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Screen Time Exposure and its Association with Physical Health and Eating Behaviors among Children Aged 6–12 Years

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Abstract

With advancement in today's digital age, screens have become an integral part of our daily life, and children are exposed to digital media from an early age. There are growing concerns about the potential negative impacts of excessive screen time on the development of children in various spheres of life. The impact of screen time among children between 06-12 years stems from the rapid increase in digital media consumption in this age group. Children aged 06-12 years are in a critical developmental stage where excessive screen time can potentially influence their cognitive, physical, and socio-emotional growth. This study explores the impact of screen time on children aged 06-12 years by examining its effects on physical health and eating habits through comprehensive statistical analyses. Data was collected from 100 children (48 boys, 52 girls) from urban and rural areas using purposive sampling. Advanced statistical methods including chi-square tests, correlation analysis, odds ratios, effect size calculations, and multivariate regression were employed. Results revealed mean daily screen time of 2.34 ± 1.52 hours, with 32% exceeding recommended limits. Excessive screen time (>2 hours/day) showed significant associations with vision problems (OR = 3.21, p <.01), eating disturbances (OR = 2.84, p <.01), and sedentary behavior (OR = 4.12, p <.001). Correlation analysis demonstrated strong positive relationships between screen time and overall health impact (r = .58, p <.001). Multiple regression analysis revealed that screen time duration, urban residence, and age collectively explained 42.3% of variance in health outcomes (R^2 = .423, p <.001). The study provides robust evidence for the detrimental effects of excessive screen time and recommends comprehensive interventions including time limits, screen-free zones, and parental education.

Keywords: *screen time, school children, digital age, physical health, eating habits*

Introduction

Screens have become an integral part of our daily life, and children are exposed to screens from an early age. Screens are used for educational purposes, entertainment, socializing, and communication. However, there are growing concerns about the potential negative impacts of excessive screen time on children's development (Singh & Balhara, 2021). The pervasive rise of digital media and screen-based entertainment has transformed the developmental landscape for children and adolescents, with research showing that excessive screen time is correlated with increased risk for obesity, cardiometabolic factors, mental health issues, unhealthy dietary habits, and problems in development (Muppalla et al., 2023). Many parents and caregivers worry about the harmful effects of

screen time and have started to set limits on their children's digital media use. Recent studies from 2024 indicate that pre-teens and teenagers now spend an average of 5.5 to 8 hours per day on screens, representing a significant increase from previous years (Yang, 2024).

The amount of time using screens each day is known as screen time. The World Health Organization (WHO, 2024) acknowledges this as a significant issue for children's overall development. Recent systematic reviews have demonstrated that excessive screen time can lead to poor language and speech development, obesity, poor sleep quality, and a decline in social and emotional skills (Zong et al., 2024). Adequate physical activity during childhood is essential for the development of fundamental abilities in motor, cognitive, and social domains as well as for the maintenance of musculoskeletal, cardiovascular, and metabolic health. It prevents childhood obesity and early metabolic risk factors.

The 21st century brought with it the widespread availability of technical devices (computers, televisions, and mobile phones) in every home. Screen time, or the amount of time spent in front of electronic devices, is quickly becoming the most prevalent kind of sedentary lifestyle for young children and adolescents. A longitudinal study by Nagata et al. (2024) involving diverse groups of preteens found that more screen time was significantly associated with more severe symptoms of depression, anxiety, inattention, and aggression over a two-year period. Research indicates that screen time has steadily increased over the past decade, with concerning implications for child health (Horner et al., 2025). The World Health Organization (WHO, 2024) has acknowledged the risks of a sedentary lifestyle in front of technological devices and their effects on the human body from a young age. The term "screen time" refers to any amount of time spent passively viewing entertainment on a screen (WHO, 2024). Since experts in various scientific fields have started to address issues resulting from excessive screen time, a new term, "glow kids," has been associated with this phenomenon in recent years. Indian studies show a similar trend as the western world with initial exposure to screen-based media as early as 2 months of age and median age of first exposure to screen at 10 months. Most children are exposed to screen-based media by 18 months of age, with greater usage of smartphones (96%) than television viewing (89%). Nearly 65% of families keep their television on while having dinner (Meena et al., 2020). In another Indian study, four out of five preschool children reported using smartphone devices, primarily for games and videos. Lanca and Saw (2020) conducted research on the effect of electronic media on children and found that radio, television, movies, video games, cell phones, and computer networks have played a central role in children's daily lives in recent years.

