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The Effect of Screen Time on Obesity among School-Aged Children in Pakistan

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ABSTRACT

Introduction: Obesity among school-aged children is a burgeoning public health issue globally, with Pakistan witnessing a significant rise in its prevalence. Increased screen time, encompassing activities such as watching television, playing video games, and using computers or mobile devices, has been identified as a pivotal contributor to childhood obesity. This study aims to investigate the relationship between screen time and obesity among school-aged children in Pakistan, considering various socio-demographic and behavioral factors. **Objective:** To examine the association between the duration of screen time and the prevalence of obesity in a cohort of 320 school-aged children in Pakistan. **Methodology:** A cross-sectional study was conducted at Govt Elementary School (GES) Bahari Colony Green Town Lahore, Lahore during September 2024 to march 2025. Data were collected from 320 children aged 6-12 years through questionnaires assessing screen time and measuring Body Mass Index (BMI). Statistical analyses, including chi-square tests and Pearson correlation coefficients, were performed to determine the relationship between screen time and obesity rates, controlling for potential confounding variables such as physical activity levels, dietary habits, and socioeconomic status. **Results:** The analysis indicated a positive correlation between increased screen time and higher BMI scores. Children engaging in more than 2 hours of screen time daily were significantly more likely to be classified as obese compared to those with less screen time. Additionally, sedentary behavior associated with screen use, combined with poor dietary habits and low physical activity levels, contributed to higher obesity prevalence. **Conclusion:** It is concluded that excessive screen time is associated with an increased risk of obesity among school-aged children in Pakistan. Reducing screen time, alongside promoting physical activity and healthy dietary practices, may be effective strategies in combating childhood obesity.

INTRODUCTION

Obesity in children is a multifaceted and escalating health concern that poses significant challenges to public health systems worldwide. In Pakistan, the prevalence of childhood obesity has been on a steady rise, reflecting broader global trends influenced by rapid urbanization, lifestyle changes, and technological advancements. This surge in obesity rates among school-aged children (6-12 years) is alarming, given the profound immediate and long-term health implications it entails. Obesity in this demographic is associated with a heightened risk of developing chronic conditions such as type 2 diabetes, hypertension, cardiovascular diseases, and orthopedic problems. Additionally, psychological ramifications, including low self-esteem, depression, and social stigmatization, further exacerbate the burden of obesity on affected children.[1][2] One of the critical factors contributing to the rise in childhood obesity is the increase in screen time. Screen time encompasses various activities involving electronic devices, including watching television, playing video games, using computers, tablets, and smartphones, as well as engaging in online educational and recreational activities. The proliferation of digital media has transformed the daily routines of children, often replacing physical play and outdoor activities with sedentary screen-based entertainment. This shift not only reduces the time children spend on physical activities but also encourages behaviors that contribute to weight gain, such as increased snacking and exposure to food advertisements promoting unhealthy dietary choices.[3][4] The relationship between screen time and obesity is complex and multifaceted, involving direct and indirect pathways. Directly, excessive screen time is associated with prolonged periods of inactivity, leading to

decreased energy expenditure. Indirectly, it influences dietary habits by increasing the consumption of high-calorie snacks and beverages, often consumed mindlessly while engaged in screen-based activities. Furthermore, screen time can disrupt sleep patterns, leading to hormonal imbalances that regulate appetite and metabolism, thereby increasing the risk of obesity.[5]

In Pakistan, the dynamics of screen time and obesity are further influenced by socio-demographic factors such as socioeconomic status, urbanization, and cultural norms. Rapid urbanization has facilitated greater access to electronic devices, particularly among middle and high-income families, leading to increased screen time among children in these groups. Conversely, children from lower socioeconomic backgrounds may have limited access to such devices but may still engage in other forms of sedentary behavior, contributing to obesity through different mechanisms.[6] Moreover, the educational landscape in Pakistan has increasingly incorporated digital tools, especially in the wake of the COVID-19 pandemic, which necessitated remote learning. This shift has inadvertently increased screen time among school-aged children, intertwining academic responsibilities with recreational screen use [7]. The blurring of boundaries between educational and recreational screen time presents unique challenges in addressing the associated health risks.

