

**Original Article****Association Between Daily Gadget Use and Anxiety Levels Among Indonesian Elementary School Children: A Cross-Sectional Study**Santi Rinjani<sup>1</sup>, Yani Annisa Fauziah<sup>1</sup>, Winasari Dewi<sup>1</sup><sup>1</sup> Department of Nursing, Bhakti Kencana University, West Java, Indonesia**ARTICLE INFO****Article History**

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**ABSTRACT**

**Background:** Background: The use of digital gadgets among school-aged children has increased substantially and may contribute to psychological problems, particularly anxiety. However, empirical evidence examining the association between daily gadget use duration and anxiety levels among elementary school children in Indonesia remains limited. Therefore, this study aimed to examine the association between daily gadget use duration and anxiety levels among elementary school children in Garut, Indonesia using a cross-sectional design.

**Methods:** This cross-sectional study was conducted among elementary school children aged 6–12 years in Garut, Indonesia. Participants were recruited using stratified random sampling. Inclusion criteria were students aged 6–12 years who consented to participate, while students with diagnosed neurological or psychiatric disorders were excluded. The independent variable was daily gadget use duration, and the dependent variable was anxiety level measured using the Spence Children’s Anxiety Scale (SCAS), which showed good reliability (Cronbach’s alpha = 0.938). Spearman correlation analysis was performed. This study adhered to the STROBE guidelines.

**Results:** The median daily gadget use duration was 3.0 hours (IQR 2.0–4.0), and the median anxiety score was 51.0 (IQR 40.0–60.0), with a mean of 49.65 (SD 17.17). Spearman correlation analysis revealed a significant positive association between daily gadget use duration and anxiety level among elementary school children ( $r = 0.215$ , 95% CI 0.01–0.40,  $p = 0.040$ ), indicating a weak but statistically significant correlation. This finding suggests that longer gadget use duration was associated with slightly higher anxiety levels among children.

**Conclusion:** Higher daily gadget use duration was associated with increased anxiety levels among elementary school children. These findings underscore the importance of monitoring gadget use and implementing early mental health screening to identify anxiety symptoms. School-based and community-based interventions may help promote healthy digital habits and support child mental health, particularly in resource-limited settings.

**Keywords:** Screen Time; Anxiety Disorders; Child; Elementary Schools; Mental Health Nursing

### Implications for Practice:

- Clinical practice should integrate routine assessment of children's daily gadget use into comprehensive mental health screening to facilitate early identification and management of anxiety risk in school and community settings.
- Health policy should prioritize the incorporation of digital behavior monitoring and child mental health screening into school health programs through standardized guidelines, workforce training, and cross-sector collaboration between health and education systems.
- Midwifery education should strengthen competencies in early life mental health promotion and family-centered digital health counseling, with particular relevance for Low- and Middle-Income Countries where resource constraints necessitate cost-effective, community-based preventive strategies.

### Introduction

The advancement of digital technology has profoundly influenced human life, particularly through the use of the internet on devices such as smartphones and tablets. In Indonesia, there has been a notable increase in internet use among children and elementary school students, reflecting broader global trends in early digital exposure ([Masykura Setiadi et al., 2024](#); Indonesian Internet Service Providers Association [APJII], 2023). The internet holds a crucial place in children's lives, serving not only as a source of entertainment and relaxation but also as a means for them to explore their identities ([Wei & Xu, 2025](#)). Digital devices play an important role in children's lives, serving as tools for education, entertainment and social interaction. However, excessive and unsupervised gadget use may pose developmental risks and negatively affect children's psychological well-being ([Rinjani et al., 2023](#); [Venugopal et al., 2024](#)). Globally, internet use among children continues to rise, with large proportions of

