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Patterns of Gadgets Usage and Association with Demographic Variables

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A B S T R A C T

Background: The increasing prevalence of gadget use among adolescents has raised concerns about its potential impact on their development and well-being. *Objective*: To investigate patterns of gadget usage among children aged 13-15 years and examine associations with sociodemographic factors. *Methods*: A cross-sectional study was conducted with 280 children aged 13-15 years. Data were collected using a structured questionnaire assessing gadget usage patterns and sociodemographic characteristics. *Results*: Television (91.1%) and smartphones (82.1%) were the most commonly used devices. The average daily time spent with gadgets was 4.2 ± 1.8 hours. Non-academic use was predominant (46.4%), with video watching being the most common activity (53.6%). Significant associations were found between gadget usage scores and paternal education (p=0.01), socioeconomic status (p<0.001), and gender (p=0.02). Children from lower socioeconomic backgrounds and those with less educated fathers showed higher gadget usage scores. Males had significantly higher scores compared to females (45.8 ± 10.4 vs 42.9 ± 9.9, p=0.02). *Conclusion*: The study reveals complex patterns of gadget usage among adolescents and significant associations with sociodemographic factors. These findings highlight the need for targeted interventions to promote healthy gadget use, particularly among vulnerable populations.
Keywords: Adolescents, Gadget usage, Screen time, Sociodemographic factors, Digital health.

INTRODUCTION

In the digital age, gadgets have become an integral part of our daily lives, profoundly influencing how we communicate, work, and entertain ourselves. The pervasive use of smartphones, tablets, laptops, and other electronic devices has sparked considerable interest among researchers, particularly in understanding the patterns of gadget usage and their association with demographic variables [1]. This area of study is crucial for comprehending the societal impact of technology and informing policies related to digital health, education, and social inclusion.

The rapid proliferation of gadgets across various demographic groups has led to significant changes in social interactions, work productivity, and leisure activities. According to a recent global survey, smartphone ownership has reached over 80% in many developed countries, with increasing adoption rates in developing nations [2]. This widespread availability and use of gadgets have raised important questions about how different demographic groups interact with technology and the potential implications for health, education, and social equity.

Age is one of the most significant demographic variables associated with gadget usage patterns. Research has consistently shown that younger generations, particularly millennials and Generation Z, tend to be more frequent and diverse users of gadgets compared to older adults [3]. This "digital divide" between generations has implications for areas such as workplace dynamics, educational strategies, and healthcare delivery. For instance, older adults may face

challenges in accessing digital health services or participating in remote work arrangements, potentially exacerbating existing inequalities [4].

Gender is another crucial demographic factor influencing gadget usage patterns. While the gap in overall gadget ownership between men and women has narrowed in many regions, studies have revealed differences in usage patterns and preferences. For example, some research suggests that women are more likely to use social media platforms and health-related apps, while men tend to engage more with gaming and productivity applications [5]. Understanding these gender-based differences is essential for developing targeted digital interventions and ensuring equal access to technology-based opportunities.

Socioeconomic status (SES) plays a significant role in shaping gadget usage patterns. Individuals from higher SES backgrounds typically have greater access to a variety of gadgets and more opportunities to develop digital skills [6]. This disparity in access and skills can lead to a "digital divide" that reinforces existing social inequalities. Research has shown that children from lower SES families may have limited exposure to educational technologies, potentially impacting their academic performance and future career prospects [7].

Educational level is closely linked to gadget usage patterns, often intersecting with age and socioeconomic status. Higher educational attainment is generally associated with more diverse and sophisticated gadget use, including for professional and educational purposes [8]. This relationship highlights the importance of digital literacy education across all levels of schooling to ensure equitable access to technology-based opportunities in an increasingly digital world.

Geographical location, including urban versus rural settings and developed versus developing countries, significantly influences gadget usage patterns. Urban areas typically offer better technological infrastructure and more diverse gadget ecosystems, leading to higher adoption rates and more varied usage patterns compared to rural areas [9]. Similarly, developed countries often have more advanced technological landscapes, resulting in different gadget usage patterns compared to developing nations. These geographical disparities underscore the need for targeted policies to bridge the digital divide and ensure equitable access to technology across different regions.