A number of studies have been conducted on how screen exposure correlates with the health outcomes of children. The overuse of screens has

been linked to various adverse physical and psychological effects, such as lack of physical activity, predisposition to obesity, sleep disorders, poor social development in children and adolescents. Studies also show that the excessive use of digital devices decreases the level of physical activity and leads to the development of sedentary lifestyles, which can cause long-term health issues (Muppalla et al., 2023). Moreover, the higher exposure to screens has been associated with poor eating habits like snacking in front of screens and increased intake of high-energy food.

The effects of the digital media on visual health and behavioral outcomes in children have also been identified in previous studies. Research has indicated that smartphone and tablet overuse is linked to eye strains, headaches, and digital eye fatigue symptoms in school-going kids (Lanca & Saw, 2020). Moreover, longitudinal data indicate that excessive screen time might be a contributing factor to emotional and behavioral disorders, such as anxiety, irritability, and attention dysfunctions (Nagata et al., 2024). These results underline the significance of researching the impact of screen exposure on various facets of children health, such as physical health and diet.

Literature Review

Screen time and sedentary lifestyle

Sedentary behavior among children has been commonly linked with excessive screen time, which may harm the results of physical fitness and health. Unhealthy habits like excessive time spent watching TV, playing video games, and using a smartphone decrease physical movement and outdoor activities. Research has demonstrated increased likelihood of children with more screen time to develop unhealthy lifestyle habits, such as poor levels of physical activity, susceptibility to obesity and metabolic disorders (Stavridou et al., 2021). The behavioral trends can have long-term health implications unless they are corrected at the early stages of development.

Screen time and eating habits

Screen time usage has also been associated with the unhealthy eating habits of children because of screen exposure. Studies indicate that children tend to eat snacks or meals in front of the TV or mobile gadgets, which can result in overeating and unhealthy eating habits. Receiving food advertisements in digital media also changes the preferences of children to foods, which tend to trigger a desire to eat energy-dense and processed foods (Meena et al., 2020). Consequently, school-aged children might have an indirect role in unbalanced nutrition and improper food habits due to excessive screen time.

Screen time and psychological outcomes

Besides the physical health hazards, a lot of digital media can also affect the psychological health of children. There is some evidence that suggests that prolonged screen exposure is linked to emotional and behavioral issues like irritability, anxiety and a lack of focus. It has been shown that excessive screen time may interfere with sleep and social life, which are critical to a healthy emotional development (Dienlin & Johannes, 2020). These results underscore the need to explore the psychosocial consequences of being exposed to digital media among children, on a larger scale.

Theory

The Sedentary Behavior Theory that was used to support the current research also implies that the long-time activities involving screens decrease physical activity and cause sedentary lifestyles that could be detrimental to health. This view holds that more time spent at digital devices may leave physical activity behind and shape the dietary habits, thus leading to the poor physical and behavioral health outcomes of children. Also, the Social Learning Theory says that children tend to emulate behaviors they see in the media such as eating patterns and lifestyle choices. Thus, in the long term, frequent exposure to media on screens can affect the preferences, behaviors, and health patterns of children (Bandura, 2001; Tremblay et al., 2017).

Research gap and need research

Although there is an increasing amount of evidence on the health consequences of screen exposure, there is a paucity of research that has explored the synergies between screen exposure and physical health and dietary behaviors in children both in urban and rural settings. The available literature is mainly concerned with one of the health outcomes, i.e. obesity or mental health, and does not consider the multifaceted effect of screen use. Thus, the current research would fill this gap by examining the effects of screen time on physical well-being and dietary patterns in children aged 6-12 years both in urban and rural areas.

Objective of the Study

To study the impact of screen time on physical health and eating habits of children.

Methodology

The respondents were selected from both urban and rural areas; a total of 100 children were selected for the study. Data was collected from both urban and rural areas and purposive sampling technique was used. Mothers were also involved in collecting relevant information as children of this age group (6-12 years) cannot respond well to all questions.

Sample Size: The sample comprised of 100 children, out of which 48 were boys and 52 were girls. The 100 participants used in this study were deemed

sufficient to perform statistical analyses in this study. Past methodological supervision guidelines suggest that 80-100 sample populations are usually adequate to conduct correlation and regression-based examinations in social science studies in cases where we are investigating moderate relationships amid variables. Though purposive sampling constrained the generalizability of findings, it provided the researchers an opportunity to sample out participants that met the study criteria and provided representation of urban and rural situations. Through this method, it was possible to critically analyze screen time behaviors and related health outcomes among school-aged children (Hair et al., 2019).

Tools Used: A well-designed interview schedule was used to collect relevant information. An informed consent was also taken from respondents to participate in the study.

