

## Factors Influencing Language Development in Preschool Children in Karanganyar Regency, Central Java

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### ABSTRACT

Children under five years old are an important period in a child's developing body. Child growth and development is a continuous process, not only experiencing physical growth, brain development, there is also a learning process in the development of intelligence, motor skills, speech, language and social and independence. Fulfillment of nutrition is very necessary to support good child growth and development. The purpose of this study was to analyze the factors that influence the language development of preschool children in Karanganyar Regency, Central Java. Subjects and Methods: This study used a cross-sectional research design, which was conducted in Karanganyar Regency, Central Java from April to August 2024. A sample of 112 children was selected using a purposive sampling technique. The dependent variable is language development. The independent variables are cognitive ability, stunting, breastfeeding, immunization and gender. Data collection using questionnaires and analyzed by logistic regression using Stata 13. Results: The language development of preschool children can be delayed in children with cognitive abilities ( $b = 2.52$ ; 95% CI = 0.03 to = 0.28;  $p = 0.013$ ), stunting ( $b = 2.82$ ; 95% CI = 0.05 to 0.30;  $p = 0.006$ ), non-exclusive breastfeeding ( $b = 2.97$ ; 95% CI = 0.07 to 0.38;  $p = 0.004$ ), in boys ( $b = 7.2$ ; 95% CI = 0.33 to 0.28;  $p < 0.001$ ), and children with incomplete immunization. Conclusion: The language development of preschool children is related to children's cognitive abilities, the incidence of stunting, non-exclusive breastfeeding, incomplete immunization and male gender.

**Keywords:** Cognitive Ability, Language Development, Stunting, Breast milk, gender and

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## 1. INTRODUCTION

Growth and development in children are important factors in producing good quality human resources in the future [25]. Development of quality human resources should start from an early age as the best investment [12]. Growth and development are two different things but are interrelated. Growth is the process of increasing the number and size of cells in the body and can be measured quantitatively, including visible physical changes such as increased height, weight, and other body sizes [14]. While development is an increase in the ability of the structure and function of the body, emotional and intellectual including qualitative changes that can be observed through changes in a person's abilities and character. Development here means cognitive, language, motor, emotional, and behavioral development as a result of interaction with the environment [37]. Children under five years old are in an important period in the child's body development [10]. At that age, children have a very big interest in learning because of the brain development which is usually called the brain growth spurt period so that the brain experiences very rapid development [2].

The development that occurs in children includes cognitive development, fine motor development, gross motor development, language development, and social development. Language development as an indicator of the entire child's development, this is because language development is related to delays in other systems such as cognitive, motor, psychological, emotional abilities, and adaptation to the child's environment [37]. The function of language development in children as a means of speaking, a means of listening, a means of

thinking, and a means of reading and writing, so it becomes a very important aspect [26]. Delayed language development is the most common problem found in preschool children. In Indonesia, it was found that 9.4 million children experience delayed speech and language development. If described, children aged 5 years who experience speech and language delays are 19%, (6.4% speech delay disorders, 4.6% speech and language delay disorders, 6% language delays) [10].

Several studies have found that delays in language development in children can be influenced by several aspects. The first aspect is influenced by stunting conditions in children, where stunting is a long-term manifestation of a lack of nutritional intake in children, causing the development of brain cells to be hampered. Several research results have found that stunting conditions in children can affect delays in language development [30]-[31]. The second aspect of cognitive ability, Children's cognitive abilities play a significant role in language development. Children with better cognitive abilities tend to have faster and better language skills. Adequate cognitive stimulation at an early age, such as verbal interaction with parents, can improve children's language skills [16] Research shows that the brain networks of children who receive stimulation will develop better, thus supporting their language skills [9]. The third aspect of breastfeeding affects the language development of preschool children because the content of breast milk has many nutrients that are good for children's development, so the amount of breast milk obtained by children can affect their language development [33]. Other research supports that the duration of breastfeeding has a significant influence on child development, especially language development [3]. Fourth is the aspect of providing immunization, where according to research results it was found that when children receive complete basic immunization it can have a positive effect on their development including language development compared to children who do not receive complete basic immunization [21]. Immunization is one of the supporting factors for good child growth and development, where the completeness of immunization is related to the nutritional status of children. The results of the study found that children who received complete immunization had good nutritional status, while children who did not receive complete immunization had poor nutritional status, which affected their development, especially language development [18]. The fifth aspect is gender, from several research results found that children with female gender have faster language development compared to children with male gender. Language development in this case is in speaking ability, on average children with female gender can speak faster when compared to children with male gender, where the vocabulary owned by female children is significantly more than that of male children [1].