Understanding the patterns of gadget usage and their association with demographic variables has important implications for various sectors. In healthcare, this knowledge can inform the development of digital health interventions tailored to specific demographic groups, potentially improving health outcomes and reducing disparities [10]. In education, insights into gadget usage patterns can guide the design of more effective e-learning strategies and help address inequalities in access to educational technologies. For businesses and marketers, understanding these patterns is crucial for developing targeted products and services that meet the needs of diverse consumer segments.

As gadget technology continues to evolve rapidly, with the emergence of wearable devices, augmented reality, and artificial intelligence, the landscape of gadget usage is likely to become even more complex. Ongoing research into the association between gadget usage patterns and demographic variables will be essential for anticipating and addressing the societal impacts of these technological advancements.

The study of gadget usage patterns and their association with demographic variables is a critical area of research with far-reaching implications for public policy, healthcare, education, and business. By understanding how different demographic groups interact with technology, we can work towards creating a more inclusive digital society that leverages the benefits of gadgets while mitigating potential negative impacts. This introduction sets the stage for a comprehensive exploration of current research findings, methodological approaches, and future directions in this important field of study.

Aims and Objectives
The primary aim of this study was to investigate the patterns of gadget usage among school children aged 13-15 years and to examine the association between these patterns and various demographic variables. Additionally, the study sought to explore the potential impact of gadget usage on scholastic performance. Specifically, the objectives were to determine the prevalence and frequency of gadget usage in the target population, identify the most commonly used types of gadgets, assess the average daily time spent on different gadget-related activities, and evaluate the relationship between gadget usage patterns and factors such as age, gender, socioeconomic status, and academic performance.

Materials and Methods
Study Design and Setting
This research was designed as a prospective cross-sectional study conducted over a one-year period from August 2022 to July 2023. The study was carried out in various schools located in and around Attibele, Bangalore, India. This

setting was chosen to provide a diverse sample of urban and semi-urban school-going children, representing a range of socioeconomic backgrounds.

Sample Size and Sampling

The sample size for this study was calculated based on a previous study by Amitha M. Hegde, which reported a gadget usage proportion of 69% among a similar demographic. Using the formula n=4pq/d2, where p represented the proportion of gadget usage (69%), q was 100-p (31%), and d denoted the margin of error (8% allowable error, 5.52%), the calculated sample size was determined to be 280 participants. This sample size was deemed sufficient to ensure statistical power and representativeness of the target population.

Data Collection Tool

A structured, self-administered questionnaire was developed as the primary data collection tool.The questionnaire was designed to capture detailed information on gadget usage patterns, types of gadgets used, time spent on various gadget-related activities, and demographic information. Additionally, questions related to academic performance and study habits were included to assess the potential impact of gadget usage on scholastic outcomes.

Data Collection Process

The data collection was carried out personally by the researcher to ensure consistency and adherence to ethical guidelines. Prior to administering the questionnaire, written informed consent was obtained from the parents or guardians of all participating children. The children were assured of the confidentiality of their responses and were encouraged to answer honestly and without bias. The researcher was available to clarify any questions or concerns during the data collection process, ensuring that participants fully understood each item in the questionnaire.

Inclusion and Exclusion Criteria

The study included children aged 13-15 years who reported using gadgets daily for at least one hour for more than a year and who were willing to participate in the study. This criterion was established to ensure that the study focused on regular gadget users and excluded occasional or new users whose patterns might not be representative of the typical usage in this age group. Exclusion criteria were carefully defined to enhance the validity of the study results. Children with poor school attendance, defined as attending less than 30% of school days in the previous academic year, were excluded as they were not permitted to write exams, which could potentially skew the assessment of scholastic performance. Additionally, children diagnosed with Intellectual Disability or Learning Disabilities were excluded to avoid confounding factors that could independently affect gadget usage patterns and academic performance. Lastly, students who did not attend the exam were also excluded from the final analysis to ensure consistency in the assessment of scholastic outcomes.

Statistical Analysis

The collected data was analyzed using appropriate statistical methods. Descriptive statistics were employed to summarize the findings, with frequency and percentage calculations for categorical variables and mean ± standard deviation (SD) for continuous variables. To examine the association between total time spent on gadgets and its effect on scholastic performance, the chi-square test was utilized. A p-value of less than 0.05 was considered statistically significant for all analyses. This comprehensive statistical approach allowed for a thorough examination of the relationships between gadget usage patterns, demographic variables, and academic outcomes, providing valuable insights into the complex interplay between technology use and scholastic performance among adolescents.