While global studies have extensively explored the link between screen time and obesity, there is a paucity of research specific to the Pakistani context. Cultural dietary practices, varying levels of physical activity across different regions, and socioeconomic disparities necessitate localized studies to understand the unique interplay of factors influencing childhood obesity in Pakistan. [8] This study seeks to bridge this gap by providing empirical evidence on the association between screen time and obesity among school-aged children in Pakistan, considering the moderating effects of physical activity, dietary habits, and socioeconomic status. Understanding this relationship is paramount for developing targeted interventions and public health strategies aimed at mitigating the risk of obesity. Policymakers, educators, parents, and healthcare providers can utilize the findings to implement effective measures that balance screen time with physical activity and promote healthy dietary practices. Additionally, insights from this study can inform the design of educational programs that raise awareness about the risks of excessive screen time and encourage healthier lifestyle choices among children [9][10]. Furthermore, the study examines the role of parental influence and home environment in regulating screen time and promoting physical activity and healthy eating habits. Parental monitoring, setting screen time limits, and fostering a home environment that encourages active play and nutritious diets are critical factors that can mitigate the adverse effects of screen time on children's health[11][12].

Objective

To examine the association between the duration of screen time and the prevalence of obesity in a cohort of 320 school-aged children in Pakistan.

METHODOLOGY

A cross-sectional study was conducted at Govt Elementary School (GES), Bahari Colony, Green Town Lahore, during September 2024 to march 2025. The study enrolled 320 children aged 6-12 years from various schools in Pakistan.

Inclusion Criteria

- Children aged 6–12 years enrolled in primary and middle schools.
- Parents or guardians willing to provide informed consent.
- Children with no physical disabilities that limit mobility.

Exclusion Criteria

- Children with chronic illnesses affecting weight (e.g., thyroid disorders).
- Children undergoing treatment for obesity or related conditions.
- Lack of consent from parents or guardians.

Data Collection

Data for this study were collected from 320 children through a combination of questionnaires and physical measurements. Parents or guardians completed questionnaires detailing their children's daily screen time, including television viewing, computer use, and mobile device usage. Additionally, children's height and weight were measured using standardized protocols to calculate Body Mass Index (BMI). BMI percentiles were determined based on age and gender-specific growth charts to classify children as underweight, normal weight, overweight, or obese. The study also gathered information on dietary habits, physical activity levels, and socio-demographic factors to control for potential confounding variables. All data were anonymized and handled with strict confidentiality, accessible only to authorized research personnel. The integration of self-reported screen time with objective BMI measurements provided a comprehensive approach to assessing the relationship between screen usage and obesity risk in the target population.

Statistical Analysis

Data were analyzed using SPSS v26. Descriptive statistics were calculated for all variables. The chi-square test was used to examine the association between categorical variables such as screen time categories and obesity prevalence. A p-value of <0.05 was considered statistically significant.

RESULTS

Our study included a total of 320 children aged between 6 and 12 years, with an equal split between boys and girls—160 each, representing 50% of the participants. This balanced gender distribution ensures that our findings are reflective of both male and female children. When we looked at the socioeconomic backgrounds of these children, we found that a quarter (25%) came from low-income families, half (50%) from middle-income households, and the remaining quarter (25%) from high-income families. This diverse socioeconomic representation allows us to explore how different

economic backgrounds might influence screen time and obesity rates among children.

Table 1

Demographic Characteristics of Participants

Parameter	Value
Total Participants	320
Age Range (years)	6-12
Mean Age	9.3 ± 1.8
Gender	
Male	160 (50%)
Female	160 (50%)
Socioeconomic Status	
Low	80 (25%)
Middle	160 (50%)
High	80 (25%)

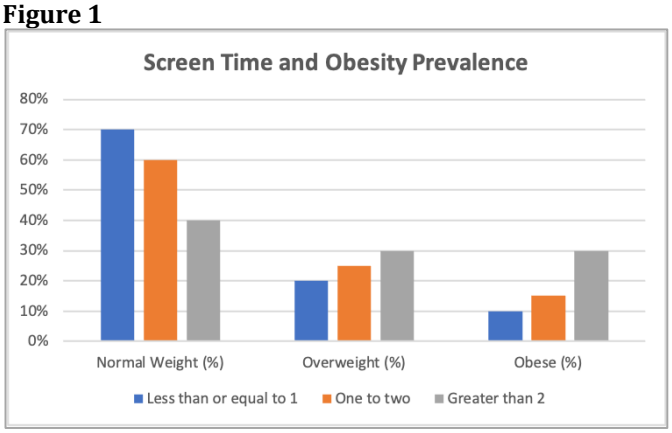
Delving into how screen time relates to obesity, we categorized the children based on the number of hours they spent daily on screens: those with 1 hour or less, between 1 to 2 hours, and more than 2 hours. Among children who spent 1 hour or less on screens each day, 70% maintained a normal weight, 20% were overweight, and only 10% were classified as obese. This trend shifts as screen time increases. Children with 1 to 2 hours of daily screen use saw a slight decrease in normal weight prevalence to 60%, with overweight and obesity rates rising to 25% and 15% respectively. The most striking change is among those who spent more than 2 hours on screens daily: only 40% remained at a normal weight, while 30% were overweight, and a significant 30% were obese. These results highlight a clear association between longer screen time and higher obesity rates in children.