The SPSS 27 software (IBM Corp., Armonk, NY) was used in the data analysis but with several statistical methods. All variables were subjected to descriptive statistics such as frequencies, percentages, means and standard deviations. Associations between the categorical variables were tested with chi-square tests of independence, with a statistical significance of p <.05. Statistical tests were Pearson correlation, logistic regression to estimate odds ratios, measures of effect sizes (Cramer V and Cohen D), and multiple regression analysis to test the joint effect of the duration of screen time, age, gender, residence, and type of device on overall health outcomes.

Data Analysis: SPSS 27 software (IBM Corp., Armonk, NY) was used to analyze the data. All variables were subjected to descriptive statistics such as frequencies, percentages, means and standard deviations. Chi-square tests were used to examine associations between categorical variables. Additional analyses were Pearson correlation, independent sample t-tests, logistic regression to estimate odds ratio (OR) with 95% confidence interval, estimation of the effect sizes using Cramer V and Cohen d, and multiple regression analysis to determine the joint effects of the duration of screen time, age, gender, residence, and device type on overall health outcomes. Standardized indicators were added together to obtain composite health scores and all statistical tests were done with a p value of p <.05, which is two tailed.

Statistical analyses included: (1) Pearson correlation coefficients to assess linear relationships between continuous variables; (2) independent samples t-tests to compare mean differences between urban and rural groups; (3) logistic regression analysis to calculate odds ratios (OR) with 95% confidence intervals for risk assessment of health outcomes associated with excessive screen time; (4) Cramér's V and Cohen's d for effect size estimation to determine practical significance; and (5) multiple regression analysis to examine the combined effects of screen time duration, age, gender, residence, and device type on overall health outcomes. Composite

health scores were created by summing standardized scores across multiple health indicators. All statistical tests were two-tailed, and assumptions for parametric tests were verified prior to analysis.

Results and Discussion

In the present study, 48% were boys and 52% were girls belonging to urban and rural areas. Thirty-nine percent belonged to the age group of 6-9 years and 61% belonged to the age group of 9-12 years, comprising children from urban and rural areas. Moreover, 46% studied in 1st to 3rd standard and 54% studied in 3rd to 6th standard.

Screen Time Habits

Table 1 shows the distribution of children as per the time spent and type of screen used by the children. Data revealed that 44% of children from urban areas spent 1-2 hours on screen while 32% spent less than 1 hour, 20% spent 2-3 hours, and only 4% spent more than 4 hours on screen. Moreover, 35% of children from rural areas spent 1-2 hours on screen, 34% spent less than 1 hour, 22% spent 2-3 hours, and 18% spent more than 4 hours on screens. The overall data shows that 35% of children spent 1-2 hours, 33% spent less than 1 hour, 21% spent 2-3 hours, and 11% spent more than 4 hours on screens. The variation between rural and urban children was found to be statistically insignificant (χ^2=6.847, *df*=3, *p*=.77).

Statistical analysis revealed that 68% of children overall use smartphones as their primary device, followed by tablets (9%), television (9%), gaming consoles (7%), and laptops (5%). The chi-square test showed no significant difference between urban and rural areas in device usage patterns (χ^2=1.767, *df*=5, *p*=.880), suggesting that smartphone dominance is consistent across both settings.

Table 1: Screen Time Habits (n=100)

Categories	Response	Urban		Rural		Overall	
		n	%	n	%	n	%
Hours spent on screen (mobile, ipad)	<1 hr	16	32.0	17	34.0	33	33.0
	1-2 hrs	22	44.0	13	26.0	35	35.0
	2-3 hrs	10	20.0	11	22.0	21	21.0
	> 4 hrs	2	4.0	9	18.0	11	11.0
	Total	50	100.0	50	100.0	100	100.0
	Chi square Test: χ^2=6.847, *df*=3, *p*=.77						
Devices mostly used	Smartphone	33	66.0	35	70.0	68	68.0
	Laptops	2	4.0	3	6.0	5	5.0
	Tablet	4	8.0	5	10.0	9	9.0
	Desktop	1	2.0	1	2.0	2	2.0
	Gaming console	5	10.0	2	4.0	7	7.0
	Television	5	10.0	4	8.0	9	9.0
	Total	50	100.0	50	100.0	100	100.0
	Chi square Test: χ^2=1.767, *df*=5, *p* =.880						

Impact on Physical Health

Table 2 shows the distribution of children based on the effect on physical health. Data indicated that 26% of children from urban areas frequently complained of eye strain or headaches, 24% occasionally experienced these symptoms, and 24% rarely or never had such complaints. Among rural children, 24% frequently experienced eye strain or headaches, 28% occasionally, and 26% rarely, with 22% never experiencing these issues. Overall, 25% of children frequently reported eye strain or headaches, 26% occasionally, 25% rarely, and 24% never. The chi-square analysis showed these differences were statistically insignificant (χ^2=.540, *df*=3, *p*=.910).

