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'Knowledge Of Primary School Children On The Bio-Psycho-Social Effects Of Electronic Gadget Usage And Its Association With Demographic Factors In Samba District'

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Abstract

Introduction: The widespread use of electronic gadgets among children has become a growing concern worldwide. While these devices provide educational and recreational opportunities, their excessive use is linked to adverse bio-psycho-social effects such as eye strain, obesity, sleep disturbances, stress, poor concentration, and reduced social interaction. Despite these risks, awareness remains limited, particularly among primary school children. This study aimed to assess primary school children's knowledge in Samba District about the adverse effects of electronic gadget use to guide preventive and educational measures.

Methodology: A descriptive cross-sectional design was employed for the study. The sample comprised 350 primary school children selected through non-probability convenience sampling from schools in Samba District. Data were collected using a structured, self-administered questionnaire designed to assess the biological, psychological, and social dimensions of gadget use. The reliability of the tool was tested using the split-half method, which yielded a correlation coefficient of 0.75, indicating acceptable reliability. Data analysis was carried out using both descriptive and inferential statistical techniques.

Results: Among the 350 participants, 52.9% demonstrated inadequate knowledge regarding the adverse effects of electronic gadgets, 37.7% had moderate knowledge, and only 9.4% showed adequate knowledge. Chi-square analysis revealed significant associations between knowledge levels and demographic variables such as age, parental occupation, family type, type of gadget used, and daily screen time.

Conclusion: The study highlights a considerable gap in knowledge among primary school children regarding the adverse effects of electronic gadgets. Targeted educational interventions are essential to enhance awareness and promote healthier gadget usage practices.

Keywords: Children, Bio-Psycho-Social Effects, Electronic gadgets, Knowledge, Screen time, Technology use.

INTRODUCTION:

Rapid advances in science and technology have fundamentally altered everyday life. Electronic gadgets—such as smartphones, tablets, laptops, gaming consoles, and televisions—are now ubiquitous due to their portability, affordability, and multifunctionality. As a result, they have become integral household items and are being used by children at increasingly younger ages.[1]

In India, exposure to screen-based media often begins in infancy: many children encounter these devices as early as 10 months old, and by 18 months most have regular access. Remarkably, smartphone usage (96%) has exceeded television viewing (89%) among these young users.[2]

Despite potential educational and entertainment value, prolonged and uncontrolled gadget use poses substantial biological, psychological, and social risks. Physically, excessive screen time is associated with eye strain, refractive errors, obesity, sleep disturbances, musculoskeletal discomfort, and poor posture. Psychologically, overuse contributes to reduced concentration, hyperactivity, stress, emotional dependence, and behaviors that resemble addiction.[3] Socially, it undermines family interaction, weakens communication skills, fosters peer withdrawal, and correlates with poorer academic performance.[4]

Globally, children's screen use has been linked with delayed cognitive and language development, especially when unsupported by parental and educator oversight. In the Indian context, children's increasing smartphone dependency has been connected with delayed speech, learning difficulties, anxiety, and depressive symptoms.[5] With India ranking among the highest in global internet usage for children aged 5–11, these issues constitute an emerging public health concern.[6]

Despite these alarming trends, awareness about the adverse effects of gadget use remains low, particularly among primary-school children. Parents and teachers—especially in semi-urban and rural areas such as Samba District—often underestimate the long-term implications of excessive screen time. The shortage of region-specific awareness initiatives further exacerbates this gap.

Given the growing accessibility and duration of gadget use among young school children, especially at home and in educational settings, it is vital to assess their knowledge about associated bio-psycho-social risks. Accordingly, this study was designed to evaluate knowledge levels concerning the adverse effects of electronic gadget use among primary-school children in Samba District. Findings from this research aim to inform policymakers, educators, and healthcare professionals, aiding in the design of targeted and contextually relevant educational interventions to promote safe and balanced gadget use.

METHODOLOY

Research Design

A descriptive cross-sectional study design was employed to assess the knowledge of primary school children regarding the adverse effects of electronic gadget use on bio-psycho-social parameters. This design was selected as it enabled measurement of existing knowledge and examination of associations with demographic variables at a single point in time.

