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Digital addiction among elementary school children in rural Southeast Sulawesi: A descriptive cross-sectional study

Kecanduan digital pada anak sekolah dasar di pedesaan Sulawesi Tenggara: Studi deskriptif cross-sectional

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Abstract

Previous studies on digital addiction in children have predominantly focused on urban or digitally advanced regions, leaving a gap in understanding how digital behaviors manifest in rural contexts, especially among elementary-aged children. This study aims to describe the level of digital addiction, including screen time and game addiction, among elementary school children in a rural area of Southeast Sulawesi, Indonesia. A descriptive cross-sectional design was applied involving 50 students from State Elementary School 2 Wakorumba Selatan, selected through proportional random sampling. Data were collected using a screen time questionnaire and the Game Online Addiction Scale, then analyzed univariately using SPSS. The results revealed that 54% of children had daily screen time exceeding three hours and 66% were classified as addicted to games. Notably, digital addiction was more prevalent among children over nine years old and among girls. Despite limited personal gadget ownership, many children still accessed digital content, with a recurring habit of playing games before bedtime. These findings highlight the urgent need for targeted digital literacy programs and parental guidance in rural communities. This study contributes to public health by offering evidence to inform community-based interventions and educational policies aimed at preventing digital addiction and promoting healthy digital behaviors among children

Abstrak

Penelitian sebelumnya mengenai adiksi digital pada anak sebagian besar berfokus pada wilayah perkotaan atau daerah dengan akses digital tinggi, sehingga masih terdapat kesenjangan dalam memahami perilaku digital anak di wilayah pedesaan, khususnya pada anak usia sekolah dasar. Penelitian ini bertujuan untuk menggambarkan tingkat adiksi digital, termasuk durasi screen time dan adiksi game, pada anak-anak sekolah dasar di wilayah pedesaan Sulawesi Tenggara, Indonesia. Penelitian ini menggunakan desain deskriptif potong lintang dengan melibatkan 50 siswa dari SD Negeri 2 Wakorumba Selatan yang dipilih melalui teknik proportional random sampling. Data dikumpulkan menggunakan kuesioner screen time dan Game Online Addiction Scale, lalu dianalisis secara univariat menggunakan SPSS. Hasil menunjukkan bahwa 54% anak memiliki screen time lebih dari tiga jam per hari dan 66% mengalami adiksi game. Adiksi digital lebih banyak ditemukan pada anak usia di atas sembilan tahun dan pada siswa perempuan. Meskipun sebagian besar tidak memiliki gawai pribadi, anak tetap dapat mengakses konten digital, termasuk kebiasaan bermain game sebelum tidur. Temuan ini menekankan pentingnya literasi digital dan pendampingan orang tua di komunitas pedesaan. Studi ini berkontribusi bagi pengembangan kesehatan masyarakat dengan memberikan dasar evidensial untuk intervensi berbasis komunitas dan kebijakan pendidikan dalam mencegah dampak negatif adiksi digital pada perkembangan anak.

Keywords :

children; digital addiction; screen time; students; rural areas

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INTRODUCTION

In recent decades, various portable digital devices such as smartphones, tablets, and laptops have undergone rapid development, bringing humans into the digital age. The phenomenon of digital addiction among children has increasingly drawn the attention of researchers worldwide, particularly in light of the COVID-19 pandemic, which necessitated greater reliance on digital devices for education and social interaction. One significant finding is that rates of digital addiction can be notably high among children. For instance, a study conducted in Bangladesh reported that 46.9% of children aged 8–14 exhibited high levels of gadget addiction (Al-Mamun et al., 2024). A recent meta-analysis indicates that global rates of various types of digital addiction among children range from 6.04% to 26.99%, with smartphone addiction at 26.99% and social media addiction at 17.42% (Al-Mamun et al., 2024). This increase in digital dependency often correlates with the greater time spent on educational platforms during the COVID-19 pandemic, which has fostered internet addiction in several youth (Islam et al., 2022). Many children faced challenges in regulating their digital usage, leading to significant mental health issues, including depressive symptoms linked to digital game addiction (Çelik, 2024).

