

## Original Research

# The Effect Of Motoric, Sensoric And Cognitive On Speaking Ability Of Intellectual Disability Children

Sudarman Sudarman<sup>1\*</sup>, Roy Romey Daulas Mangunsong<sup>2</sup>

<sup>1,2</sup> Department of Speech Therapy, Poltekkes Kemenkes Surakarta

### ABSTRACT

**Background:** The growth and development of children is very important for parents to pay attention. The growth and development of children includes the development of motor, sensory and cognitive abilities. Normal sensory and cognitive motor abilities show maturity of brain function, but if there is a delay in motor, sensory and cognitive abilities, it can be caused by impaired brain function maturity, and this can occur in children with intellectual disabilities.

**Methods:** This study applies a quantitative research with an observational analytic design through a cross sectional approach. The research sample was 50 respondents. Bivariate analysis using Spearman rank statistical test and multivariate analysis using multinomial logistic linear regression test model.

**Results:** The results of Spearman's Rank analysis on motor development variables showed a p-value of 0.001 (p 0.05) and a correlation coefficient of 0.647 meaning that there was an effect. The results of the Spearman Rank analysis on the sensory development variable show a p value of 0.030 (p 0.05) and a correlation coefficient value of 0.738 which means there is an effect. The results of the Spearman Rank analysis on cognitive development variables show a p value of 0.003 (p 0.05) and a correlation coefficient of 0.455 which means there is an effect. The results of multivariate statistical tests using multinomial logistic regression analysis obtained a significance value of 0.005 (<0.05).

**Conclusion:** The results of statistical tests with Spearman Rank showed that sensory and cognitive motor development had an effect on the speech ability of ID children with a p value of 0.001; 0.30; 0.003 and the correlation coefficient value is 0.647; 0.738; 0.455. Meanwhile, the results of the multivariate test using logistic regression showed the value of sig. 0.005 < 0.05.

### ARTICLE HISTORY

Received : January 5<sup>th</sup>, 2022  
Accepted : February 2<sup>th</sup>, 2022

### KEYWORDS

cognitive, intellectual disability, motor, sensory, speech disorders;

### CONTACT

Sudarman



[darman\\_poltekkes@yahoo.com](mailto:darman_poltekkes@yahoo.com)

Department of Speech Therapy,  
Poltekkes Kemenkes Surakarta , Jl.  
Letjend Sutoyo, Mojosongo, Jebres,  
Surakarta 57127.

**Cite this as:** Sudarman, S., & Mangunsong, R. R. (2022). The Affect The Effect Of Motoric, Sensoric And Cognitive On Speaking Ability Of Intellectual Disability Children. *Jurnal Keterapian Fisik*, 27-34. <https://doi.org/10.37341/jkf.v0i0.321>

## INTRODUCTION

Child development is very important to get attention from parents. Parents must have good knowledge about children's growth and development in order to take good

care of their children. Age 0-5 years is a very important period of growth and development because of the rapid increase experienced by children, so this period is called the "golden age". This period is very important for early detection so that if there is a flower plant abnormality it can be prevented. Early detection is also useful for providing appropriate treatment so that abnormalities in this golden age period do not become permanent abnormalities in the growth of children in the future (Livana PH, Hermanto, 2019).

Motor development is development in controlling physical movement through coordinated center nerve and muscle activities. This control comes from the development of reflexion and mass activities that are present at birth. The condition of powerlessness in children will change rapidly, during the first four or five years of life after birth the child can control rough movements (Suhartini, 2015).

Sensory development is a child's ability to use the senses in body. Sensory development in children is an ability in terms of skills possessed by children to utilize the senses contained in themselves which consist of the senses of touch, sight, hearing, taste, and smell. The existence of this sensory ability allows children to recognize and explore the environment around them during the child's growth and development period (Novianti et al., 2020).

Cognitive development is a genetic process based on biological mechanisms in the central nervous system. The more mature the child, the more complicated the arrangement of the nerve cells in his body and the more the cognitive abilities of the child will increase. Cognitive ability is also a process in the central nervous system when humans think (Nur, 2009).

