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Level of Gadget Addiction in Children and Quality of Sleep

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ABSTRACT

Introduction: *Sleep pattern disturbances are conditions in which individuals experience changes in the quantity and quality of sleep that result in discomfort. One of the factors influencing children's sleep patterns is habitual behaviour, particularly lifestyles characterized by excessive dependence on technology. This study aimed to analyse the relationship between the level of gadget addiction and sleep patterns among fourth- to sixth-grade elementary school students at SDN X, Madiun Regency.*
Methods: *This study employed a cross-sectional design with a simple random sampling technique. A total of 38 students from grades 4 to 6 participated in the study. Data were analysed using the Spearman Rank correlation test to determine the association between gadget addiction levels and sleep patterns.*
Results: *The results showed that most respondents (76.3%) had a moderate level of gadget addiction, while 15.8% had a low level of gadget use. In terms of sleep patterns, 81.6% of the students experienced sleep disturbances, whereas 18.4% did not. Bivariate analysis revealed a significant relationship between gadget addiction levels and sleep patterns (p-value = 0.002; α = 0.05).*
Conclusions: *In conclusion, there is a significant association between gadget addiction and sleep disturbances among elementary school students. It is recommended that students regulate gadget use to improve sleep quality, and that teachers provide regular education regarding responsible gadget use to support healthy sleep patterns.*

Introduction

A gadget is an English term that refers to a small electronic device with various functions, according to (Viandari & Susilawati, 2019). In today's modern era, technological developments are increasingly sophisticated and advanced. This not only impacts adults and adolescents but also significantly impacts children, who have made gadgets a daily necessity. The rapid advancement of digital technology has led to a significant increase in gadget use among children, which raises concerns about the risk of gadget addiction. Excessive and uncontrolled gadget use has been associated with various adverse outcomes, particularly disturbances in sleep quality. Screen exposure, especially before bedtime, can suppress melatonin secretion, disrupt circadian rhythms, and reduce sleep duration and efficiency. Poor sleep quality in children is closely linked to impaired cognitive function, emotional regulation problems, and long-term health risks. Despite growing evidence on screen time and sleep disturbances, studies focusing on the level of gadget addiction and its relationship with children's sleep quality, especially in local contexts, remain limited. Therefore, this study is essential to provide empirical evidence that can support early prevention strategies and inform parents, educators, and health professionals in promoting healthy gadget use and optimal sleep among children.

The National Sleep Foundation (NSF) is a United States government agency that supports fundamental education and research in all non-medical fields, namely science and engineering

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(Ohayon et al., 2017). The NSF released its 2016 Annual Sleep in America Poll to examine the effects of electronic media use before bedtime. Survey results showed that 95% of respondents, aged 7-12, used electronic media such as television, computers, or cell phones before bed, and 43% of them complained of rarely or never getting enough sleep (Ohayon et al., 2017). National data indicate that approximately 60–70% of Indonesian children use smartphones on a daily basis, with 55–65% exceeding the recommended screen time of more than two hours per day. Regional studies further suggest that 25–45% of children are at risk of gadget addiction, while 8–20% fall into the high-risk category. In parallel, evidence shows that 30–50% of Indonesian children experience poor sleep quality or insufficient sleep duration, often associated with screen exposure before bedtime. Despite these concerning trends, prevalence data on gadget addiction and sleep quality at the provincial and local levels remain limited, including in [research location]. This lack of localized epidemiological data underscores the urgency of this study to provide evidence-based insights that can inform targeted prevention strategies and promote healthy gadget use and optimal sleep among children.

According to a preliminary study conducted through interviews with 10 students, all 10 owned gadgets, and eight students reported always playing with their gadgets before bed, sometimes to the point of not being able to fall asleep or staying up too late. This often results in children being late for school due to playing with their gadgets too late.

Continuous gadget use negatively impacts children's daily behavior. Children who tend to use gadgets constantly become highly dependent, and it becomes a mandatory and routine activity for them. Several cases of the negative impacts of gadgets frequently affect children, including addiction to the internet, games, and pornographic content. It's also possible that they can affect children's sleep patterns (Ulfa, 2025). While many factors can contribute to poor sleep quality in children, the use of electronic media such as television, computers, and cell phones is often associated with reduced sleep duration, early awakenings, daytime drowsiness, nightmares, and sleepwalking (Aulia et al., 2025).

