

# Use of Smartphone and its Relation to Nutritional Status and Scholastic Performance in Primary School Going Children

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## ABSTRACT

Children's use of mobile phones has been on the rise, and now the question is, how does it affect the health of children and their academic performance? The aim of this study is to determine the association of Smartphone use and its impact on nutritional status and scholastic performance of pupils attending primary schools. A cross sectional study research design was used, with a sample of 150 students (6-12 years), and questionnaires, anthropometric measurement and school performance tools were used to collect the data. The following details of smartphone use, dietary habits, Body Mass Index (BMI) and academic performance were analysed in the study. The results showed that 44.7% of the children used smartphones for an average of 1-3 hrs/day, and 36.6% of the children used smartphones for more than 3 hrs/day. The most common activities were gaming and viewing video (32.0% and 27.3% respectively). 54.0% of the subjects were in the normal BMI range, 19.3% were underweight, 16.7% were overweight and 10.0% were obese. 31.3% of children were seen to skip meals often. Academic achievement, 39.4% of the individuals score good academically and 14.0% of them score poor in academic achievement. The kids with a lot of smartphone use exhibited lower attention span and academic performance. It is concluded from the study that primary school children's nutrition habits and academic performance are adversely affected if they use the smartphone for a long time.

**Keywords:** Smartphone Use, Nutritional Status, Scholastic Performance, Primary School Children, Screen Time

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## I. INTRODUCTION

With the rapid development of digital technology, the use of smart phones among children, in the world, has been greatly increased. Smartphones today are considered a need of life, to let people communicate, be educated, entertained, socially interactive and so on [1]. In recent years, primary school students have been introduced to the smartphone in more and more aspects for education, games, watching video and social media applications. Smartphones are used for a series of educational and technological purposes that benefit the children, but when it is not correctly and moderately used it can have adverse effects on

children's health, nutrition intake and their school performance [2]. Thus, the importance of researching the effects of using a smartphone in young children has become an important priority. Child nutrition status is a vital yardstick of children's growth and their overall health. More time spent on the phone correlates with more time sitting, less healthy dietary habits and less physical activity, and increased intake of unhealthy snacks and fast food. Little children often get good sleep when they play or indulge in interesting leisure activities, while they often suffer from poor sleep when exposed to long hours of screens. Children may also not get onto a good sleeping schedule when using

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screens, and this can affect nutritional wellbeing due to the loss of good sleep habits [3]. Concurrently, overuse of the smartphone may have an impact on the students' academic achievement, it may distract students in learning activities, shorten the time in which students study, and reduce their concentration when learning. Spending the majority of their time on their smartphones can hinder children's learning, cause poor focus and attention spans, and prevent them from having proper engagement in school.

Primary school age is a critical stage that the quality of nutrition and educational performance has a strong impact on the growth and development of intellectual capacity, which in turn will have an impact on the health that will be obtained later in life. Parents, teachers and health care workers are more and more worried about the rising dependence on smart phones among school-going children. Therefore, this study will be focussed on the relationship between the use of smart phones, nutritional status, scholastic performance of primary school children. This will help with the development of awareness and strategies for promoting healthy habits when using a smart phone and help improve children's wellbeing and success in school.

### II. RELATED WORKS

Widespread adoption of smartphones and digital media has been a growing problem among young people across the globe, impacting not only their physical health, but mental and social well-being as well as their education. There has been a number of studies that looked at screen time, nutrition, physical health and school performance for school-going children. The current literature suggests that an over-usage of the mobile phone can have a detrimental effect on the lifestyles of children, their nutritional status and their school performance. Alrasheed et al. [15] studied the link of screen time with dieting behavior of school children. According to their study, kids who had an increased amount of screen time were at increased risk of eating unhealthy snacks, sugar sweetened drinks, and fast food. More screen time also correlated to eating less frequently and less exercise. The results indicate that the excessive use of the smartphone can be a factor affecting children's nutrition practices.

