



The Effect of Gadget Use on Speech Delay in Children Aged 3-5 Years

Pratiwi Rintang¹, Nila Widya Keswara^{2*}

¹⁻²Bachelor of Midwifery, Faculty of Health Sciences, Institut Teknologi Sains dan Kesehatan
RS dr. Soepraoen Malang, Indonesia

*Correspondence author : nilakeswara35@itsk-soepraoen.ac.id

Abstract. Language development in preschool children is an important aspect in supporting children's cognitive, social, and emotional abilities in the future. One environmental factor that is thought to contribute to speech delay is excessive use of gadgets at an early age. This study aims to analyze the effect of gadget use on speech delay in children aged 3–5 years at the Tungoi Community Health Center. This study uses an analytical observational design with a cross-sectional approach. The study sample consisted of 50 children aged 3–5 years who met the inclusion criteria, using consecutive sampling. Data were collected through a questionnaire on gadget use filled out by parents and a screening of children's speech development. Data analysis was performed univariately and bivariately using the Chi-Square test with a significance level of $p < 0.05$. The results showed that most children used gadgets for more than one hour per day (70%) and more than half of the respondents experienced speech delay (56%). The Chi-Square test showed a significant relationship between gadget use and the occurrence of speech delay ($p = 0.000$). Children with longer gadget use had a greater risk of speech development delay compared to children with more limited gadget use. The conclusion of this study indicates that gadget use is a significant risk factor for speech delay in children aged 3–5 years. Therefore, it is necessary to limit the duration of gadget use and increase the role of parents and health workers in providing optimal verbal stimulation and assistance to support children's language development.

Keywords: Child Health; Gadget Use; Language Development; Preschool Children; Speech Delay.

1. INTRODUCTION

Language development in preschool children (3–5 years old) is an important foundation for cognitive, social, and academic abilities in later life. During this period, children are in a phase of high neuroplastic development, so adequate language stimulation through two-way interaction with the environment is crucial for the quality of speech and language development. Speech delay in early childhood not only affects communication skills but also has the potential to cause behavioral problems, learning difficulties, and self-confidence issues in later stages of development (Albarracín & Shavitt, 2018; Zimmerman et al., 2019).

Globally, speech and language disorders in early childhood remain a significant public health issue. Epidemiological studies report that approximately 5–10% of preschool children experience speech and language delays, with variations in figures between countries (Madigan et al., 2020). In developing countries, including Indonesia, this figure tends to increase in line with changes in parenting patterns and the environment in which children grow and develop (Indonesian Ministry of Health, 2024). National data shows that speech delay is one of the most common developmental complaints found in primary health care services, including community health centers, and is often detected late because it is considered a normal variation in child development (Indonesian Ministry of Health, 2025).

In the last decade, the increase in gadget use among young children has become a global phenomenon that is inseparable from modern family life. Gadgets such as smartphones and tablets are increasingly being used as a means of entertainment, education, and even as a tool to calm children. The World Health Organization (WHO) recommends limiting screen time for children aged 2–4 years to no more than one hour per day, emphasizing the importance of direct interaction between children and caregivers (WHO, 2019). However, various reports indicate that many preschool children are exposed to gadgets far beyond these recommendations (Madigan et al., 2019).

Theoretically, the effect of gadget use on speech delay can be explained through several clinical approaches. The displacement theory states that the time children spend in front of screens tends to replace activities that are essential for language development, such as talking, symbolic play, and reading with parents (Karani et al., 2022). In addition, the interactionist approach to language development emphasizes that language develops optimally through two-way communication (serve and return), where children receive verbal and nonverbal responses directly from their social environment (Glanz et al., 2019). Passive exposure to gadgets has the potential to reduce the frequency and quality of such interactions.

From a neurocognitive perspective, exposure to fast-paced and repetitive digital content can affect children's attention, language processing, and ability to understand linguistic structures in depth (Madigan et al., 2020). Children who are exposed to screens too often tend to become passive recipients of information, limiting opportunities to practice articulation, vocabulary, and pragmatic skills (Zimmerman et al., 2019). This condition reinforces the assumption that uncontrolled use of gadgets can contribute to speech delay.