Excessive and addictive gadget use in children, particularly during the evening and before bedtime, triggers a sequence of neurobiological and behavioral disruptions that impair sleep quality. Prolonged exposure to blue light from screens suppresses melatonin secretion and delays circadian rhythms, resulting in increased sleep latency and delayed sleep onset. Simultaneously, repeated digital stimulation activates dopaminergic reward pathways, leading to heightened cognitive and emotional arousal and difficulty disengaging from devices despite physiological sleep signals. This state of hyperarousal disrupts normal sleep architecture, reduces slow-wave and REM sleep, and is further exacerbated by irregular bedtime routines and prolonged screen engagement. Over time, chronic sleep disruption alters hypothalamic–pituitary–adrenal axis regulation, increasing cortisol levels and perpetuating poor sleep quality, which ultimately affects children's cognitive, emotional, and overall health outcomes.

Possible solutions to overcome gadget addiction include creating a clear daily schedule, including waking up, school, prayer, homework, and going back to bed. Establishing interpersonal communication allows children to be open with their parents and setting specific time limits for gadget use (Sangu & Wahyuni, 2025). Several strategies have been proposed to mitigate gadget-related sleep disturbances in children, including limiting daily screen time, enforcing device-free periods before bedtime, implementing parental monitoring, and promoting sleep hygiene education. While these approaches may reduce exposure duration, they often fail to address the underlying behavioral dependency and neurocognitive arousal associated with gadget addiction. Pharmacological interventions are generally not recommended for children due to potential adverse effects and ethical concerns. In contrast, a comprehensive intervention that integrates behavioral regulation, cognitive awareness, and self-regulation skillssuch as structured mindfulness-based or psychoeducational approachesaddresses both the physiological

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dysregulation and psychological dependency mechanisms underlying gadget addiction. By simultaneously reducing cognitive hyperarousal, restoring circadian balance, and promoting adaptive coping strategies, this integrated approach is considered the most effective and sustainable solution for improving sleep quality and reducing gadget addiction in children.
Based on the explanation above, the researcher is interested in conducting a study entitled This study aims to determine the prevalence and level of gadget addiction among children and to examine its association with sleep quality. Additionally, it seeks to analyze the pathophysiological and behavioral mechanisms through which excessive gadget use affects sleep regulation. By comparing existing mitigation strategies, this research also aims to identify the most effective and comprehensive approach for reducing gadget addiction and improving sleep quality in children. The findings are expected to provide evidence-based recommendations for parents, educators, and health professionals to support healthy gadget use and optimal sleep patterns among children. **"Level of Gadget Addiction in Children and Quality of Sleep".**

Methods

Study Design and Setting

This study employed a quantitative observational design using a cross-sectional approach. The research was conducted at SDN X, Madiun Regency, Indonesia. Data collection was carried out on a single day, July 28, 2025.

Population and Sample

The study population consisted of all fourth- to sixth-grade elementary school students enrolled at SDN X Grades 4 to 6 were selected because children in this age range (approximately 9–12 years) begin to use gadgets more independently while still being within a critical developmental period for sleep regulation. At this stage, children have adequate cognitive and reading abilities to accurately complete self-report questionnaires on gadget addiction and sleep quality. Additionally, evidence shows that the risk of excessive screen time and gadget dependency increases significantly during late childhood, making this group a relevant target for early prevention. A total of 38 students were selected as respondents using a simple random sampling technique to ensure equal selection probability for each participant. Students who were present during data collection and had parental consent were included in the study and use total sampling.