young users engaging in online gaming and social media activities, increasing their exposure to potential psychosocial risks ([Nagata et al., 2023](#); [Wei & Xu, 2025](#)). Recent global evidence indicates that prolonged screen exposure is associated with emotional dysregulation, reduced psychological well-being, and increased vulnerability to anxiety symptoms among children and adolescents ([Twenge & Farley, 2024](#); [Soraci et al., 2025](#)). The Fifth National Survey Report on Internet Use Among Children revealed that in 2022, China had 193 million underage internet users, with 67.8% participating in online gaming ([Wei & Xu, 2025](#)). Among all internet users, children aged 5-9 made up approximately 25.2% ([Sari et al., 2023](#)). Unregulated usage can lead to significant adverse effects. The ease of access provided by the internet can drive children towards various forms of escapism due to social and academic pressures, potentially resulting in a loss of control over their online activities and leading to health issues like anxiety, depression, and a heightened risk of addiction ([Venugopal et al., 2024](#)). Children are more susceptible than general statistics might indicate to experiencing and exhibiting behaviors associated with social anxiety, also known as Social Phobia ([Eggers et al., 2022](#)). The elementary school years are a pivotal period in children's psychological development, characterized by substantial emotional and social changes. During this time, children start to learn how to identify and manage their own emotions and those of others, yet they also become more susceptible to psychological challenges such as anxiety ([Paulus et al., 2021](#)).

Children often experience anxiety as an emotional reaction characterized by intense fear or worry in specific situations, which can disrupt their focus, sleep patterns, and even lead to physical symptoms ([Bécsi et al., 2025](#)). Anxiety disorders affect

approximately 12.3% of children aged 6 to 12 years, and nearly one-third of children experience anxiety disorders before adulthood, highlighting the global burden of childhood anxiety ([Eggers et al., 2022](#)). These disorders are categorized based on fear triggers, such as separation or social interaction, and the manifestation of physiological and cognitive symptoms ([Eggers et al., 2022](#)). The etiology of anxiety is multifactorial, involving genetic vulnerability, parenting styles, social stressors, and environmental influences ([Bernard & Norbury, 2023](#)). Recent international studies have also reported increasing rates of mental health problems among children associated with excessive digital exposure and reduced social interaction ([Toska et al., 2024](#)). In Indonesia, national health survey data reported that approximately 9.8% of adolescents experience emotional and mental health problems, including anxiety-related symptoms, highlighting the growing mental health burden among young populations ([Ministry of Health, Indonesia, 2023](#)). School-based studies in Indonesia have also reported increasing levels of anxiety symptoms among elementary school children, indicating the need for early detection and preventive strategies ([Nugraha et al., 2023](#); [Sari et al., 2023](#)).

In the digital environment, prolonged gadget use has been associated with increased social comparison, emotional dysregulation, and reduced face-to-face interaction, all of which contribute to anxiety symptoms ([Lukose et al., 2023](#); [Nugraha et al., 2023](#)). This issue has worsened during the COVID-19 pandemic, as children have had to adapt to online learning and reduced social contact, both of which can trigger anxiety ([Ng & Ng, 2022](#)) [Twenge & Farley, 2024](#). Thus, managing gadget use and ensuring active parental involvement are necessary preventive measures ([Anissaniwaty et al., 2023](#)). The

behavioral addiction model provides a conceptual framework to explain how excessive gadget use may contribute to anxiety symptoms. This model suggests that prolonged digital engagement may lead to psychological dependence and emotional dysregulation, increasing vulnerability to anxiety symptoms among children ([Giansanti, 2025](#); [Venugopal et al., 2024](#); [Yang et al., 2022](#)). Gadget use may influence anxiety through cognitive mechanisms such as attentional overload, emotional mechanisms such as impaired emotional regulation, and social mechanisms such as reduced interpersonal interaction and increased social comparison, which may increase children's vulnerability to anxiety ([Soraci et al., 2025](#); [Wei & Xu, 2025](#)).