Additionally, parental influence plays a crucial role in shaping children's digital behaviors. Research indicates that children whose parents frequently use digital devices tend to exhibit higher levels of digital play addiction themselves (İlvan & Ceylan, 2023; Eo & Lee, 2022). This underscores the necessity for caregivers to educate themselves and their children about the ramifications of excessive media consumption, particularly in fostering healthy digital habits (Karaköse et al., 2022). Moreover, evidence suggests that as children's digital game addiction increases, their social and emotional development can decline, with findings indicating higher aggression levels and hindered social interactions among heavily engaged gamers (Şenol et al., 2023; ÇETİN, 2023).

The implications of digital addiction extend beyond individual psychological disturbances, also affecting broader areas of well-being, including academic performance and social skills. A review of recent studies reveals that children prone to problematic media use often exhibit diminished self-regulation abilities, which adversely impacts their academic success and peer interactions (Endert, 2021; Bağatarhan, 2023). This relationship highlights the urgent need for effective intervention strategies, urging educators and parents to cultivate environments that mitigate the risks of digital addiction while promoting positive engagement with technology. Digital game addiction among children presents significant developmental and psychological risks. Evidence indicates that excessive engagement in online gaming can lead to various adverse mental health outcomes, including increased depressive symptoms. For instance, children demonstrating high tendencies of digital game addiction often exhibit behavioral issues such as impulsivity, anxiety, and reduced social competencies (Çelik, 2024; Şenol et al., 2023). Such addictive behaviors may stem from the immediate rewards and immersive environments offered by video games, making them particularly enticing and distracting for children, hindering their ability to focus on less stimulating tasks (Farchakh et al., 2020).

Moreover, studies have linked gaming addiction to neurodevelopmental challenges, especially among children with Attention Deficit Hyperactivity Disorder (ADHD). These children show a heightened vulnerability to game addiction and are more prone to prolonged gaming sessions, potentially exacerbating their inattention and social withdrawal (Alrahili et al., 2023; Baabbad et al., 2023; Masi et al., 2021). The correlation between gaming addiction and diminished social skills complicates the developmental landscape, as children become increasingly detached from real-life interactions, negatively impacting their self-esteem and interpersonal relationships (Şenol et al., 2023). Given the mounting evidence, it is crucial for parents and educators to recognize these risks and promote healthier digital habits to foster children's holistic development. Implementing appropriate guidelines and proactive interventions can mitigate these risks associated with digital game addiction, ensuring healthier psychosocial growth among children (Zhu, 2023).

In Indonesia, internet usage has surged dramatically: from 143 million users in 2017 (54.7% of the population) to approximately 221 million (79.5%) in 2024 (Asosiasi Penyelenggara Jasa Internet Indonesia, 2017, 2022). Notably, smartphone penetration is especially high among youth: 99.26% for students and 62.43% for children aged 5–12 (APJII, 2022). Given their portability and multifunctionality, smartphones have become the primary gateway to the internet for Indonesian children (Bröhl et al., 2018; Aljomaa et al., 2016). In response, the Indonesian government has implemented digital literacy initiatives—including amendments to the ITE Law and campaigns by the Ministry of Communication and Information—to reach over

Table 1. Distribution of respondent characteristics

Characteristics	n (50)	%
Gender		
Male	31	62
Female	19	38
Age		
£ 9 Years	20	40
> 9 Years	30	60
Class		
I	6	12
II	6	12
III	8	16
IV	9	18
V	10	20
VI	11	22
Extracurricular activities		
There are activities	29	58
No activities	21	42
Gadget Ownership		
Have	19	38
No	31	62
Screen Time		
≤ 3 hour	23	46
> 3 hour	27	54
Game Addiction		
No	17	34
Yes	33	66

12 million citizens and raise the national digital literacy index, currently rated at 3.47/5 (Mahendra et al., 2022; Harnum & Pinariya, 2023; Isabella et al., 2024). Nonetheless, gaps persist in parents' understanding of how their involvement influences children's digital habits (Asmayawati, 2023), and despite policy efforts, rural areas remain under-researched in terms of digital addiction and literacy development (Rahman et al., 2021).