Wong et al. [17] studied risk factors associated with musculoskeletal discomfort arising from the use of a smartphone among children. Yang et al. [16] analysed

the use of the smartphone and musculoskeletal discomfort problem in kids. The researchers found that excessive smartphone usage led to physical discomfort, a lack of proper posture and sedentary lifestyle. Productive time that could be spent getting physical, searching for ideas, or collaborating with others in the creative process could actually be damaging to nutrition and well-being of the child if engaged in excess on the cell phone. Asmare et al. [17] investigated the link between nutrition status and performance of primary school children. According to their investigation, the children with normal nutritional status performed better in the academic level, than the children who are unsung. Eating skills were referred to as one of the factors affecting concentration, memory and learning ability of school-aged children.

In a similar study, Pengpid and Peltzer [18] found that being sedentary and having poor nutrition was highly correlated among adolescents. Increased screen time was shown to decrease physical activity and promote unhealthy eating habits in their study. The results threw weight behind the hypothesis that excessive reliance on a smart phone could be a cause of nutritional imbalance and obesity among children. Beressa et al. [19] looked at some of the nutritional status and the factors associated with it among school age children in Ethiopia. The study pointed out that poor nutritional conditions and a low activity of both physical activity and unhealthy behaviours significantly affected the nutritional status of the children. The researchers pointed out that it is crucial that healthy behavioural habits are encouraged in childhood.

Twenge and Campbell [20] did study the effects of media on children's academics. This study found that high usage of the digital media had an adverse impact on academic performance, attention in class and study time. The children who viewed greater amounts of digital entertainment and smartphone use had poorer academic performance than those with reduced use of these media. In a digital media exposure childhood obesity study, researchers Li et al. [21] looked at digital close and personal contact with food among children, as well as their material involvement in cooking. Longer amounts of time spent on screens were shown to be positively correlated with obesity in young people in this study. Heavy use of the smartphone was linked to sedentary lifestyle, less time

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outdoors, unhealthy nutrition habits which led to overweight and obesity. Kurniasanti et al. [22] discussed Internet addiction and emotional behavioral problems of children. They indicated that overusing the internet and smartphones is associated with poor behaviour, emotions and social interactions; and these factors might also have an impact on academic achievement and development. Kumar and Kumar [23] looked at the impact of dietary diversity on school performance of children. The researchers found children with a balanced and diverse diet performed better in school than did children with poor dietary intake. Good nutrition was deemed to be important for cognition and class participation.

The impact of digital media on children and adolescents was discussed by Chassiakos et al. [24]. The study pointed out potentially adverse impacts of unregulated digital media usage on sleep, health, social interactions and school performance of children. In the study of Hossain et al., [25] examined the relationship between smartphone use, physical activity, and nutritional intakes of children. In their study they found there was a great correlation between ill nutrition, low levels of physical activity, and smartphone addiction. This resulted in unhealthy eating habits and the risk of obesity when the issue was excessive use of the smartphone.

Lastly, a systematic review of the association between social media use and psychological distress among adolescents was made by Keles et al. [26]. The study established that being exposed to social media for a longer duration would lead to anxiety, depression and lowered psychological well-being of the child, indirectly impacting the degree of participation and performance of children during learning. In general, the previous studies showed that high smartphone use is associated with high impacts on children's nutrition, physical condition and academic performance. However, a small number of studies have investigated how people' nutritional status is linked with their smart phone use, and academic achievement of primary school going children in particular, so this study is needed.

### III. METHODOLOGY

#### Research Design

In this study, the quantitative, cross sectional approach is used to study the relationship between the usage of a smartphone, nutritional status and scholastic performance of primary school going children. A

cross-sectional design was employed as a suitable research design for this study since data were gathered from the participant(s) at one specific point in time; and associations between variables could be identified in this type of design. The research centres on examining the potential effect of various habits in their smartphone usage on children's nutritional status and educational results [4].

#### Study Area and Population

The research was carried out with the primary school children studying in selected schools. The children enrolled in primary schools aged between 6-12 years old constituted the target population. The male and female students have participated in the study [5]. Additionally, parental and/or teacher input on children's use of their smart phones and diet and academic progress was provided as appropriate.

