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Gadget use and developmental status among children aged 2–5 years: A cross-sectional study

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Abstract

Background: The increasing use of gadgets among young children may reduce opportunities for developmental stimulation through play, communication, and social interaction. Developmental deviations have been identified among children in the working area, indicating the need to examine the relationship between gadget use and child development.

Purpose: To determine the relationship between gadget use and the development of children aged 36–65 months in the working area.

Method: This quantitative study employed a correlational analytic design with a cross-sectional approach. The population consisted of 143 children aged 36–65 months, of whom 105 were selected using purposive sampling. Data were collected using a gadget use questionnaire and the Pre-Screening Questionnaire for Child Development (PQCD). Data were analysed using univariate analysis and the Pearson chi-square test.

Results: The majority of children were aged 48–53 months (32; 30.5%) and were female (57; 54.3%). Most children had high gadget use (47; 44.8%), while 64 children (61.0%) experienced developmental deviations. Among children with high gadget use, 42 (89.4%) experienced developmental deviations, whereas 17 children (63.0%) with low gadget use had appropriate development. The analysis showed a significant relationship between gadget use and child development ($\chi^2 = 63.977$, $p < 0.001$), with a contingency coefficient of 0.615, indicating a strong association.

Conclusion: Gadget use was significantly associated with the development of children aged 36–65 months, with a strong association between the two variables. Parents are encouraged to limit children's gadget use, supervise their use, and provide adequate developmental stimulation through play, communication, and social interaction.

Keywords: Child Development; Early Childhood; Gadget Use; PQCD; Preschool Children.

INTRODUCTION

Early childhood development is an important indicator of future human resource quality. The age of 2–5 years is considered a critical period because rapid development occurs in motor, language, cognitive, and social-emotional domains. Optimal development requires adequate stimulation from the family and surrounding environment, whereas insufficient stimulation may increase the risk of

developmental delays that can persist into later life (Sihabuddin, Utama, Nugraha, & Dewi, 2023; Fitri, Sagita, & Wahyuni, 2022). Developmental disorders in children remain an important public health concern worldwide. The World Health Organization (WHO) reported that approximately 52.9 million children under five years of age experience developmental difficulties, particularly in low- and middle-income

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countries. In addition, approximately 25% of children aged 36–59 months worldwide are estimated to experience delays in motor, language, social-emotional, and early learning abilities (Azizah, Setyono, Jannah, & Munawaroh, 2024; United Nations Children's Fund, 2024). These conditions highlight the importance of continuous growth and developmental monitoring and early detection during early childhood.

In Indonesia, child development problems also require continued attention. Data from the Early Childhood Development Index (ECDI) in 2024 indicated that 12.3% of children aged 24–59 months had not achieved development appropriate for their age. Furthermore, the prevalence of developmental delays among children under five identified through the Stimulation, Detection, and Early Intervention of Child Growth and Development (CGD) program remains approximately 7.5%–16% (Ministry of Health of the Republic of Indonesia, 2022). In Lampung Province, the implementation of CGD has not been evenly distributed across districts and municipalities. East Lampung Regency reported a coverage of growth and developmental monitoring of 64.37%, indicating that a proportion of children had not received optimal monitoring (Lampung Provincial Health Office, 2025). Data from the Labuhan Maringgai Community Health Center in 2026 also indicated the presence of children with suspected developmental delays, particularly in motor and language domains. The increasing availability of digital technology has also contributed to greater gadget use among young children. UNICEF (2024) reported that more than 70% of young children have been exposed to digital devices. In Indonesia, the Central Statistics Agency reported that 39.71% of young children used mobile phones and 35.57% accessed the internet in 2024 (Statistics Indonesia, 2025). Excessive gadget use may reduce opportunities for active play, direct communication, social interaction, and other activities that provide important developmental stimulation. The Indonesian Pediatric Society (IDAI) recommends limiting gadget use among children aged 2–5 years to no more than one hour per day and emphasizes the importance of parental supervision during use.

