2
Age group	6–9 years	166	27.7
	10–13 years	193	32.2
	14–17 years	241	40.2
School location	Urban/Semi-urban	410	68.3
	Rural	190	31.7
	High	127	22.6
Screen time (hours/day)	≤2 hours	441	73.3
	>2 hours	157	26.3
Physical activity (hours/day)	<1 hour	229	38.4
	1–2 hours	310	51.9
	≥3 hours	58	9.7
Sleep duration	<9 hours	366	61.2
	≥9 hours	232	38.8
Eating meals in front of TV	Yes	347	58.1
	No	250	41.9
Academic performance	Very good (9–10)	346	57.7
	Good (7–8.9)	201	33.5
	Fair/Poor (<7)	53	8.8
BMI categories	Underweight	221	36.8
	Normal weight	319	53.2
	Overweight/Obese	60	10.0

*Percentages may not total 100% due to missing data.
Source: Authors' research

Schoolchildren who passed more than 2 hours/ day on screens were more likely to fall into higher BMI categories. Among underweight pupils, 84.1% watched 2 hours or less of TV per day, while only 15.9% exceeded 2 hours ($\chi^2 = 8.500$, df = 2, $p = 0.014$). 30.2% of healthy weight children spent more than 2 hours in front of a screen, this proportion increased to 43.3% among overweight and obese pupils. Chi-square analysis confirmed that this association was statistically significant ($\chi^2 = 23.743$, df = 2, $p < 0.001$), and the linear-by-linear association indicated a significant positive trend. To further examine differences in BMI distribution between groups, a Mann-Whitney U test was conducted comparing students reporting ≤2 hours versus >2 hours of daily screen time. The analysis revealed a significant difference (U = 23,653.50, Z = −5.898, $p < 0.001$), with students exceeding 2 hours of screen exposure showing higher BMI ranks

(Mean Rank = 369.34) compared to those with ≤2 hours (Mean Rank = 274.64). Additionally, eating meals while watching TV was statistically linked to a higher body mass index.

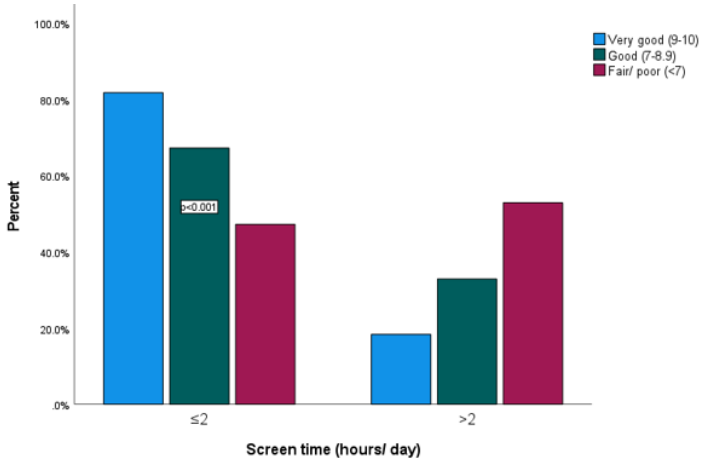
Figure 1: BMI category distribution by daily screen time.



Source: Authors' research, graph obtained from SPSS output

Pupils who passed more than 2 hours/ day on screens showed lower academic performance. Among pupils with high grades (9–10), 81.7% watched 2 hours or less of TV per day, while only 18.3% exceeded 2 hours. In contrast, over half of the students with low grades (<7) reported watching more than 2 hours daily. Chi-square analysis confirmed that this association is statistically significant ($\chi^2 = 35.033$, df = 2, $p < 0.001$), and the linear-by-linear association indicated a significant negative trend, suggesting that increased screen time is linked to reduced academic achievement.

Figure 2: Academic performance distribution by daily screen time.



Source: Authors' research, graph obtained from SPSS output

Using the logistic regression technique, several factors were discovered to be associated with an increased likelihood of spending more than two hours/ day in front of a screen.