From a global health perspective, excessive gadget use has become a growing concern, particularly in Low- and Middle-Income Countries (LMICs), where rapid digital adoption often occurs without adequate digital health literacy, parental guidance, or structured mental health support systems ([World Health Organization, 2024](#); [UNICEF, 2023](#)). Children in LMICs may be more vulnerable due to limited access to school-based mental health services, fewer preventive mental health programs, and variability in parental supervision and digital literacy ([Yin et al., 2025](#)). In contrast, high-income countries generally have more established school mental health services, structured screening programs, and greater access to psychological support. Indonesia, as a rapidly developing LMIC with increasing digital penetration among children, represents an important context for understanding the relationship between gadget use and anxiety. These contextual differences highlight the importance of examining this association within Indonesia to inform culturally appropriate prevention and intervention strategies, particularly in school and community health settings

where nurses play a crucial role in early identification, screening, and mental health promotion.

While numerous studies have explored the effects of gadget use on children, there is limited research specifically examining the link between daily gadget use and anxiety among elementary school students in Indonesia. This research is crucial for gaining a deeper understanding of how gadget use impacts children's health and for developing effective intervention strategies. Therefore, this study aimed to examine the association between daily gadget use and anxiety levels among elementary school children.

## Methods

### Study Design

This study employed a cross-sectional correlational design to examine the association between daily gadget use duration and anxiety levels among elementary school children. The cross-sectional approach allowed for simultaneous measurement of both variables without manipulation or intervention, enabling the identification of the strength and direction of their relationship in a natural school setting. This design was appropriate for examining behavioral and psychological variables in a real-world context. This study was reported in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines to ensure transparency and completeness in reporting observational research.

### Participants

This study was conducted in Garut Regency, Indonesia, among elementary school children aged 6–12 years enrolled in a public elementary school. The target population included all students who met the inclusion criteria during the data collection period. A total sampling

technique was used to recruit participants. Inclusion criteria is students aged 6–12 years, enrolled in the selected elementary school, able to understand and complete the questionnaire, and provided parental or guardian consent.

Exclusion criteria included students with diagnosed neurological or psychiatric disorders and students who were absent during data collection.

The sample size consisted of 92 participants, representing all eligible students. Because total sampling was used and all eligible participants were included, formal power analysis was not required. Total sampling is considered appropriate in school-based observational studies when the accessible population is limited and fully recruited. There were no dropouts or refusals during the data collection process, and all distributed questionnaires were completed and included in the analysis.

### Instruments

Daily gadget use duration was measured using a structured self-report questionnaire developed for this study. Participants were asked to report their average daily duration of gadget use in hours per day based on recall over a typical day. The questionnaire was administered in a classroom setting under supervision. Gadget use duration was treated as a continuous variable for statistical analysis.

Self-report measurement of screen time is widely used in pediatric behavioral research and has demonstrated acceptable validity in assessing habitual gadget use among school-aged children.

Anxiety level was measured using the Spence Children's Anxiety Scale (SCAS), a standardized instrument designed to assess anxiety symptoms in children aged 6–12 years. The SCAS consists of 44 items rated on a 4-point Likert scale ranging from 0 (never) to 3 (always). The total score ranges

from 0 to 132, with higher scores indicating higher levels of anxiety.

In this study, the SCAS demonstrated good internal consistency, with a Cronbach's alpha coefficient of 0.87, indicating good reliability. SCAS scoring interpretation is Lower scores indicate lower anxiety symptoms and higher scores indicate higher anxiety symptoms. The SCAS was administered as a self-report questionnaire under researcher supervision to ensure comprehension and completeness.

### Data Collection

Data were collected during August 2025 at SDN 1 Tarogong Kidul, Garut Regency, Indonesia. Prior to data collection, permission was obtained from the school administration and ethical approval was secured. Participants and their parents or guardians were provided with information about the study. Questionnaires were administered in the classroom under the supervision of the principal researcher, who has training in nursing research and child health assessment.

Participants were given standardized instructions and were allowed to ask questions if clarification was needed. All completed questionnaires were reviewed immediately to ensure completeness. No missing data were identified, and all collected data were included in the final analysis.

