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The Impact of Gadget Use on Personal-Social and Language Development in Preschool Children at TK Bintang Permata

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Abstract

Introduction: Technology, particularly gadgets, is no longer limited to adults; even young children now use them. Excessive gadget use can negatively impact children's personal-social and language development, reducing crucial early social interactions. This study analyzes the relationship between gadget use duration and personal-social and language development in children aged 4–6 years at TK Bintang Permata.

Methods: This cross-sectional study was conducted at TK Bintang Permata from May to September 2024 using Spearman's rho test. A purposive sample of 84 children aged 4–6 years was selected. Data were collected through parental interviews to determine children's gadget usage duration, while the Denver Developmental Screening Test (DDST) was used to assess personal-social and language development levels.

Results: The analysis revealed a negative correlation between gadget use duration and personal-social development ($r = -0.781$) as well as language development ($r = -0.806$), with a significance value of 0.000 ($p < 0.05$).

Conclusion: A significant and strong negative correlation was found between gadget use duration and personal-social and language development in children aged 4–6 years at TK Bintang Permata. This indicates that the longer a child uses gadgets, the lower their personal-social and language development levels. These findings highlight the importance of limiting screen time to enhance social interactions and language skills, fostering a more supportive environment for holistic development. However, this study has limitations, including its cross-sectional design, which prevents causal inference, potential bias from parental self-reports, and limited generalizability due to the purposive sampling method.

Keywords: Children, Language, Gadgets, Personal-Social Development

Introduction

Technology, particularly gadgets, is no longer used exclusively by adults; even young children can now operate and engage with them.[1] Previous studies have shown that 16.9% of children who use gadgets for more than 60 minutes per day experience below-average personal-social development, while 37.7% of children who use gadgets for less than 60 minutes per day also exhibit similar developmental delays. This indicates that the duration of gadget use affects children's personal-social development.[2] The 2018 Basic Health Research (*Riset Kesehatan Dasar*, RISKESDAS) on child development reported an increase in personal-social development among Indonesian children to 69.9%.

However, this percentage remains lower than that of Vietnam (91.2%), Kazakhstan (82.1%), and Thailand (79.4%).[3] According to RISKESDAS 2018, the developmental progress of children aged 3–5 years in Indonesia was recorded across various aspects, including literacy (64.6%), physical development (97.8%), and personal-social development (69.9%). Meanwhile, the learning aspect reached 95.2%, and the overall developmental index for children aged 3–5 was 88.3%. Additionally, language delays among toddlers in Indonesia remain relatively high.[4] One crucial aspect of personal-social development is language, a primary means of communication for conveying ideas, information, and emotions. Typically, children in the toddler to preschool stage acquire fundamental language and speech skills.[5]

Albert Bandura proposed that children learn through observation and imitation. If children spend excessive time on gadgets, they may lack sufficient exposure to positive social behavior models from adults or peers, impacting their ability to develop personal-social and language skills necessary for effective interaction.[6] Therefore, efforts are needed to prevent developmental delays and to educate parents about the potential risks of excessive gadget use, particularly regarding personal-social and language development. While several studies have examined the impact of gadget use on child development, especially regarding personal-social and language skills, in-depth research explicitly analyzing the effect of gadget usage duration among preschool-aged children remains limited, particularly in Indonesia and, more specifically, in Bali. Existing research tends to generalize the effects of gadget use without focusing on the duration of use or identifying how socio-cultural contexts and family gadget usage habits contribute to these developmental outcomes.

A more detailed study on the relationship between gadget use duration and personal-social and language development in preschool children in Indonesia, particularly in Bali, is still rare. This research aims to fill that gap by

providing deeper insights into the factors influencing personal-social and language development among Indonesian children. Furthermore, it seeks to raise awareness among parents and relevant stakeholders about monitoring and managing children's digital exposure to support their holistic development in this technology-driven era. Based on this, the study examines whether a relationship exists between gadget use duration and personal-social and language development in preschool-aged children. It investigates explicitly whether prolonged gadget use negatively affects these developmental aspects, hypothesizing that there is a significant negative correlation between gadget use duration and personal-social and language development in children aged 4–6 years at TK Bintang Permata.

