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Gadget Usage and Its Relationship with Mental and Emotional Health in Early Childhood (3–6 Years) at Puskesmas Medan Tuntungan

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ABSTRACT

Introduction: Excessive gadget use in early childhood is increasingly associated with cognitive, behavioral, and emotional problems. Preschool-aged children are particularly vulnerable as this period involves rapid socio-emotional and motor development. **Objective:** This study aimed to determine the association between gadget use and mental and emotional health among children aged 3–6 years at Puskesmas Medan Tuntungan. **Methods:** A cross-sectional study was conducted involving 105 children selected through consecutive sampling. Data on gadget use (duration, type, ownership, and age of first exposure) were collected using parent-reported questionnaires. Mental and emotional status was assessed using the KMME instrument. Bivariate analysis was performed using the Chi-square test with a significance level of $p < 0.05$. **Results:** Most children (61.90%) used gadgets for more than one hour per day, exceeding recommended limits. A total of 64 children (60.95%) screened positive for mental and emotional problems. Screen time >1 hour was significantly associated with mental–emotional problems ($p = 0.001$). No significant relationship was found between personal gadget ownership and mental–emotional problems ($p = 0.729$). **Conclusion:** Longer screen time, particularly >1 hour per day, was significantly associated with mental and emotional problems in preschool-aged children. Further longitudinal studies with larger samples are needed to strengthen causality and generalizability.

Keywords: gadget, mental, emotional, preschool

1. Introduction

Gadget dependence occurs across all age groups, including children [1]. According to data from KOMINFO in 2014, as many as 98% of children and adolescents in Indonesia were already familiar with the internet, with 79.5% actively using it. Similarly, a study conducted in the United States in 2019 reported a significant increase in children's media use over the past two decades. For example, among children aged 0–2 years, the average daily screen time increased from 1.32 hours to 3.05 hours [2]. These findings indicate that excessive gadget use in early childhood is a global issue that requires urgent attention.

Although gadget use has certain benefits, such as supporting the learning process and stimulating imagination, it also brings several negative impacts. Children may experience difficulties concentrating

during learning, become reluctant to write or read, and show decreased social interaction skills. Excessive use may lead to addiction, health problems, delays in cognitive and language development, as well as increased aggressive behaviour due to exposure to violent content [1,3]. Gadget addiction involving devices such as iPads and tablets has become a major challenge for parents in the digital era [4]. To address this issue, various international organizations such as the AAP and WHO recommend limiting screen time: children aged 0–2 years should not be exposed to gadgets, those aged 3–5 years should be limited to a maximum of 1 hour per day, and those aged 6–18 years to a maximum of 2 hours per day [5]. However, in reality, many children exceed these limits by 4–5 times [4].

Uncontrolled gadget use can interfere with child development, particularly during the preschool period (ages 3–6 years), when children are expected to achieve critical developmental milestones. Disruptions at this stage may affect subsequent growth and development. The Indonesian Ministry of Health estimates that 16% of toddlers experience developmental disorders, including speech, socio-emotional, and motor delays [6]. Unsupervised internet exposure also increases the risk of children accessing inappropriate content, which can have negative psychological effects. Gadget addiction may reduce social interaction, create a crisis of self-confidence, and affect both physical development and character building. When experiencing mental and emotional disturbances, children are at greater risk of facing difficulties in adaptation, reduced independence, and challenges in developing a strong self-concept [7]. Therefore, this study aims to assess the association between gadget usage and mental–emotional health in early childhood at Puskesmas Medan Tuntungan.

2. Methods

This study was analytical research with a cross-sectional design conducted at Puskesmas Medan Tuntungan in February 2023. The sample size was calculated using the Lemeshow formula, resulting in a minimum of 96 respondents, and a total of 105 participants were collected through a consecutive sampling technique. Data were obtained using questionnaires distributed in the form of flyers and online (Google Form), which were completed by parents or guardians of children with assistance from researchers. The duration of use was categorized based on AAP recommendations (≤1 hour/day and >1 hour/day). Types of gadgets were classified into mobile phones, televisions, laptops, and tablets, while reasons for provision were grouped into entertainment, distraction, educational purposes, and social conformity (children wanting to be similar to peers).

The dependent variable was children's mental health, which was assessed using the Mental Emotional Problems Questionnaire (KMME) developed by the Indonesian Ministry of Health. This instrument consists of 12 yes/no questions, where a "yes" response to any item indicates the presence of mental and emotional problems. Bivariate analysis was performed to examine the relationship between gadget use and children's mental and emotional health among those aged 3–6 years. The Chi-square test was applied using SPSS version 20, with a significance level set at $p < 0.05$.

3. Results

This study was conducted at Puskesmas Medan Tuntungan using questionnaires and Google Forms to collect primary data. A total of 105 respondents participated.