Previous studies have reported an association between gadget use and child development. Greater screen time was associated with lower language

abilities among children (Rayce, Okholm, & Flensburg-Madsen, 2024). Similarly, a significant relationship was found between gadget use and development in the gross motor, fine motor, and socialization and independence domains (Sofiyah, Susaldi, & Sumanti, 2024). Evidence regarding the relationship between gadget use and overall development among children aged 2–5 years in the working area, remains limited. A preliminary survey involving 10 children aged 2–5 years found that 30% of children had high gadget use, 40% had moderate gadget use, and 30% had low gadget use. In addition, several children were identified as having delays in aspects of development based on the Pre-Screening Questionnaire for Child Development (PQCD). These findings indicate the need to further examine the relationship between gadget use and child development in this population.

RESEARCH METHOD

This study employed a quantitative analytic design with a correlational approach and a cross-sectional design to examine the relationship between gadget use and the development of children aged 36–65 months. The study was conducted in the working area of the Labuhan Maringgai Community Health Center, East Lampung Regency, Indonesia. Data collection was conducted over nine days in May–June 2026 through Early Childhood Education/kindergarten schools, integrated health posts, and door-to-door visits. The study population consisted of 143 children aged 36–65 months based on data from the Labuhan Maringgai Community Health Center for January–March 2026. The sample size was determined using the Slovin formula with a 5% margin of error, resulting in 105 children. Participants were selected using purposive sampling based on predetermined inclusion and exclusion criteria. The inclusion criteria were children aged 36–65 months who resided in the study area, whose parents or primary caregivers were familiar with the child's gadget-use habits, whose parents or caregivers agreed to participate, and who were present and able to undergo developmental assessment. Children with chronic diseases, neurological disorders, or congenital abnormalities that could affect development, those who were ill at the time of assessment, and those with incomplete research data were excluded. Gadget use was the independent variable and was assessed using a

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questionnaire adopted from Annabila, Mauliza, and Nadira (2025). The questionnaire consisted of 12 statements covering children's interaction patterns with gadgets, the impact of gadget use on play activities, and its impact on social interaction. Each item had three response options. The total score was categorized into low gadget use (29–36), moderate gadget use (21–28), and high gadget use (12–20). The questionnaire had previously undergone validity and reliability testing, with item validity coefficients ranging from $r = 0.42$ – 0.78 and a Cronbach's alpha coefficient of 0.86 .

Child development was assessed using the Pre-Screening Questionnaire for Child Development (PQCD), selected according to the child's chronological age in months. The PQCD assesses four developmental domains: gross motor, fine motor, language, and socialization and independence. The results were classified as appropriate, questionable, or developmental deviation. As a screening instrument, the PQCD assessment was not intended to establish a clinical diagnosis of developmental disorders. Data were collected directly by the researcher with the assistance of two trained research assistants. Before data collection, the research assistants were briefed on the questionnaire administration and PQCD assessment procedures. After informed consent was obtained, parents or primary caregivers completed the gadget-use questionnaire, followed by developmental

assessment of the child using the age-appropriate PQCD. When a child was not initially cooperative, the researcher established rapport through play and communication using a helping relationship approach. When necessary, parents were involved to provide emotional support without directing the child's responses or assisting the child in completing the PQCD tasks. The collected data were checked for completeness and processed through editing, coding, data entry, cleaning, and tabulation. Univariate analysis was used to describe respondent characteristics, gadget use, and child development using frequencies and percentages. Bivariate analysis was performed using the Pearson chi-square test (χ^2) with a significance level of $\alpha = 0.05$. The chi-square assumption was assessed based on expected cell counts. One cell (11.1%) had an expected count of less than 5, with a minimum expected count of 4.88; therefore, the assumption for the chi-square test was considered satisfied. The strength of the association between gadget use and child development was assessed using the contingency coefficient (C). Ethical approval was obtained from the Research Ethics Committee of Universitas Malahayati, Indonesia, under approval number 5324/EC/KEP-UNMAL/IV/2026, dated April 15, 2026. Participation was voluntary, and all parents or primary caregivers received an explanation of the study objectives and procedures before providing written informed consent.