Previous studies have examined the relationship between gadget use and children's language development. A longitudinal study by Madigan et al. (2019) showed that high screen time at 24 and 36 months was associated with lower language development scores at subsequent measurements. Another meta-analysis reported that excessive screen time is associated with delays in expressive and receptive language, especially when gadget use is not accompanied by parental supervision (Madigan et al., 2020). Research in Asian countries also found that children with more than two hours of gadget exposure per day had a higher risk of speech delays than children with more limited exposure (Karani et al., 2022).

In Indonesia, several studies have reported a link between excessive gadget use and delayed language development in early childhood (Abida et al., 2024; Hidayati et al., 2025). However, most studies still focus on children under three years of age or use descriptive designs, so empirical evidence on preschool-aged children (3–5 years) at the primary health

care level is still limited. In addition, many studies have not distinguished in detail the patterns of gadget use, such as duration, type of content, and parental involvement, which could potentially affect children's language development outcomes.

The Indonesian context, particularly in health center working areas, presents its own challenges. Gadgets are often used as "substitute caregivers" when parents are working or have limited time, especially in areas with limited access to childcare. Community health centers, as primary health facilities, play a strategic role in the early detection of developmental disorders, including speech delay, as well as in educating families about appropriate growth and development stimulation (Indonesian Ministry of Health, 2024). However, the lack of specific local data on the influence of gadget use on speech delay at the community health center level makes it difficult to formulate evidence-based interventions.

Based on the above explanation, there is a clear research gap regarding the need for research that analyzes the effect of gadget use on speech delay in children aged 3–5 years in the context of primary health care in Indonesia. The research conducted at the Tungoi Community Health Center is expected to provide an empirical picture of the extent to which gadget use contributes to speech delay in preschool children. Therefore, the purpose of this study is to analyze the effect of gadget use on speech delay in children aged 3–5 years at the Tungoi Community Health Center, so that the results of the study can be used as a basis for strengthening promotional and preventive efforts, as well as improving parental education practices in supporting optimal child language development.

2. RESEARCH METHOD

This study used an analytical observational design with a cross-sectional approach. This design was chosen because the study aimed to analyze the effect of gadget use on speech delay in children aged 3–5 years by measuring independent and dependent variables at the same time. The cross-sectional approach is considered most appropriate for primary health care-based research such as community health centers because it is efficient, ethical, and able to describe the relationship between variables in real field conditions.

The research approach used was quantitative, as the data collected was numerical and categorical data that could be analyzed statistically. This approach allowed researchers to objectively measure the level of gadget use and the status of children's speech development, then analyze the relationship or influence between the two variables.

The population in this study consisted of all children aged 3–5 years who were registered and visited the Tungoi Community Health Center during the study period. This population was

selected based on the consideration that the age of 3–5 years is a crucial phase of language development, during which speech delays can be identified more clearly and have meaningful clinical implications.

The research sample consists of members of the population who meet the inclusion and exclusion criteria. Inclusion criteria included children aged 3–5 years, having parents or primary caregivers who were willing to be respondents, children without hearing impairment or severe neurological disorders, and being registered as active in health services at the Tungoi Community Health Center. Exclusion criteria included children with a diagnosis of severe developmental disorders such as autism or cerebral palsy, as well as parents who were unable to provide complete information.

The sample size is determined by considering the availability of the population and the principle of statistical adequacy. In analytical observational studies at the community health center level, a minimum sample size of 30–60 respondents is sufficient for analyzing relationships using nonparametric statistical tests or simple regression. The sample size can also be adjusted according to the number of children aged 3–5 years who meet the criteria during the data collection period.

The sampling technique used was non-probability sampling with the consecutive sampling method, whereby all subjects who met the inclusion criteria were taken consecutively until the sample size was reached. This technique was chosen because it is suitable for research in primary health facilities, easy to apply, and can minimize selection bias in limited populations.