#### Sample Size and Sampling Technique

Basically 150 primary school children were selected for the study. An equal opportunity was created through simple random sampling to reduce sampling bias among the participants ensuring they have an equal chance to be sampled [6]. The schools were chosen because they were conveniently accessed and agreed to participate in the study. The research included students who used their smartphones regularly and parents who gave their consent.

**Table 1: Inclusion and Exclusion Criteria**

Inclusion Criteria	Exclusion Criteria
Children aged 6–12 years	Children with chronic medical illnesses
Students enrolled in primary schools	Children without parental consent
Children using smartphones regularly	Students absent during data collection
Both male and female students	Children with incomplete responses

#### Data Collection Methods

Primary data was gathered by making use of a structured questionnaire to suit the objective of this study. An online survey comprised four sections. Demographic data including age, gender, class and family background was included in the first part. The

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second part captured how a smartphone is utilised, such as daily screen time, why people use their smartphones, how often they play games on their phone, how often they use social media and whether they use a smartphone before bedtime [7]. In the third section, nutritional status was evaluated using nutrition intake, frequency of meals, use of fast food, physical activity and anthropometry parameters (height, weight). BMI calculated by standard formula and children were classified as underweight, normal weight, overweight and obese. In the fourth section, recent examination scores, teacher evaluation of classroom activity focusing, classroom attendance, and recent exam scores were all used. Data was collected following the permission of school authorities and informed consent of parents/guardians. Students questionnaires were distributed with the help of teachers and/or parents as necessary.

### Variables of the Study

In this study, the independent variable was the Smartphone use and the dependent variables were nutritional status and scholastic performance.

**Table 2: Study Variables and Measurements**

Variable	Indicators	Measurement Method
Smartphone Use	Daily screen time, gaming, social media use, educational use	Structured questionnaire
Nutritional Status	BMI, eating habits, meal skipping, junk food intake	Height, weight, dietary assessment
Scholastic Performance	Academic scores, attendance, concentration	School records and teacher assessment

### Research Instruments

The main instrument of this study was a self-structured questionnaire that was created according to literature in the field of the use of the smartphone and application to children's health. The questionnaire was written in easy-to-understand language for children and parents to understand [8]. Body weight and height

were accurately recorded using anthropometric equipment like weighing machine, measuring tape.

Both closed and multiple choice type questions were used in the questionnaire so as to make the analysis possible. The questionnaire was piloted before the formal data collection, with a small number of students to assess clarity, reliability and validity of the questionnaire.

### Validity and Reliability

For content validity, the questionnaire was checked by experts in the field of child health, nutrition and education. Based on experts' suggestions, some changes were made as necessary. A pilot study was carried out to assess reliability and the questionnaire had an acceptable internal consistency [9]. Standardised procedures of height and weight measurement were carried out to ensure the accuracy and minimise the measurement error. The data collectors were trained adequately prior to the start of the study.

### Data Analysis

Data gathered were analyzed using statistical computer software. Demographic characteristics, Smartphone usage pattern, nutritional status and academic performance were summarized using descriptive statistics frequency, percentage, mean and standard deviation. An inferential statistical test was also used to find the relationship between the use of the smartphone, nutrition and intellectual performance [10]. The software used for data analysis were the Chi-square test and correlation analysis in order to find the significant association between the variables. The data had been displayed in Table, Chart and Graph to the interpretation.

BMI values were determined using the following formula:

$$BMI = \frac{\text{Weight (kg)}}{\text{Height (m)}^2}$$

Standard age- and sex-specific BMI classifications were used to classify children.

### Ethical Considerations

The study was given ethical approval by the appropriate institutional authority prior to data collection. The school administrations also gave their permission. The parents/guardians gave informed consent for their children's involvement in the study.

The confidentiality and privacy of all players was strictly adhered to in the research process. Collection of personal information from students has been

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anonymised and only used for academic purposes [11]. The study was self-selected and the respondents could withdraw at any time of the study without any consequences.