Factors such as cognitive ability, stunting conditions, fulfillment of exclusive breastfeeding, fulfillment of complete immunization, and gender have significant roles in the language development of preschool children. Further research is needed to understand the interactions between these factors and how they can be optimized to support children's overall language development. By understanding this background, it is hoped that research can provide new insights in improving the quality of interventions to support language development in children in Indonesia.

## **2. RESEARCH METHOD**

### **1. Research Design**

This type of research is analytical observational with a cross-sectional approach. The place of research is in Karanganyar, Central Java. The research time is in April - August 2024.

### **2. Population and Sample**

The population of the study was preschool children in Karanganyar Regency, Central Java. The sample of this study was 112 preschool children. Sampling using purposive sampling technique.

### **3. Research variables**

Dependent variable language development. Independent variables are cognitive ability, stunting, breast milk, immunization and gender.

### **4. Operational Definition of Variables**

**Language development** is the ability to convey ideas or opinions and express feelings and thoughts to others according to their developmental age. The measuring instrument used is a questionnaire. The continuous data scale for data analysis purposes is changed into a dichotomy with the code 0 = late; 1 = not late

**Cognitive abilities** is: the ability to think logically, think critically, be able to give reasons, and find causal relationships in solving problems faced. The measuring instrument used is a questionnaire. The continuous data scale for data analysis purposes is changed into a dichotomy with the code 0 = good; 1 = not good

**Stunting** is a child who has short nutritional status with anthropometric index based on TB/U indicator is at the threshold  $< -2$  SD WHO-NCHS reference book. The measuring instrument used is a questionnaire.

Continuous data scale for data analysis purposes is changed to dichotomy with code 0= normal; 1= stunting

**breast milk** is the provision of breast milk to babies without any additional food, measured by the duration of providing breast milk without additional food for at least 6 months. The measuring instrument used is a questionnaire. The continuous data scale for data analysis purposes is changed into a dichotomy with the code 0= exclusive breastfeeding; 1= non-exclusive breastfeeding

**Immunization** is the completeness of immunization seen from the perspective of whether basic immunization is complete or not. The measuring instrument used is a questionnaire. The continuous data scale for data analysis purposes is changed into a dichotomy with the code 0= complete; 1= incomplete

**Gender** is the biological difference between men and women. The measuring instrument used is a questionnaire. The continuous data scale for data analysis purposes is changed into a dichotomy with the code 0= Female; 1= male

## 5. Data analysis

Univariate analysis to describe in general the variables studied include children's language abilities, cognitive ability, stunting, breast milk, immunization and gender to produce the distribution and percentage of each variable.

Bivariate analysis to explain one independent variable (cognitive ability, stunting, breast milk, immunization and gender) on one dependent variable (child language ability). Statistical test Chi-square statistical test and odds ratio (OR) calculation with a confidence interval (CI) of 95%.

Multivariate analysis is used to see the influence of more than one independent variable. The method used in this study is logistic regression analysis using Stata 13.

## 3. RESULTS AND DISCUSSIONS

### Results

#### 1. Univariate Analysis

Description of research variables in univariate distribution of research subjects based on each research variable.

Based on table 1, it shows that the cognitive development of children with good is 44 (39.29%), while bad is 68 children (60.71%), children who are not stunted (normal) are 55 (49.11%) while children with stunting are 57 (50.89%). Children with exclusive breastfeeding are 96 (48%), those who are not exclusively breastfed are 104 (52%). Children with complete basic immunization are 67 (59.8%) while children with incomplete basic immunization are 45 (40.18%). There are 57 male children (50.89) while there are 55 female children (49.11%).