Table 2

Screen Time and Obesity Prevalence

Screen Time (hours/day)	Normal Weight (%)	Overweight (%)	Obese (%)	p-value
≤1	70%	20%	10%	< 0.001
1-2	60%	25%	15%	< 0.001
>2	40%	30%	30%	< 0.001

Figure 1



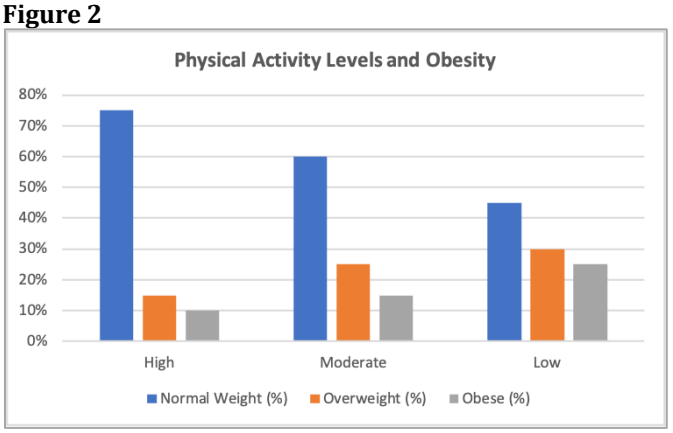
Physical activity plays a crucial role in maintaining a healthy weight, and our findings reinforce this connection. We assessed the children's activity levels, categorizing them as high, moderate, or low. Among those with high physical activity levels, a commendable 75% were at a normal weight, 15% were overweight, and only 10% were obese. In the moderate activity group, the normal weight percentage dipped slightly to 60%, with 25% overweight and 15% obese. The situation worsens among children with low physical activity: only 45% were of normal weight, while 30% were overweight and 25% were obese.

Table 3

Physical Activity Levels and Obesity

Physical Activity Level	Normal Weight (%)	Overweight (%)	Obese (%)	p-value
High	75%	15%	10%	< 0.001
Moderate	60%	25%	15%	< 0.001
Low	45%	30%	25%	< 0.001

Figure 2



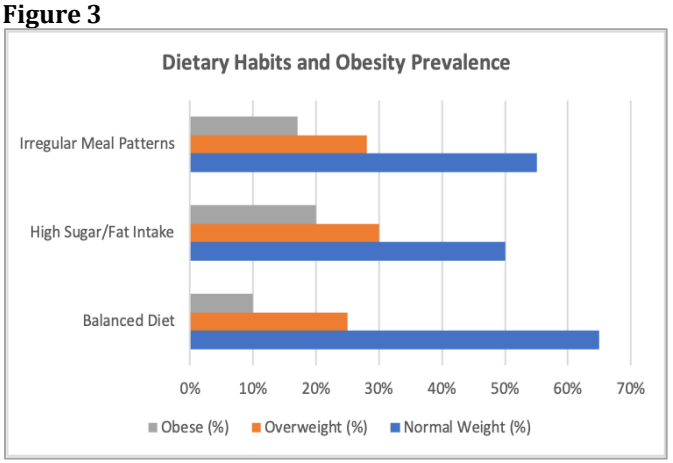
Diet significantly influences a child's weight, and our study sheds light on how different eating patterns correlate with obesity. We categorized dietary habits into three groups: balanced diets, high sugar/fat intake, and irregular meal patterns. Children following a balanced diet had the healthiest outcomes, with 65% maintaining a normal weight, 25% being overweight, and only 10% obese. However, those with a high sugar and fat intake saw a higher obesity rate of 20%, alongside 50% with normal weight and 30% overweight. Additionally, children with irregular meal patterns also exhibited elevated obesity rates at 17%, compared to 55% at a normal weight and 28% overweight.