Study Setting

The study was conducted in selected private schools of Samba District, Jammu and Kashmir, representing both urban and semi-urban areas to ensure socio-economic diversity. The study population consisted of primary school children enrolled in 4th and 5th grades, considered developmentally capable of comprehending the questionnaire and providing valid responses.

Study Population

The target population consisted of all primary school children in the selected schools. The accessible population comprised students enrolled in the 4th and 5th grades, as they were developmentally capable of understanding the questionnaire and providing reliable responses.

Sampling Technique and Criteria

A non-probability convenience sampling technique was adopted owing to feasibility in school settings, where participation depended on administrative permissions and availability of students. A total of 350 students meeting the eligibility criteria were recruited for the study.

Children aged 8–12 years, studying in 4th and 5th grades, present during the data collection period, and able to comprehend English or Hindi were included. Those unwilling to participate, absent during data collection, or involved in the pilot study were excluded.

Data Collection Tool

Data were collected using a self-structured questionnaire developed through literature review and expert consultation in paediatrics, nursing, and child psychology. The tool had two sections: demographic variables (age, gender, class, parental education, parental occupation, type of family, number of siblings, birth order, religion, residence, type of gadgets owned, previous awareness, and daily screen time) and a 20-item knowledge questionnaire. The latter assessed knowledge across biological (vision problems, obesity, sleep disturbance, posture issues), psychological (reduced concentration, stress, dependency, hyperactivity), and social domains (peer interaction, family bonding, academic performance). Each correct response was given a score of one, with total scores ranging from 0 to 20. Scores below 10 were classified as inadequate knowledge, 10–15 as moderate, and 16–20 as adequate.

Validity and Reliability

Content validity was established by seven expert's doctorates in various sub-specialities of nursing, community health nursing, and public health. The instrument was translated into Hindi for better comprehension. Reliability was tested using the split-half method and Karl Pearson's correlation coefficient, which yielded $r = 0.75$, indicating acceptable internal consistency.

Data Collection Procedure

A pilot study was conducted on 35 students to test the feasibility and clarity of the tool. The main study was undertaken from December 2023 to January 2025 after obtaining permission from school authorities. Written parental consent and child assent were obtained. The purpose of the study was explained, and confidentiality was assured. Questionnaires were administered in classrooms under supervision, with each session lasting 25–30 minutes. All 350 students completed the questionnaire.

Data Analysis

Data were coded and analyzed using SPSS version 25. Descriptive statistics (frequency, percentage, mean, and standard deviation) were used to summarize demographic details and knowledge scores. Inferential statistics were applied using the Chi-square test to determine associations between knowledge and selected demographic variables. A p-value of <0.05 was considered statistically significant.

Ethical Considerations

Ethical clearance was obtained from the Institutional Ethics Committee, and administrative permission was secured from school authorities. Written informed consent was obtained from parents, and assent was obtained from children. Confidentiality and anonymity were maintained, and participation was entirely voluntary with the option to withdraw at any stage.

RESULT:

Section I: Frequency and Distribution of Demographic Variables of participants (n=350)

Table 1. Demographic Characteristics of Participants (n = 350)

Variable	Category	Frequency (n)	Percentage (%)
Age (years)	8–9	30	8.57
	9–10	108	30.86
	10–11	175	50.00
	11–12	37	10.57
Gender	Male	185	52.86
	Female	165	47.14
Current grade	4^{th}	134	38.29
	5^{th}	216	61.71
Father's education	No formal education	42	12.00
	5th pass	69	19.71
	10th pass	133	38.00
	12th or above	106	30.29
Mother's education	No formal education	10	2.86
	5th pass	53	15.14
	10th pass	135	38.57
	12th or above	152	43.43
Father's occupation	76	25	7.14
	Private job	195	55.71
	Government job	48	13.71
	Business/self-employed	82	23.43
Mother's occupation	Homemaker	118	33.71
	Private job	98	28.00
	Government job	84	24.00
	Business/self-employed	50	14.29