**Table 1. Characteristics**

Variables	Frequency (n)	Percentage (%)
<b>Cognitive abilities</b>		
Good	44	39.29
Bad	68	60.71
<b>Stunting</b>		
Normal	55	49.11
Stunting	57	50.89
<b>breast milk</b>		
Exclusive Breastfeeding	96	48.0
Breastfeeding is not exclusive	104	52.0
<b>Immunization</b>		
Complete	67	59.82
Incomplete	45	40.18
<b>Gender</b>		
Man	57	50.89
Woman	55	49.11

#### 2. Bivariate Analysis

Bivariate analysis explains the influence of each independent variable on the dependent variable (child language development), the method used is the chi-square test.

Table 2 shows that children with poor cognitive abilities increase the delay in children's language development (OR=5.4; p=0.001). Children with stunting conditions increase the delay in children's language development (OR=7.3; p<0.001). Children with non-exclusive breastfeeding increase the delay in children's language development (OR=10.5; p<0.001). Children with complete immunization increase the delay in children's language development (OR=3.3; p=0.004). Children with male gender increase the delay in children's language development (OR=7.2; p<0.001).

**Table 2. Bivariate analysis of a number of factors influencing children's language development**

Independent Variables	Child Language Development				OR	p
	In accordance		Late			
	N	%	N	%		
<b>Cognitive abilities</b>						
Good	39	88.7	5	11.3	5.4	0.001
Bad	40	58.8	24	41.2		
<b>Stunting</b>						
Normal	49	89.09	6	10.9	7.3	<0.001
Stunting	30	52.63	27	47.47		
<b>breast milk</b>						
Exclusive Breastfeeding	70	83.3	14	16.7	10.5	<0.001
Breastfeeding is not exclusive	9	32.1	19	67.9		
<b>Immunization</b>						
Complete	54	80.6	13	19.4	3.3	0.004
Incomplete	25	55.5	20	44.5		
<b>Gender</b>						
Man	24	42.1	33	57.9	7.20	<0.001
Woman	55	100	0	0		

### 3. Multivariate Analysis

Multivariate analysis is used to see the influence of more than one independent variable. The method used in this study is logistic regression analysis using Stata 13.

**Table 3. Logistic regression analysis of a number of factors influencing the development of children's language**

Independent Variables	Regression coefficient (b)	CI 95%		p
		Lower Limit	Limit On	
Cognitive abilities	2.52	0.03	0.28	0.013
Stunting	2.82	0.05	0.30	0.006
breast milk	2.97	0.07	0.38	0.004
Immunization	0.03	-0.12	0.13	0.975
Gender	7.20	0.33	0.28	<0.001

*N observations = 112*  
*Log likelihood = 26.75*  
*p<0.001*

Table 3 shows that poor cognitive ability has an effect on children's language development. Children with poor cognitive ability are 2.52 units more likely to experience delayed language development than children with good cognitive ability (b= 2.52; 95% CI=0.03 to=0.28; p=0.013).

Children with stunting have an influence on children's language development. Children with stunting are likely to experience language development delays of 2.82 units higher than normal children (b=2.82; 95% CI=0.05 to 0.30; p=0.006).

Children with non-exclusive breastfeeding have an influence on children's language development. Children with non-exclusive breastfeeding are likely to experience language development delays of 2.97 units higher than children with exclusive breastfeeding (b=2.97; 95% CI= 0.07 to 0.38; p=0.004)

Boys have an influence on children's language development. Boys are likely to experience a delay in language development as much as 7.2 units higher than girls (b = 7.2 ; 95% CI = 0.33 to 0.28 ; p <0.001).

Children with incomplete immunization have an influence on children's language development but are not statistically significant ((b = 0.03 ; 95% CI = -0.12 to 0.13 ; p = 0.975).