### Limitations of the Study

The study was conducted in specific Primary Schools, and results may not be applicable to other Primary Schools across various geo-locations. Partly relying on self-reported data by children and parents can lead to response bias in the research. Furthermore, the usage of a cross-sectional design led to associations but not necessarily direct causes and effects between the use of smartphones, nutrition and school performance.

### Summary

The approach of this study was planned to present the relationship between the use of smart phones, the nutritional status and academic performance of primary school children, systematically. The study used quantitative data collection and anthropometric measurements to gather accurate data on the impact of smartphone usage on children's well-being and educational achievement, which were statistically analysed [12].

## IV. RESULTS AND ANALYSIS

This chapter shows the results of the study carried out with 150 primary school going children surrounding the use of smartphones and correlation with nutritional status and performance in schools. Data collected were analysed with descriptive and inferential statistics. The results are displayed in tables and explained in detail.

### Impact on School Life



67% of surveyed teachers observed students being negatively distracted by mobile devices.



90% of surveyed teachers stated the number of students with emotional challenges increased.

**47%** of parents think their child is addicted to their smartphone



Figure 1: "Smartphone Usage Patterns Among Primary School Children"

### 4.1 Demographic Characteristics of Participants

In demographical profile of the respondents it revealed the age, gender of students and their class level with which they related. Demographic characteristics are relevant as they might have an impact on smartphone use and students' behaviours in school.

**Table 1: Demographic Characteristics of Participants (N = 150)**

Variable	Category	Frequen cy	Percentage (%)
Age	6–8 years	52	34.7
	9–10 years	61	40.7
	11–12 years	37	24.6
Gender	Male	82	54.7
	Female	68	45.3
Class Level	Grades 1–2	48	32.0
	Grades 3–4	63	42.0
	Grades 5–6	39	26.0

As per above table, most of the participants were in the age group 9-10 years (40.7%) followed by 6-8 years (34.7%). 24.6% of the children in the total sample were between the ages of 11 and 12 years. The males and females who participated in the study were 54.7% and 45.3% respectively [13]. The primary school children (Grades 3-4) learners were well represented, with 42.0% in the category.

### 4.2 Smartphone Usage Patterns Among Children

The behaviour of people who use their smart phone was analysed to discover what and for how long the participants spend on their smartphones and how often.

**Table 2: Smartphone Usage Patterns**

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Smartphone Usage Variable	Category	Frequency	Percentage (%)
Daily Smartphone Use	Less than 1 hour	28	18.7
	1–3 hours	67	44.7
	More than 3 hours	55	36.6
Purpose of Use	Educational activities	39	26.0
	Gaming	48	32.0
	Watching videos	41	27.3
	Social media	22	14.7
Smartphone Use Before Sleep	Yes	96	64.0
	No	54	36.0

The results showed that 44.7% of the children reported using their televisions for 1-3 hours daily and 36.6% of the children reported more than 3 hours of Smartphone usage daily. Small cell phone use – 18.7% used it daily for less than an hour. The most prevalent reason for using a Smartphone, in this case, for gaming use was identified as: 32.0% for gaming; 26.0% for educational purposes; 27.3% for watching videos [14]. There was 14.7% of social media use. Many children (64.0%) said that they use a smartphone before going to sleep. This recurring schedule can lead to insomnia, loss of physical activity and concentration abilities in studying.

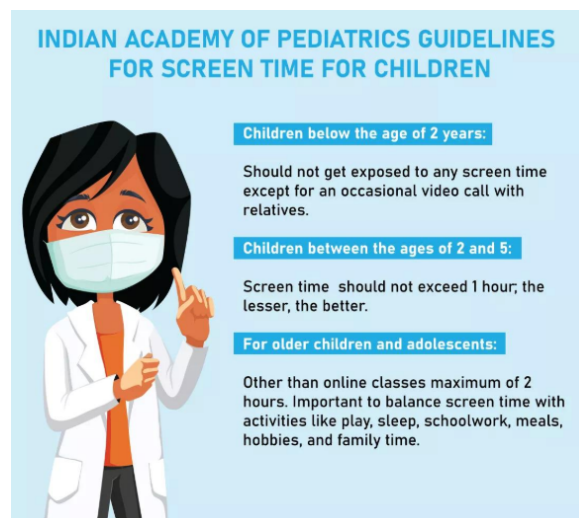


Figure 2: “Relationship Between Smartphone Use and Nutritional Status in Children”

### 4.3 Nutritional Status of Participants

Body Mass Index classification and dietary behaviours indicators were used to measure the nutritional status of the participants.