The independent variable in this study was gadget use, which was measured based on the duration of gadget use per day (e.g., <1 hour, 1–2 hours, and >2 hours), frequency of use, and purpose of gadget use (entertainment, education, or mixed). The dependent variable was speech delay, which was assessed based on the results of speech development screening using standard instruments or development questionnaires appropriate for the child's age.

The research instrument used was a structured questionnaire completed by the child's parents or primary caregiver. The questionnaire on gadget use included questions about the age at which the child was first exposed to gadgets, the duration of use per day, the type of device used, and parental supervision when the child used gadgets. Speech delay was assessed using a speech development screening tool that had been adapted to the child's age and was widely used in primary health care. The instruments used have undergone validity and reliability testing or refer to recommended standard instruments.

Data collection was conducted directly at the Tungoi Community Health Center using guided interviews and brief observations of children when necessary. The collected data was then processed and analyzed statistically using data processing software.

Data analysis was conducted in stages. Univariate analysis was used to describe the characteristics of respondents, gadget use, and the speech delay status of children in the form of frequency distributions and percentages. Furthermore, bivariate analysis was used to determine the effect of gadget use on speech delay. If both variables were categorical, the Chi-Square test was used, and if there were cells with an expected count <5 , the Fisher Exact Test was used as an alternative. To strengthen the analysis of the effect, a simple logistic regression analysis could be performed to determine the risk (Odds Ratio) of gadget use on speech delay.

All statistical analyses were performed with a 95% confidence level and a significance threshold of $p < 0.05$. The results of the analysis are presented in tables and interpretive narratives to facilitate understanding and draw conclusions.

With this research method, it is hoped that a clear and evidence-based picture of the effect of gadget use on speech delay in children aged 3–5 years can be obtained, so that the research results can be used as a basis for strengthening promotional and preventive efforts at the Tungoi Community Health Center, particularly in educating parents about healthy gadget use and stimulating children's language development.

3. RESULTS AND DISCUSSION

Table 1. Demographic data.

	Var	n	F (%)
Gender	Male	13	26
	Female	37	74
Parental guidance	No	36	72
	Yes	14	28
Gadget use	< 1 hour/day	15	30
	> 1 hour/day	35	70
Speech delay	No	22	44
	Yes	28	56
Total		50	100

(source: primary data, 2025)

Most respondents were female, namely 37 children (74%), while 13 children (26%) were male. In terms of parental guidance, the majority of respondents did not receive parental guidance, namely 36 children (72%), while only 14 children (28%) received parental guidance.

Based on the duration of gadget use, most children used gadgets for more than 1 hour per day, namely 35 children (70%), while 15 children (30%) used gadgets for less than 1 hour per day.

In terms of speech delay, more than half of the respondents experienced speech delay, namely 28 children (56%), while 22 children (44%) did not experience speech delay.

In general, these data show that most respondents were girls, with relatively high gadget usage and a significant proportion not receiving parental guidance. This condition is in line with the high percentage of children experiencing speech delay, so that the variables of parental guidance and gadget usage have the potential to be important factors that need to be considered in further analysis.

Table 2. Statistical Analysis.

Independent variable	N	P Value	Dependent variable
Gadget use	50	0.000	Speech delay

Chi-square

(source: primary data, 2025)

The Chi-Square test shows that there is a significant relationship between gadget use and speech delay in children, with a p-value of 0.000 ($p < 0.05$). A p-value smaller than the significance threshold of 0.05 indicates that the null hypothesis is rejected, meaning that gadget use is significantly related to speech delay.

These results indicate that children who use gadgets for longer periods of time (> 1 hour per day) tend to be at greater risk of speech delay than children who use gadgets for shorter periods of time (< 1 hour per day). Conceptually, excessive use of gadgets can reduce opportunities for children to interact directly with their parents or their surroundings, which are important factors in stimulating language development.

Thus, gadget use can be considered an environmental risk factor contributing to speech delay, especially when not accompanied by adequate parental guidance and verbal interaction. These findings emphasize the importance of regulating gadget use and improving the quality of parent-child interaction as part of efforts to prevent speech delay

Discussion

The results of this study indicate a significant relationship between gadget use and speech delay in children, as evidenced by a Chi-Square test with a p-value of 0.000. These findings indicate that gadget use for more than one hour per day is closely related to an increased risk of speech development delay. Clinically, these results reinforce concerns that excessive screen

exposure at an early age may interfere with the natural process of language development in children.