While existing studies have quantified digital addiction prevalence among children and highlighted parental influence and mental health consequences (Lam et al., 2020; Li et al., 2025; Trumello et al., 2021), most have focused on urban or school-based samples, with limited attention to elementary school children in rural regions. Few investigations have examined both screen time and game addiction patterns among children in these contexts, particularly regarding access to digital devices without ownership and pre-bedtime gaming habits that may exacerbate addiction risks. Although government programs aim to improve digital literacy in rural Indonesia, it remains uncertain whether these efforts effectively address behavioral addiction in young children. Assuming that literacy equates to healthy digital behavior often overlooks how children interact with devices at home, especially before sleep. This study addresses the gap by providing descriptive data on digital addiction—covering screen time and game usage—among rural elementary children in Southeast Sulawesi. We also examine contextual factors such as device access and bedtime gaming, offering insights beyond standard literacy measures. The aim is to describe the level of digital addiction among rural elementary students, analyze its correlation with age and gender, and identify relevant behavioral patterns.

Table 2. Distribution of screen time based on gender and age

Characteristics	Screen time				Total	
	> 3 hour		≤ 3 hour			
	n	%	n	%	n	%
Gender						
Male	10	37.04	15	65.22	25	50
Female	17	62.96	8	34.78	25	50
Age						
≤ 9 Years	9	33.33	11	47.83	20	40
> 9 Years	18	66.67	12	52.17	30	60

METHODS

This study employed a descriptive research approach using a cross-sectional study design aimed at exploring the patterns of digital addiction among elementary school children in a rural setting. The research was conducted at State Elementary School 2 Wakorumba Selatan, located in Muna Regency, Southeast Sulawesi Province. This location was selected based on both practical and scientific considerations. Wakorumba Selatan represents a typical rural area where internet infrastructure is growing, yet digital literacy interventions remain limited. Selecting this site allowed researchers to investigate digital behavior in a population often underrepresented in national surveys and educational technology initiatives, thereby providing valuable contextual insights into digital addiction risks among rural children.

The study population consisted of all students enrolled in grades I to VI, totaling 161 individuals. A proportional random sampling technique was employed to ensure that the sample reflected the population structure across all grade levels. A total of 50 students were selected as the final sample. Inclusion criteria included being an active student at the selected school and having parental consent to participate in the study. Exclusion criteria were students who were absent during data collection or whose parents declined participation. The data were collected using two standardized instruments: a screen time questionnaire and the Game Online Addiction Scale. The screen time questionnaire assessed the average duration of digital device use per day, while the Game Online Addiction Scale, adapted to the Indonesian context, measured behavioral indicators of game-related addiction, such as preoccupation, loss of control, and interference with daily functioning. Key items included questions such as “How often do you play games before sleeping?” and “Do you feel upset when you cannot play games?”.

Data collection was conducted with strict adherence to ethical research standards. Before participation, written informed consent was obtained from all parents or legal guardians, and verbal assent was obtained from the children. Data were manually verified, coded, and entered into SPSS v.21 for statistical processing. A univariate analysis was performed to generate descriptive statistics such as frequencies and percentages, providing a clear profile of children’s screen time habits and levels of game addiction. The results were then tabulated and interpreted to identify patterns by gender, age, and other demographic variables. All procedures were approved by the local educational authorities, ensuring that the study met both ethical and academic standards.

RESULTS

Table 1 presents the demographic and behavioral characteristics of the 50 respondents. The majority were male (62%), while females accounted for 38%. In terms of age, 60% of the respondents were over 9 years old, while 40% were 9 years old or younger. Regarding grade level, the largest proportion came from Grade VI (22%), followed by Grade V (20%) and Grade IV (18%). The fewest were from Grades I and II, each contributing 12%.