Table 3: Nutritional Status of Participants

Nutritional Indicator	Category	Frequency	Percentage (%)
BMI Classification	Underweight	29	19.3
	Normal weight	81	54.0
	Overweight	25	16.7
	Obese	15	10.0
Meal Skipping	Frequently	47	31.3
	Occasionally	62	41.3
	Never	41	27.4
Junk Food Consumption	Daily	53	35.3

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	Weekly	71	47.3
	Rarely	26	17.4

The findings showed there were more than half of the people with normal BMI (54.0%). But, 10.0%, 16.7% and 19.3% of them were underweight, overweight and obese, respectively. These results indicate that an under and/or over nutrition prevailed among the population. Children also had an incidence of meal skipping behaviour. About 31.3% of the population often did not eat their meals and 41.3% often food was not available to them. Only 27.4% said that they never missed meals. Children's intake of junk food was noted on a regular basis; 35.3% of them were eating junk food every day and 47.3% of them ate junk food weekly [27]. The results also indicate that excessive use of their cell phone could be linked to poor eating habits and even eating other types of healthier food less frequently.

### 4.4 Scholastic Performance of Participants

Students' academic achievement was assessed based on their examination results, concentration and attendance.

**Table 4: Scholastic Performance of Participants**

Scholastic Indicator	Category	Frequency	Percentage (%)
Academic Scores	Excellent	26	17.3
	Good	59	39.4
	Average	44	29.3
	Poor	21	14.0
Classroom Concentration	High	38	25.3
	Moderate	71	47.4
	Low	41	27.3

Attendance Record	Regular	102	68.0
	Irregular	48	32.0

The results confirm that good academic achievement was recorded by 39.4 % of the students and average it was by 29.3 % of students. Only 17.3% conformed to the excellent academic outcomes, while 14.0% were in poor academic performance. Concerning their concentration in class, 47.4% of the children were moderately concentrated and 27.3% were concentration with a low level. A regular attendance was obtained in 68.0% of the students while 32.0% of students had irregular attendance. It has been suggested that overuse of the smartphone links to short attention spans, poor study skills, less engagement in the class and thus impacts schoolwork [28].

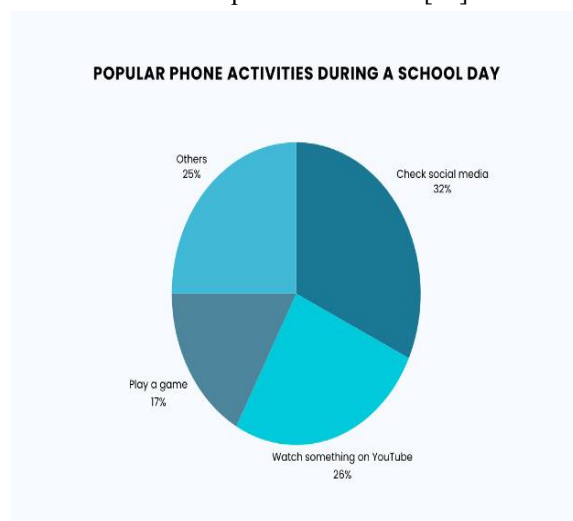


Figure 3: "Impact of Smartphone Use on Scholastic Performance of Primary School Children"

### 4.5 Relationship Between Smartphone Use, Nutritional Status, and Scholastic Performance

Correlation and comparative analyses were used for the study of the association between health and academic outcomes with the duration of the use of smart phones.