Language development in children is highly dependent on meaningful social interaction, especially two-way communication between children and adults. According to the interactional theory of language development, speaking ability is not only influenced by biological maturation, but also by the quality and quantity of verbal stimulation that children receive from their environment (Owens, 2020). Excessive use of gadgets tends to replace direct interaction, causing children to lose opportunities to imitate sounds, enrich their vocabulary, and understand the social context of language.

These findings are consistent with previous studies reporting that high screen time duration is associated with delays in expressive and receptive language. Research by Madigan et al. (2019) shows that every increase in screen time in early childhood correlates with lower language development scores. Another longitudinal study also found that children with high exposure to gadgets have a greater risk of speech delays than children with limited and controlled gadget use (McArthur et al., 2022).

In addition to duration, the nature of gadget use is also an important aspect. Gadgets that are used passively—such as watching videos without interaction—do not provide adequate linguistic stimulation. The World Health Organization (2019) emphasizes that young children need active stimulation through playing, talking, and reading with their parents, not just visual exposure from screens. Therefore, prolonged gadget use without supervision can increase the risk of speech delay, as reflected in the high proportion of respondents who did not receive parental guidance in this study.

From the perspective of neuroplasticity theory, early childhood is a golden period of brain development, during which neural connections are highly responsive to environmental stimulation (Kolb & Gibb, 2018). Rich verbal stimulation strengthens language neural pathways, while a lack of interaction can lead to suboptimal development of these pathways. Excessive exposure to gadgets can shift children's time away from activities that stimulate neurocognitive development, such as talking and symbolic play, to passive activities that require minimal response.

Although this study found a significant relationship between gadget use and speech delay, other variables such as gender and parental guidance were not analyzed inferentially in the main results. However, descriptively, the proportion of children who did not receive sufficient parental guidance was quite high. This supports the findings of other studies which state that parental involvement is an important protective factor in language development, even in

children who remain exposed to gadgets (Radesky et al., 2020). In other words, gadgets do not always have a negative impact if they are used in a limited, targeted manner and accompanied by active interaction between parents and children.

The absence of significant correlations in other variables does not mean that these factors are irrelevant, but may be due to limitations in the research design or sample size. Studies with multivariate designs often show that speech delay is multifactorial, involving biological, environmental, parenting, and socioeconomic factors (Law et al., 2017). Therefore, the results of this study should be understood as part of a broader picture of the determinants of child language development.

The clinical implications of this study are highly relevant to midwifery and child health practices. Health workers, particularly midwives and community nurses, have a strategic role in educating parents about the safe limits of gadget use and the importance of early verbal stimulation. This education needs to be emphasized during routine child health visits, at health posts, and in parenting classes, using an empathetic approach that does not blame parents.

In practical terms, parents are encouraged to limit their children's use of gadgets in accordance with the recommendations of the WHO and the American Academy of Pediatrics, and to replace it with interactive activities such as reading stories, singing, and role-playing. Thus, efforts to prevent speech delay should not only focus on limiting gadget use, but also on improving the quality of warm and responsive parent-child interactions.

4. CONCLUSION

This study concludes that there is a significant relationship between gadget use and speech delay in children. Children who use gadgets for more than one hour per day are more likely to experience speech development delays than children with more limited gadget use. These findings emphasize that gadget use at an early age needs serious attention, especially in terms of duration and patterns of use. Children's language development is greatly influenced by responsive direct interaction between children and their surroundings, especially their parents. Therefore, limiting gadget use accompanied by an increase in the quality of verbal stimulation and parental guidance is an important step in preventing speech delay. The results of this study are expected to serve as a basis for health workers, especially midwives and pediatricians, in educating parents about healthy gadget use that is appropriate for their children's developmental stages.