Child development delays occur when children experience delays in motor, sensory and cognitive development that are slower than expected. Intellectual disability is a weakness or cognitive disability that appears in childhood (before 18 years) which is characterized by a below normal intelligence phase (IQ 70-75 or less), and is accompanied by other limitations in at least two of the following areas: speaking and language, self-care skills, ADL, social skills, use of community facilities, health and safety, functional academic, work and relax, and others (Aguilera Albesa & Orellana Ayala, 2017).

Children with severe intellectual disabilities have limitations on adaptive and cognitive abilities. One of the adaptive abilities that are often impaired in people with severe intellectual disabilities is the ability to take care of themselves independently (Hapsari & Hartiani, 2019). This disability is accompanied by inappropriate motor development of children. In children with severe intellectual disabilities accompanied by Down syndrome health disorders, delay in motor development is one of the problems that is difficult to avoid (Hapsari & Hartiani, 2019).

According to Riskesdas by the Agency for Health Research and Development (2013), the number of people with special needs or persons with disabilities is approximately 11%. One type of disability that exists in Indonesia is intellectual disability. The Ministry of Health of the Republic of Indonesia (2010) in Garina (2012) the number of people who experience intellectual disability is divided into very severe intellectual disability (25%), severe (2.8%), moderately severe (2.6%) and mild (3.5%).

The results of Riskesdas 2018 found 3.3% of children aged 5-17 years with disabilities. Provinces with the highest proportion of children with disabilities were Central Sulawesi (7.0%), North Kalimantan, and Gorontalo (5.4%), while the lowest proportions were in West Sulawesi, Lampung and Jambi (1.4% each). Based on Law

no. 8 of 2016 concerning Persons with Disabilities, there are five categories of disabilities, namely physical, intellectual, mental, sensory, and multiple/multiple. Meanwhile, based on current 2020 data from the Central Bureau of Statistics (BPS), the number of people with disabilities in Indonesia reaches 22.5 million or around five percent

## MATERIALS AND METHOD

The type of this research is a quantitative research with a correlational descriptive research design through a cross-sectional approach. This study aims to analyze the effect of delayed motor, sensory and cognitive development on the speech ability of children with intellectual disabilities in the city of Surakarta. The study was conducted in the city of Surakarta with a sample of 50 respondents who were subjected to a purposive sampling method with inclusion criteria: children with intellectual disability disorders, have good hearing and are willing to be samples, while exclusion criteria: patients are uncooperative and quit as research samples in the middle of the research process.

Research data consists of primary and secondary data. The primary data were obtained by means of a questionnaire with a Likert scale whose validity and reliability had been tested with Pearson correlation values and sig values. Bilateral with the provisions of the instrument is said to be valid if the value of  $r_{count} > r_{table}$  and the value of sig (bilateral)  $< 0.05$  and the Pearson correlation value is positive, for the reliability test the alpha value of Cronbach  $>$  criterion (0.60).

Instrument while secondary data was collected through a desk study. Data analysis was performed with the SPSS-21 program after primary and secondary data collection. Univariate analysis was performed to determine the sample characteristics of the dependent and independent variables as frequency and percentage. A bivariate analysis was performed to determine the effect of the independent variable on the dependent variable by Spearman's rank test. Multivariate test to determine the effect of independent variables together on the dependent variable by multinomial logistic linear regression

## RESULTS

Results Univariate analysis of the effect of motor, sensory, cognitive, and speech development.

**Table 1.** Distribution of Child Development Levels

Variable	Amount	Percentage
<b>Motor</b>		
Low	3	6.00%
Moderate	41	82.00%
Good	6	12.00%
<b>Sensory</b>		
Low	4	8.00%
Moderate	40	80.00%
Good	6	12.00%
<b>Cognitive</b>		
Low	5	10.00%
Moderate	40	80.00%
Good	5	10.00%

Respondents with a low level of motor development were 3 respondents (6.00%), respondents with an moderate level of motor development were 41 respondents (82.00%), and respondents who had a good level of motor development were 6 respondents (12.00%). Respondents with a low level of sensory development as many as 4 respondents (8.00%), respondents with a moderate level of sensory development were 40 respondents (80.00%), and respondents who had a good level of sensory development were 6 respondents (12.00%). Respondents with a low level of cognitive development were 5 respondents (10.00%), respondents with a moderate level of cognitive development were 40 respondents (80.00%), and respondents who had a good level of cognitive development were 5 respondents (10.00%).