Research Variables and Instruments

The independent variable was the level of gadget use addiction, while the dependent variable was sleep pattern disturbance. Data were collected using structured self-administered questionnaires that assessed gadget usage behaviour and sleep patterns. The gadget addiction questionnaire measured frequency and duration of gadget use, while the sleep pattern questionnaire evaluated sleep duration, sleep quality, and the presence of sleep disturbances. he instruments used in this study demonstrated satisfactory validity and reliability. The Gadget Addiction Scale for Children showed good construct validity, with item–total correlation coefficients ranging from 0.42 to 0.78, and high internal consistency (Cronbach's $\alpha = 0.86$). The sleep quality questionnaire also demonstrated adequate validity, with correlation coefficients between 0.40 and 0.75, and acceptable reliability (Cronbach's $\alpha = 0.82$). These values indicate

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that both instruments are valid and reliable for assessing gadget addiction and sleep quality among children in grades 4 to 6

Data Collection Procedure

Data collection was conducted directly at the school under researcher supervision. Respondents completed the questionnaires within one session to minimize information bias. Ethical considerations, including informed consent and confidentiality, were strictly maintained throughout the study (Sugiyono, 2020). Data collection was conducted after obtaining ethical approval and informed consent from parents and participants. Data were gathered in a classroom setting using a demographic questionnaire, the Gadget Addiction Scale for Children, and a sleep quality questionnaire administered under researcher supervision. Completed questionnaires were checked, coded, and entered into statistical software for data cleaning and analysis. Descriptive statistics were used to summarize participant characteristics and prevalence, while inferential analyses examined the relationship between gadget addiction and sleep quality. The findings were presented clearly in tables and figures to ensure transparency and ease of interpretation.

Data Analysis

Univariate analysis was used to describe respondents characteristics, gadget addiction levels, and sleep patterns using frequency and percentage distributions. Bivariate analysis was conducted using the Spearman Rank correlation test to examine the relationship between gadget addiction level and sleep patterns, as the data were ordinal in nature. A p-value of < 0.05 was considered statistically significant (Sugiyono, 2020).

Novelty

The novelty of this study lies in its focus on elementary school children in a rural educational setting, which remains underrepresented in gadget addiction research. Additionally, the study examines the direct association between varying levels of gadget addiction and sleep pattern disturbances within a narrowly defined age group (grades 4–6), providing context-specific evidence that can support early preventive interventions at the primary school level.

Results

General Data

Based on the results of the field survey and data processing that has been carried out, there is general data from respondents as follows:

Table 1. Frequency of Respondent Characteristics by Class

No.	Class	Frekuency (f)	Presentase (%)
1.	4	10	26,3
2.	5	10	26,3
3.	6	18	47,4
Total		38	100

Based on table 1, it shows that the majority of the respondents' classes were class 6 with a total of 18 students (47.4%), and a small number were classes 4 and 5 with a total of 10 students each (26.3%).

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Table 2. Respondent Characteristics by Gender

No.	Gender	Frekuency (f)	Presentase (%)
1.	Boy	17	44,7
2.	Girl	21	55,3
Total		38	100

Based on table 2, it shows that the gender of the respondents was mostly female with a total of 21 students (55.3%), and a small proportion were male with a total of 17 students (44.7%).

Table 3. Respondent Characteristics by Age

No.	Age	Frekuency (f)	Presentase (%)
1.	9-10 year	13	34,2
2.	11-12 year	25	65,8
Total		38	100

Based on table 3, it shows that the majority of respondents were 11-12 years old, with a total of 25 students (65.8%), and a small number were 9-10 years old, with a total of 13 students (34.2%).

Table 4. Respondent Characteristics Based on Parents' Occupation

No.	Occupation	Frekuency (f)	Presentase (%)
1.	Private	11	28,9
2.	Self-Employed	6	15,8
3.	Farmers	10	26,3
4.	Civil Servants	6	15,8
5.	Odd Jobs	5	13,2
Total		38	100

Based on table 4, it shows that the majority of respondents' parents' jobs were private, with a total of 11 people (28.9%), and a small portion were odd jobs, with a total of 5 people (13.2%).

Special Data

Table 5. The Relationship Between Gadget Addiction Levels and Sleep Patterns

No	*Smartphone Addiction*	Sleep Quality				Amount	%	Sig
		Sleep Patterns		No Sleep Patterns				
		N	%	N	%			
1	Low	6	66,7%	3	33,3%	9	100%	
2	Average	25	86,2%	4	13,8%	29	100%	0,002
Total		31	81,6%	7	18,4%	38	100%	

Based on Table 8, it can be seen that of the 9 respondents with a low level of gadget addiction, 6 respondents (66.7%) had sleep disorders, and 3 respondents (33.3%) had no sleep disorders. Meanwhile, of the 29 respondents with a moderate level of gadget addiction, 25 respondents (86.2%) had sleep disorders, and 4 respondents (18.4%) had no sleep disorders.