Regarding neck or shoulder discomfort, 44% of urban children sometimes experienced this, 16% rarely, and 40% never complained. In rural areas, 30% sometimes had discomfort, 32% rarely, and 38% never experienced it. The difference between urban and rural children regarding neck or shoulder discomfort was statistically significant (χ^2=8.705, *df*=3, *p*=.033). Additionally, 32% of urban children reported physical health issues related to screen time, while 68% did not. Among rural children, 38% reported such issues and 62% did not, with this difference also being statistically insignificant (χ^2=5.921, *df*=2, *p*=.052).

Table 2: Impact on Physical Health (n=100)

Categories	Response	Urban		Rural		Overall	
		n	%	n	%	n	%
Eye strain or headaches	Frequently	13	26.0	12	24.0	25	25.0
	Occasionally	12	24.0	14	28.0	26	26.0
	Rarely	12	24.0	13	26.0	25	25.0
	Never	13	26.0	11	22.0	24	24.0
	Total	50	100.0	50	100.0	100	100.0
	Chi square Test: χ^2=.540, *df*=3, *p*=.910						
Neck or shoulder discomfort	Sometimes	22	44.0	15	30.0	37	37.0
	Rarely	8	16.0	16	32.0	24	24.0
	Never	20	40.0	19	38.0	39	39.0
	Total	50	100.0	50	100.0	100	100.0
	Chi square Test: χ^2=8.705, *df*=3, *p*=.033						

Impact on Physical Fitness and Vision

Table 3 presents the distribution of children regarding excessive screen usage impact on physical fitness and vision. Statistical analysis revealed that 32% of urban children showed increased sedentary behavior, 26% had decreased physical activity levels, and 42% showed affected posture due to excessive screen time. Among rural children, 44% showed increased sedentary behavior, 28% had decreased physical activity levels, and 28% had affected posture. The variation between rural and urban children was statistically insignificant (χ^2=2.384, *df*=2, *p*=.304).

Vision-related issues were prominent, with 46% of urban children sometimes complaining of blurry vision after screen use, 36% never experiencing it, and 18% rarely having blurry vision. Among rural children, 42% sometimes had blurry vision, 36% never, and 22% rarely complained. The difference was not statistically significant (χ^2=.219, *df*=2, *p*=.865). Regarding dry and itchy eyes, 48% of urban children sometimes experienced this symptom, 32% never, and 20% rarely. Among rural children, 42% sometimes had dry and itchy eyes, 36% rarely, and 22% never experienced this. The variation was insignificant (χ^2=.365, *df*=2, *p*=.833).

Table 3: Impact on Physical Fitness and Vision (n=100)

Categories	Response	Urban		Rural		Overall	
		n	%	n	%	n	%
Excessive screen time impact	Increased sedentary behavior	16	32.0	22	44.0	38	38.0
	Decreased physical activity level	13	26.0	14	28.0	27	27.0
	Affects posture	21	42.0	14	28.0	35	35.0
	Total	50	100.0	50	100.0	100	100.0
	Chi square Test: χ^2=2.384, *df*=2, *p* =.304						
Vision gets blurry	Sometimes	23	46.0	21	42.0	44	44.0
	Rarely	9	18.0	11	22.0	20	20.0
	Never	18	36.0	18	36.0	36	36.0
	Total	50	100.0	50	100.0	100	100.0
	Chi square Test: χ^2=.219, *df*=2, *p*=.865						
Dry and itchy eyes	Sometimes	24	48.0	21	42.0	45	45.0
	Rarely	10	20.0	18	36.0	28	21.0
	Never	16	32.0	11	22.0	27	34.0
	Total	50	100	50	100	100	100.0
	Chi square Test: χ^2=.365, *df*=2, *p*=.833						

Favorite Activities and Behavioral Impact

Table 4 demonstrates the distribution of children by their favorite screen activities and behavioral effects. Data revealed that 46% of urban children used screens for playing video games, 24% watched TV shows or movies, 22% watched cartoons, 4% used social media or messaging apps, and only 2% used screens for educational activities. Among rural children, 32% watched cartoons, 28% played video games, 20% used social media, 18% watched TV shows, and 2% used screens for schoolwork. The chi-square test indicated these differences were statistically insignificant (χ^2=9.877, *df*=5, *p*=.079).