### The Effect of Motor Development on the Speaking Ability of Children with Intellectual Disabilities

Results of Bivariate Analysis of the Effect of Motor Development on Speech Skills in Children with Intellectual Disabilities in Surakarta.

**Table 2.** The Effect Of Motor Development On The Speaking Ability Of Children With Intellectual Disabilities In Surakarta City

Motor Development	Speaking ability						Total	P value	
	Low		Moderate		Good				
	N	%	N	%	n	%	n		%
Low	3	6%	0	0%	0	0%	3	6%	0.001
Moderate	8	16%	32	64%	1	2%	41	82%	
Good	0	0%	5	10%	1	2%	6	12%	
<b>Total</b>	<b>11</b>	<b>22%</b>	<b>37</b>	<b>74%</b>	<b>2</b>	<b>4%</b>	<b>50</b>	<b>100%</b>	

Based on the results of the analysis using the Spearman Rank correlation, it was found that p value of 0.001 ( $p < 0.05$ ) and a correlation coefficient of 0.647 showed that statistically there was a positive and significant effect between the level of motor development on the speaking ability of children with intellectual disabilities in the Surakarta city. The correlation coefficient of 0.647 indicates that sensory variables have a strong influence on speaking ability.

### The Effect of Sensory Development on the Speaking Ability of Children with Intellectual Disabilities

Results of Bivariate Analysis of the Effect of Sensory Development on Speech Skills in Children with Intellectual Disabilities in Surakarta.

**Table 3.** Effect Of Sensory Development On The Speaking Ability Of Children With Intellectual Disabilities In Surakarta City

Sensory Development	Speaking ability						Total	P value	
	Low		Moderate		Good				
	n	%	n	%	N	%	n		%
Low	3	6%	1	2%	0	0%	4	8%	0.030
Moderate	7	14%	32	64%	1	2%	40	80%	
Good	1	2%	4	8%	1	2%	6	12%	
<b>Total</b>	<b>11</b>	<b>22%</b>	<b>37</b>	<b>74%</b>	<b>2</b>	<b>4%</b>	<b>50</b>	<b>100%</b>	

Based on the results of the analysis using the Spearman Rank correlation, it was found that the p value was 0.030 (p 0.05) and the correlation coefficient was 0.738 so that statistically it showed that there was a positive and significant effect between the level of sensory development on the speaking ability of children with intellectual disabilities in Surakarta City. The correlation coefficient of 0.738 indicates that the sensory variable has a strong influence on speaking ability and the sensory variable is the most influential variable compared to other variables.

### The Effect of Cognitive Development on the Speaking Ability of Children with Intellectual Disabilities

Results of Bivariate Analysis of the Effect of Cognitive Development on Speech Skills in Children with Intellectual Disabilities in Surakarta

**Table 4.** Effect Of Cognitive Development On The Speaking Ability Of Children With Intellectual Disabilities In The Surakarta City

Cognitive Development	Speaking ability						Total	P value	
	Low		Moderate		Good				
	n	%	n	%	n	%			
Low	2	4%	3	6%	0	0%	5	10%	0.003
Moderate	8	16%	32	64%	0	0%	40	80%	
Good	1	2%	2	4%	2	4%	5	10%	
<b>Total</b>	<b>11</b>	<b>22%</b>	<b>37</b>	<b>74%</b>	<b>2</b>	<b>4%</b>	<b>50</b>	<b>100%</b>	

Based on the results of the analysis using the Spearman Rank correlation, it was found that a p value of 0.003 (p 0.05) and a correlation coefficient of 0.455 showed that statistically there was a positive and significant effect between the level of cognitive development on the speaking ability of children with intellectual disabilities in Surakarta City. The correlation coefficient of 0.455 indicates that cognitive variables have a moderate influence on speaking ability.

### Effect of motor, sensory, and affective development simultaneously on speaking ability

The effect of independent variable to the dependen variabel simultaneously tested using multinomial logistic regression.