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Discussion

Based on the cross-tabulation results presented in Table 5.5, most children with a moderate level of gadget addiction (25 students; 86.6%) experienced moderate sleep quality disturbances, while 6 children (66.7%) showed mild sleep disturbances. Statistical analysis demonstrated a significant association between gadget addiction and sleep patterns, with a p-value of 0.002 and a strong correlation coefficient of 0.838, indicating a very strong relationship between the two variables.

This relationship can be explained through the role of melatonin, a hormone primarily produced by the pineal gland located between the two hemispheres of the brain (Wawo, 2021). Melatonin levels are minimal during daylight hours and increase significantly at night. This hormone plays a crucial role in regulating circadian rhythms, which control the sleep–wake cycle over a 24-hour period (Putri & Ispriantari, 2025). Circadian rhythms are highly sensitive to light exposure; therefore, exposure to artificial light at nightparticularly from electronic devicescan suppress melatonin production (Norhasanah et al., 2024). Children who are addicted to gadgets tend to keep their devices close even during bedtime. Notifications and screen illumination may continuously stimulate the brain, delay sleep onset, and disrupt circadian rhythm regulation, ultimately reducing sleep quality (Dewi & Agustina, 2024). Continuous exposure to electronic light also causes persistent brain stimulation, making it difficult for users to relax and fall asleep, which contributes to sleep disturbances (Ikawati & Yuniarti, 2025).

The findings further indicate that sleep pattern disturbances among respondents were influenced by excessive gadget use. Mild sleep disturbances reported by six children (66.7%) included symptoms such as fear at night, sleep talking, vivid dreams, and confusion upon awakening, although these symptoms were often forgotten by morning. Increased frequency and duration of gadget use were associated with poorer sleep quality, whereas limited gadget use was linked to better sleep fulfillment. This finding is consistent with previous research stating that excessive gadget use negatively affects sleep quality (Hani et al., 2025). Poor sleep quality may impair concentration and memory, and children who spend excessive time on gadgets tend to neglect other activities, further worsening their sleep condition. Excessive fatigue and psychological stress are also known to disrupt sleep quality, particularly among school-aged children and adolescents (Potter & Perry, 2011).

Overall, this study confirms a significant relationship between gadget addiction levels and sleep patterns among elementary school children. Abnormal or excessive gadget use reduces sleep duration and increases the risk of sleep disorders. Statistical testing using the Spearman Rank correlation showed that the p-value (0.002) was lower than the significance level (α = 0.005), leading to the rejection of the null hypothesis and acceptance of the alternative hypothesis. This indicates a significant and strong relationship between gadget addiction and sleep patterns among fourth- to sixth-grade students at SDN X, Madiun Regency.

The researchers assume that gadget addiction and sleep disturbances in children should not be underestimated (Nahdiyah et al., 2023). Excessive gadget use may cause visual impairment due to prolonged screen exposure and may trigger headaches or dizziness related to electromagnetic stimulation. Meanwhile, insufficient sleep can negatively affect children's health, growth, behaviour, and brain function (Masykura Setiadi et al., 2024). Physical signs of sleep deprivation include dark circles around the eyes, swollen eyelids, sunken eyes, excessive daytime sleepiness, and difficulty concentrating (Purwandari et al., 2024). Psychological symptoms may include social withdrawal, fatigue, decreased motivation, memory impairment, confusion, reduced decision-making ability, and declining academic performance (Nur Haqiqi et al., 2024). Therefore, controlling gadget use is essential to maintaining optimal sleep quality and overall child development (Andini et al., 2024).

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Conclusion

Based on the data and research results that have been conducted, it can be concluded that the use of gadgets in elementary school children, most of the 32 respondents (84.2%) in grades 4-6 at SDN X experienced a moderate level of addiction to gadget use. Sleep patterns in elementary school children, most of the 31 respondents (81.6%) in grades 4-6 at SDN X had sleep disorders. There is a relationship between gadget use and sleep patterns in elementary school children, most of the 31 respondents (81.6%) in grades 4-6 at SDN X.

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