A total of 350 primary school children participated in the study. Most of the participants were between 10–11 years of age (50%) and the majority were studying in 5th grade (61.71%). Boys represented a slightly higher proportion (52.86%) than girls (47.14%). Regarding parental education, 38% of fathers and 38.57% of mothers had completed 10th standard, while 30.29% of fathers and 43.43% of mothers were educated up to 12th or higher. More than half of the fathers (55.71%) were engaged in private jobs, whereas one-third of mothers (33.71%) were homemakers. (Table 1)

Table 2. Social and Gadget-Use Characteristics of Participants (N = 350

Variable	Category	Frequency (n)	Percentage (%)
Number of siblings	None	9	2.57
	1 sibling	168	48.00
	2 siblings	101	28.86
	≥3 siblings	72	20.57
Birth order	1st	111	31.71
	2nd	124	35.43
	3rd	51	14.57
	≥4th	64	18.29
Religion	Hindu	111	31.71
	Muslim	82	23.43
	Sikh	64	18.29
	Christian	52	14.86
	Other	41	11.71
Area of residence	Urban	194	55.43
	Rural	156	44.57
Type of family	Nuclear	166	47.43
	Joint	105	30.00
	Extended	79	22.57
Gadgets at home	1–2 devices	104	29.71
	3–4 devices	152	43.43
	5–6 devices	52	14.86
	≥7 devices	42	12.00
Most used gadget	Smartphone/tablet	186	53.14
	Laptop/computer	61	17.43
	Television	92	26.29
	Video games	9	2.57
	Other	2	0.57
Awareness of adverse effects	Yes	64	18.29
	No	286	81.71
Daily gadget use	<2 hours	45	12.86
	2–4 hours	57	16.29
	4–6 hours	105	30.00
	>6 hours	143	40.86

In terms of social profile, 48% of children had one sibling, and 35.43% were second-born. The majority of participants belonged to Hindu religion (31.71%), followed by Muslim (23.43%) and Sikh (18.29%). More than half resided in urban areas (55.43%) and 47.43% lived in nuclear families.

Regarding gadget use, 43.43% of households owned 3–4 devices, and 53.14% of children primarily used smartphones or tablets. Only 18.29% had prior awareness about the adverse effects of gadgets. Daily usage was high, with 40.86% reporting more than 6 hours of screen time, and 30% using gadgets for 4–6 hours per day. (Table 2**)**

Section II: Knowledge Scores

Table 3. Distribution of respondents according to knowledge scores (n = 350)

Knowledge Level	Score Range	Frequency (f)	Percentage (%)
Inadequate	<50%	185	52.86
Moderate	50–75%	132	37.71
Adequate	>75%	33	9.43