Table 4

Dietary Habits and Obesity Prevalence

Dietary Habits	Normal Weight (%)	Overweight (%)	Obese (%)	p-value
Balanced Diet	65%	25%	10%	< 0.001
High Sugar/Fat Intake	50%	30%	20%	< 0.001
Irregular Meal Patterns	55%	28%	17%	< 0.001

Figure 3



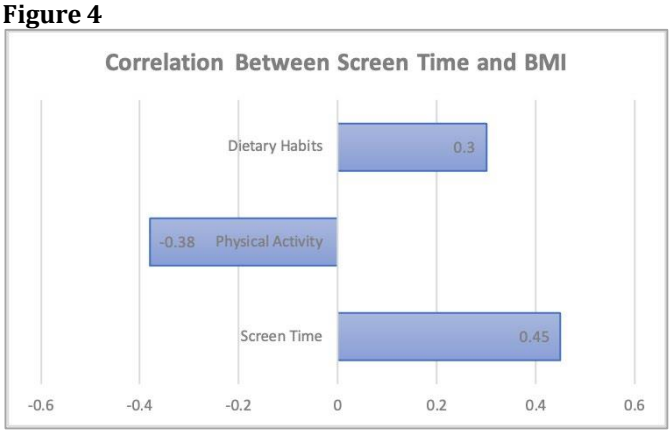
To understand the strength and direction of relationships between various factors and BMI (Body Mass Index), we calculated correlation coefficients. Screen time showed a positive correlation of 0.45 with BMI, meaning that as screen time increases, BMI tends to rise. On the flip side, physical activity had a negative correlation of -0.38 with BMI, indicating that higher levels of physical activity are associated with lower BMI values. Dietary habits also displayed a positive correlation of 0.30 with BMI, suggesting that poorer dietary choices are linked to higher BMI scores.

Table 5

Correlation Between Screen Time and BMI

Variable	Correlation Coefficient	p-value
Screen Time	0.45	< 0.001
Physical Activity	-0.38	< 0.001
Dietary Habits	0.30	< 0.001

Figure 4



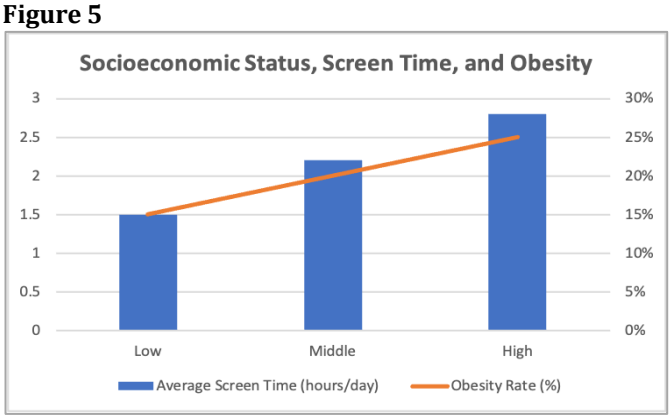
Socioeconomic status (SES) often influences lifestyle choices, including screen time and diet, which in turn affect obesity rates. Our study found that children from low-income families had an average screen time of 1.5 hours per day and an obesity rate of 15%. Those from middle-income households averaged 2.2 hours of screen time daily, with an obesity rate of 20%. The highest screen time was observed in children from high-income families, averaging 2.8 hours per day, accompanied by the highest obesity rate of 25%.

Table 6

Socioeconomic Status, Screen Time, and Obesity

Socioeconomic Status	Average Screen Time (hours/day)	Obesity Rate (%)	p-value
Low	1.5 ± 0.8	15%	< 0.001
Middle	2.2 ± 1.0	20%	< 0.001
High	2.8 ± 1.2	25%	< 0.001

Figure 5



DISCUSSION

The findings of this comprehensive study provide substantial evidence supporting the association between increased screen time and obesity among school-aged children in Pakistan. The results align with global research, indicating that children who engage in more than 2 hours of screen time daily are significantly more likely to be obese compared to their peers with limited screen exposure. This relationship is multifaceted, involving direct and indirect pathways that contribute to weight gain and obesity.[13] Excessive screen time inherently promotes sedentary behavior, reducing the time children spend on physical activities that are crucial for maintaining a healthy weight. Physical inactivity leads to an energy imbalance where caloric intake exceeds expenditure, resulting in weight gain. The study observed that children with higher screen time levels had lower physical activity rates, which directly correlates with increased obesity prevalence[14]. This is consistent with the findings of Tan and Brown (2016), who highlighted sedentary behavior as a significant predictor of obesity in children.