Methods

This analytical observational study uses a quantitative research approach with a cross-sectional design. The first round of data collection was conducted on May 20, 2024, involving 33 children, followed by a second round on September 2, 2024, with 51 children using the same data collection methods. The study occurred at TK Bintang Permata, at Jalan Kapten Japa Gang Nusa Indah I/12, Dangin Puri Klod, East Denpasar, Denpasar, Bali. The research procedures were assisted by competent healthcare professionals and were approved by the Research Ethics Committee of FK UNUD/RSUP Sanglah under approval number 1027/UN14.2.2.VII.14/LT/2024. The sampling technique employed in this study was purposive sampling, using the cross-sectional formula by Lemeshow. The calculation results indicated a minimum sample size of 81 respondents without considering potential dropouts. Out of 142 children, 84 met the inclusion criteria, which included children aged 4–6 years, those willing to participate in the study with parental or guardian consent, and those who regularly used gadgets in their daily lives. The exclusion criteria were children with special needs (specifically those with medically confirmed speech development disorders) and children enrolled in language courses or tutoring programs.

The independent variable, gadget usage duration, was obtained through parental interviews regarding the child's cumulative daily screen time and was categorized based on World Health Organization (WHO) standards: typical (<1 hour/day) and abnormal (≥1 hour/day). The dependent variable, personal-social and language development, was assessed using the Denver Developmental Screening Test (DDST), which was interpreted as follows: expected (no delays or a maximum of one "caution"), suspected delay (≥2 "cautions" and ≥1 delay), and abnormal (≥2 delays). Participants' parents or guardians were provided with an informed consent form, with guidance from the research team on completing it. Parents or caregivers filled out demographic data sheets and answered interview questions regarding gadget use. Researchers then conducted the DDST screening in the presence of the parent or caregiver, following DDST guidelines.

To control potential information bias, direct interviews were conducted with parents, who were asked to provide accurate and detailed information about their child's gadget usage habits. Additionally, to enhance data accuracy, parental responses were compared with observations and reports from kindergarten teachers. This approach allowed researchers to obtain a more comprehensive and objective understanding of the children's behavior and identify potential discrepancies between parental perceptions and actual behaviors observed in the school environment.

The relationship between gadget usage duration and personal-social and language development was analyzed using a bivariate test with Spearman's rho test. This test was chosen because the data on gadget usage duration and child development scores were ordinal and did not follow a normal distribution. As a non-parametric statistical technique, Spearman’s rho test is appropriate for measuring the strength and direction of relationships between two variables that do not meet the assumption of normal distribution. Through this method, researchers could assess whether a significant correlation existed between children's time using gadgets and their personal-social and language development levels.

Results

This study involved children aged 4–6 years at TK Bintang Permata, using purposive sampling for sample selection. Out of a total population of 142 children, 84 participants met the inclusion criteria and were analyzed. The remaining 58 children were excluded for various reasons, such as lack of parental consent, not meeting the age criteria, having a medically confirmed speech disorder, or not using gadgets in daily activities. No participants experienced dropout, meaning all those who met the inclusion criteria completed the study correctly.

Data collection involved interviews with parents regarding their child's daily gadget usage duration and assessments of their personal-social and language development. Before analysis, data were reviewed and verified to prevent information loss, resulting in a final dataset of 84 complete cases.

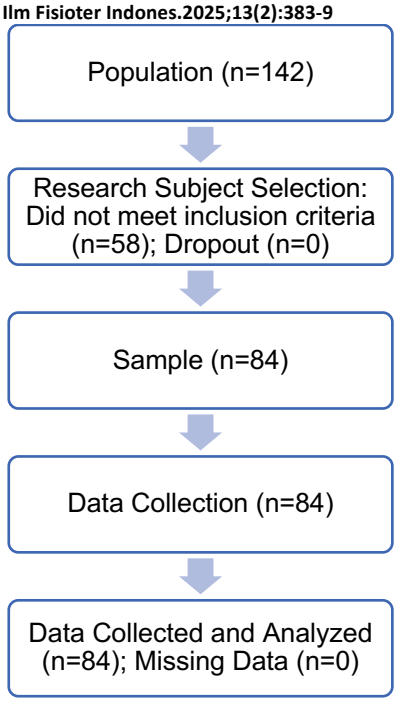

Figure 1. Study Flowchart

Eighty-four children aged 4–6 years from TK Bintang Permata were included in this study. The characteristics of the subjects are presented in Table 1.

