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Effect of Gadget Use on the Development of Language and Speech Ability in Children Under Five

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ABSTRACT

Background: Language development is a hierarchical change that begins with hearing and learning through hearing through the sounds of words. This research aims to analyze the effect of gadget use on language and speaking abilities.
Subjects and Method: An observational analytical research design using a cross sectional approach was carried out at Bayu Asih Hospital, Purwakarta and Rama Hadi Hospital, Purwakarta in November 2023. A total of 200 children under five were used using a random sampling technique. The dependent variable is language and speech delays. The independent variables are gadget use, mother's employment, mother's education, family income, and child's education. The instruments used were Early Detection of Communication Ability Disorders (DDGKB) and questionnaires. Data analysis uses path analysis.
Results: The results of path analysis explain that there is an influence of gadget use (b=1.85; 95% CI=1.02 to 3.40; p=0.044), gender (b=1.85; 95% CI=1.02 to 3.40; p=0.044) and parental income (b =1.85; 95% CI=1.02 to 3.40; p=0.044), mother's employment (b=0.56; 95% CI=0.31 to 1.02; p=0.058), mother's employment (b=0.56; 95% CI=0.31 to 1.02 ; p=0.058) and mother's education (b=0.91; CI 95%=0.48 to 1.73; p=0.783) and child's education (b=0.74; CI 95%=0.42 to 1.34; p=0.325) on speech delays in children.
Conclusion: Gadget use, gender, parental income, maternal employment, maternal education, and child education increase the risk of speech delays in children.

Keywords: speech delays, gadget use, child education, toddlers.

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BACKGROUND

Gadget is a term that comes from English which means a small electronic device that has a special function (Wikipedia). Excessive and inappropriate use of gadgets can have an impact in the form of speech or language delays at developmental age. In Indonesia the number of speech and language delays in toddlers reaches 10% (Amalia, 2017). The aim of this research is to determine the

relationship between the intensity of gadget use and delays in the development of aspects of speech and language in toddlers.

Language development is a hierarchical change that begins with hearing and learning through hearing through the sounds of words. According to Piaget's theory, before a child can speak, the child communicates through actions and behavior. After that, children begin to perform concrete thinking operations and develop expressive and receptive language. After six months, the child's ability to differentiate sounds will increase, followed by rapid development of lexical resources and word interconnections from the age of 1.5 years to 3 years.

These skills make a significant contribution to the long-term development of early childhood. Assessment of early childhood development screening tools includes Modified Denver, Denver Develop-mental Screening Test (DDST), Diagnostic Inventory for Screening Children (DISC), Developmental Skills Instrument (DSI), and Modified Denver II. Early childhood development screening in Thailand is mainly carried out using the Developmental Surveillance and Promotion Manual (DSPM). DSPM in language development screening can be categorized into two aspects, namely receptive language understanding through sensory nerves obtained through input from hearing and input from vision. With this, a child can differentiate between different sounds, interpret them, and understand their meaning. Turning to expressive language is the verbal communication of intent.

Speech delays are the most common growth and development disorders in children. It is important to identify speech problems early because this is an important part of a child's development and impacts a child's social interactions, behavior and academic skills. The incidence of speech delays varies from time to time, in 2009 it was reported that in Indonesia the prevalence was 0.9% in children under five years old.

Concerns are often expressed about modern lifestyle issues (e.g. the impact of television viewing and computer use). Some studies have found that children who are heavy gadget users have lower language scores while other studies have shown that television can be a positive factor and provide important opportunities for children to engage verbally with other family members.

According to WHO, the definition of a child is counted from when a person is in the womb until the age of 19 years. According to Law of the Republic of Indonesia number 23 of 2002 article 1 paragraph 1 concerning child protection, a child is someone who is not yet 18 years old, including those who are still in the womb. Children are a national asset that will continue the struggle of a nation, so their growth and development must be paid attention to (Ministry of Health of the Republic of Indonesia, 2014).

SUBJECTS AND METHOD

1. Study Design

The study was a cross sectional study conducted on Thursday, July 13, 2023 through online learning held on Zoom media.

2. Population and Sample

The population in this study were all patients under five who sought treatment at the Medical Rehabilitation Installation Polyclinic at Bayu Asih Hospital, Purwakarta and Ramahadi Hospital, Purwakarta. The sample is part of the scope that can be used as a research subject through sampling. According to Hair et al. (1998) in Murti (2013) the samples in this study were patients under five who were seeking treatment at the Medical Rehabilitation Installation Polyclinic, Bayu Asih Hospital, Purwakarta and RSU Ramahadi, Purwakarta, that the ratio between the number of

subjects in a study and a total of 200 subjects.