Age is significantly linked to excessive screen time (OR=1.323; 95%CI: 1.232-1.422; p=0.000). Every year of age increase the odds of spending more than 2 hours/ day in front of screens by 32.3%.

Gender was a significative predictor (OR=2.098; 95%CI: 1.377-3.196; p<0.001), indicating that boys had approximately two times higher odds of excessive screen time compared to girls.

BMI showed a connection with screen time that was statistically significant (OR=1.059; 95% CI: 0.999-1.123; p=0.054). Although increasing BMI was associated with higher odds of excessive screen time, the confidence interval included 1, suggesting marginal significance.

Sleep duration was inversely associated with excessive screen time (OR=0.547; 95%CI: 0.352-0.848; p=0.007). Children who slept ≥9 hours per night had 45% lower odds of excessive screen time compared to those sleeping <9 hours.

Participants who did not engage in physical activity had 68.1% higher odds of spending more than 2 hours/ day in front of screens compared to those who were physically active (OR = 1.681; 95% CI: 1.002–2.818; p = 0.049), specifies that regular physical activity has a protective effect against excessive time spent using electronic devices such as a computer, television, ipad, etc.

4. DISCUSSION

Findings from this research highlight a significant relationship of screen time with BMI and academic performance to schoolchildren in Tirana. Notable proportion of participants (26.3%) exceeded the recommended screen time of 2 hours/ day, and this excessive exposure was strongly linked to both higher BMI and poorer academic outcomes. Children who belonged to the highest BMI category were more likely to achieve lower grades, whereas pupils with normal BMI generally reported very good academic performance. These results indicate that weight status and screen-related behaviors are closely intertwined with educational achievement.

Excessive screen time appears to influence academic performance through several mechanisms. First, prolonged screen exposure may reduce time available for homework, reading, and cognitively stimulating activities, which can compromise learning outcomes (Stiglic & Viner, 2019). Second, high screen use is often associated with disrupted sleep patterns, as supported by our finding that longer sleep duration (≥9 hours/night) was protective against excessive screen time. Inadequate sleep has been previously linked to impaired attention, memory, and executive function, which are essential for school success (Börnhorst et al., 2015; Chaput & Tremblay, 2012).

Our results also revealed that male pupils and older adolescents were more likely to exceed 2 hours a day in front of the screen. This demographic trend may partly explain observed differences in academic performance, as boys and older pupils with high screen exposure may experience both reduced physical activity and increased sedentary behaviors, contributing to higher BMI and lower grades (Whiting et al., 2022). Furthermore, children who reported eating meals in front of the television were more likely to be overweight / obese, reflecting broader sedentary habits that may indirectly affect school engagement and performance (Carson et al., 2015).

The interplay between BMI and academic performance in this study underscores that obesity is not only a health issue but also an educational concern. Pupils with overweight or obesity had significantly lower academic results, suggesting that interventions targeting healthy weight and lifestyle behaviors could have dual benefits in physical health, educational outcomes (Tremblay et al., 2016; UNICEF Albania, 2023). Promoting regular physical activity, structured mealtimes without screens, and adherence to recommended sleep durations may therefore improve academic performance while mitigating BMI-related risks.

Overall, this study demonstrates that screen time is a modifiable behavioral factor with implications for both BMI and school performance. Public health strategies in the Albanian context should aim to reduce recreational screen use, encourage physical activity, and foster healthy daily routines, particularly among boys and older adolescents, to support optimal cognitive, academic, and physical development (Stiglic & Viner, 2019; Whiting et al., 2021, 2022; UNICEF Albania, 2025).

5. CONCLUSIONS

The study demonstrates that excessive screen time is related to higher BMI and lower academic achievement among pupils in Tirana. Protective factors such as sufficient sleep, regular physical activity highlight of having a healthy daily routine. These findings support targeted public health strategies to improve both physical health and educational outcomes in school-aged populations.

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