Table 1. Characteristics of Children Aged 4–6 Years at TK Bintang Permata

Characteristic	Frequency (n)	Percentage (%)
Age (months)		
50–59	16	19.2
60–69	47	55.8
≥70	21	25.0
Gender		
Male	38	45.2
Female	46	54.8
Birth Type		
Normal	77	91.7
Premature	7	8.3
Mother's Occupation		
Unemployed	34	40.5
Employed	50	59.5
Gadget Usage Duration		
Abnormal	51	60.7
Normal	33	39.3
Personal-Social Development		
Normal	24	28.6
Suspect	34	40.5
Abnormal	26	31.5
Language Development		
Normal	38	45.2
Suspect	39	46.6
Abnormal	7	8.3

Table 1 presents the characteristics of the sample based on various variables. The majority of children were aged 60–69 months (55.8%), with a higher number of girls (54.8%) than boys (45.2%). Most children were born through standard delivery (91.7%), while 8.3% were born prematurely. Regarding maternal occupation, more mothers were employed (59.5%) than unemployed (40.5%). Regarding gadget usage, most children (60.7%) had abnormal usage durations, while 39.3% had expected usage durations.

Only 28.6% of children exhibited normal personal-social development, 40.5% were categorized as suspect, and 31.5% were abnormal. Similarly, 45.2% of children demonstrated everyday language skills in language development, whereas 46.6% were in the suspect category, and 8.3% were categorized as abnormal. Overall, many children had excessive gadget use and exhibited delays or impairments in personal-social and language development, suggesting a potential impact of gadget usage duration on child development.

Bivariate Analysis: Relationship Between Gadget Usage Duration and Personal-Social & Language Development

Table 2. Relationship Between Gadget Usage Duration and Personal-Social Development

Personal-Social Development	Gadget Usage Duration	Correlation	p-value
	Abnormal	Normal	
Normal (28.6%)	0%	24	-0.781
Suspect (40.5%)	25	9	
Abnormal (31.0%)	26	0	

The Spearman's Rho correlation test between gadget usage duration and personal-social development in Table 2 indicates a significant relationship, with a p-value of 0.000. The correlation coefficient (r) is -0.781, which suggests a strong negative correlation (as values between -0.700 and -0.890 indicate a strong relationship). The negative correlation implies an inverse relationship—meaning that the longer a child spends using a gadget, the lower their personal-social development level.

Figure 2. Graph of the Relationship Between Gadget Usage Duration and Personal-Social Development

As illustrated in Figure 2, children with abnormal gadget usage durations are more likely to experience issues in personal-social development, as reflected in the higher percentage of suspect and abnormal cases. Conversely, children with expected gadget usage durations predominantly exhibit healthy (normal) personal-social development, although a small proportion still falls into the suspect category. This suggests that excessive gadget use may negatively impact children's personal-social development, whereas balanced gadget use is associated with better personal-social outcomes.

Table 3. Relationship Between Gadget Usage Duration and Language Development

Language Development	Gadget Usage Duration	Correlation	p-value
	Abnormal	Normal	
Normal (45.2%)	7.1%	38.1%	-0.806
Suspect (46.6%)	45.2%	1.2%	
Abnormal (8.3%)	8.3%	0%	

The Spearman's Rho correlation test between gadget usage duration and language development (Table 3) indicates a significant relationship, with a p-value of 0.000. The correlation coefficient (r) is -0.806, indicating a strong negative correlation. This suggests that the longer a child uses a gadget, the lower their language development level.

