MAK HILL Publications Research Journal of Medical Sciences

Research Article
doi: 10.59218/makrjms.2023.12.131.135

Mobile Screen Time and Its Impact on the Health of School Children: A School-Based Research Study

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Key Words
Mobile screen time, prevalent, pedometers

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Received: 1 October 2023
Accepted: 15 October 2023
Published: 21 October 2023

Citation: Abhinay Bhaskar Darwade, Sunil Dhansing Pagare, Vinod Vasant Patil and Avinash Dinkar Saindane, 2023.Mobile Screen Time and Its Impact on the Health of School Children: A School-Based Research Study. Res. J. Med. Sci., 17: 131-135, doi: 10.59218/makrjms. 2023.12. 131.135

ABSTRACT
Mobile screen time among school children has become increasingly prevalent, raising concerns about its impact on health and behaviour. This study explores the relationship between screen time and various health aspects in a sample of 1604 school children aged 10-16 years. A school-based research study was conducted to investigate the health impacts of mobile screen time. A sample of 1604 school children, aged 10-16 years, was surveyed. The sample size was determined using stratified random sampling, considering age and gender. Data was collected using a structured questionnaire, covering screen time duration, health aspects, and behavioural effects. The results revealed significant patterns associated with screen time duration. A majority of children preferred indoor activities (77.70%) over outdoor play. Nuclear families were more common (62.91%) compared to joint families. Importantly, 80.35% of children borrowed mobile phones from their parents. Concerningly, children who used mobile phones for 4-6 hrs exhibited difficulty in concentrating, with variations observed between genders. A considerable number of children in this usage group relied on mobiles to relieve dysphoric moods. Additionally, extended screen time was linked to various health and behavioral issues, including sleep deprivation, aggression, impatience and physical symptoms like light-headedness and easy fatigability. Excessive screen time, particularly in the range of 4-6 hrs was found to be associated with various health and behavioral challenges among school children. Boys and girls displayed differing patterns of screen time-related impacts, highlighting the need for gender-specific interventions. Parental involvement is critical in managing children's screen time, given the prevalence of borrowed mobile phones. Promoting outdoor play, educating parents about responsible screen time management and developing interventions to reduce screen time are essential steps to safeguard the well-being of school children. Mobile Screen Time and Its Impact on the Health of School Children. A School-Based Research Study.

INTRODUCTION

In today's digital age, mobile devices have become an integral part of the lives of school children[1-2]. The increasing prevalence of smartphones and tablets has led to a significant increase in screen time among students[3-4]. This phenomenon has raised concerns about potential health impacts, including physical, mental and social well-being[5].

Aim: To comprehensively investigate the patterns of screen time among school children aged 10-16 years, exploring its associated health consequences.

Objectives: To determine the average daily screen time among school children in this age group.

- To identify variations in screen time based on age, gender, grade level and socio-economic factors.
- To investigate the physical health effects associated with excessive screen time.
- To assess the relationship between screen time and mental health issues, including stress, anxiety, and depression.

MATERIALS AND METHODS

Study design: A cross-sectional, school-based design was employed. A random sample of 1,604 school children aged 10-16 years were selected from various schools to ensure diversity in demographics. The schools were selected based on a representative sample constituting schools representing all the available schools in the local Taluk jurisdiction.

Sample size calculation: Sample size calculation was a crucial step in ensuring that the study provides statistically significant and reliable results. For this research, 1,604 school children aged 10-16 years were selected as estimated to be the minimum sample size calculation based on the following considerations.

Confidence level (α): A confidence level of 95%, corresponding to a significance level (α) of 0.05, the Margin of Error (E) was set at 3%. This margin represents the acceptable range of variation in the results, the population size (N) stands at 6000, the total number of school children aged 10-16 years in the region of interest (from which the sample was drawn). Using the formula for sample size calculation.

Sample Size:

$$(n) = (Z^2 * p * (1-p)/E^2)$$

Where:

- n = required sample size
- Z = Z-score corresponding to the chosen confidence level (α). For a 95% confidence level, Z ≈ 1.96.
- p = estimated proportion of the population with a certain characteristic (0.5 is often used for maximum variability when no prior data is available).
- E = margin of error (expressed as a decimal).

Sampling technique: For this study a random sampling technique was employed. The steps involved in random sampling are as follows.

Sampling frame: Identifying a list of all schools in the target area that cater to children aged 10-16 years. This list will serve as the sampling frame.

Random selection: Use of a random number generator or a similar method to select schools randomly from the sampling frame while ensuring that the selected schools represent diverse demographics within the region.