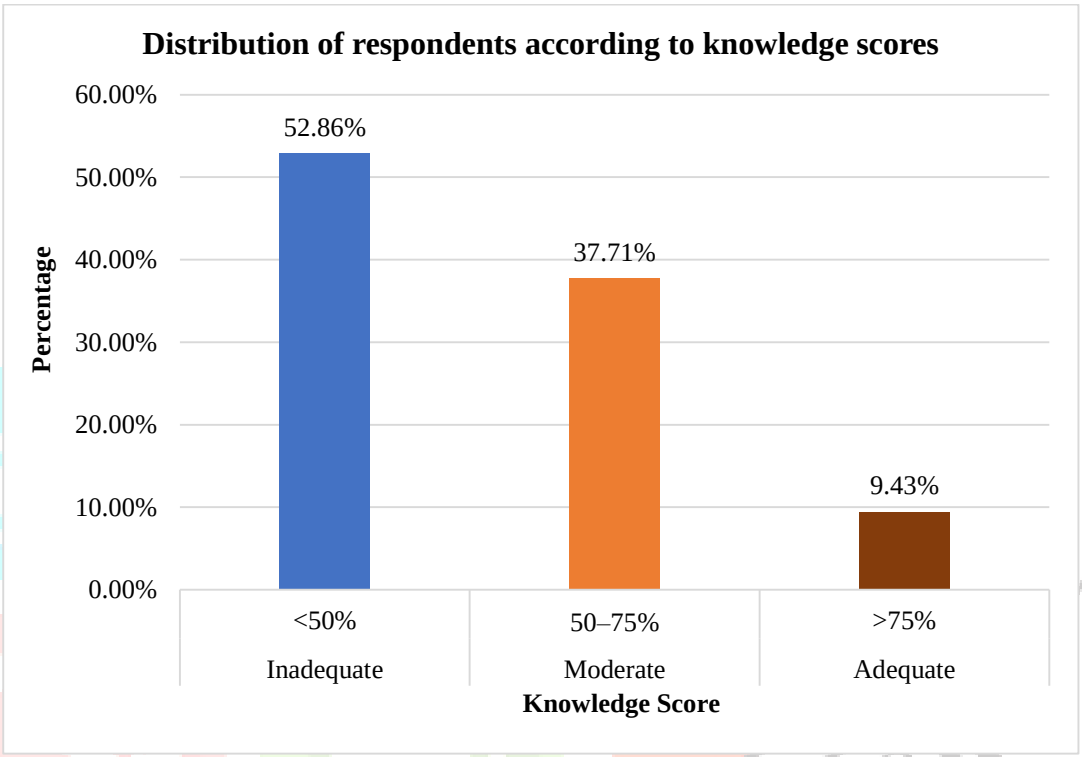

Figure no. 1: Distribution of respondent according to knowledge scores

Knowledge score regarding adverse effect of electronic gadget on bio-psycho social parameter assessed using self-administered questioner, a majority of children (52.86%) had inadequate knowledge regarding the adverse effects of electronic gadget usage. About 37.71% had moderate knowledge, while only 9.43% demonstrated adequate knowledge. (Table no.3 and figure no. 1)

Section III: Association between pre-test knowledge scores and selected demographic variables

Association between pre-test knowledge scores and demographic variables analysed using

Chi-square revealed significant association between the level of knowledge and age of the children (χ^2=13.54, p=0.035), father's occupation (χ^2=30.53, p<0.0001), mother's occupation (χ^2=35.77, p<0.0001), type of family (χ^2=10.58, p=0.03), type of electronic gadget used most frequently (χ^2=16.90, p=0.03), and daily time spent on gadgets (χ^2=25.82, p<0.0001). These findings indicate that older children, those from families with employed parents, nuclear families, and those who use smartphones/tablets more frequently or spend longer hours on gadgets, tend to have significantly different levels of knowledge.

In contrast, gender, current standard of study, parental education, number of siblings, birth order, religion, area of residence, number of gadgets at home, and awareness regarding adverse effects did not show any significant association with knowledge levels (p>0.05). (table no.4)

Table 4: Association between Demographic Variables and Level of Knowledge on Adverse Effects of Electronic Gadget Usage (n=350)

Demographic Variables	Frequency	Level of knowledge			Df	P value	χ^2 value	Result
		Inadequate	Moderate	Adequate				
1. Age in Years					6	0.035	13.54	S
8-9 years	30	17	10	3				
9-10 years	108	52	48	8				
10-11 years	175	98	64	13				
11-12 years	37	18	10	9				
2. Gender					2	0.22	2.94	NS
Male	185	90	77	18				
Female	165	95	55	15				
3. Current Standard of Study								
4th	134	70	56	8	2	0.15	3.72	NS
5th	216	115	76	25				
4. Educational Status of Father					6	0.59	4.58	NS
No formal education	42	20	18	4				
5th pass	69	38	21	10				
10th pass	133	71	50	12				
12th pass or above	106	56	43	7				
5. Educational Status of Mother								
No formal education	10	4	4	2	6	0.39	6.257	NS
5th pass	53	22	25	6				
10th pass	135	78	44	13				
12th pass or above	152	81	59	12				
6. Occupational Status of Father					6	<0.0001	30.526	S
Labourer	25	10	13	2				
Private job	195	112	71	12				
Government job	48	23	11	14				
Business / self-employed	82	40	37	5				
7. Occupational Status of Mother								
Homemaker	118	88	25	5	6	<0.0001	35.77	S
Private job	98	37	47	14				
Government job	84	36	39	9				