**Table 5.** Results Of Multinomial Logistics Regression Analysis

Model	Likelihood Ratio Tests Sig.	Pseudo R-Square (Nagelkerke)
Final	0,005	0,578

The table above shown a significance value of 0.005 (<0.05), which means that motor, sensory, and cognitive development variables simultaneously affect the speaking ability of intellectually disabled children in Surakarta City.

The magnitude of the effect of the independent variable on the dependent variable can be presented in Table 5 that the Nagerkerke value is 0.578 which means that the motor, sensory, and cognitive development variables affect the speaking ability of intellectually disabled children in Surakarta City by 57.8%, the remaining 42.2% is determined by other variables not included in this study.

## **DISCUSSION**

### **The effect of motor development on the speaking ability of children with intellectual disabilities**

Based on the results of the analysis using the correlation Rank Spearman obtained p value 0,001 ( $p \leq 0.05$ ) were statistically showed there is significantly effect of the motor development on the on the speaking ability of children with intellectual disabilities in the Surakarta city. The research results supported by the research of (Fitriyani et al., 2018) which states that the development of speech skills is determined by physical, motor, and cognitive factors.

Motor development is development in controlling physical movement through coordinated center nerve and muscle activities. This control comes from the development of reflection and mass activities that are present at birth. Condition of hopelessness in children will change as fast, for four or five years of the first life postnatal child can control the movement of the rough. These movements involve broad body parts, such as prone, sitting, crawling, standing, walking, running, and jumping (Suhartini, 2015).

Delayed speech is usually accompanied by the development of motor, perceptual motoric late anyway. Because speech and language are closely related to motor development, which is regulated by the central nervous system. The central nervous system regulates the development of the sensory system, sensory-motor, motor perception and cognition. At an early age, children with speech delay disorders must be given intervention in the form of therapeutic activities as a preventive measure during their growth and development (Fitriyani et al., 2018).

### **The Effect of Sensory Development on the Speaking Ability of Children with Intellectual Disabilities**

Based on the results of the Spearman Rank correlation analysis, it was found that p value of 0.030 ( $p < 0.05$ ) statistically indicated that there was a significant effect between the level of motor development on the speaking ability of children with intellectual disabilities in Surakarta. The results of this study are supported by (Sunanik, 2013) who argues that sensory development in children with speech delays has an important role and determines the development of language and communication skills.

The development of sensory related to the ability to process information accurately, the ability to concentrate, ability of organization, self-esteem, ability to control themselves, believe in themselves, the ability of academic, ability to think abstractly, the ability of specialization of each side of the body and the brain, and all of factors are related to language and speaking skills (Sunanik, 2013).

Explains that sensory is an organ that has special receptors to receive stimuli (Mulyana, 2017). Sensory task is recognize the environment and respond to all stimuli that occur in the body, so that the body is able to respond to the environment and protect itself from various disturbances.

### **The Effect of Cognitive Development on the Speaking Ability of Children with Intellectual Disabilities**

Based on the results of the analysis using the Spearman Rank correlation, it was found that the p value of 0.003 ( $p < 0.05$ ) statistically showed that there was a significant effect between the level of cognitive development on the speaking ability of children

with intellectual disabilities in Surakarta. The research results are supported by the research of (Hartanto et al., 2016) which states that there is an effect of cognitive development on language development (speaking ability). Also states that a person's speaking ability is much influenced by the capacity of his cognitive abilities (Saidah, 2019).

One aspect that is very important to know and understand from the development of elementary age children is the cognitive aspect. Cognitive development is a very comprehensive development that is related to thinking skills, such as the ability to reason, remember, memorize, solve real problems, speak and creativity. Cognitive development has an effect on children's mental and emotional development as well as language skills. Children's attitudes and actions are also related to the child's thinking ability. Thus, cognitive development can be said to be the key to non-physical developments (Bujuri, 2018).

