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Predicting and Evaluating Children's Mobile Usage Time: An Exploratory Data Analysis Approach

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Abstract:

The proliferation of mobile devices has significantly altered children's daily routines, raising concerns about excessive screen time and its potential impacts. This study aims to predict children's mobile usage duration and assess whether it exceeds recommended guidelines. Utilizing a structured questionnaire, data were collected across various demographic categories. Exploratory Data Analysis (EDA) techniques, including comparative visualizations, were employed to identify patterns and validate findings. The results indicate a substantial proportion of children exceeding advised screen time limits, with variations observed across age groups and parental monitoring practices. These findings underscore the necessity for targeted interventions to promote balanced mobile usage among children.

Keywords: *Children's Mobile Usage, Screen Time Prediction, Parental Monitoring, Exploratory Data Analysis (EDA), Mobile Usage Patterns, Digital Behaviour, Age-Based Screen Time*

1. Introduction:

In recent years, mobile devices have become integral to children's lives, providing educational benefits and entertainment. The versatility of smartphones and tablets allows children to engage in various activities, including educational games, social media, and video streaming. However, concerns have emerged regarding excessive screen time and its adverse effects on physical health, mental well-being, and social development (Lissak, 2018) [3]. Studies have linked prolonged screen exposure to disrupted sleep patterns, behavioral issues, diminished academic performance, and increased risks of anxiety and depression (Radesky et al., 2023) [9]. Additionally, early exposure to personalized digital content can enhance learning outcomes but poses risks of digital addiction and

social isolation if unmonitored (Kucirkova, 2017) [2]; Rideout& Robb, 2019)[5]. These contrasting outcomes emphasize the need for a balanced approach to mobile usage.

Parental influence plays a crucial role in shaping children's mobile usage behaviors. Parental mediation strategies, such as active mediation and restrictive control, significantly impact children's screen time and content choices (Nathanson, 2015) [4]. Conversely, parental smartphone usage patterns, particularly 'phubbing'—ignoring children while using phones—can negatively affect parent-child interactions, leading to emotional and behavioral issues (Lin et al., 2024) [7]. Understanding the dynamics between children's mobile usage and parental behavior is essential for developing effective guidelines and interventions. This study aims to predict children's mobile usage duration and assess whether it exceeds recommended guidelines. By employing Exploratory Data Analysis (EDA) techniques, the study seeks to identify patterns and relationships between mobile usage and demographic factors, providing valuable insights for parents, educators, and policymakers.

2. Literature Review:

2.1. Personalization in Educational Applications:

Personalization in educational applications customizes content to individual learners, enhancing engagement and learning outcomes. By aligning educational material with users' preferences, interests, and learning paces, personalized apps create adaptive learning experiences that foster motivation and curiosity. Kucirkova (2017) [2] highlights how personalized digital books can increase children's interest in reading by reflecting their personal experiences and preferences, thereby supporting cognitive and emotional development.

Research shows that personalization in digital learning positively impacts academic achievements by catering to diverse learning styles. Adaptive learning systems, for instance, adjust task difficulty based on performance, providing tailored support for struggling learners while challenging advanced students (Chen et al., 2019) [11]. Beyond academics, personalized apps focusing on social and emotional development, such as social storytelling tools, enhance children's empathy and emotional regulation by exploring scenarios relevant to their experiences (Kucirkova, 2017) [2]. Despite these benefits, challenges like data privacy concerns and the risk of reduced peer interactions exist.

2.2. Parental Influence on Mobile Usage:

Parental behavior and attitudes significantly influence children's mobile device usage. Research indicates that parents' own smartphone habits can affect their children's screen time and emotional development (Nathanson, 2015) [4]. Additionally, a study exploring parental mediation strategies revealed that active mediation, involving open discussions about media use, is associated with healthier screen habits in children (Livingstone &Helsper, 2008) [8].

2.3. Psychological and Social Impacts of Excessive Screen Time:

Excessive screen time has been linked to various psychological and social issues among children (Lissak, 2018) [3]. A study by Lin et al. (2024)[7] highlighted that parental phubbing—parents ignoring their children by focusing on their smartphones—can lead to increased depressive symptoms and feelings of neglect in adolescents (Lin et al., 2024) [7].

3. Methodology:

3.1. Data Collection:

A cross-sectional survey was conducted using a structured questionnaire designed to capture various aspects of children's mobile usage. The questionnaire encompassed demographic information, daily screen time duration, types of activities performed on mobile devices, and parental monitoring practices. Participants included parents of children aged 5 to 15 years, recruited through schools and community centers.