Business / self-employed	50	24	21	5				
8. No. of Siblings					6	0.53	5.08	NS
No Siblings	9	4	5	0				
1 sibling	168	92	62	14				
2 siblings	101	56	33	12				
3 and more siblings	72	33	32	7				
9. Birth Order					6	0.30	7.21	NS
1st order	111	66	35	10				
2nd order	124	62	46	16				
3rd order	51	24	23	4				
4th order or more	64	33	28	3				
10. Religion					8	0.800	4.586	NS
Hindu	111	60	38	13				
Muslim	82	43	30	9				
Sikh	64	33	26	5				
Christian	52	26	24	2				
Any other	41	23	14	4				
11. Area of residence					2	0.73	0.61	NS
Urban	194	106	71	17				
Rural	156	79	61	16				
12. Type of family					4	0.03	10.58	S
Nuclear family	166	80	65	21				
Joint family	105	52	45	8				
Extended Family	79	53	22	4				
13. How many electronic gadgets are available in your home?								
1-2 devices	104	55	36	13	6	0.60	4.57	NS
3-4 devices	152	77	61	14				
5-6 devices	52	28	22	2				
7 or more devices	42	25	13	4				
14. Which type of electronic gadgets do you use maximum at home?								
Smartphone/Tablets	146	68	66	12	8	0.03	16.9	S
Laptop/Computers	92	53	29	10				
Television	101	59	35	7				
Video game	9	4	2	3				
Any other	2	1	0	1				
15. Awareness regarding the adverse effects of electronic gadgets								
Yes	64	33	29	2	2	0.104	4.52	NS

No	286	152	103	31				
16. Daily time spent on electronic gadgets.								
Less than 2 hours	45	20	12	13	6	<0.0001	25.82	S
2-4 hours	57	26	27	4				
4-6 hours	105	60	37	8				
More than 6 hours	143	79	56	8				

Discussion

The present study was conducted to assess the knowledge levels regarding the adverse effects of electronic gadget use on the bio-psycho-social development of primary school children in selected schools of Samba District. It further evaluated the association between knowledge scores and key socio-demographic and behavioural factors, including age, gender, family characteristics, and patterns of electronic gadget usage.
The age distribution shows a clear concentration within the late childhood stage (9–11 years), which corresponds with the developmental phase where children begin to assert independence, show heightened curiosity, and engage more with digital devices. This pattern is consistent with the findings of Yuswandi et al. (2024), who also reported a similar age range in their study examining the relationship between gadget usage and social development in children, with an average respondent age of 11.08 years.[7]

Gender distribution in the current study was relatively balanced, with a slight predominance of male participants. This mirrors the findings of Yuswandi et al., though their study reported a somewhat higher proportion of male respondents. Such balance in gender representation strengthens the generalizability of the findings, particularly in relation to screen time behaviors, which have been shown to vary across genders in past literature.

In terms of educational status, the sample predominantly included children from 4th and 5th standards, indicating a focus on upper primary school students. These years are crucial for academic and social skill development, and therefore serve as an appropriate group to assess the impact of electronic gadget exposure. Similar results were found in a study conducted by Jandayan, M. A. on electronic gadget usage and its effects on learners' physical, social, and cognitive development.[8]
Parental educational attainment reveals that most fathers had completed at least secondary education, while a greater proportion of mothers had attained higher secondary or above. Interestingly, this maternal educational pattern contrasts with findings from previous studies such as Jasintha et al. (2021), where a lower level of maternal education was reported. This suggests a positive shift toward maternal literacy and possibly greater engagement in children's upbringing and digital literacy, which can be critical in moderating children's screen time and awareness of its effects.[9]

Occupational data suggest economic diversity, with a significant portion of fathers engaged in private sector jobs or self-employment. Mothers showed a mix of roles, including homemakers and participants in both public and private sectors. Compared to earlier studies like Jasintha et al. (2021), the current findings indicate higher maternal employment, which may influence children's unsupervised access to electronic devices. This supports prior research suggesting that parental employment—particularly maternal employment—may impact monitoring of children's media use and associated behavioural patterns.