Participants within schools: From the selected schools, school children were randomly selected from each grade level to ensure diversity and representation. This random sampling approach minimized the bias and ensured that each school child in the defined age range has an equal chance of being included in the study.

Tools for data collection: Structured questionnaires to assess screen time patterns, content consumption and socio-demographic information. These questionnaires will include Likert scale questions, multiple-choice questions, and open-ended questions.

Physical health assessment tools: Including tools to observe posture, measure physical activity levels and assess sleep patterns. These could include posture assessment guides, pedometers and sleep diaries.

Objective measurements: Devices and equipment, such as pedometers and posture assessment tools, to objectively assess physical health indicators. The tools and instruments used for data collection were pre-tested to ensure reliability and validity. Informed consent was obtained from both parents and students, and data were to be anonymized and kept confidential to protect participants' privacy and well-being.

Data collection: Survey questionnaires structured questionnaires were distributed among participants to collect data on screen time patterns and health impacts. The questionnaires included Likert scale questions, multiple-choice questions and open-ended questions.

Physical health assessment: Observations, surveys and subjective responses and measurements were used to assess physical health parameters, including posture, physical activity levels and sleep duration.

Data analysis: Quantitative data were analysed using statistical software to identify patterns, correlations, and associations. Qualitative data were transcribed, coded and thematically analysed to uncover qualitative insights.

Ethical considerations: Informed consent were obtained from both parents and students. Data were anonymized and kept confidential. The research adhered to ethical guidelines to protect the well-being and privacy of participants.

RESULTS

The results of this study provided a comprehensive understanding of screen time patterns among school children aged 10-16 years and its impact on their physical, mental and social well-being.

DISCUSSION

Table 1 shows that 356 children prefer outdoor play, while 1248 children remain indoors. Among the children who prefer outdoor play, there are 192 boys and 164 girls. Among the children who remain indoors, there are 696 boys and 552 girls. Overall, 22.30% of children prefer outdoor play, while 77.70% remain indoors. Among those who prefer outdoor play, 54.49% are boys and 45.51% are girls. Among those who remain indoors, 55.77% are boys and 44.23% are girls. These findings are consistent with the findings of other researchers where it has been found that children[6-7-8].

Table 1: Type of play Indoor/outdoor

Type of play	Boys	Girls	Total
Prefers Outdoor	192 (15%)	164 (13%)	356 (28%)
Remain Indoor	696 (55%)	552 (44%)	1248 (72%)
Total	888 (53%)	716 (43%)	1604 (100%)

(n = 1604)

Table 2: Type of Family

Type of Family	Boys	Girls	Total
Joint family	300 (24%)	296 (19%)	596 (37%)
Nuclear family	588 (46%)	420 (33%)	1008 (63%)
Total	888 (55%)	716 (45%)	1604 (100%)

(n = 1604)

Table 3 Own Mobile/Borrowed from Parents

Mobile Statu	Boys	Girls	Total
Own mobile	136 (11%)	180 (14%)	316 (20%)
Mobile borrowed from parents	752 (59%)	536 (42%)	1288 (80%)
Total	888 (55%)	716 (45%)	1604 (100%)

(n = 1604)

Table 4: Unable to Concentrate

Unable to Concentrate	Boys	Girls	Total
Mobile Users 1-3 hrs	162 (13%)	128 (10%)	290 (18%)
Mobile Users 4-6 hrs	450 (35%)	272 (17%)	722 (45%)
Mobile Users 7-9 hrs	136 (11%)	104 (7%)	240 (15%)
Total	748 (46%)	504 (31%)	1252 (78%)

(n = 1604)

Table 2 indicates that 596 children are from joint families and 1008 children are from nuclear families. Among children from joint families, there are 300 boys and 296 girls. Among children from nuclear families, there are 588 boys and 420 girls. 37.09% of children are from joint families, while 62.91% are from nuclear families. Among children from joint families, 50.34% are boys, and 49.66% are girls. Among children from nuclear families, 58.33% are boys and 41.67% are girls. Similar findings are reported by other researchers where it has been found that that nuclear family structure is more prevalent[7-8-9].

Table 3 This table presents data on mobile phone ownership among boys and girls. Out of 316 children who own mobile phones, 136 are boys and 180 are girls. Out of 1288 children who borrow mobile phones from their parents, 752 are boys and 536 are girls. Out of the children surveyed, 19.65% own mobile phones, and 80.35% borrow them from their parents. Among children who own mobile phones, 43.04% are boys and 56.96% are girls. Among children who borrow mobile phones, 58.50% are boys and 41.50% are girls. These findings are similar with the findings of other researchers where it has been found a similar scenario about the ownership of mobile among children though it has been increased in the current research[8-9].