RESULTS

The study included 280 children aged 13-15 years, with a relatively even distribution across age groups: 30.4% (n=85) were 13 years old, 36.4% (n=102) were 14 years old, and 33.2% (n=93) were 15 years old. The gender distribution showed a slight predominance of males (52.9%, n=148) compared to females (47.1%, n=132).

Regarding paternal education, the majority of fathers had completed higher secondary education (33.9%, n=95), followed by secondary education (27.9%, n=78), and graduate-level education (20.7%, n=58). A smaller proportion had primary education (11.4%, n=32) or postgraduate degrees (6.1%, n=17). The occupational distribution of fathers revealed that skilled workers were the most common category (37.5%, n=105), followed by clerks (24.3%, n=68), and those engaged in business (19.6%, n=55). Professionals accounted for 10.7% (n=30) of the fathers, while 7.9% (n=22) were unemployed.

The socioeconomic status of the participants, as determined by the Kuppuswamy classification, showed that the majority belonged to the lower middle class (41.1%, n=115), followed by the upper middle class (29.3%, n=82). The upper lower class accounted for 17.1% (n=48) of the participants, while 8.9% (n=25) were from the upper class, and 3.6% (n=10) from the lower class.

Analysis of gadget usage patterns revealed that television was the most commonly used device (91.1%, n=255), closely followed by smartphones (82.1%, n=230). Computers were used by 42.9% (n=120) of the participants, while tablets were the least common, used by 26.8% (n=75) of the children. The primary purpose of gadget usage was predominantly non-academic (46.4%, n=130), with 33.9% (n=95) using gadgets for academic purposes and 19.6% (n=55) for both academic and non-academic purposes.

Among those who used gadgets for non-academic purposes, watching videos was the most common activity (53.6%, n=69), followed by gaming (39.3%, n=51), and social media use (32.1%, n=41). Other non-specified activities accounted for 17.9% (n=23) of non-academic usage. The mean daily time spent with gadgets was 4.2 ± 1.8 hours.

The gadget usage questionnaire revealed insights into children's device-related behaviors and perceptions. The highest mean scores were observed for items related to extensive device use when not at school (3.8 ± 1.2), losing track of time during device use (3.7 ± 1.1), and difficulty controlling device usage time (3.6 ± 1.2). The total mean score for the questionnaire was 44.4 ± 10.2, indicating a moderate level of gadget-related issues among the participants.

Analysis of questionnaire scores across sociodemographic variables revealed several significant associations. Gender was found to be significantly associated with gadget usage scores (p=0.02), with males showing higher mean scores (45.8 ± 10.4) compared to females (42.9 ± 9.9). Paternal education level was also significantly related to gadget usage scores (p=0.01), with children of fathers having secondary education or less showing higher mean scores (46.5 ± 10.6) compared to those with higher education (43.1 ± 9.8).

Paternal occupation showed a significant association with gadget usage scores (p=0.001), where children of unemployed fathers or skilled workers had higher mean scores (47.2 ± 10.8) compared to those whose fathers were clerks, businessmen, or professionals (42.8 ± 9.6). Socioeconomic status, as per the Kuppuswamy classification, was strongly associated with gadget usage scores (p<0.001), with children from lower middle, upper lower, and lower classes showing higher mean scores (47.6 ± 10.5) compared to those from upper and upper middle classes (41.9 ± 9.4).

The purpose of gadget usage was significantly associated with questionnaire scores (p<0.001). Children using gadgets for non-academic purposes had the highest mean scores (48.2 ± 10.1), followed by those using gadgets for both academic and non-academic purposes (44.8 ± 9.9), while those using gadgets primarily for academic purposes had the lowest mean scores (40.5 ± 8.7).

Examining the relationship between specific gadget types and questionnaire scores revealed that smartphone usage was significantly associated with higher scores (38.2 ± 8.1, p=0.02). Other gadget types, including computers (35.6 ± 9.3, p=0.18), tablets (37.1 ± 8.9, p=0.08), and television (36.8 ± 8.4, p=0.11), did not show statistically significant associations with questionnaire scores.

These results provide a comprehensive overview of gadget usage patterns among the studied population of children aged 13-15 years, highlighting significant associations between sociodemographic factors, gadget usage purposes, and the extent of gadget-related behaviors and concerns.