A total of 29 children (58%) were involved in extracurricular activities, with most of them being students in Grades IV, V, and VI. Meanwhile, 21 children (42%) did not participate in any extracurricular activities. In terms of gadget ownership, 62% of children did not have their own devices, while 38% did. Regarding daily screen time, more than half (54%) reported screen time exceeding three hours per day, while 46% had three hours or less. Notably, 66% of

Table 3. Distribution of game addiction by gender and age

Characteristics	Game Addiction				Total	
	Yes		No			
	n	%	n	%	n	%
Gender						
Male	16	48,48	9	52,94	25	50
Female	17	51,52	8	47.06	25	50
Age						
≤ 9 Years	14	42.42	6	35.29	20	40
> 9 Years	19	57.58	11	64.71	30	60

the children showed signs of game addiction, compared to 34% who did not.

Table 2 further explores screen time based on gender and age. Female respondents were more likely to have longer screen time, with 17 girls (62.96%) spending more than three hours per day on screens, compared to 10 boys (37.04%). Similarly, older children (aged >9 years) showed higher screen time, with 18 (66.67%) reporting screen use of more than three hours daily, compared to 9 (33.33%) among the younger group (≤9 years).

Table 3 describes the distribution of game addiction by gender and age. The prevalence of game addiction appeared nearly balanced between male (48.48%) and female (51.52%) respondents, with a slightly higher proportion among girls. Children older than nine years showed a greater tendency toward game addiction, with 57.58% of them affected, compared to 42.42% among younger children.

DISCUSSION

The findings of this study revealed that 66% of children in a rural elementary school in Southeast Sulawesi experienced digital game addiction, with more than half (54%) reporting daily screen time exceeding three hours. The prevalence was higher among older children (aged >9 years) and female students. Furthermore, 62% of the respondents did not own their own gadgets but still exhibited high digital engagement, suggesting that access through shared devices is sufficient to foster potentially addictive behavior. These results align with and expand upon global and national data on children's digital behavior, emphasizing the pervasive nature of digital addiction beyond urban or high-tech environments.

Comparing these findings with global literature reveals consistent trends regarding the impact of digital addiction on child development. In Indonesia, İlvan & Ceylan (2023) highlighted that increased digital play usage correlates with higher addiction tendencies, especially when influenced by parental device use. This mirrors global findings showing that parental digital habits significantly shape children's screen time patterns and likelihood of addiction (Şenol et al., 2023). These parallels underscore the universality of digital behavior patterns among children, regardless of geographic or socio-economic context.

Excessive screen time has been repeatedly linked to negative mental health outcomes such as anxiety and depression, both globally and in Indonesia (Çelik, 2024). Our study supports this by revealing patterns of prolonged gaming and screen exposure that have been associated with such psychological effects. Furthermore, digital environments—while facilitating social interaction—can produce either positive or negative outcomes depending on usage habits (Quiñones & Adams, 2021; Caughey et al., 2023). Interventions around the world are now increasingly focused on fostering balanced media use among children and educating families about its associated risks (Ding & Li, 2023), a direction that is equally relevant in the Indonesian context.

Socio-cultural factors further influence the dynamics of digital addiction, particularly in gaming behaviors. Peer influence is a prominent factor; children often replicate gaming practices within their social circles, which can intensify addiction tendencies (Jung, 2020). Multiplayer and interactive games, though socially enriching, carry an elevated risk of addiction due to the strong social reinforcement they offer (Çelik, 2024). This finding is particularly relevant in school environments, where shared gaming culture can normalize prolonged gaming behavior.

Family dynamics are also instrumental in shaping children's digital behavior. The lack of parental attention or emotional support often drives children toward online games as a form of escapism, reflecting a deeper link between

familial settings and behavioral health (Yolanda et al., 2021; Bao et al., 2024). This trend is more pronounced in households with lower socio-economic status or heightened academic pressures, where gaming becomes a coping mechanism (Zhu, 2023). These socio-economic and psychological stressors compound the risk, reinforcing the need for multifaceted and context-sensitive interventions.