Figure 3. Graph of the Relationship Between Gadget Usage Duration and Language Development

The bar chart in Figure 3 illustrates a correlation between gadget usage duration and language development. Children with abnormal gadget usage durations tend to experience language development issues, as reflected in the high percentage of suspect and abnormal cases. Conversely, children with expected gadget usage durations predominantly exhibit normal language development, although a small percentage still falls into the suspect category. This indicates that excessive gadget use may negatively impact language development, while balanced usage is associated with better language skills.

Discussion

Relationship Between Gadget Usage Duration and Personal-Social Development

In this study, fifty-one children (60.7%) were identified as having an excessive duration of gadget use, while the remaining 33 (39.3%) used gadgets within an acceptable limit. These findings indicate that most children in the study sample spent more time on gadgets than is generally recommended for their age group. Excessive gadget use has the potential to impact child development, particularly in the areas of personal-social and language skills, which are the main focus of this study.

The findings from research conducted at TK Bintang indicate that 34 children (40.5%) fell into the suspected interpretation category for personal-social development, while 26 children (31%) were categorized as abnormal. Meanwhile, 24 children (28.6%) were classified as having normal personal-social development. The study yielded a significance value (Sig. (2-tailed)) of 0.000, leading to the rejection of the null hypothesis (Ho). A similar result was found in a study by Dewi (2022), which revealed that the majority of children exhibited borderline personal-social development (47 children, 49.0%), while 27 children (28.1%) had abnormal growth, and 22 children (22.9%) had normal personal-social development among preschool children (aged 3–6 years) in the working area of the Rimbo Tengah Health Center, Bungo District.[7]

Research by Sulistiawati et al. (2019) also found that children exposed to gadgets had higher scores compared to those who were not. Statistical analysis in this study concluded with a p-value of 0.049, which is lower than the alpha level (0.049 < 0.05), leading to the rejection of the null hypothesis (Ho). This result demonstrates a significant influence of gadget usage on the personal-social development of preschool children at a kindergarten in Bumi Agung Village, Tegineneng Subdistrict, Peshawar District, in 2019.[3]

This relationship may occur because children who frequently use gadgets prefer gadget-based activities over peer interaction. Additionally, children may imitate violent scenes from games, directing their entire attention to the gadget. This condition reduces children's involvement in social interactions, negatively impacting their personal-social development.

Prolonged and continuous gadget use can lead children to develop antisocial tendencies, such as difficulty in communication, lack of empathy, and reduced responsiveness when parents attempt to engage with them. Consequently, children experience delays in personal-social aspects, leading to shallow social relationships. Thus, this study further strengthens the evidence that excessive gadget use duration has a significant negative correlation with children's personal-social development.[8]

However, it is essential to note that potential bias exists in data collection regarding gadget usage duration, as it relies heavily on parental reports. Dependence on parental information may lead to inaccuracies, as parents might not fully recognize or accurately recall how long their child uses gadgets daily. Additionally, parents may intentionally provide more favorable responses or underreport actual usage duration to avoid negative judgment. Therefore, employing more objective measurement methods, such as direct observation or screen-time tracking applications, is recommended to obtain a more accurate depiction of children's gadget use. Future research should explore environmental factors and parenting styles that influence gadget use. Researchers could conduct interviews or surveys with parents to understand the home context of gadget use, including implemented rules and the types of content children access.

Relationship Between Gadget Usage Duration and Language Development

The study conducted at TK Bintang Permata found that 39 children (46.4%) fell into the suspected category for language development, while 38 children (45.2%) were classified as usual. Additionally, seven children (8.3%) were categorized as abnormal. This study is supported by research conducted by Silvia (2023), which found a relationship between gadget use and children's language development at SDN 51/XI Kumun Mudik, Kumun Debai Subdistrict, Sungai Penuh City, Jambi Province. The study concluded that Ha was accepted and H0 was rejected, as indicated by the significance value (Sig. 2-tailed). The study found an inverse relationship between gadget use and language development, meaning that children's language development scores decreased as gadget usage increased. This finding was reinforced by teacher assessments of language development, which showed that none of the children had excellent language development scores. Additionally, 14 out of 30 children had poor language development scores, further supporting the negative correlation between increased gadget use and decreased language development.[9]