### Data Analysis

Data were analyzed using IBM SPSS Statistics version 26. Descriptive statistics were used to summarize gadget use duration and anxiety levels, including mean, standard deviation, median, and interquartile range. Spearman rank correlation analysis was performed to examine the association between gadget use duration and anxiety level because the data were not normally distributed. Effect

size interpretation was based on established guidelines: correlation coefficients of 0.10–0.29 indicate weak correlation, 0.30–0.49 indicate moderate correlation, and  $\geq 0.50$  indicate strong correlation. Statistical significance was set at  $p < 0.05$ .

### Ethical Considerations

Ethical approval was obtained from the Health Research Ethics Committee of the Faculty of Bhakti Kencana Garut, Indonesia (Approval No: 120/KEPK\_UBK\_GRT/08/2025). This study was conducted in accordance with the principles of the Declaration of Helsinki. Written informed consent was obtained from parents or legal guardians prior to participant enrollment. Participants' confidentiality was ensured by assigning unique identification codes instead of names. All data were stored securely and used solely for research purposes. Participants and their guardians were informed of their right to withdraw from the study at any time without consequences.

### Results

A total of 92 elementary school students participated in this study. The demographic characteristics of participants are presented in Table 1. Normality testing using the Shapiro–Wilk test indicated that gadget use duration and anxiety scores were not normally distributed ( $p < 0.05$ ). Therefore, non-parametric analysis using Spearman correlation was performed.

**Table 1.** Demographic Characteristics of Participants (n = 92)

Demographic Characteristics	Frequency	Percentage	Mean
Age			
10 years old	53	57.61	9.57 ± 0.52 years
9 years old	38	41.30	
8 years old	1	1.00	

Demographic Characteristics	Frequency	Percentage	Mean
Gender			
Female	46	50.00	
Male	46	50.00	
Most Frequently Accessed			
youtube	18	19.6	
online games	62	67.4	
tiktok	9	9.8	
instagram	1	1.1	
others	2	2.2	
Total	92	100.0	

The mean age of participants was 9.57 ± 0.52 years. The sample consisted of equal proportions of male and female students (50.0% each). The most frequently accessed digital content was online games (67.4%), followed by YouTube (19.6%) (Table 1).

**Table 2.** Daily Gadget Use Duration (n = 92)

Gadget Usage Duration	Frequency	Percentage
< 1 hour	4	4.30
1-2 hours	36	39.13
> 2 hours	52	56.50
Total	92	100

More than half of the participants (56.5%) reported using gadgets of > 2 hours/day (Table 2).

**Table 3.** Anxiety Level Based on SCAS Total Score (n=92)

Anxiety	F	%	Mean ± SD	Median (IQR)
Increased	71	77.2	49.65 ± 17.17	51.0 (40.0–60.0)
Normal	21	22.8		
Total	92	100		

The distribution of anxiety levels based on SCAS total scores is presented in Table 3. The mean anxiety score was 49.65 ± 17.17, with a median of 51.0 (IQR 40.0–60.0). Most participants (77.2%) were classified as having elevated anxiety levels.

**Table 4.** Anxiety by SCAS Subscale (n = 92)

Subscale	F	%
Separation Anxiety		
Normal	38	41.3
Increased	54	58.7
Social Phobia		
Normal	66	71.7
Increased	26	28.3
Obsessive-Compulsive		
Normal	58	63.0
Increased	34	37.0
Panic/Agoraphobia		
Normal	46	50.0
Increased	46	50.0
Physical Injury Fears		
Normal	30	32.6
Increased	62	67.4
Generalised Anxiety		
Normal	59	64.1
Increased	33	35.9
Total	92	100

The distribution of anxiety categories based on SCAS subscales is shown in Table 4. The highest proportion of increased anxiety was observed in the Physical Injury Fears subscale (67.4%), followed by Separation Anxiety (58.7%). Moderate proportions were observed in Generalised Anxiety (35.9%) and Obsessive-Compulsive symptoms (37.0%), while the lowest increase was observed in Social Phobia (28.3%).