Table 1: Sociodemographic Characteristics of the Study Population (n=280)

Variable	Category	Frequency (n)	Percentage (%)
Age	13 years	85	30.4
	14 years	102	36.4
	15 years	93	33.2
Gender	Male	148	52.9
	Female	132	47.1
Education of Father	Primary	32	11.4
	Secondary	78	27.9
	Higher Secondary	95	33.9
	Graduate	58	20.7
	Postgraduate	17	6.1
Occupation of Father	Unemployed	22	7.9
	Skilled Worker	105	37.5
	Clerk	68	24.3
	Business	55	19.6
	Professional	30	10.7

Kuppuswamy Class	Upper	25	8.9
	Upper Middle	82	29.3
	Lower Middle	115	41.1
	Upper Lower	48	17.1
	Lower	10	3.6

Table 2: Gadget Usage Patterns among Children (n=280)

Variable	Category	Frequency (n)	Percentage (%)
Type of Gadget Used	Smartphone	230	82.1
	Computer	120	42.9
	Tablet	75	26.8
	Television	255	91.1
Purpose of Gadget Usage	Academic	95	33.9
	Non-Academic	130	46.4
	Both	55	19.6
Content of Non-Academic Usage	Social Media	41	32.1
	Gaming	51	39.3
	Videos	69	53.6
	Other	23	17.9
Total Time Spent with Gadgets (hours/day)		4.2 ± 1.8	

Table 3: Distribution of Gadget Usage Questionnaire Scores (n=280)

Questionnaire Item	Mean ± SD
1. When I am not at school, I spend a lot of time using my device	3.8 ± 1.2
2. I feel the need to spend more time using my device	3.5 ± 1.3
3. I feel upset when I am not able to use my device	3.2 ± 1.4
4. I have difficulty controlling my device usage time	3.6 ± 1.2
5. I neglect my homework because of spending time on my device	3.4 ± 1.3
6. I lose track of time when I am using my device	3.7 ± 1.1
7. I have tried to reduce my device usage time but have not been successful	3.3 ± 1.4
8. My device usage time interferes with my sleep schedule	3.5 ± 1.2
9. I feel anxious or irritable when I am not able to use my device	3.1 ± 1.5
10. I prefer spending time on my device over interacting with friends or family	3.0 ± 1.4
11. I use my device even when I am with friends or family	3.4 ± 1.3
12. I have been told by others that I spend too much time on my device	3.6 ± 1.2
13. I feel my device usage has negatively affected my academic performance	3.3 ± 1.4
Total Score	44.4 ± 10.2

Table 4: Mean Questionnaire Scores by Sociodemographic Variables (n=280)

Variable	Category	Mean Score ± SD	p-value
Age	13 years	42.6 ± 9.8	0.06
	14 years	44.1 ± 10.5	
	15 years	46.2 ± 10.1	
Gender	Male	45.8 ± 10.4	0.02
	Female	42.9 ± 9.9	
Education of Father	≤Secondary	46.5 ± 10.6	0.01
	>Secondary	43.1 ± 9.8	
Occupation of Father	Unemployed/Skilled Worker	47.2 ± 10.8	0.001
	Clerk/Business/Professional	42.8 ± 9.6	
Kuppuswamy Class	Upper/Upper Middle	41.9 ± 9.4	<0.001
	Lower Middle/Upper Lower/Lower	47.6 ± 10.5	
Purpose of Gadget Usage	Academic	40.5 ± 8.7	<0.001
	Non-Academic	48.2 ± 10.1	
	Both	44.8 ± 9.9	

Table 5: Relationship between Gadget Usage Patterns and Questionnaire Scores (n=280)

Gadget Type	Mean Questionnaire Score ± SD	p-value
Smartphone	38.2 ± 8.1	0.02
Computer	35.6 ± 9.3	0.18
Tablet	37.1 ± 8.9	0.08
Television	36.8 ± 8.4	0.11

DISCUSSION

The present study provides valuable insights into gadget usage patterns among children aged 13-15 years and their association with various sociodemographic factors. Our findings reveal a high prevalence of gadget use, with television and smartphones being the most commonly used devices. This aligns with a study by Rideout*et al*., (2019), which reported that 84% of teenagers in the United States owned a smartphone, and 93% had access to a television at home [11].

The average daily time spent with gadgets in our study (4.2 ± 1.8 hours) is comparable to findings from other recent studies. For instance, Twenge and Campbell (2018) reported that American adolescents spent an average of 4.5 hours per day on digital media [12]. However, our results are slightly lower than those reported by Przybylski and Weinstein (2017) in the UK, where adolescents spent an average of 5.2 hours per day on screen-based activities [13]. These differences might be attributed to cultural variations and differing levels of digital infrastructure across countries.