RESEARCH RESULTS

Table 1. Characteristics of Respondents (N= 105)

Variable	Results
Age (n/%) (Mean$\pm$SD) (Range) (Month)	(54.1 $\pm$ 7.2) (36-65)
36-41	8/7.6
42-47	8/7.6
48-53	32/30.5
54-59	26/24.7
60-65	31/29.5
Gender (n/%)	
Male	48/45.7
Female	57/54.3
Gadget Use (n/%)	
Low	27/25.7

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Moderate	31/29.5
High	47/44.8
Child Development (n/%)	
Appropriate	22/21.0
Questionable	19/18.1
Developmental Deviation	64/61.0

Table 1 shows that the largest proportion of children was aged 48–53 months (32 children; 30.5%), with a mean age of 54.1 ± 7.2 months. Female children represented the larger proportion of respondents (57; 54.3%). Regarding gadget use, the largest proportion of children had high gadget use (47; 44.8%). In terms of developmental status, most children were classified as having developmental deviations (64; 61.0%).

Table 2. Association Between Gadget Use and Child Development Among Children Aged 2–5 Years

Gadget Use	Appropriate (n= 22)	Questionable (n= 19)	Developmental Deviation (n= 64)	χ^2	P-Value
Low	17/77.3	9/47.4	1/1.6	63.977	<0.001
Moderate	1/4.5	9/47.4	21/32.8		
High	4/18.2	1/5.2	42/65.6		

Table 2 shows the distribution of gadget use according to the child's developmental status. Among children with appropriate development, the largest proportion had low gadget use (17; 77.3%). Among children with questionable development, low and moderate gadget use each accounted for 9 children (47.4%). Among children with developmental deviations, the largest proportion had high gadget use (42; 65.6%). The chi-square test showed a statistically significant association between gadget use and child development ($\chi^2 = 63.977$; $p < 0.001$).

DISCUSSION

The findings showed that high gadget use was the most common category, accounting for 47 children (44.8%). This finding indicates that gadget use has become increasingly integrated into the daily activities of preschool children in the study area. Easy access to smartphones and tablets may contribute to more frequent gadget use among young children. Most preschool children with high levels of gadget use primarily used gadgets for watching videos, playing digital games, and accessing entertainment content (Suryani, 2023). The increase in gadget use among young children may occur alongside technological development and easier access to digital devices within families (Hadi & Sumardi, 2023). The high prevalence of gadget use may therefore be related to

the increasing integration of digital technology into family life. Based on interviews conducted during data collection, several parents reported giving gadgets to children when they were bored or fussy or when parents were working or performing household activities. This practice may increase children's exposure to gadgets and reduce the time available for other developmental activities. Conversely, some parents reported limiting gadget use, accompanying children during use, and encouraging alternative activities such as outdoor play, drawing, reading, and interaction with peers. These findings emphasize the importance of parental supervision and appropriate limits on gadget use (Hidayat & Maesyaroh, 2020). The American Academy of Pediatrics recommends limiting screen media use to no more than one hour per day for children aged 2–5 years, with high-quality, age-appropriate content and parental co-viewing (Council on Communications and Media, 2016).

Most children in this study were classified as having developmental deviations, with 64 children (61.0%) falling into this category. Meanwhile, 22 children (21.0%) had development appropriate for their age and 19 children (18.1%) had questionable development. Children classified as having appropriate development generally demonstrated age-appropriate abilities in gross motor, fine motor, language, and socialization and independence

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domains. Children with questionable results require increased stimulation and repeated developmental screening, whereas those classified as having developmental deviations require further assessment by competent health professionals because the PQCD is a screening instrument and not a diagnostic tool (Imron, 2018).

The high proportion of developmental deviations indicates the importance of strengthening growth and developmental monitoring in the study area. However, these findings should not be interpreted as confirming that all children had developmental disorders because screening results require further evaluation. Child development is influenced by multiple factors, including genetic factors, health and nutritional status, parenting practices, parental education, family environment, and the quality of stimulation received by the child (Ministry of Health of the Republic of Indonesia, 2020). Therefore, developmental outcomes cannot be attributed to a single factor.