Table 1. Frequency distribution of respondent characteristics, gadget use, and average duration of gadget use by age group

Characteristics of Respondents	Frequency (n)	Percentage (%)
Gender		
Female	37	35.23
Male	68	64.76
Age (years)		
3–4	19	18.10
4–5	24	22.86
5–6	62	59.05
Mean Age: 4.98 years		
Gadget Usage Characteristics		
Duration of Gadget Use		
>1 hour	65	61.90
≤1 hour	40	38.10
Types of Gadgets		
Mobile Phone (HP)	92	87.61
TV	33	31.42
Laptop	4	3.80
Tablet	3	2.85
Age at First Use of Gadget (years)		
Mean Age: 3.13 years		
Reasons for Giving Gadgets		
Children's Request / Entertainment	75	71.42
Want to be the Same as Friends / Associates	6	5.71
Education	7	6.67
Distraction in Children	17	16.19
Personal Gadget Ownership		
Yes	18	17.14
No	87	82.85
Age Group	Average Duration (hours)	
3–4 years	2.00	
4–5 years	2.08	
5–6 years	2.63	
Mean: 2.42 hours		

Table 1 presents the respondents' characteristics, showing that the majority were male (64.76%) and aged between 5 and 6 years (59.05%), with an average age of 4.98 years. Entertainment was the primary reason for providing gadgets (71.42%), followed by distraction, educational purposes, and social interaction. Most children did not own a personal device (82.85%) and used gadgets for more than one hour per day (61.90%), with an average usage time of 2.42 hours, exceeding the American Academy of Pediatrics (AAP) recommendations. Gadget usage duration generally increased with age, with children aged 5–6 years showing the highest average use (2.625 hours). The average age at first gadget exposure was 3.13 years, which may reflect both modern parental time constraints that lead caregivers to introduce screens earlier for practical supervision and the contemporary developmental context, in which children demonstrate earlier functional independence and are therefore more readily granted access to digital devices. Mobile phones were the most frequently used devices (61.90%), followed by televisions, laptops, and tablets.

Table 2. The relationship between duration of gadget usage and personal gadget ownership with mental and emotional disorders in children

Duration of Gadget Use	Yes	No	Total	p-value
> 1 hour	50	15	65	
≤ 1 hour	14	26	40	0.001
Total	64	41	105	
Personal Gadget Ownership				
Yes	11	6	17	
No	53	35	88	0.729
Total	64	41	105	

Table 2 shows that 77% of children with screen time >1 hour experienced mental and emotional problems, compared to 35% with screen time ≤1 hour. A p-value of 0.000 from the chi-square test indicates a statistically significant relationship between duration of gadget use and mental and emotional problems. In contrast, there was no association between ownership of personal gadgets and mental and emotional problems (p-value = 0.729), although the percentage of mental and emotional problems was slightly higher in children who owned personal gadgets (65%) than those who did not (60%).

4. Discussion

In this study, it was found that 18 children (20.6%) out of 105 had personal gadgets, which may reflect increasing accessibility of digital devices in households and the tendency of modern parents to introduce gadgets earlier for convenience, supervision, or behavioral management. A similar finding was also reported by Mulyantari, who stated that 18 out of 68 children (26%) owned personal gadgets [8]. In Kabali et al.'s study, 175 children (50%) at the age of four already had their own television, and three-quarters of them owned personal gadgets [9]. Meanwhile, a survey conducted by Pew Research showed a lower figure of 6% of children with personal gadgets [10]. A national survey by Northwestern University further revealed that parents frequently use gadgets while caring for their children, functioning as tools for distraction, or as means of giving rewards and punishments, essentially serving as digital pacifiers to help manage and control children's behavior [11]. In this study, the main reason parents provided gadgets to their children was for entertainment purposes, accounting for 75 children. The second most common reason was distraction, enabling parents to attend to other tasks, which was reported in 17 children. Similarly, Kabali et al. found that the most common reason parents gave gadgets to children was to keep them occupied while parents did household work [9]. The high rates of gadget ownership and lending by parents may explain why preschool children's gadget usage remains significantly high.

The study also showed that most of the children experienced mental and emotional problems, with 64 children (60.95%) advised to undergo re-evaluation within three months. However, this result may contain bias since the KMME instrument was designed as an initial screening tool, and no intervention or follow-up reassessment was conducted after three months [12]. Among the KMME items, the question that received the most "Yes" responses was question number 1, which pertains to children's emotions. This finding aligns with Mulyantari's research, which reported that the same question was the most frequently endorsed by parents [8]. Likewise, Andriani's research also identified question number 1 as the most common positive response [13]. This is consistent with Hiniker et al.'s study, which suggested that transitions, such as when parents take gadgets away from children, can trigger tantrums. Prolonged gadget use can interfere with the development of self-regulation and reduce peer interactions [14]. Other KMME items that often posed problems were question number 5 (concentration difficulties) and question number 7 (sleep disturbances). The link between gadget use and sleep problems is thought to result from electromagnetic waves emitted by devices that inhibit melatonin production. Lower melatonin levels may disrupt circadian rhythms, leading to altered sleep patterns among children who use gadgets excessively.