These findings align with previous studies, which state that gadget use affects children's language skills, including listening, speaking, reading, and writing. However, excessive gadget use can also lead to speech delays, inhibiting direct communication with the child's surrounding environment.[10] The impact of gadget use on speech development includes high-intensity gadget use, which negatively affects concentration, reduces physical activity, limits socialization, causes addiction, and exposes children to radiation, which can hinder brain development, cognitive growth, and language skills.[11]

Skinner and Bandura's behaviorism theory explains the findings at TK Bintang Permata, suggesting that language development occurs through stimulus-response processes reinforced by the environment. If children receive more stimulation from gadgets without reciprocal interaction, they will struggle to develop practical communication skills. Previous studies also indicate that children who spend too much time on gadgets experience decreased concentration, reduced listening skills, and cognitive development impairments, negatively impacting their language abilities. Based on language development theories and empirical research findings, it can be concluded that excessive gadget use negatively correlates with children's language development by inhibiting essential social interactions required for language acquisition.[12]

However, it is essential to acknowledge that research findings may vary depending on different regions or age groups. A study conducted in Seremban 3, Malaysia, found that gadget use facilitated learning, enabled quick access to information, and enhanced creativity. The study involved interviews with parents, caregivers, and teachers of children aged 10 to 14 exposed to gadgets.[13] This suggests that cultural context, content type, and gadget usage methods can influence research outcomes. By comparing these findings with those from various contexts, we can better understand the factors affecting the relationship between gadget use duration and children's language development and identify best practices to support optimal child development.

Parents and educators must be aware of the negative impacts of excessive gadget use and take proactive steps to regulate its duration. For example, parents can set time limits on gadget use and encourage children to engage in more interactive activities, such as outdoor play, reading books, or participating in games that involve social interaction. Outdoor physical activities help children develop motor skills and provide opportunities to learn cooperation and communication with peers. Similarly, teachers can incorporate activities that promote communication and collaboration in the classroom, such as group projects, open discussions, and educational games that involve all students. By creating an inclusive and interactive learning environment, children can feel more comfortable expressing themselves and learning from one another. Additionally, teachers can use technology wisely, such as implementing educational applications that encourage student teamwork and ensure that children benefit from technological advancements without losing opportunities for direct social interaction.

Conclusion

The duration of gadget use has a strong correlation with personal-social development ($r = -0.781$, $p = 0.000$, <0.05) and language development ($r = -0.806$, $p = 0.000$, <0.05), both showing a negative relationship. This indicates that the longer children spend time on gadgets, the poorer their personal-social and language development, particularly among children aged 4–6 at TK Bintang Permata. These findings suggest that excessive use of gadgets can impair children's ability to interact effectively with peers and adults, a crucial aspect of personal-social development. Additionally, prolonged screen time reduces opportunities for activities stimulating language development, such as speaking, listening, and engaging in interactive play.

Therefore, it is essential for parents and educators to recognize the negative impact of excessive gadget use and to create a healthy balance between screen time and direct social interactions. This study has limitations in measuring gadget use duration, as it relies on parental reports, which may introduce bias. Future research should adopt more objective methods, such as screen-time tracking applications, and explore the role of environmental factors and parenting styles. Such an approach would provide deeper insights into the impact of gadget use on child development.

Author Information

Kadek Diah Sagita Pradnyandari: Conceptualization, methodology, data collection, data analysis, and manuscript drafting.
Sayu Aryantari Putri Thanaya: Supervision, guidance on research design, and critical review of the manuscript.
Putu Ayu Sita Saraswati: Supervision, validation, and manuscript editing.
Indah Pramita: Supervision, methodological consultation, and final manuscript review.

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Conflict of Interest Statement

The authors declare that there are no conflicts of interest related to this study.

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Ethics Statement

This study was conducted in accordance with the ethical principles of the Declaration of Helsinki. Ethical approval was not required as the study involved only non-invasive procedures (blood pressure measurement and questionnaire surveys) and posed minimal risk to participants. Informed consent was obtained from all participants prior to their inclusion in the study, and confidentiality was strictly maintained.

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