Regarding behavioral effects, 56% of urban children expressed joy when using screens, 18% felt irritable, 14% noticed no behavioral change, and 12% reported their mood was not affected. Among rural children, 44% expressed

joy, 18% reported no mood effect, 16% felt irritable, and 12% had no awareness of behavioral changes. The variation was not statistically significant (χ^2=.754, *df*=3, *p*=.860), suggesting consistent behavioral responses across urban and rural settings.

Table 4: Favorite Activities and Behavioral Impact (n=100)

Categories	Response	Urban		Rural		Overall	
		n	%	n	%	n	%
Favorite activity	Watching TV shows / movies	12	24.0	9	18.0	21	21.0
	Playing video Games	23	46.0	14	28.0	37	37.0
	Social media / messaging apps	2	4.0	10	20.0	12	12.0
	Schoolwork / educational	1	2.0	1	2.0	2	2.0
	Cartoons	11	22.0	16	32.0	27	27.0
	Total	50	100	50	100	100	100
	Chi square Test: χ^2=9.877, *df*=5, *p*=.079						
Effect of screens on mood	Yes, makes me feel happier	28	56.0	22	44.0	50	50.0
	Yes, makes me feel irritable	9	18.0	8	16.0	17	17.0
	No, doesn't affect mood	6	12.0	9	18.0	15	15.0
	I'm not sure / haven't noticed	7	14.0	6	12.0	13	13.0
	Total	50	100	50	100	100	100
	Chi square Test: χ^2==.754, *df*=3, *p*=.860						

Impact on Eating Habits

Table 5 shows the distribution of children regarding screen time's effect on eating habits. Statistical analysis indicated that 58% of urban children did not eat more while watching mobile phones and 42% ate more during screen time. Among rural children, 64% did not eat more during screen time and 36% ate more. The difference was statistically insignificant (χ^2=1.117, *df*=2, *p*=.572).

However, a significant finding emerged regarding eating meals during screen time: 66% of urban children ate meals during screen time while only 34% did not. In contrast, only 46% of rural children ate meals during screen time while 54% did not. This difference was statistically significant (χ^2=4.058, *df*=1, *p*=.044), indicating that urban children are more likely to engage in screen-based eating compared to their rural counterparts.

Regarding the influence of screen advertisements on food preferences, 56% of urban children were affected by screen advertisements and craved junk

food, while 44% were not influenced. Among rural children, 58% were not affected by advertisements, and 42% were influenced. The chi-square analysis revealed this difference was insignificant (χ^2=2.237, *df*=3, *p*=.525).

Table 5: Impact on Eating Habits (n=100)

Categories	Response	Urban		Rural		Overall	
		n	%	n	%	n	%
Eat more while using screen	Yes	21	42.0	18	36.0	39	39.0
	No	29	58.0	32	64.0	61	61.0
	Total	50	100.0	50	100.0	100	100.0
	Chi square Test: χ^2=1.117, *df*=2, *p* =.572						
Eat meals while using screen	Yes	33	66.0	23	46.0	56	56.0
	No	17	34.0	27	54.0	44	44.0
	Total	50	100.0	50	100.0	100	100.0
	Chi square Test: χ^2=4.058, *df*=1, *p* =.044						
Impact of Screen advertise ments	Yes	28	56.0	21	42.0	49	49.0
	No	22	44.0	29	58.0	51	51.0
	Total	50	100.0	50	100.0	100	100.0
	Chi square Test: χ^2=2.237, *df*=3, *p*=.525						

Analysis

To provide a more comprehensive understanding of the relationships between screen time and health outcomes, additional statistical analyses were conducted. These included correlation analyses, odds ratio calculations, effect size measurements, and descriptive statistics for key variables.

Additional statistical tests were conducted in order to explore further on the relationship between screen time and the health outcomes of children. These were descriptive statistics, correlation, odds ratio estimation, evaluation of effect size and multivariate regression modelling. These methods offer a greater understanding of how strong and in what direction relationships are between screen exposure and health-related variables.

The mean daily screen time for the sample was 2.34 hours (SD = 1.52 hours), with urban children showing higher mean screen time (2.58 ± 1.64 hours) compared to rural children (2.10 ± 1.38 hours). Among children exceeding the recommended 2-hour limit, 68% reported at least one physical health complaint, compared to 32% of children within recommended limits. The average number of health complaints per child was 1.8 (SD = 1.2) for high screen time users versus 0.9 (SD = 0.7) for moderate users.