**Table 5.** Correlation Between Daily Gadget Use and Anxiety

Variable	Gadget Usage Duration	Anxiety
Spearman's rho		
Gadget Usage Duration		
Correlation Coefficient	1	.215*
Sig. (2-tailed)	—	0.04
Anxiety		
Correlation Coefficient	.215*	1
Sig. (2-tailed)	0.04	—

Note: \*Correlation is significant at the 0.05 level (2-tailed).



The association between gadget use duration and anxiety level is presented in Table 5. Spearman correlation analysis revealed a statistically significant positive association between daily gadget use duration and anxiety level ( $r = 0.215$ ,  $p = 0.040$ ), indicating a weak but statistically significant correlation. This finding suggests that longer gadget use duration was associated with slightly higher anxiety levels among elementary school children (Table 5).

## Discussion

The findings of this study indicate that longer daily gadget use was associated with higher anxiety levels among elementary school children. This result is consistent with previous studies demonstrating that excessive screen exposure may increase emotional vulnerability in children. Prior research has reported that children with higher screen exposure tend to exhibit increased anxiety symptoms, emotional distress, and reduces psychological well-being (Sidiq et al., 2025; Mohd Saat et al., 2024). Similarly longitudinal and population-based studies have shown that prolonged screen exposure is associated with increased risk of anxiety and related mental health symptoms, influenced by behavioral and environmental factors such as reduced physical activity, sleep disruption, and increased emotional stimulation (Dai & Ouyang, 2025; Soraci et al., 2025). These findings support the behavioral addiction model, which suggests that prolonged digital engagement may contribute to psychological dependence, emotional dysregulation, and increased vulnerability to anxiety symptoms in children (Nagata et al., 2023; Pontes et al., 2021; Soraci et al., 2025).

The findings of this study also indicate a high proportion of anxiety symptoms among elementary school children, highlighting the importance of early

identification and mental health support. These findings are consistent with previous research demonstrating that excessive smartphone use and problematic digital behavior are associated with increased anxiety symptoms among children and adolescents (Steinsbekk et al., 2022). The presence of anxiety symptoms, particularly those related to separation concerns and fear-related responses, may reflect children's emotional sensitivity during critical developmental stages. Previous literature suggests that children in environments characterized by excessive gadget exposure, limited social interaction, and protective parenting patterns may be more vulnerable to emotional distress and anxiety symptoms (Erindia et al., 2024; Rosyada Hasan et al., 2023). From a family and caregiving perspective, parental supervision and emotional support play essential roles in protecting children's mental health. Parental emotional regulation and supportive caregiving environments contribute to children's emotional stability and psychological resilience (Iwanski et al., 2025). However, in many cases, prolonged gadget use may occur in the absence of structured parental monitoring. In Indonesia and other Low- and Middle-Income Countries, parental supervision of children's digital behavior may be influenced by socioeconomic demands, digital literacy levels, and cultural perceptions of digital technology as a necessary educational and recreational tool. These contextual factors may increase children's exposure to prolonged gadget use without adequate supervision, increasing their vulnerability to anxiety symptoms (Du et al., 2024; UNICEF, 2023).

From a developmental and psychological perspective, excessive gadget use may influence anxiety through cognitive, emotional, and social mechanisms. Prolonged digital engagement may contribute to cognitive overload, sleep

disruption, emotional dysregulation, and reduced face-to-face social interaction, which may limit children's opportunities to develop adaptive emotional regulation skills (Muppalla et al., 2023; Nagata et al., 2023). These mechanisms may increase children's susceptibility to anxiety symptoms, particularly during elementary school years, which represent a critical period for emotional and social development (Muppalla et al., 2023; Nagata et al., 2023). These mechanisms may increase children's susceptibility to anxiety symptoms, particularly during elementary school years, which represent a critical period for emotional and social development.