3. Study Variables

The dependent variable was Language and Speech Delay. The independent variables were Gadget Use, Mother's Employment, Mother's Education, Family Income, and Children's Education.

4. Operational Definition of Variables

Language and Speech Delay: language ability is a person's ability to express intentions using language that is in accordance with linguistic knowledge or linguistic rules. Speaking ability is the ability to pronounce articulatory sounds or words to express, state and convey thoughts, ideas and feelings. Value 0 = speech delay and 1 = normal.

Gadget Usage: User as activity. Value 0 = no, 1 = yes

Mother's Education: Basic, planned efforts to create a learning atmosphere and learning process in order to develop oneself. Value 0<high school, 1>high school

Family Income: Activities or activities carried out to meet their living needs. Average monthly income to support the entire family. Value 0=< median and value 1= ≥ median

Children's Education: Basic planned efforts to create a learning atmosphere and learning process so that they can develop themselves. Score 0 = not yet PAUD, 1 = already PAUD.

Mother's Work: One of the activities realized by the Movement Movement. Value 0= working at home and value 1= ≥ working outside the home.

5. Study Instruments

Data collection related to gadget use, mother's employment, mother's education, family income, children's education was carried out using interview techniques using a questionnaire. While the dependent variable is speech and language delays, the assessment instrument uses Early Detection of Communication Ability Disorders (DDGKB).

5. Data analysis

This is used to provide an overview of the characteristics of research respondents. Continuous data is described using the parameters frequency (n), mean, standard deviation (SD), minimum value, and maximum value. Meanwhile, categorical data is described using frequency (n) and percentage (%) parameters.

Bivariate analysis was carried out to understand the relationship between two variables. Differences in proportions between groups were tested using the chi-square test.

Multivariate analysis was carried out using path analysis techniques. Path analysis is a method for analyzing variables, both those that have a direct and indirect relationship (Murti, 2019).

6. Research Ethics

This research has obtained Ethical Clearance from research ethics commission faculty of medicine, Universitas Islam Al-Azhar, Mataram No. 74/ EC/FK-06/UNIZAR/XII/-2023.

RESULTS

1. Characteristic Sample

Based on Table 1. shows that of the 200 research samples, 128 children (36%) had speech delays and 72 children (64%) had speech delays. The majority of subjects were female, 119 children (59.5%), 108 (54%) children under 4 years of age. Most of the children use gadgets, 132 children (66%). The majority of children had mothers with an education level below high school, 144 (72%) of the children. A total of 123 children

(61.5%) had mothers who worked, and 161 children (80.5%) had a family income of IDR 4,000,000 and above. Furthermore, as many as 112 children (56%) did not receive Early Childhood Education (PAUD).

2. Univariate Analysis

In the univariate analysis, analysis was carried out on the variables speech delay, gender, age, gadget use, maternal education, maternal occupation, family income and children's education for 200 research subjects.

Table 1. Results of univariate analysis of factors influencing speech delays in children

Variable	Frequency	Percentage (%)
Speech Delay		
No	72	36
Yes	128	64
Gender		
Male	81	40.5
Female	119	59.5
Age		
<4 years	108	54
≥4 years	92	46
Gadget Use		
No	68	34
Yes	132	66
Mother's Education		
<Senior High School	144	72
≥Senior High School	56	28
Mother's Job		
Jobless	123	61.5
Job	77	38.5
Family Income		
<Rp, 4,000,000	39	19.5
≥Rp, 4,000,000	161	80.5
Children's Education		
Early Childhood Education	112	56
No Early Childhood Education	88	44

3. Bivariate Analysis

Bivariate analysis was carried out to analyze the influence of gadget use, gender, family income, mother's occupation, and mother's education and child's education.

Based on Table 2. Shows that there is an influence of gadget use on speech delays in children. Children who use gadgets are 1.85 times more likely to have speech delays than children who don't use gadgets and this is statistically significant (OR=1.85; 95% CI=1.02 to 3.40; p=0.044).

There is an influence of gender on speech delays in children. Girls are 0.98 times more likely to have speech delays than boys, but this is not statistically significant (OR=0.98; 95% CI=0.55 to 1.78; p=0.962).

There is an influence of family income on speech delays in children. Children whose parents have an income of ≥Rp. 4,000,000 are 0.86 times more likely to have speech delays than parents with an

income of <Rp. 4,000,000 but this is not statistically significant (OR=0.86; 95% CI=0.41 to 1.81; p=0.699).