Demographic variables such as age and gender also play critical roles. Consistent with previous research, this study found that older children and girls demonstrated a higher rate of digital addiction, contradicting earlier assumptions that boys are more vulnerable, especially in competitive gaming genres (Alrahili et al., 2023). These findings suggest a shifting pattern in gendered gaming behavior, necessitating updated intervention strategies that reflect current usage trends.

The implications of digital addiction are multidimensional, affecting health and educational domains. Health-wise, the risks extend to both mental and physical well-being—ranging from depression and anxiety to sedentary behavior, which may lead to obesity. From an educational standpoint, digital literacy is emerging as a crucial protective factor. Structured digital education programs that involve parents and promote conscious engagement with technology can reduce risks while enhancing learning (Barakat et al., 2025; Nuique, 2024).

Educational institutions play a vital role in this endeavor. Schools that integrate digital literacy into their curriculum help shape responsible digital users and build students' resilience to addiction (İlvan & Ceylan, 2023). Meanwhile, government efforts to promote safe online behavior through public awareness campaigns and national policies are essential in complementing school and family-based interventions (Noor et al., 2025). Together, these multi-sectoral approaches can foster digital citizenship and healthier media habits among children.

This study possesses several strengths. Firstly, it contributes new evidence from an under-researched rural population, offering insights into digital behavior patterns in Southeast Sulawesi, a region often excluded from national data analyses. Secondly, the study employs validated instruments adapted to measure both screen time and gaming addiction, allowing for specific and reliable findings. Moreover, the study adds value by examining contextual factors such as device access and bedtime gaming—areas seldom explored in previous research.

However, the study is not without limitations. The relatively small sample size from a single school limits the generalizability of the findings to broader rural populations. In addition, the use of self-reported questionnaires may introduce response bias, especially among younger children who might struggle to estimate screen time accurately. The cross-sectional nature of the study also prevents causal inferences. Future research should consider larger samples, include multiple rural settings, and potentially adopt longitudinal designs to explore behavioral changes over time.

CONCLUSION

This study reveals a relatively high prevalence of digital addiction among elementary school children in a rural area of Southeast Sulawesi, as indicated by prolonged screen time and gaming behavior. The findings highlight that girls and children over the age of nine are more likely to experience excessive screen time and game addiction. Notably, despite the lack of personal gadget ownership, children still access digital content through shared or parental devices, often engaging in digital gaming before bedtime. These behaviors are exacerbated by inadequate parental supervision and the absence of structured digital usage guidelines.

The study confirms that age and gender are significant factors influencing children's digital engagement, and it underscores the broader implications for children's physical, psychological, and social well-being. These include risks such as disrupted sleep patterns, impaired academic performance, and emotional difficulties. As such, the findings contribute to the growing body of public health evidence calling for urgent, community-based digital literacy strategies tailored to rural populations.

In response, local governments should prioritize the integration of digital literacy programs into community health and education initiatives, especially targeting parents and children in rural settings. Schools, through the education department, can implement structured modules promoting responsible digital habits and offer non-digital extracurricular activities that foster creativity and social interaction. Health practitioners, including school health officers, can play a preventive role by screening early signs of digital addiction and counseling families on safe technology use. Future researchers are encouraged to expand this work through longitudinal studies across diverse rural settings to deepen the understanding of digital addiction trajectories and to test intervention models that effectively reduce its risks.

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AUTHORS' CONTRIBUTIONS
Siti Nurfadilah H. wrote the manuscript, acquired the data, revised the manuscript, and read and approved the final manuscript. Devi Savitri Effendy revised the manuscript, and performed the field work.

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COMPETING INTERESTS
The authors affirm that there are no conflicts of interest related to the research, writing, or publication of this article.

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