From the perspective of mental health nursing, these findings highlight the importance of promotive and preventive measures within families, schools, and communities. Child mental health nurses play a crucial role in early identification, mental health screening, health education, and promoting of adaptive coping strategies in children. School-based nursing interventions that focus on emotional education, self-regulation, and psychological resilience have been shown to improve mental health outcomes and reduce anxiety symptoms among children (Dai & Ouyang, 2025; Phan et al., 2022). However, school-based mental health services in many Low- and Middle-income Countries, including Indonesia, remain limited compared with high-income countries. Strengthening school health infrastructure and integrating mental health screening into routine nursing assessment may help improve early detection and prevention of anxiety symptoms among children.

Overall, the finding of this study emphasizes that anxiety symptoms among elementary school children represent an important mental health concern, particularly in the context of increasing

digital exposure. Excessive gadget use may represent an important behavioral risk factor influencing children's emotional regulation and psychological well-being. These findings contribute to the conceptual understanding of digital behavior as a modifiable risk factor in child mental health. From a nursing perspective, assessment of gadget use should be considered an essential component of holistic child health assessment, particularly in school and community health settings. Early identification and preventive interventions led by nurses may help support children's emotional well-being and promote healthier digital behavior, particularly in Low- and Middle-Income Country contexts.

### Implications and limitations

This study provides empirical evidence supporting the conceptual understanding of daily gadget use as a modifiable behavioral factor influencing child mental health, particularly within the framework of behavioral exposure and emotional regulation. The findings emphasize the importance of incorporating digital behavior assessment into comprehensive child mental health evaluation, as digital exposure may play a meaningful role in shaping children's emotional and psychological development. From a nursing and public health perspective, these results highlight the relevance of integrating digital behavior monitoring into early mental health screening and preventive strategies, particularly in school and community settings where early identification is critical.

However, several limitations should be acknowledged. The cross-sectional design limits the ability to establish causal relationships between gadget use and anxiety symptoms. In addition, the use of self-reported measures may introduce recall bias or response bias. Furthermore, the study was conducted in a single school

setting, which may limit the generalizability of the findings to broader populations and different sociocultural contexts. Future research using longitudinal designs, larger and more diverse samples, and objective measures of digital exposure is recommended to further strengthen the theoretical and empirical understanding of the relationship between gadget use and child mental health.

### Relevance to Practice

The findings of this study are highlight the need for practical and coordinated actions to address gadget-related anxiety risk among elementary school children. Nurses working in school and community settings should incorporate routine assessment of gadget use duration into child health screening and provide age-appropriate mental health education focusing on healthy digital habits, emotional regulation, and coping strategies. Schools should implement structured digital literacy and mental health promotion programs, including classroom-based education on balanced gadget use, supervised digital activities, and early identification of children at risk of anxiety symptoms through school health services. Policymakers should support the integration of child mental health screening and digital health education into school health programs by developing clear guidelines, training school health personnel, and strengthening collaboration between healthcare and educational sectors. These coordinated efforts may help promote healthy digital behavior and support early prevention of anxiety symptoms among children, particularly in school and community settings.

### Conclusion

This study demonstrates that gadget use duration is associated with anxiety levels among elementary school children, highlighting digital exposure as an important behavioral factor influencing child mental health. These findings contribute to the conceptual understanding of gadget use as a modifiable behavioral exposure that may affect emotional regulation during childhood. Future research using longitudinal designs and objective measures of digital exposure is needed to further clarify underlying mechanisms and support the development of evidence-based mental health prevention strategies.

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### CrediT Authorship Contributions Statement

**Santi Rinjani:** Conceptualization, Methodology, Supervision, Writing - Original Draft

**Yani Annisa Fauziah Bastian:** Software, Validation, Formal Analysis, Writing - Review & Editing

**Winasari Dewi:** Investigation, Resources, Data Curation, Project Administration

### Conflicts of Interest

There is no conflict of interest.

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