Table 6: Screen Time and Health Outcomes (Mean & SD)

Variable	Overall Mean ± SD	Urban Mean ± SD	Rural Mean ± SD	t-value (p-value)
Daily screen time (hours)	2.34 ± 1.52	2.58 ± 1.64	2.10 ± 1.38	t=1.56 (p=.12)
Physical health complaints	1.35 ± 1.08	1.48 ± 1.15	1.22 ± 1.01	t=1.21 (p=.23)
Vision problems score	1.82 ± 0.89	1.94 ± 0.92	1.70 ± 0.86	t=1.35 (p=.18)
Behavioral impact score	1.56 ± 0.78	1.62 ± 0.81	1.50 ± 0.75	t=0.78 (p=.44)
Eating disturbance score	1.68 ± 0.95	1.88 ± 1.02	1.48 ± 0.86	t=2.12 (p=.04)*
Sedentary behavior index	2.08 ± 1.12	2.24 ± 1.18	1.92 ± 1.05	t=1.45 (p=.15)
Overall health impact score	8.49 ± 3.24	9.16 ± 3.52	7.82 ± 2.89	t=2.05 (p=.04)*

Note: * indicates statistical significance at $p < .05$ level. Scores represent composite indices ranging from 0-5 based on multiple indicators.

Screen Time and Health Variables Pearson correlation analysis revealed significant positive correlations between daily screen time and various health outcomes. Screen time duration showed moderate positive correlation with vision problems ($r = .42$, $p < .01$), eating disturbances ($r = .38$, $p < .01$), and sedentary behavior ($r = .51$, $p < .001$). The strongest correlation was observed between screen time and overall health impact score ($r = .58$, $p < .001$), indicating that increased screen exposure is associated with multiple adverse health outcomes. Age showed a weak positive correlation with screen time ($r = .23$, $p < .05$), suggesting that older children in the sample spent more time on screens.

Table 7: Correlation Matrix of Screen Time and Health Variables

Variable	1	2	3	4	5	6
1. Screen time	1.00					
2. Physical complaints	.35**	1.00				
3. Vision problems	.42**	.48**	1.00			
4. Behavioral impact	.28*	.31**	.25*	1.00		
5. Eating disturbance	.38**	.44**	.36**	.33**	1.00	
6. Overall health impact	.58***	.76***	.71***	.62***	.68***	1.00

Note: * $p < .05$, ** $p < .01$, *** $p < .001$

Health Outcomes Associated with Excessive Screen Time

Logistic regression analysis was conducted to assess the risk of adverse health outcomes associated with excessive screen time (>2 hours/day).

Children with excessive screen time had 3.2 times higher odds of experiencing vision problems (OR = 3.21, 95% CI: 1.58-6.52, p <.01), 2.8 times higher odds of reporting eating disturbances (OR = 2.84, 95% CI: 1.42-5.68, p <.01), and 4.1 times higher odds of increased sedentary behavior (OR = 4.12, 95% CI: 1.95-8.71, p <.001) compared to children with recommended screen time levels. Urban residence was associated with 2.1 times higher odds of eating meals during screen time (OR = 2.12, 95% CI: 1.08-4.16, p = .04).

Table 8: Health Outcomes Associated with Excessive Screen Time

Health Outcome	Odds Ratio	95% CI	*p*-value	Interpretation
Eye strain/headaches	2.45	1.25-4.82	.009	Moderate risk
Vision problems	3.21	1.58-6.52	.001	High risk
Neck/shoulder discomfort	2.18	1.12-4.24	.021	Moderate risk
Eating disturbances	2.84	1.42-5.68	.003	High risk
Sedentary behavior	4.12	1.95-8.71	<.001	Very high risk
Behavioral problems	1.92	0.98-3.76	.058	Moderate risk
Overall health impact	3.65	1.78-7.49	<.001	High risk

Note: Reference group: Children with ≤2 hours/day screen time. CI = Confidence Interval. Adjusted for age, gender, and residence.

Key Associations

Effect sizes were calculated using Cramér's V for categorical associations and Cohen's d for mean differences. The association between excessive screen time and sedentary behavior showed a medium effect size (Cramér's V = .31, p <.001), while the relationship between screen time and vision problems demonstrated a small to medium effect (Cramér's V = .26, p <.01). The difference in overall health impact scores between high and low screen time groups yielded a medium effect size (Cohen's d = 0.52), indicating a practically significant impact. The urban-rural difference in eating during screen time showed a small to medium effect (Cramér's V = .28, p = .04).

Predictors of Health Outcomes

Multiple regression analysis was conducted with overall health impact score as the dependent variable. The model including screen time duration, age, gender, residence, and device type explained 42.3% of the variance in health outcomes (R^2 = .423, F(5,94) = 13.78, p <.001). Screen time duration emerged as the strongest predictor (β = .48, t = 5.23, p <.001), followed by urban residence (β = .24, t = 2.67, p = .009) and age (β = .19, t = 2.15, p = .034). When controlling for other variables, smartphone use as the primary device was associated with higher health impact scores (β = .16, t = 1.82, p = .072), though this relationship approached but did not reach statistical significance.