Acknowledgement

The author would like to thank all respondents and parents who participated in this study. Thanks are also extended to health workers and related parties who assisted in the data collection process and provided support during the study. The highest appreciation is given to educational institutions and parties who provided facilities and permission so that this study could be carried out properly. It is hoped that the results of this research will contribute to the advancement of midwifery and child health sciences, and serve as a tangible contribution to efforts to improve the quality of child development.

REFERENCES

- Abida, L. L., et al. (2024). The effect of screen time on delays in language and speech development in early childhood. *BMC Pediatrics*, 24, 112.
- Albarracín, D., & Shavitt, S. (2018). Attitudes and attitude change. *Annual Review of Psychology*, 69, 299-327. <https://doi.org/10.1146/annurev-psych-122216-011911>
- American Academy of Pediatrics. (2016). Media and young minds. *Pediatrics*, 138(5), e20162591. <https://doi.org/10.1542/peds.2016-2591>
- Glanz, K., Rimer, B. K., & Viswanath, K. (2019). *Health behavior: Theory, research, and practice* (5th ed.). Jossey-Bass.
- Hidayati, N. U., et al. (2025). Excessive gadget use and language delay among preschool children in Indonesia. *Journal of Child Development Studies*, 7(1), 45-54.
- Karani, N. F., et al. (2022). Screen time and language development in early childhood. *Early Human Development*, 168, 105548. <https://doi.org/10.1016/j.earlhumdev.2022.105548>
- Kolb, B., & Gibb, R. (2018). Brain plasticity and behavior in the developing brain. *Journal of the Canadian Academy of Child and Adolescent Psychiatry*, 27(2), 91-97.
- Law, J., Charlton, J., Dockrell, J., Gascoigne, M., McKean, C., & Theakston, A. (2017). Early language development: Needs, provision, and intervention. *Early Childhood Research Quarterly*, 38, 1-15.
- Madigan, S., et al. (2019). Association between screen time and developmental outcomes in children. *JAMA Pediatrics*, 173(3), 244-250. <https://doi.org/10.1001/jamapediatrics.2018.5056>
- Madigan, S., et al. (2020). Screen use and child language skills: A systematic review and meta-analysis. *JAMA Pediatrics*, 174(7), 665-675. <https://doi.org/10.1001/jamapediatrics.2020.0327>
- Madigan, S., McArthur, B. A., Anhorn, C., Eirich, R., & Christakis, D. A. (2019). Associations between screen use and child language skills. *JAMA Pediatrics*, 173(3), 244-250. <https://doi.org/10.1001/jamapediatrics.2018.5056>
- McArthur, G., et al. (2022). Screen time and language development in early childhood. *Developmental Psychology*, 58(5), 891-903.
- Ministry of Health of the Republic of Indonesia. (2024). *Guidelines for stimulation, detection, and early intervention in child growth and development*.

- Ministry of Health of the Republic of Indonesia. (2025). *Speech delay in preschool children*.
- Owens, R. E. (2020). *Language development: An introduction* (10th ed.). Pearson.
- Radesky, J. S., Weeks, H. M., Ball, R., et al. (2020). Young children's use of smartphones and tablets. *Pediatrics*, *146*(1), e20193518. <https://doi.org/10.1542/peds.2019-3518>
- Tomopoulos, S., et al. (2019). Media exposure and language development. *Academic Pediatrics*, *19*(2), 152-159.
- Vygotsky, L. S. (2018). *Mind in society: The development of higher psychological processes*. Harvard University Press.
- WHO. (2019). *Guidelines on physical activity, sedentary behavior, and sleep for children under 5 years of age*.
- World Health Organization. (2019). *Guidelines on physical activity, sedentary behavior, and sleep for children under 5 years of age*. WHO.
- Zimmerman, F. J., & Christakis, D. A. (2015). Associations between content types of early media exposure and language development. *Pediatrics*, *135*(1), 14-20.
- Zimmerman, R. S., et al. (2019). Attitude-behavior relationships in child development. *Health Education Research*, *34*(3), 205-217.
- Zubrick, S. R., et al. (2017). Late talking and the risk for psychosocial problems. *Pediatrics*, *139*(4), e20163455.