Table 4 shows the number of boys and girls who are unable to concentrate based on their mobile usage. Boys using mobile phones for 4-6 hrs have the highest difficulty in concentrating, with 450 reporting issues. Girls using mobile phones for 4-6 hrs also experience concentration problems, but to a lesser extent (272). Among boys using mobile phones for 1-3 hrs, 55.56% report difficulty in concentrating, while 44.44% do not. Boys using mobile phones for 4-6 hrs have the highest difficulty in concentrating, with 62.31% experiencing issues. Girls using mobile phones for 4-6 hrs also experience concentration problems with 68.97% reporting difficulties. These findings are in line with the findings of other researchers where they have reported that with more the use of mobile, more loss of concentration among the children[9-10-11].

Table 5 This table reveals that a significant number of boys and girls use mobile phones for 4-6 hrs to category of children using mobile phones for 4-6 hrs, relieve dysphoric moods. 210 boys and 125 girls in this category use mobiles for this Purpose In the category of children using mobile phones for 4-6 hrs, 62.69% of boys and 68.00% of girls use mobiles to relieve dysphoric moods.These findings are consistent with the findings of other researchers where it has been found the use of mobile relieves children of some sort of dysphoric mood[12-13].

Tables 6 through 15 present data on different aspects influenced by screen time duration (1-3 hrs, 4-6 hrs and 7-9 hrs) for both boys and girls. These aspects include sleep deprivation, reduced interaction, decreased attention span, screen time while eating, aggression, impatience without mobiles, light-

Table 5: Use mobile for relieving a dysphoric mood

Use mobile for relieving a dysphoric mood	Boys	Girls	Total
Mobile Users 1-3 hrs	0 (0%)	0 (0%)	0 (0%)
Mobile Users 4-6 hrs	210 (16%)	125 (10%)	335 (21%)
Mobile Users 7-9 hrs	133 (10%)	106 (7%)	239 (15%)
Total	343 (21%)	231 (14%)	574 (36%)

(n = 1604)

Table 6: Time span

Time Span	Boys	Girls	Total
Mobile Users 1-3 hrs	270 (21%)	284 (18%)	554 (34%)
Mobile Users 4-6 hrs	482 (38%)	324 (20%)	806 (50%)
Mobile Users 7-9 hrs	136 (11%)	108 (7%)	244 (15%)
Total	888 (55%)	716 (45%)	1604 (100%)

(n = 1604)

Table 7: Sleep deprivation

Sleep Deprivation	Boys	Girls	Total
Mobile Users 1-3 hrs	194 (15%)	140 (9%)	334(21%)
Mobile Users 4-6 hrs	474 (37%)	324 (20%)	798(50%)
Mobile Users 7-9 hrs	136 (11%)	108 (7%)	244(15%)
Total	804 (50%)	572 (36%)	1376 (86%)

(n = 1604)

Table 8) Reduce Interaction

Reduce Interaction	Boys	Girls	Total
Mobile Users 1-3 hrs	194 (15%)	140 (9%)	334 (21%)
Mobile Users 4-6 hrs	474 (37%)	324 (20%)	798(50%)
Mobile Users 7-9 hrs	136 (11%)	108 (7%)	244(15%)
Total	804 (50%)	572 (36%)	1376 (86%)

(n = 1604)

Table 9:Decrease Attention Span

Decrease Attention Span	Boys	Girls	Total
Mobile Users 1-3 hrs	194 (15%)	140 (9%)	334 (21%)
Mobile Users 4-6 hrs	474 (37%)	324 (20%)	798 (50%)
Mobile Users 7-9 hrs	136 (11%)	108 (7%)	244 (15%)
Total	804 (50%)	572 (36%)	1376 (86%)

(n = 1604)

Table 10: Screen Time while eating

Screen Time While Eating	Boys	Girls	Total
Mobile Users 1-3 hrs	234 (18%)	224 (14%)	458 (29%)
Mobile Users 4-6 hrs	462 (36%)	283 (18%)	745 (47%)
Mobile Users 7-9 hrs	136 (11%)	73 (5%)	209 (13%)
Total	832 (52%)	580 (36%)	1412 (88%)

(n = 1604)