There is an influence of mother's work on children's speech delays. Children with working mothers are 0.56 times more likely to have speech delays compared to mothers who do not work and this is statistically significant (OR=0.56; 95% CI=0.31 to 1.02; p=0.058).

There is an influence of maternal education on children's speech delays. Children who have mothers with more than high school education are 0.91 times more likely to have speech delays than children with mothers with less than high school education, but this is not statistically significant (OR=0.91; 95% CI=0.48 to 1.73; p=0.783).

There is an influence of children's education on speech delays in children. Children who received Early Childhood Education (PAUD) were 0.74 times more likely to have speech delays compared to children without Early Childhood Education (PAUD), but this was not statistically significant (OR=0.74; 95% CI=0.42 to 1.34; p=0.325).

Table 2. Results of bivariate analysis of factors that influence speech delays in children

Variable	Speech Delay		Total	OR	95% CI	P
	No	Yes				
Use of Gadgets						
No	31	41	72	1.85	1.02-3.40	0.044
Use	37	91	128			
Gender						
Male	29	43	72	0.98	0.55-1.78	0.962
Female	52	76	128			
Family Income						
< Rp, 4,000,000	13	59	72	0.86	0.41-1.81	0.699
≥ Rp, 4,000,000	26	102	128			
Mother's Job						
Jobless	38	34	72	0.56	0.31-1.02	0.058
Working	85	43	128			
Mother's Education						
< SHS	51	21	72	0.91	0.48-1.73	0.783
≥ SHS	93	35	128			
Children's Education						
No early childhood education	37	35	72	0.74	0.42-1.34	0.325
Early childhood education	75	53	128			

4. Pathway Analysis

The model specification describes the relationship between the variables to be studied. In this study there were 7 variables measured, namely speech delay, mother's education, child's education, mother's occupation, family income, gender, and gadgets, with the following results:

a. Path analysis Model

Figure 1. Explains the relationship between the variables studied, described through model specifications which are differentiated based on endogenous and exogenous variables. The exogenous variables are age, gadget use, mother's education, mother's

job, family income, and children's education, while the endogenous variable is Speech Delay.

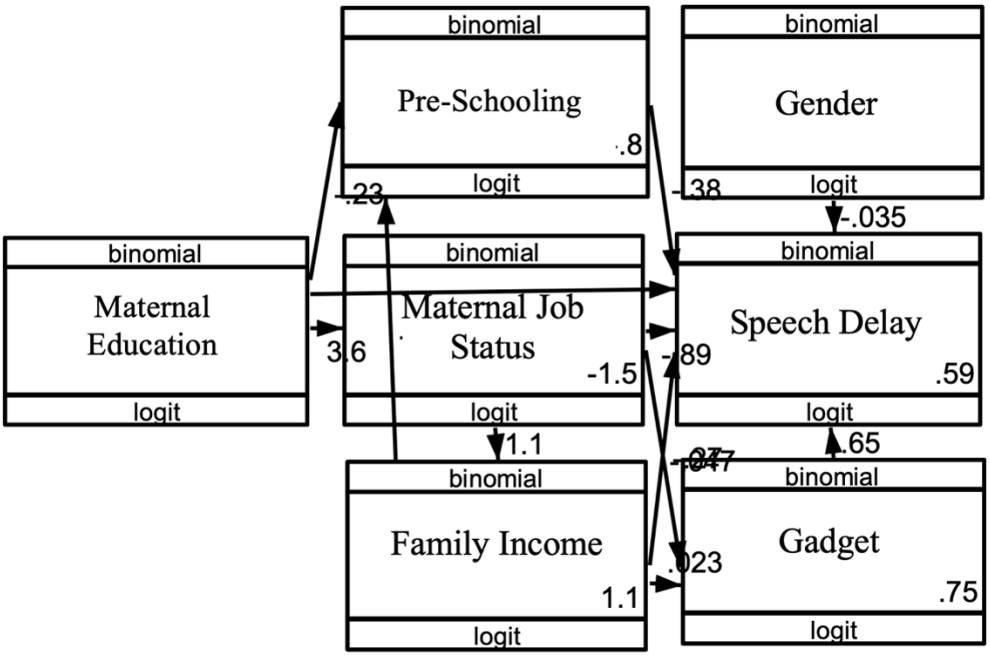

Figure 1. Structural model of path analysis of factors influencing speech and language delays

b. Parameter Estimation

Table 4. Results of path analysis of factors influencing speech delays in children