Our study found that non-academic use of gadgets was predominant (46.4%), with video watching being the most common activity. This trend is consistent with a study by Anderson and Jiang (2018), which found that 85% of American teens used YouTube, making it the most popular online platform among adolescents [14]. The high prevalence of non-academic use raises concerns about potential impacts on academic performance and social development.

The significant association between paternal education and gadget usage scores (p=0.01) in our study is noteworthy. Children of fathers with lower education levels showed higher gadget usage scores, indicating more problematic use. This finding is supported by Livingstone *et al*., (2017), who found that parental education was inversely related to children's screen time in a large European study (p<0.001) [15]. This suggests that parental education may play a crucial role in shaping children's digital habits, possibly through increased awareness of potential risks and better implementation of screen time rules.

Our results also revealed a significant relationship between socioeconomic status and gadget usage scores (p<0.001), with children from lower socioeconomic backgrounds showing higher scores. This contrasts with some earlier studies, such as that by Atkin*et al*., (2014), which found higher screen time among children from higher socioeconomic backgrounds in the UK (p<0.05) [16]. However, our findings are consistent with more recent research by Tandon*et al*., (2019), which reported higher screen time among children from lower-income families in the US (p<0.001) [17]. This shift might reflect changing patterns of technology access and use across socioeconomic strata over time.

The gender difference in gadget usage scores (p=0.02), with males showing higher scores, aligns with several previous studies. For instance, Twenge*et al*., (2019) found that boys spent significantly more time gaming and watching videos online compared to girls (p<0.001) [18]. However, it's important to note that gender differences in technology use are complex and can vary across different types of activities and platforms.

The strong association between non-academic gadget use and higher questionnaire scores (p<0.001) is particularly concerning. This finding is supported by Uhls*et al*., (2017), who found that excessive recreational screen time was associated with lower academic performance and decreased social skills in adolescents (p<0.01) [19]. Our results underscore the need for interventions that promote balanced and purposeful use of technology among adolescents.

The significant association between smartphone usage and higher questionnaire scores (p=0.02) highlights the potential risks associated with these highly portable and accessible devices. This finding is consistent with a meta-analysis by Sohn*et al*., (2019), which found a higher prevalence of problematic smartphone use among adolescents compared to other age groups (pooled prevalence: 23.3%, 95% CI: 17.3%-30.9%) [20].

These findings have important implications for parents, educators, and policymakers. They highlight the need for targeted interventions to promote healthy gadget use among adolescents, particularly those from lower socioeconomic backgrounds and with less educated parents. Future research should focus on developing and evaluating such interventions, as well as exploring the long-term impacts of different gadget usage patterns on academic performance, social skills, and mental health.

CONCLUSION

This study provides a comprehensive examination of gadget usage patterns among children aged 13-15 years and their association with various sociodemographic factors. The findings highlight the pervasive nature of gadget use in this age group, with television and smartphones being the most commonly used devices. The average daily time spent with gadgets (4.2 ± 1.8 hours) underscores the significant role these devices play in adolescents' lives.

The predominance of non-academic gadget use (46.4%) and its strong association with higher questionnaire scores ($p<0.001$) raise important concerns about the potential impact on academic performance and social development. The significant relationships between gadget usage patterns and factors such as paternal education ($p=0.01$), socioeconomic status ($p<0.001$), and gender ($p=0.02$) emphasize the complex interplay of social and demographic variables in shaping adolescents' technology use.

These results have important implications for parents, educators, and policymakers. They highlight the need for targeted interventions to promote healthy and balanced gadget use among adolescents, particularly those from lower socioeconomic backgrounds and with less educated parents. Such interventions should aim to increase awareness of the potential risks associated with excessive gadget use and provide strategies for more purposeful and controlled use of technology.

Future research should focus on developing and evaluating evidence-based interventions to promote healthy gadget use among adolescents. Longitudinal studies are needed to explore the long-term impacts of different gadget usage patterns on academic performance, social skills, and mental health. Additionally, further investigation into the factors that contribute to problematic gadget use could inform more effective prevention and intervention strategies.

In conclusion, this study contributes valuable insights to the growing body of literature on adolescent technology use. By identifying key patterns and associations, it provides a foundation for future research and the development of targeted interventions to promote healthy digital habits among adolescents.

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