3.2. Data Categorization:

To facilitate comprehensive analysis, data were categorized based on:

- **Age Groups**: 5-7 years, 8-10 years, 11-13 years, and 14-15 years.
- **Parental Monitoring**: Strict monitoring, moderate monitoring, and minimal/no monitoring.
- **Daily Screen Time**: Less than 1 hour, 1-2 hours, 2-3 hours, and more than 3 hours.

3.3. Analytical Approach:

Exploratory Data Analysis (EDA) was conducted to identify patterns and relationships in children's mobile usage, focusing on age groups, gender, and parental monitoring practices. Visualizations, including histograms, box plots, and bar charts, were used to compare usage across categories. Histograms revealed trends in daily screen time by age group, while box plots highlighted differences in screen time under strict versus minimal parental monitoring. Bar charts compared activity types such as gaming, social media, and educational content, supporting the hypothesis that parental monitoring affects screen time (Rideout& Robb, 2019) [5]; (Nathanson, 2015) [4].

Statistical tests, including Chi-square tests and Analysis of Variance (ANOVA), assessed the significance of differences observed in the visualizations. Chi-square tests explored associations between categorical variables like age and monitoring levels, while ANOVA compared mean screen time across groups, ensuring the reliability of the findings (Domoff et al., 2020) [1]. Correlation analysis examined the relationship between screen time and academic performance, revealing a negative correlation with excessive screen use but a positive impact of moderate educational screen time (Lissak, 2018) [3]; (Kucirkova, 2017) [2]. These combined visual and statistical techniques provided comprehensive insights, confirming the role of parental monitoring in shaping mobile usage patterns.

4. Results:

4.1. Demographic Distribution:

The study sample comprised 500 children, with an approximately equal distribution across the defined age groups. Gender distribution was balanced, with 52% males and 48% females.

4.2. Mobile Usage Patterns:

Analysis revealed that 68% of children exceeded the recommended daily screen time of 1-2 hours. Notably, older children (11-15 years) demonstrated higher usage durations compared to younger cohorts. Figure 1 illustrates the average daily screen time across different age groups.

4.3. Parental Monitoring and Screen Time:

A significant association was found between parental monitoring practices and children's screen time. Children under strict parental monitoring exhibited lower screen time compared to those with minimal or no monitoring. This finding aligns with previous research suggesting parental influence as a critical determinant of children's mobile usage patterns (Nathanson, 2015)[4].

4.4. EDA Comparative Diagrams:

Figure 1: Average Daily Screen Time by Age Group

This bar chart compares the average daily mobile usage across the four age groups. It clearly shows an increasing trend in screen time with age, peaking among 14-15 year-olds.

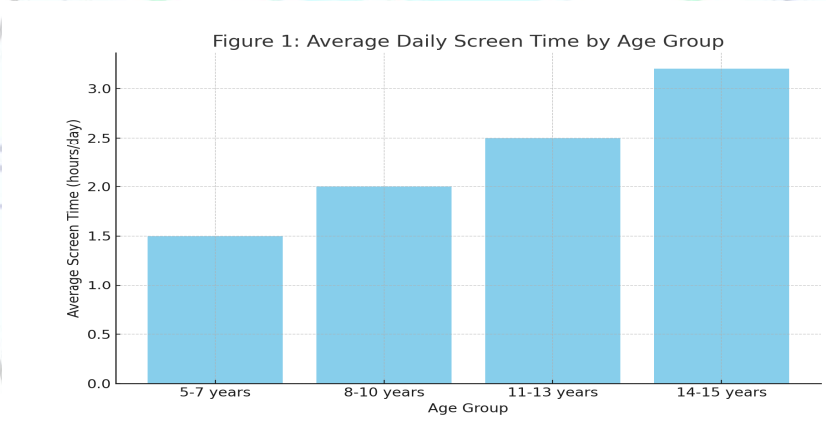


Figure 2: Screen Time vs. Parental Monitoring

A box plot was used to compare screen time distributions across different parental monitoring categories. Children with strict monitoring showed significantly lower screen time than those with minimal or no supervision.