Dependent Variable	Independent Variable	b	CI 95%		p
			Lower Limit	Upper Limit	
Direct Effects					
Speech Delay	← Mother's Job	-0.89	-1.68	-0.09	0.030
	← Mother's Education	0.56	-0.32	1.44	0.210
	← Children's education	-0.38	-0.98	0.23	0.223
	← Family income	-0.05	-0.84	0.75	0.908
	← Gender	-0.03	-0.65	0.58	0.912
	← Use of Gadgets	0.65	0.02	1.27	0.042
Indirect Effects					
Family Income	← mother's job	1.07	0.23	1.90	0.013
Use of Gadgets	← Mother's Job	-0.27	-0.87	0.34	0.390
	← Family income	0.02	-0.73	0.78	0.951
Mother's job	← Mother's Education	3.59	2.64	4.53	<0.001
children's education	← Mother's Education	-0.23	-0.87	0.42	0.491
	← Family income	0.76	-0.01	1.53	0.052

Based on Table 4 presents the results of path analysis regarding the effect of gadget use and other factors on the risk of children under five experiencing speech delays.

Gadget use increases the risk of children under five experiencing speech delays, and this effect is statistically significant. Toddlers who use gadgets on average have a logodd (likelihood) of experiencing speech delays that is 0.65 units greater than those who do not use gadgets (b= 0.65; 95% CI= 0.02 to 1.27; p = 0.042).

Working mothers reduce the risk of children under five experiencing speech delays, and this effect is statistically significant. Toddlers whose mothers work on average have a logodd (likelihood) of experiencing speech delays that is 0.89 units lower than mothers who do not work (b= -0.89; 95% CI= -1.68 to -0.09; p= 0.030). Speech delays are not significantly influenced by mother's education, family income, child's gender, or whether or not the child attends a PAUD (early childhood education) school.

There is a relationship between working mothers and family income. Families whose mothers work on average have a logodd (likelihood) of earning more than IDR 4,000,000/month 1.07 units higher than those who do not work (b= 1.07; 95% CI= 0.23 to 1.90; p= 0.013). Gadget use is not significantly influenced by the mother's employment status or family income.

DISCUSSION

1. The Effect of Gadgets on Speech Delay

In this study, there was an influence of gadget use in children on speech delays. Children who use gadgets are more likely to experience speech delays. On the other hand, children who do not use gadgets are less likely to experience speech delays (b= 0.65; 95% CI= 0.02 to 1.27; p = 0.042).

This is in line with research conducted by Nugraha et al. (2019) which states that toddlers who are given gadgets by their parents are likely to experience speech delays. It is explained more clearly that the use of gadgets among toddlers is a form of barrier to communication between children and those around them. Toddlers who use gadgets will experience a reduction in time for two-way interaction with their parents so that the toddler's cognitive development will also be delayed and ultimately result in the toddler experiencing speech delays.

Furthermore, this research is in line with research conducted by Alamri et al. (2023) which states that the use of gadgets or smart devices can prevent speech delays in children. The use of gadgets in children tends to reduce children's involvement in activities that encourage the development of their ability to talk with their parents and siblings. Gadget use is also associated with poor vocabulary and lower lexical skills in children.

2. The influence of maternal employment status on speech delays

In this study, it was found that there was an influence of the mother's employment status on children's speech delays. Children whose mothers work are less likely to experience speech delays than children whose mothers don't work.

This is in line with research conducted by Zaib et al. (2022) which states that children under five with working mothers have a reduced likelihood of experiencing speech delays.

According to researchers, even though a working mother has a job in her life, she lacks interaction with her toddler, but many working mothers choose to entrust their children to day care or choose to hire an experienced baby sitter to care for their toddler so that their interaction with their surroundings is maintained.

In contrast to the research of Fan et al. (2021) which states that children under five whose mothers work have a higher chance of experiencing speech delays than children

whose mothers are housewives. This explains that mothers who work as housewives have a lot of time to communicate with toddlers and with the guidance of mothers who always accompany their toddlers, they can increase cognitive intelligence in children.

3. The Effect of Mother's Employment Status on Family Income

In this study, it was found that working mothers were more likely to have a higher average family income than mothers who did not work. This is because a working mother can help a father's income which makes the family income greater.

This is explained in research conducted by Schaller and Zerpa (2017) which states that a mother who has a job will have an impact on family income, and monthly family income has an influence on children's health, both physical health and mental health.

AUTHOR CONTRIBUTION

All authors have made significant contributions to data analysis as well as preparing the final manuscript.

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CONFLICT OF INTEREST

There is no conflict of interest in this study

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