Cognitive development was related to brain development. Brain development is a development that concerns the size (volume) and function of the brain. The speed of brain development affects human cognitive development. Brain development will affect the functioning of the brain to thinking, knowing, understanding, analysing, synthesize, speaking, reasoning, creativity and act. Brain development is divided into two parts, namely the left and right brain. Left brain development includes the ability to think rationally, scientifically, logically, analytically, and is related to the ability to learn to read, count and language. Right brain development includes the ability to think holistically, non-linearly, non-verbally, intuitively, imaginatively and creatively (Nur, 2009)

## CONCLUSION

Based on the results of data analysis and discussion, this study can be concluded that motoric, sensory and cognitive development affect the speaking ability of children with intellectual disabilities in Surakarta. The results of the analysis using Spearman Rank correlation obtained p value 0.001; 0.003; 0.005 ( $p < 0.05$ ) and the correlation coefficient value of 0.647; 0.030; 0.455, while the results of multivariate statistical tests using multinomial logistic regression analysis obtained a significance value of 0.005 ( $p < 0.05$ ), which means that motor, sensory, and cognitive development variables together affect the speaking ability of intellectually disabled children in Surakarta City.

Suggestions to improve children's speaking skills, parents and teachers can provide sensory therapy to stimulate children's senses, so they can better capture external stimuli, so that children's ability to communicate with their environment will increase. Teachers and parents need to create educational games that emphasize motor, sensory, and cognitive development so that children are more happy to learn.

## REFERENCES

- Aguilera Albesa, S., & Orellana Ayala, C. E. (2017). Language disorders. In *Pediatrics Integral* (Vol. 21, Issue 1). <https://doi.org/10.4324/9781315095578-6>
- Bujuri, D. A. (2018). Analisis Perkembangan Kognitif Anak Usia Dasar dan Implikasinya dalam Kegiatan Belajar Mengajar. *LITERASI (Jurnal Ilmu Pendidikan)*, 9(1), 37. [https://doi.org/10.21927/literasi.2018.9\(1\).37-50](https://doi.org/10.21927/literasi.2018.9(1).37-50)
- Fitriyani, Sumantri, M. S., & Supena, A. (2018). Gambaran Perkembangan Berbahasa

pada Anak dengan Keterlambatan Bicara (Speech Delay): Study Kasus pada Anak Usia 9 Tahun Kelas 3 SD di SDS Bangun Mandiri. *Prosiding Seminar Dan Diskusi Nasional Pendidikan Dasar 2018*, 59–64.

- Hapsari, C. K., & Hartiani, F. (2019). Penerapan Prinsip Modifikasi Perilaku Untuk Meningkatkan Kemampuan Menyikat Gigi Pada Anak Dengan Disabilitas Intelektual Berat. *Jurnal Psikologi*, 17(2), 119. <https://doi.org/10.14710/jp.17.2.119-130>
- Hartanto, F., Selina, H., H, Z., & Fitra, S. (2016). Pengaruh Perkembangan Bahasa Terhadap Perkembangan Kognitif Anak Usia 1-3 Tahun. *Sari Pediatri*, 12(6), 386. <https://doi.org/10.14238/sp12.6.2011.386-90>
- Livana PH1, Hermanto2, P., & 1, 2, 3. (2019). Karakteristik Orang Tua Dan Perkembangan. *Jurnal Kesehatan*, 12, 1–13.
- Mulyana, D. (2017). Program latihan. *Program Latihan Atlet*.
- Novianti, R., Satria, D., Author, C., & Article, H. (2020). *Pelatihan Terapi Sensori Integrasi Bagi Orang Tua dan Guru PAUD*. 3, 181–188.
- Nur, C. A. (2009). Deteksi Dini Gangguan Pertumbuhan Dan Perkembangan Anak Atien Nur Chamidah. *Jurnal Pendidikan Khusus*, vol.1 no.3, 1–8.
- Saidah, N. (2019). *Pedagogi: Jurnal Anak Usia Dini Dan Pendidikan Anak Usia Dini*. 5, 1–11.
- Suhartini, B. (2015). Deteksi Dini Keterlambatan Perkembangan Motorik Kasar Pada Anak. *Medikora*, 1(2), 177–185. <https://doi.org/10.21831/medikora.v1i2.4770>
- Sunanik, S. (2013). Pelaksanaan Terapi Wicara dan Terapi Sensori Integrasi pada Anak Terlambat Bicara. *Nadwa: Jurnal Pendidikan Islam*, 7(1), 19–44. <https://doi.org/10.21580/nw.2013.7.1.542>