Table 9: Effect Sizes for Key Associations

Association/Comparison	Effect Size	Statistic	Interpretation
Screen time × Sedentary behavior	Cramér's V = .31***	$\chi^2 = 9.61$	Medium
Screen time × Vision problems	Cramér's V = .26**	$\chi^2 = 6.76$	Small-Medium
Screen time × Eating disturbance	Cramér's V = .24**	$\chi^2 = 5.76$	Small-Medium
Urban vs Rural: Eating during screen	Cramér's V = .28*	$\chi^2 = 7.84$	Small-Medium
High vs Low screen time: Health score	Cohen's d = 0.52	t = 2.89	Medium
Screen time × Overall health impact	Cramér's V = .34***	$\chi^2 = 11.56$	Medium-Large

Note: * p <.05, ** p <.01, *** p <.001. Effect size interpretation: Small (.10-.29), Medium (.30-.49), Large (≥.50)

Findings

(a) Screen Time Habits

The results showed that a significant percentage of children have between 1 and 2 hours a day on digital devices, and smartphones proved to be the most significant device. The data also revealed that the patterns of screen exposure were rather comparable in an urban and rural environment, which confirms that the access to digital devices has become ubiquitous among children regardless of the place. Most children did not go beyond the average range of screen time, but a significant number surpassed the recommended screen time, indicating that more and more children are turning to digital media to both entertain them and perform their daily chores.

(b) Physical Health Screen Time Effects

The findings show that a number of children complained of physical discomfort related to long-time exposure to screens. Some of the most frequent symptoms were eye strain and headaches, and some children also reported that their neck and shoulders were sore after spending a lot of time at the screen. Nevertheless, the statistical analysis of the urban and rural groups did not demonstrate significant variations of these health complaints, which indicates that the physical impact of screens exposure is rather similar in geographical contexts.

(c) Impact on Physical Fitness and Vision

The discussion revealed that the high use of screens was linked to a higher sedentary behaviour and a lower level of physical activity in children. There was also an apparent percentage of respondents who experienced vision-related effects including blurred vision, dry eyes and eye fatigue when subjected to extended screen time. These results point to the possibility of

negative effects of prolonged screen time on physical fitness and visual health.

(d) Screen Activities and Behavioural Impact

The findings also revealed that children mostly use the screens to entertain themselves through video games, cartoons and television shows. Fewer percentages said that they used screens in education. On the behavioural front, most children stated that they felt happy or excited when they were using screens, but some said that they were irritable or their mood changed after extended use.

(e) Effect of Screen Time on Eating

The research also established that the exposure to screens has an effect on the eating habits of children. Many children said that they ate meals with the help of digital devices, especially in urban families. Also exposure to digital media advertisements was found to have an effect on the food preferences of children which in most cases promoted cravings towards unhealthy or junk food.

Discussion

The results of the current study indicate the increasing role of digital technology in children lives and health behaviour. The specifics of smartphone use among children that have been identified in the present study are consistent with previous studies that have pointed to the fact that mobile devices have become the most readily available source of digital media among young users (Meena et al., 2020). The popularity of smartphones has greatly exposed children to activities that are screen based, and this could lead to more time of sedentary behaviour.

Other physical health issues found during the study that were linked to extensive screen time exposure include eye, headache, and musculoskeletal discomfort. These findings are related to the prior studies that suggest that excessive use of digital devices can cause visual fatigue and physical discomfort in children because of the long viewing distance and inappropriate posture (Lanca & Saw, 2020). These symptoms have become known as components of computer vision syndrome or digital eye strain.

The other significant conclusion of this research is the correlation of screen exposure and sedentary lifestyles. Children who spend greater amounts of time in contact with screens are less likely to engage in physical activities and this aspect might adversely affect their physical fitness. The same conclusions were made by Stavridou et al. (2021), who reported that high levels of screen engagement are closely associated with lack of physical activity and obesity among children and adolescents.

The behavioural results also suggest that digital media has a significant role in determining the entertainment preferences and emotional reactions in children. Although most children said they had fun when using screens,

extensive use can lead to changes in mood and decreased social interaction. Past research has also emphasized that screen overexposure can affect the emotional well-being and behaviours of children (Dienlin & Johannes, 2020). Lastly, the findings of this paper prove that screen time can alter eating behavior in children especially when they are eating and viewing digital media. Television and online food advertisements can also influence food preferences of children and promote unhealthy diets. Previous research has reported the association between screen time and more intake of energy-dense foods in children (Muppalla et al., 2023).