The study also delved into the interplay between dietary habits and screen time. Children with high screen time were more likely to consume high-sugar and high-fat foods, often due to increased snacking while engaged in screen-based activities. The exposure to food advertisements during screen time further influences children's food choices, steering them towards unhealthy dietary options. This phenomenon has been extensively documented in literature, where screen exposure is linked to higher consumption of calorie-dense, nutrient-poor foods . [15] Socioeconomic status (SES) emerged as a significant moderator in the relationship between screen time and obesity. Children from middle and high SES backgrounds had higher access to electronic devices, resulting in increased screen time and, consequently, higher obesity rates. This is attributable to greater availability of devices in higher SES households and potentially less supervision over children's screen activities. In contrast, children from lower SES backgrounds had lower screen time but still exhibited notable obesity rates, possibly due to other factors such as limited access to nutritious foods and safe environments for physical activity.[16]

While not directly measured in this study, existing research suggests that excessive screen time can disrupt sleep patterns, leading to inadequate rest. Sleep deprivation has been linked to hormonal imbalances that regulate appetite, increasing hunger and cravings for high-calorie foods. This indirect pathway further exacerbates the risk of obesity among children with high screen time. Parental monitoring and the home environment play crucial roles in regulating children's screen time and promoting healthy behaviors. Parents who set clear boundaries on screen use and encourage physical activities contribute to lower obesity rates in their children. Conversely, permissive parenting styles may result in unchecked screen time and poor dietary habits, increasing the risk of obesity[17][18]. Educational programs targeting parents to raise awareness about the

impacts of screen time and strategies to manage it can be instrumental in mitigating childhood obesity.

The study's findings have significant implications for educational institutions and policymakers. Schools can integrate physical activity into daily curricula and promote extracurricular activities that reduce screen time. Policymakers should consider regulations that limit screen time exposure, especially in educational settings, and encourage the availability of public spaces that facilitate physical activities for children. Obesity is not merely a physical health issue but is intertwined with psychological and social dimensions. Children with obesity often face bullying, social isolation, and mental health challenges such as anxiety and depression. These psychological stressors can lead to emotional eating and further weight gain, creating a vicious cycle that perpetuates obesity.[19]

While technology is a significant contributor to increased screen time, it also offers innovative solutions to address obesity. Interactive and educational screen-based interventions that promote physical activity and healthy eating can transform screen time from a sedentary activity to a tool for health promotion. Gamification of physical activities and the use of fitness apps tailored for children can engage them in active behaviors while leveraging their interest in technology. Despite its comprehensive approach, the study has certain limitations. The cross-sectional design limits the ability to infer causality between screen time and obesity. Longitudinal studies are needed to establish temporal relationships and causative links. Additionally, the reliance on self-reported screen time and dietary habits may introduce reporting biases[20][21]. Future research should incorporate objective measures of screen time and dietary intake to enhance the accuracy of the findings. Future studies should explore the longitudinal impact of screen time on obesity to establish causality and understand the long-term health outcomes. Investigating the role of specific types of screen activities (e.g., educational vs. recreational) can provide nuanced insights into their differential effects on obesity. Additionally, examining the effectiveness of intervention programs that target screen time reduction and promote physical activity and healthy eating can inform evidence-based strategies to combat childhood obesity.

Pakistan's unique cultural context and dietary practices influence the relationship between screen time and obesity. Traditional diets rich in carbohydrates and fats, combined with modern sedentary lifestyles, contribute to weight gain. Understanding cultural dietary norms and integrating culturally appropriate nutritional education into intervention programs can enhance their effectiveness.[22] While the study included an equal number of male and female participants, gender-specific analyses could reveal differential impacts of screen time on obesity. Social norms and expectations regarding physical activity and dietary behaviors often vary between genders, potentially influencing obesity rates. Future research should investigate these differences to tailor interventions accordingly.

CONCLUSION

Excessive screen time is significantly associated with an increased risk of obesity among school-aged children in Pakistan. The study highlights the multifaceted nature of this relationship, where screen time interacts with various socio-demographic and behavioral factors, including physical activity levels, dietary habits, and socioeconomic status. Addressing childhood obesity requires a comprehensive and holistic approach that encompasses reducing screen time, promoting physical activity, and encouraging healthy dietary practices. Educational institutions, policymakers, parents, and healthcare providers must collaborate to implement targeted interventions that foster healthier lifestyles among children.

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