## Discussion

### 1. The Influence of Cognitive Ability on Children's Language Ability

The results of this study indicate that cognitive abilities in children have an influence on the development of their language skills. Toddlers with good cognitive abilities experienced a delay in language development of 11.3% (5 children), while toddlers with poor cognitive abilities experienced a delay in language development of 41.2% (24 children). Cognitive abilities, which include understanding, problem solving, and logical thinking, play an important role in language acquisition. Children who have good cognitive development tend to be faster in understanding and using language [3]. The process of language acquisition in children goes through several stages, such as phonological, morphological, and semantic development. Children who have good cognitive abilities can usually go through these stages more smoothly [6].

Several theoretical approaches explain this relationship, including nativism, behaviorism, and cognitivism. These theories suggest that language skills develop through certain stages that are influenced by cognitive factors. For example, children use certain strategies in language acquisition that are related to their level of cognitive understanding. The study showed that children's thought processes can be expressed through language, so good cognitive skills will support better language skills [38].

### 2. The effect of stunting on children's language skills

The results of this study indicate that stunting in children has an effect on their language development. Toddlers in normal conditions experience a delay in language development of 10.9% (6 children), while toddlers with stunting experience a delay in language development of 47.47% (27 children). Stunting itself is a long-term impact of a lack of nutritional intake in children, resulting in stunted development of brain cells. Nutrients that affect the brain development process are protein, essential fatty acids, and micronutrients such as iron, zinc, iodine and vitamin B (Shao & Gao, 2024). Lack of intake of these nutrients will inhibit some growth in axons and dendrites, then the process of myelination and synapse formation, and greatly affect the acceleration of nerve impulses from one brain cell to another. The part of the brain that can be affected or disturbed is the left hemisphere of the brain located in the Broca area and Wernicke area, where this part controls speech and language abilities [35].

Several studies are in line with the results of this study, where stunting in children is 3.45 times more likely to have a risk of delayed language development [29]. In line with the results of the study, in a study at one of the integrated health posts in Karawang Regency which examined the influence of stunting conditions on children in the pre-school age group, 11 out of 28 children experienced developmental delays [30]. Other studies show that children under the age of two years show a percentage of language development delays which are divided into two, namely receptive language development of 55.4% and expressive development of 23.2% [11]. The difference between receptive language development is the ability to interpret language and words that involve obtaining information and definitions, while expressive language development is a way for children to express feelings, facial expressions, movements, words, intonation, and desires in a simple but meaningful form to other people in the surrounding environment [8];[20];[34]. The results of the study over the last two years regarding the influence of stunting conditions in toddlers on language development, show that toddlers with stunting conditions experience language delays of 19.3% (21 children), while toddlers with normal conditions experience language delays of 8.3% (9 children) [39].

### 3. The influence of breast milk on children's language skills

The results of this study indicate that toddlers who received exclusive breastfeeding as many as 84 children experienced a delay in language development of 16.7% (14 children), while toddlers who received non-exclusive breastfeeding as many as 38 children experienced a delay in language development of 67.9% (19 children). So toddlers who receive non-exclusive breastfeeding have a greater risk of experiencing delays in language development compared to toddlers who receive exclusive breastfeeding. Toddlers who are given exclusive breastfeeding are a manifestation of optimal language development. In addition to being an ideal nutrient, breast milk has the right composition and can adjust to the needs of babies, nutrients in breast milk such as Lactose, Docosahexanoic Acid (DHA), Arachidonic Acid (AA), Choline, Omega 3, Omega 6, and Tryptophan are needed by the baby's brain to grow optimally in helping synaprogenesis and myelination. The content of breast milk

that is very important in the process of brain cell maturation is tarurin [15]. The more synapses between nerve cells, the more complex the ability to receive, process, store, and respond to stimuli received by nerve cells. In general, the number of synapses will increase rapidly in the age range of 3-4 months, then there is a relationship with the center of visual information processing until the age of 6 months. Children who receive breast milk will have a higher Intelligence Quotient development compared to children who do not receive breast milk, where continuous stimulation of babies while receiving breast milk has a positive impact on the development of children's psychology. [28].