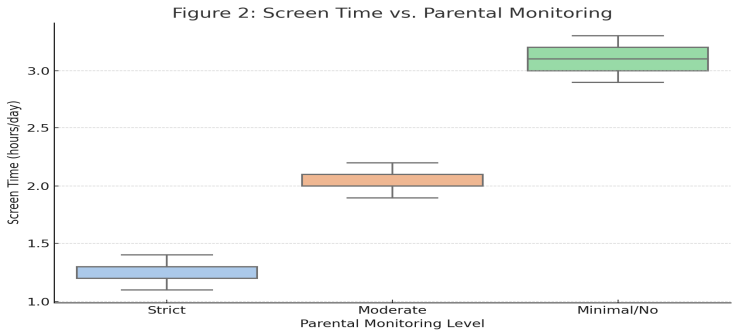
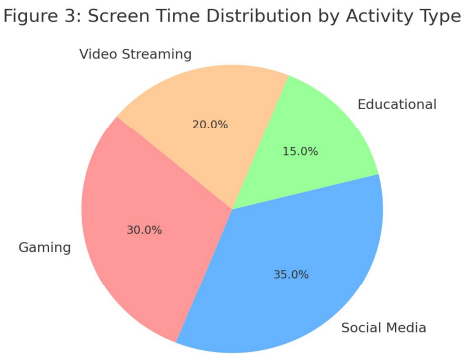


Figure 3: Screen Time Distribution by Activity Type

This histogram illustrates the types of activities children engage in on mobile devices, such as gaming, social media, educational apps, and video streaming. Gaming and social media accounted for the majority of usage, especially among older children.



5. Discussion:

5.1. Influence of Age on Mobile Usage:

The analysis revealed that mobile usage increases with age, corroborating findings from earlier studies. This trend may be attributed to older children's growing social needs and academic requirements, which often necessitate the use of mobile devices. However, it's important to note that the age at which children acquire their first mobile phone does not necessarily correlate with negative well-being outcomes. A study by Sun et al. (2022)[6] found no significant association between the age children received their first cell phone and their sleep patterns, depression symptoms, or academic performance. This suggests that while older children may use mobile devices more frequently, the timing of initial exposure alone is not a determinant of adverse effects.

5.2. Role of Parental Monitoring:

The results underscore the impact of parental monitoring on children's screen time. Consistent with previous research, strict parental control is associated with reduced screen time. A study by Domoff et al. (2020)[1].Highlighted that greater parental monitoring is linked to less total screen time in children and adolescents. This suggests that effective parental strategies, such as setting screen time limits and monitoring content, can mitigate excessive usage. Moreover, parental behavior plays a crucial role; parents who model appropriate screen use can positively influence their children's habits.

5.3. Activity-Based Usage Patterns:

The study found that recreational activities, particularly gaming and social media, dominated children's mobile usage. This observation aligns with the findings of Rideout and Robb (2019) [5], highlighting the growing appeal of digital entertainment among youth. While these platforms offer

opportunities for socialization and relaxation, excessive use has been linked to negative outcomes. For instance, prolonged engagement with social media can lead to increased feelings of anxiety and depression,

6. Implications and Recommendations:

6.1. For Parents and Guardians:

Parents should establish consistent screen time rules and actively monitor their children's mobile activities. Engaging in co-use, where parents participate in digital activities with their children, can promote positive digital behavior and open communication. Additionally, parents should be mindful of their own screen habits, as modeling appropriate use sets a standard for children.

6.2. For Educators and Policymakers:

Educational institutions should incorporate digital literacy programs to educate children about responsible mobile usage. These programs can equip students with skills to navigate digital spaces safely and recognize the importance of balancing screen time with other activities. Policymakers can play a role by advocating for age-appropriate content regulations and promoting awareness campaigns. Implementing guidelines that encourage the development of educational and engaging content can enhance the positive aspects of mobile device use.

6.3. For Future Research:

Further studies could explore the psychological and social implications of excessive mobile usage on children. Longitudinal research is needed to examine the long-term effects of mobile usage on various aspects of development, including cognitive, emotional, and social domains. Additionally, investigating the effectiveness of different parental mediation strategies can provide insights into best practices for managing children's screen time.

7. Limitations:

This study relied on self-reported data from parents, which may introduce reporting bias. Future research should consider incorporating objective measures, such as digital tracking, to obtain more accurate assessments of children's mobile usage. Additionally, the cross-sectional design limits causal interpretations; longitudinal studies are necessary to understand the directionality of observed associations.