The family structure was primarily nuclear, followed by joint and extended families. This is in line with national demographic shifts toward nuclear households, especially in urban areas. The number of siblings and birth order data further reflect typical Indian family dynamics, with most children falling within the first or second birth order. Prior studies, such as by Liza et al. (2023), also reported similar trends, noting

a higher risk of gadget addiction among children with multiple siblings and those in nuclear families, possibly due to reduced parental oversight and increased peer influence.[10]

The study reveals widespread availability of multiple electronic gadgets in households, with smartphones and tablets being the most commonly used devices. This aligns with findings by Jandayan et al. (2024), who observed near-universal mobile phone usage among school-aged children. The dominance of mobile devices in children's daily activities suggests a shift in entertainment and learning modalities but also raises concerns over prolonged screen exposure.[11]

Awareness regarding the harmful effects of electronic gadgets remains low among the children studied. This knowledge gap was similarly observed in the pre-test phase of the study by Karthi et al. (2018), where the majority of adolescents displayed inadequate knowledge prior to intervention. These findings underscore the critical need for structured awareness and educational programs to inform children about the adverse physical, cognitive, and social consequences of excessive screen time.[12]

The data also indicate that a large proportion of children engage with electronic devices for extended periods daily, often exceeding recommended screen time guidelines for their age group. Prolonged gadget use has been linked to a range of negative health outcomes, including visual strain, sleep disturbances, reduced physical activity, and behavioral challenges. Gangadharan et al. (2022) and Dubois et al. (2008) similarly found associations between high screen time and risk factors for obesity and behavioral addiction among older children and adolescents, further validating these concerns.[13,14]

Significant association between knowledge scores and selected demographic factors, including age, parental occupation, family type, type of gadget used, and daily gadget use, while no association was observed with variables such as gender, parental education, number of siblings, or residence. These findings align with Morowatisharifabad et al. (2015),[15] who reported the influence of parental habits and environment on children's screen behavior, emphasizing the role of socio-environmental factors. However, they contrast with Parmar and Prajapati (2022),[16] who found no significant link between demographic variables and knowledge levels among adolescents, suggesting that associations may vary across age groups, contexts, and study settings

Finally, the knowledge scores point to a lack of baseline awareness about the negative impacts of electronic gadget usage among primary school children. This highlights the importance of early intervention. Studies such as that by Karthi et al. (2018) support the effectiveness of structured educational interventions, which have been shown to significantly improve adolescents' understanding of the health hazards associated with gadget use.[17]

The results highlight that most children were unaware of the bio-psycho-social risks of gadget usage, including eye strain, headaches, musculoskeletal discomfort, sleep disturbances, reduced physical activity, social withdrawal, and academic decline. This lack of knowledge poses a serious concern, as awareness is the first step toward developing preventive strategies. Introducing health-focused digital literacy into school curricula could significantly improve children's understanding of safe and balanced gadget use.

The limitations of this study are it was conducted only in selected schools of Samba District, which restricts the generalizability of findings to other regions. The use of a structured questionnaire focused solely on assessing knowledge without direct observation of children's actual practices or behaviours, which may not fully capture the real-life scenario. Additionally, as responses were self-reported, there is a possibility of response bias influencing the results.

In future longitudinal studies assessing the long-term effects of gadget use on health and development are needed. Comparative studies between rural and urban settings may provide deeper insights into contextual differences in gadget use and awareness. Interventional studies focusing on digital literacy programs for children and parents could be designed to evaluate their impact on knowledge and behavioural change.

Conclusion

The study revealed low awareness among primary school children about the adverse effects of electronic gadget use, despite widespread access and prolonged usage. Knowledge was significantly associated with age, parental occupation, family type, gadget type, and daily usage, highlighting the role of socio-demographic factors. These findings stress the need for structured digital literacy programs to promote safe and balanced gadget use in children.

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Conflict of Interest: The author declares that there is no conflict of interest associated with this study.

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