**Table 5: Relationship Between Smartphone Use and Study Variables**

Variable	Less than 1 Hour	1-3 Hours	More than 3 Hours

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Underweight (%)	10.7	17.9	25.4
Overweight/Obese (%)	14.3	23.9	36.4
Poor Academic Performance (%)	7.1	13.4	25.5
Low Classroom Concentration (%)	10.7	23.9	43.6
Frequent Meal Skipping (%)	14.3	29.9	45.5

The table indicates that there is a strong relationship between the use of smartphones and negative nutrition and education outcomes. Children that used the smartphone more than 3 hours per day were reported to have higher levels of underweight and overweight/obesity than children with low smartphone use.

However, the same was found with children who used their smartphones for long periods of time, who had poorer academic performance. Children who used a smartphone for more than 3 hours a day had poor academic performance that accounted for about 25.5% while children using smartphones for less than one hour daily had poor academic performance of 7.1%. The concentration in classes, as well, decreased with increasing amount of time spent using the smartphone. Only 43.6% of heavy cell phone users had a good concentration during study time in class. In addition, children who were more exposed to smartphones had a higher rate of skipping meals [29]. The results of this study suggest that increased likelihood of unhealthy lifestyle habits, decreased levels of physical activity, poor dietary behaviours and decreased academic concentration are associated with increased time spent using the smartphone among primary school students.



Figure 4: “Preventive Strategies for Healthy Smartphone Use in Children”

### 4.6 Discussion of Findings

The current study emphasizes that smartphone use is emerging among the primary school going children and how it might affect children's health and performance. The majority of children were using smartphones for entertainment (gaming, watching videos) and not for educational work. Previous research had reported similar results between overuse with sedentary behaviour and/or poor lifestyle habits. According to the nutritional analysis, children who used their cell phones for a long time were more likely to have unhealthy eating habits, such as eating too much junk food and not eating enough meals [30]. Less physical activity linked to longer screen time can also result in overweight and obesity, whereas UNITI (undernutrition) is another potential side effect among some children because of the absence of regular eating habits linked to screen time.

Additionally, the study found that excessive cell phone use is negatively associated with academic achievement. Children who spend more time on their cell phones had lower attention in class and lower academic performance. Too much screen time could lead to less study time, impact sleep health and provide distraction when learning. These results indicate that appropriate and moderate use of the Smartphone among children of primary school plays an important role in achieving good nutritional status and acceptable school performance. The healthy use of screen media, greater physical activity, improved dietary and learning habits should be encouraged amongst children through the cooperation of parents, teachers and professionals concerned.

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### 4.7 Summary

The study results showed that there is a direct correlation between an excessive use of the smartphone and poor nutritional habits in addition to a decreased academic performance among primary school children. The higher smartphone exposure was associated with higher levels of children's skipping of meat, junk food intake, poor concentration, and academic achievement. The results highlight the need to closely track the use of smartphones to ensure the good health and educational results of children.

### V. CONCLUSION

The relation between the use of smartphones, nutritional status and scholastic achievement was concluded in the present study for primary school going children. Children's internet usage habits and orientation of using their smartphones were found to be very common with more than a few hours spent each day in gaming, watching videos or social media. Both levels of smartphone use (excessive and insufficient) were associated with children having an unfavorable dietary pattern as they ate more junk food, skipped more meals, and were less active. The study also found that exposure to smartphones for long hours negatively affected students' abilities in keeping focused while studying in the classroom, duration of study and academic success rates. Results showed statistically that children who used smartphones for prolonged time had a higher risk of nutritional imbalance (underweight and overweight cases), and had lower school outcomes than those with a limited time of smartphone use. The results in this study emphasize the need to have a well-balanced, guided usage of a cell phone by children. Children's caregivers (including parents, teachers, health professionals) should foster positive behavior related to the use of screens, physical activity, nutrition, and studying better to promote the development of children. The findings of the study highlight the importance of awareness programmes and interventions to decrease the dependency of primary school children on their smartphones.

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