Research related to the influence of breastfeeding on language development, where the duration of breastfeeding has a positive influence on children's language development and contributes to children's language development by up to 51.9%. [22]. Furthermore, research at the Cilandak District Health Center related to the provision of exclusive breastfeeding has a positive impact on their language development. In children aged 12-18 months, 14 out of 15 children can say papa and mama, then in children aged 18-24 months, 6 out of 8 children can mention 3-6 words that have meaning, and at the age of 24-36 months, 6 out of 9 children can speak well and correctly using 2 words.[40]

#### **4. The effect of immunization on children's language abilities**

The effect of complete and incomplete immunization on children's language development, the results of this study show that there are 80.6% (54 children) who have normal language development with complete immunization, while there are 55.5% (25 children) with incomplete immunization who have normal language development. Delayed language development in children with complete immunization is 13 out of 67 children or equivalent to 19.4%, while in children with incomplete immunization there is a language delay of 20 out of 44 children or equivalent to 44.5%. Complete immunization in toddlers has a significant impact not only in preventing disease, but also in supporting language and speech development. Immunization functions to protect children from infectious diseases that can affect brain development. Diseases such as meningitis or other serious infections can interfere with neurological growth, which is important for language skills. With proper immunization, children have a lower risk of experiencing health complications that can hinder their cognitive development. By maintaining physical health through immunization, children can better engage in social interactions and linguistic stimulation that are essential for the growth of their language skills [7].

Previous research observed 45 respondents and found that children who received complete basic immunizations were 15.4 times more likely to have good nutritional status compared to those who were incomplete. This suggests that immunization can support children's general health, which in turn contributes to their overall development, including language skills. [19]. Although it does not directly link immunization to language skills, research shows that a child's nutritional status influences the development of expressive language. Children with good nutritional status tend to have better language skills because they are healthier and better able to interact in a social environment that supports language development [13].

#### **5. The influence of gender on children's language skills**

The results of this study indicate that gender in preschool children affects children's language skills, this can be seen in 100% of girls who do not experience delays in the development of language skills, while in boys as many as 57.9% experience delays in the development of language skills. The brains of boys and girls develop differently in the womb, which can affect the maturation of the development of the hemispheres of the brain. Boys tend to have fewer vocabularies and less accurate pronunciation than girls, due to differences in brain maturation. [5] & [9]

Research that is in line with the results of this study shows that most respondents who experience delays in language development are boys. For example, research at TK Tadika Puri Kediri City found that 70.6% of children who had not reached the language development stage were boys. Other studies show that starting at the age of two, girls tend to show faster language development than boys. [4]. Recent research shows that boys are five times more likely to have problems with language development than girls. The study also found that boys have a smaller vocabulary and less accurate pronunciation than girls. This suggests that differences in language development may be influenced by differences in brain maturation between the sexes. [5]. In addition to these factors, other studies have shown that boys tend to experience delays in language development compared to girls. This may be due to differences in play and social interaction between the two sexes. [27]

#### 4. CONCLUSION

Based on the analysis and discussion that has been done, it can be concluded that cognitive ability, stunting conditions, exclusive breastfeeding, complete immunization, and gender have a significant influence on the development of language skills in preschool children. Children with better cognitive abilities show faster and better language development. Adequate cognitive stimulation from the environment is very important to support language skills. Stunting is closely related to delayed language development. Children who experience stunting tend to face difficulties in learning and communicating, so good nutritional fulfillment is needed to support their development. Exclusive breastfeeding for the first six months of life has been shown to provide significant benefits to children's cognitive and language development. Nutrients in breast milk contribute to the growth of the brain and nervous system, which supports language skills. Children who receive complete immunization have a lower risk of infectious diseases, which can interfere with their development, including language skills. Therefore, timely immunization is very important for children's health and language development. There are differences in language development between boys and girls, where girls tend to show faster language development. This can be influenced by biological factors as well as different ways of social interaction based on gender.

#### Research Contribution

Roy Romey Daulas Mangunsong as the main researcher played a role in data collection and processing research data. Alfiani Vivi Sutanto played a role in formulating the framework thought, supporting theories and research discussion. Sudarman play a role in the background substance and discussion of research

#### Conflict of Interest

There is no conflict of interest whatsoever in this research.

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