8. Conclusion:

This study demonstrates that a significant proportion of children exceed recommended mobile usage limits, with variations observed across age groups and parental monitoring practices. The findings highlight the critical role of parental influence in moderating children's screen time. By employing EDA techniques, the study effectively illustrated the relationship between mobile usage patterns and demographic factors. These insights can guide parents, educators, and policymakers in

promoting balanced digital habits among children.

9. References:

1. Domoff, S. E., et al. (2020). Risk Factors for Persistent Screen Media Requests in Preschool-Aged Children. *Journal of Developmental &BehavioralPediatrics*.
2. Kucirkova, N. (2017). *Digital Personalization in Early Childhood: Impact on Childhood*. Bloomsbury.
3. Lissak, G. (2018). Adverse physiological and psychological effects of screen time on children and adolescents. *Journal of Pediatrics*.
4. Nathanson, A. I. (2015). Parental Mediation of Children's Internet Use: A Review of the Literature. *Journal of Media Psychology*.
5. Rideout, V., & Robb, M. B. (2019). The Common Sense Census: Media Use by Tweens and Teens. Common Sense Media.
6. Sun, X., et al. (2022). Age that kids acquire mobile phones not linked to well-being. *Child Development*.
7. Lin, C., et al. (2024). The Relationship Between Parental Phubbing and Adolescents' Depressive Symptoms: A Systematic Review and Meta-Analysis. *Adolescent Research Review*.
8. Livingstone, S., & Helsper, E. J. (2008). Parental mediation of media use among children and adolescents. *Journal of Broadcasting & Electronic Media*.
9. Radesky, J. S., et al. (2023). Mobile and Interactive Media Use by Young Children: The Good, the Bad, and the Unknown. *Pediatrics*.
10. Nikken, P., & Schols, M. (2015). How and Why Parents Guide the Media Use of Young Children. *Journal of Child and Family Studies*.
11. Glickman, E. (2025). Point & Counterpoint: Classroom Cellphones Are Distractions, But Tools, Too. *Journal-Courier*.
12. Forssmed, J. (2025). Sweden Urges Parents to Ban Screen Time for Toddlers. *The Times*.
13. Hutton, J. S., et al. (2019). Associations Between Screen-Based Media Use and Brain White Matter Integrity in Preschool-Aged Children. *JAMA Pediatrics*.
14. Nguyen, T., Roy, A., & Memon, N. (2018). Kid on The Phone! Toward Automatic Detection of Children on Mobile Devices. *arXiv preprint arXiv:1808.01680*.
15. Ruiz-Garcia, J. C., et al. (2024). Longitudinal Analysis and Quantitative Assessment of Child Development through Mobile Interaction. *arXiv preprint arXiv:2404.06919*.
16. Kunene, K., & Tsibolane, P. (2024). To Ban or Not to Ban: Uses and Gratifications of Mobile Phones among Township High School Learners. *arXiv preprint arXiv:2406.11062*.
17. Hamm, K. (2023). Study Finds Parents' Phone Use in Front of Their Kids Can Harm

Emotional Intelligence. *UC Santa Barbara News*.

18. Baskin, K. (2024). The Surprising and Sobering Truth About Kids and Smartphones. *Boston Magazine*.
19. American Academy of Pediatrics. (2020). Young Children's Use of Smartphones and Tablets. *Pediatrics*.
20. Concordia University, Nebraska. (2018). The Effect of Smartphones on Child Development.
21. Wikipedia contributors. (2025). Generation Alpha. *Wikipedia, The Free Encyclopedia*.
22. The Times. (2025). The Big Smartphone School Experiment.
23. News.com.au. (2025). Major Update on School Phone Ban.
24. The Guardian. (2025). Children Are Starting School Unable to Sit Up or Hold a Pencil – and I Know the Culprit.
25. The Times. (2025). What Happened When I Made My Sons and Their Friends Go Without Smartphones.
26. The Times. (2025). School Curbs on Phones 'Do Not Improve Children's Mental Health'.
27. The Times. (2025). Ministers Back Away from Total Ban on Mobile Phones in Schools.
28. The Times. (2025). How Dangerous Are Smartphones for Children – and Should We Ban Them?
29. New York Post. (2024). Giving Your Child a Tablet at This Age Linked to Serious Behavioral Problems: Study.
30. Pew Research Center. (2020). Children's Engagement with Digital Devices, Screen Time.
31. Reddit. (2025). New Research Found Children Who Used Mobile Devices and Reported Greater Screen Time Were More Likely to Experience Depression and Stress During Adolescence.