The main finding of this study was the significant association between gadget use and child development. Children with low gadget use had the highest proportion of age-appropriate development (63.0%), whereas children with high gadget use had the highest proportion of developmental deviations (89.4%). Pearson's chi-square analysis confirmed a significant association between gadget use and child development ($\chi^2 = 63.977$, $p < 0.001$), with a contingency coefficient of 0.615, indicating a strong association. The pattern across gadget-use categories suggests that children with more controlled gadget use may have greater opportunities to engage in activities that provide developmental stimulation, including active play, drawing, colouring, building blocks, reading with parents, and interaction with family members and peers. In contrast, greater gadget use may reduce opportunities for physical activity, direct communication, social interaction, and environmental exploration (Sapardi, 2018). These activities are important sources of stimulation for gross motor, fine motor, language, and socialization and independence development. A significant relationship was found between gadget use and early childhood development, with higher levels of gadget use associated with less optimal developmental outcomes (Sofiyah et al., 2024). Longer screen time has also been associated with reduced opportunities for language stimulation, communication, and social

interaction (Rayce et al., 2024). These findings support the possibility that excessive gadget use may displace activities that are important for child development (Setianingsih, 2018). However, the observed association should be interpreted within the broader developmental context because children differ in their family environments, parenting practices, health conditions, and opportunities for stimulation.

From a mental health perspective, this finding is relevant because early childhood development encompasses social, emotional, and behavioral functioning in addition to physical, cognitive, language, and motor development. Higher levels of gadget use may reduce opportunities for face-to-face communication, shared play, and parent-child interaction, which are important contexts for developing emotional regulation, social competence, communication skills, and appropriate responses to social cues. The association between higher gadget use and less optimal developmental outcomes observed in this study may therefore have implications for psychosocial development and early mental health promotion. This does not indicate that gadget use directly causes mental health problems, but it highlights the importance of considering children's patterns of digital media use within their broader social and emotional environment. Parental involvement is particularly important in this context. When parents accompany children during gadget use, establish consistent limits, and provide opportunities for interactive activities, digital media can be incorporated into children's routines without replacing essential developmental experiences. Conversely, when gadgets are frequently used to manage boredom, fussiness, or parental workload, children may have fewer opportunities for direct communication and emotionally responsive interaction with caregivers. Parent-child interaction provides opportunities for children to express emotions, receive feedback, practice communication, and develop social responses. Therefore, parental supervision should be considered not only as a strategy for limiting screen exposure but also as part of a broader approach to supporting children's psychosocial well-being.

The findings also have implications for early mental health promotion and developmental monitoring. Children identified with questionable or developmental deviation screening results may

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benefit from repeated developmental assessment and appropriate stimulation, while attention should also be given to their social-emotional functioning, family interaction, and daily opportunities for psychosocial stimulation. Health professionals and early childhood education providers can support parents by promoting balanced daily routines that include active play, reading, creative activities, two-way communication, peer interaction, and adequate rest. Such an approach may help prevent digital media use from displacing activities that are important for healthy social-emotional development during early childhood (Zulaikha & Sureskiarti, 2018). The association identified in this study should not be interpreted as a causal relationship. The cross-sectional design only demonstrates an association between gadget use and developmental outcomes at the time of assessment (Tambunan & Ningsih, 2021). The presence of developmental deviations among some children with low gadget use also indicates that gadget use is not the only factor influencing development. Other factors, including parenting practices, parental education and occupation, nutritional status, child health, quality of stimulation, and family environment, may also contribute to developmental outcomes (Astuti, 2023). Future studies using longitudinal designs and incorporating these potential confounding factors may provide a more comprehensive understanding of the relationship between gadget use and child development. These findings have practical implications for parents and health professionals. Parents should establish appropriate limits on children's gadget use, supervise children during gadget use, select age-appropriate and educational content, and ensure that gadget use does not replace active play, two-way communication, social interaction, and environmental exploration. Collaboration among parents, health professionals, and early childhood education institutions is also important to strengthen developmental screening, provide appropriate stimulation, monitor children's social-emotional development, and ensure timely follow-up when questionable or developmental deviation screening results are identified.

CONCLUSION

Gadget use was significantly and strongly associated with the development of children aged 36–65 months in the working area. Most children had high

gadget use (44.8%), while 61.0% experienced developmental deviations based on developmental screening. The Pearson chi-square test showed a significant association between gadget use and child development ($\chi^2 = 63.977$, $p < 0.001$), with a contingency coefficient of 0.615, indicating a strong association. Children with high gadget use were more frequently classified as having developmental deviations, whereas children with low gadget use were more likely to have development appropriate for their age. Parents are encouraged to limit and supervise children's gadget use and provide adequate developmental stimulation through play, communication, and social interaction to support optimal child development.

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