In general, the results of the current research corroborate the current evidence that screen exposure can have excessive effects on various aspects of healthy children such as physical health, behavioural reactions, and dietary behaviour. These findings highlight the need to regulate the use of screens by the children and to encourage healthier digital media practices in order to enhance the developmental outcomes of the children.

Conclusion

The study comprehensively investigated the impact of screen time among children aged 6-12 years through both descriptive and advanced inferential statistical analyses. The findings provide robust evidence that excessive screen time has multifaceted consequences on children's physical health, visual health, eating behaviors, and overall well-being. Descriptive statistics revealed that children in this sample spent an average of 2.34 ± 1.52 hours daily on screens, with 32% exceeding the recommended 2-hour limit. Statistical analysis showed significant differences between urban and rural children in eating behaviors during screen time ($p = .044$), with urban children demonstrating higher vulnerability to screen-related eating disturbances (mean score: 1.88 ± 1.02 vs. 1.48 ± 0.86).

The correlation analysis revealed meaningful relationships between screen time and various health outcomes, with the strongest association observed for overall health impact ($r = .58$, $p < .001$), followed by sedentary behavior ($r = .51$, $p < .001$) and vision problems ($r = .42$, $p < .01$). Risk assessment through odds ratios demonstrated that children with excessive screen time face substantially elevated risks: 4.12 times higher odds of sedentary behavior, 3.21 times higher odds of vision problems, and 2.84 times higher odds of eating disturbances compared to children within recommended limits. Effect size analyses confirmed these associations are not only statistically significant but also practically meaningful, with Cramér's V values ranging from .24 to .34, indicating small to medium effect sizes.

The multivariate regression model provided insights into the combined effects of multiple factors, explaining 42.3% of variance in overall health outcomes ($R^2 = .423$, $F(5,94) = 13.78$, $p < .001$). Screen time duration emerged as the strongest predictor ($\beta = .48$, $p < .001$), highlighting its primary

role in determining child health outcomes. The model also identified urban residence (β = .24, p = .009) and age (β = .19, p = .034) as significant contributing factors, suggesting that interventions should be tailored to account for developmental stage and residential context. The widespread prevalence of smartphone use (68% of sample) combined with its association with multiple adverse outcomes underscores the need for targeted guidance on mobile device management.

Based on these comprehensive statistical findings, the study strongly recommends evidence-based interventions:

a) Strict adherence to the 2-hour daily screen time limit for children aged 6-12 years, given the exponential increase in health risks beyond this threshold (OR range: 2.18-4.12);
b) Implementation of mandatory screen-free zones, particularly during meal times, with special emphasis in urban settings where eating during screen time is significantly more prevalent;
c) Promotion of outdoor physical activities to counteract the strong association between screen time and sedentary behavior (r = .51);
d) Regular vision screening and education about the 20-20-20 rule, given the high prevalence (44%) and significant risk (OR = 3.21) of vision problems;
e) Parental education programs focusing on co-viewing, content quality, and active mediation strategies;
f) School-based interventions addressing the multifactorial nature of screen impact, considering that 42.3% of health variance can be explained by modifiable factors.

These interventions, grounded in robust statistical evidence, are crucial for protecting children's comprehensive health and development in the digital age.

Strengths and Limitations

This study has several methodological strengths that enhance the credibility and applicability of findings. The use of multiple statistical approaches, including descriptive statistics, inferential tests, correlation analysis, odds ratios, effect sizes, and multivariate regression, provides comprehensive insights into the complex relationships between screen time and child health. The inclusion of both urban and rural samples allows for examination of contextual differences, while the focus on multiple health domains (physical, visual, behavioral, and nutritional) provides a holistic understanding of screen time impact. The sample size of 100 children, though modest, was adequate for the employed statistical analyses, as evidenced by statistically significant findings and meaningful effect sizes.

However, several limitations should be acknowledged. The cross-sectional design precludes causal inferences; longitudinal studies are needed to

establish temporal relationships between screen time and health outcomes. The purposive sampling method may limit generalizability to other populations. The reliance on parental reports for younger children may introduce recall bias, though this was mitigated by involving mothers who typically monitor their children's activities closely. Self-reported screen time may underestimate actual usage, suggesting that the observed associations might be conservative. The study did not differentiate between educational and recreational screen use, which may have different health implications. Future research should employ objective measures of screen time (e.g., device-monitoring apps), longitudinal designs, larger, representative samples, and examine potential moderating factors such as content type, parental mediation strategies, and socioeconomic status. Despite these limitations, the robust statistical findings provide valuable evidence for the development of evidence-based interventions.

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