Another study by Anggrahini revealed behavioral changes after gadget use, such as reduced communication, indifference, irritability, and resistance to parental guidance. This finding supports Iswidharmanjaya's theory that the negative impact of gadget use arises when children become addicted, leading them to view gadgets as essential in their lives. Such dependence may weaken their bond with parents, their environment, and peers. This study also demonstrated a significant relationship between the duration of gadget use and children's mental and emotional problems. Similar results were found in

Andriani's study, which showed a strong correlation between screen time exceeding one hour and the mental-emotional well-being of preschool-aged children [13]. Trinika's research also reported a significant association between screen exposure and psychosocial development in children aged 3–6 years [15]. International studies provide further support. For example, Li et al., in a meta-analysis of 18 longitudinal studies, reported that longer screen time increased the risk of depression, with a relative risk of 1.10 [16]. Similarly, a Finnish study revealed that excessive screen time in five-year-old children was linked to concentration problems, hyperactivity, and both internalizing and externalizing behavioral issues. While factors such as parental stress and parenting style contributed, screen time remained a significant predictor of psychosocial problems.

Research by Ayu et al. also found consistent results, emphasizing that preschool is a critical period for the development of physical activity, skills, and cognition [12]. Children typically learn through play and naturally show interest in outdoor activities, but prolonged gadget use restricts physical play and reduces stimulation needed for motor and social development. Mechanistically, reduced movement limits proprioceptive and vestibular input essential for gross-motor maturation, while diminished face-to-face interaction lowers opportunities for reciprocal social communication, impairing development of executive function, emotional regulation, and language networks [17]. Prolonged passive screen exposure also competes with enriched environmental stimuli, leading to decreased synaptic pruning efficiency and suboptimal neurocognitive pathway formation. In this study, older children were more frequently exposed to screen time, a finding that aligns with Lauricella's research, which reported that screen exposure increases with age due to greater cognitive, motor, and language abilities. Rideout's study also supported this, showing that older children were more exposed to screen time compared to younger groups.

Based on these findings, it appears essential for parents to be more mindful of their children's gadget usage, particularly limiting screen time for children aged 3–6 years to a maximum of one hour per day, as recommended. Although the study is limited to a single-centre primary care population, these recommendations remain clinically relevant because the data provide direct and context-specific information on gadget usage patterns and their association with mental and emotional health in early childhood. Beyond quantity, the quality of screen time also matters. Parents are encouraged to provide educational content, avoid exposure to violent material, turn off unused devices, and not rely on gadgets solely to manage children's behaviour. Digital media should be kept away during mealtimes and playtime, and should not be allowed in children's bedrooms. Parenting style also plays a crucial role in shaping gadget habits. Research by Çaylan revealed that permissive parenting often results in unlimited access to gadgets, while authoritative parenting sets limits on duration and supervises content [18]. A lack of parental involvement in gadget use may further exacerbate the negative impact on children's mental and emotional well-being, which also represents a limitation of this study, as parental self-reporting and the cross-sectional design may introduce reporting bias and limit causal interpretation.

5. Conclusion

This study was an observational analytic study with a cross-sectional design, involving a total of 105 children at the Puskesmas Medan Tuntungan. The majority of respondents had a gadget usage duration of more than one hour per day, exceeding the recommendations set by several child health organizations. The duration of gadget use was found to increase with age, with mobile phones being the most commonly used type of gadget among children in this study. The results demonstrated a significant association between the duration of gadget use and the presence of mental and emotional disorders in children, whereas no association was found between personal gadget ownership and such disorders. Future studies are recommended to include larger sample sizes and utilize randomization to minimize the potential for bias.

6. Data Availability Statement

The datasets generated and analyzed during the current study are not publicly available due to privacy and ethical considerations, but are available from the corresponding author upon reasonable request. For the next researcher, it is hoped that this study can be used as a reference for basic data to carry out further research.

7. Ethical Statement

This study received ethical clearance from the Research Ethics Committee of Universitas Sumatera Utara with approval number 296/KEPK/USU/2023. ASW was responsible for the study design, while TP conducted data collection, analysis, and interpretation. MDS, NFS, VW, AAD, MI, E, SN, and RS contributed to drafting, reviewing, and revising the manuscript. All authors have read and approved the final version for publication.

8. Author Contributions

All authors contributed to the design and implementation of the research, data analysis, and finalizing the manuscript.

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11. Conflict of Interest

The authors declare no conflict of interest.

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