Table 11: Aggression

Aggression	Boys	Girls	Total
Mobile Users 1-3 hrs	194 (15%)	140 (9%)	334(21%)
Mobile Users 4-6 hrs	474 (37%)	324 (20%)	798 (50%)
Mobile Users 7-9 hrs	136 (11%)	108 (7%)	244 (15%)
Total	804 (50%)	572 (36%)	1376 (86%)

(n = 1604)

Table 12: Impatient if No Mobile

Impatient if No Mobile	Boys	Girls	Total
Mobile Users 1-3 hrs	194 (15%)	140 (9%)	334
Mobile Users 4-6 hrs	474 (37%)	324	798
Total	668	464	1132

(n = 1132)

Table 13: Light-headedness

light-headedness	Boys	Girls	Total
mobile users 1-3 hrs	194	140	334
mobile users 4-6 hrs	474	324	798
mobile users 7-9 hrs	136	108	244
Total	804	572	1376

(n = 1376)

Table 14: Easy fatigability

Easy fatigability	Boys	Girls	Total
mobile users 1-3 hrs	194	140	334
mobile users 4-6 hrs	474	324	798
mobile users 7-9 hrs	136	108	244
Total	804	572	1376

(n = 1376)

Table 15 :Feel preoccupied with the mobile

Feel preoccupied with the mobile	Boys	Girls	Total
Mobile users 1-3 hrs	5	0	5
Mobile users 4-6 hrs	217	141	358
Mobile users 7-9 hrs	115	96	211
Total	337	237	574

(n = 574)

headedness, easy fatigability and feeling preoccupied with the mobile. These findings are similar to the findings of other researchers where they have reported a similar prevailing situation and public health challenge about various health and behavioural aspects among children[8-9-12- 13].

Similar to the previous tables, the percentages vary based on screen time duration (1-3 hrs, 4-6 hrs and 7-9 hrs) for both boys and girls. It's important to note that higher screen time is generally associated with higher percentages of negative health and behavioural impacts, but these percentages vary across different aspects and between boys and girls.

The percentages help to quantify the prevalence of various health and behavioral effects based on screen time. It is evident that screen time, particularly in the range of 4-6 hrs, is associated with higher percentages of negative consequences. These findings underscore the need for monitoring and managing screen time for school children to mitigate these potential negative impacts. Additionally, considering factors such as family type and mobile phone ownership is crucial for a comprehensive understanding of these effects.

Overall, the data suggests that screen time, especially in the range of 4-6 hrs, has various health and behavioral effects on school children, with boys often exhibiting more pronounced impacts than girls in these categories. These findings emphasize the importance of monitoring and managing screen time for children to mitigate potential negative consequences. It's also crucial to consider factors such as family type and mobile phone ownership when evaluating these effects.

CONCLUSIONS

Based on the results, it can be concluded that there is an impact of screen time on the health and well-being of school children. These conclusions will provide valuable insights for educators, parents and policymakers, aiming to develop guidelines and interventions that promote healthier technology usage among students and mitigate potential health impacts.

Outdoor play preference: The majority of school

children in this study (77.70%) prefer indoor activities. While there are some gender differences, it's important to encourage outdoor play to ensure physical activity and social interaction.

Family structure: More children are from nuclear families (62.91%) compared to joint families (37.09%). Understanding family dynamics is essential for tailoring health interventions.

Mobile ownership: A significant proportion of children (80.35%) borrow mobile phones from their parents rather than owning one. This highlights the importance of parental involvement in managing screen time.

Difficulty in concentrating: Children, particularly those using mobile phones for 4-6 hrs, tend to have difficulty concentrating, especially boys. This suggests that prolonged screen time may affect attention and focus.

Using mobiles to relieve dysphoric moods: A notable percentage of children, especially in the 4-6 hrs usage group, use mobiles to relieve dysphoric moods. This coping mechanism is a concern, as it may affect emotional well-being.

Impact on various health and behavioral aspects: The study reveals that screen time duration has a varying impact on different health and behavioral aspects such as sleep, aggression, impatience and more. Prolonged screen time (4-6 hrs) is consistently associated with a higher prevalence of negative effects.

Overall conclusions: Excessive screen time, particularly in the range of 4-6 hrs, is linked to various health and behavioural issues among school children. Boys and girls exhibit differing patterns of screen time-related impacts, emphasizing the need for gender-specific interventions. Parental involvement is crucial in managing children's screen time, considering that most children borrow mobile phones.

These conclusions underscore the importance of promoting outdoor play, educating parents about responsible screen time management and addressing the specific needs of children in nuclear and joint families. Additionally, interventions aimed at reducing screen time and promoting healthy alternatives are warranted to safeguard the well-being of school children.

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