

## DEGREE OF HEARING LOSS AND STUDENTS' QUALITY OF LIFE AT A STATE-OWNED EXTRAORDINARY SCHOOL IN JEMBER, INDONESIA

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### ABSTRACT

Hearing loss is one of the health problems that can be caused by genetic factors, anatomical abnormalities, trauma to the ears and head, ototoxic drugs, and bacterial meningitis. People with hearing loss may have physical, intellectual, and mental limitations that can hinder daily activities and affect quality of life. Extraordinary School (Sekolah Luar Biasa/SLB) is the school that serves school-age children with special needs or those having a physical or/ mental disorder. This study aimed to determine the relationship between the degree of hearing loss and the quality of life of students with hearing disabilities at SLB Negeri Jember, Indonesia. This study used an analytic observational research design. The total number of samples in this study was 23 students who met the inclusion and exclusion criteria, then an audiometer examination and a questionnaire survey were carried out. This study used the Pediatric Quality of Life Inventory (PEDS-QL<sup>TM</sup>) questionnaire. The statistical test used was the Spearman correlation test. Interpretation of the results was considered to have a significant correlation if the  $p$ -value  $<0.05$ . The result of statistical analysis using Spearman's rank shows the relationship between the degree of hearing loss and the physical function of students with hearing loss at the SLB Negeri Jember shows a significance value of 0.184. The relationship between the degree of hearing loss and emotional function obtained a result of 0.005. The relationship between the degree of hearing loss and social functioning shows a significance value of 0.561. The relationship between the degree of hearing loss and school functioning showed a significance value of 0.016. The results were considered to have a significant correlation if the  $p$ -value  $<0.05$ . In conclusion, hearing loss was found not to have significant relationship with physical and social functioning in students with hearing disabilities at SLB Negeri Jember, Indonesia.

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### INTRODUCTION

There were an estimated 466 million people with hearing loss in 2019 according to the World Health Organization (WHO), of which 34 million were children. Deaf people in Southeast

Asia account for about 180 million people. One in ten people in the world by 2050 or more than 900 million people are expected to suffer from hearing loss<sup>1</sup>. Based on data collected by the Basic Health Research (Riskesdas) in 2018, people with hearing

disabilities from birth in children aged 24-59 months in Indonesia were 0.11%<sup>2</sup>. According to data from the Ministry of Social Affairs' Management Information System (SIMPDI) published in 2019, 7.03% suffered from hearing disability among all people with disabilities in Indonesia<sup>3</sup>. Extraordinary School (*Sekolah Luar Biasa/SLB*) is a school that serves school-age children with special needs or those who have a physical or mental disorder, one of them being deaf, whether it is acquired or congenital<sup>4,5</sup>.

The etiology of hearing loss in children can be congenital genetic (80%) and non-genetic (20%). Genetic hearing loss can be further classified as syndromic and non-syndromic. Syndromic hearing loss can be caused by diseases such as Waardenburg syndrome, Usher syndrome, and Pendred syndrome. Non-syndromic genetic hearing loss can result from autosomal dominant, recessive, or sex-linked mutations. Syndromic genetic hearing loss accounts for about 20% and non-syndromic genetic hearing loss is the most common cause of congenital hearing loss at about 80%. Non-genetic hearing loss can be caused by TORCH (toxoplasma, rubella, cytomegalovirus, and herpes) which are infectious agents acquired in the prenatal phase, and bacteria such as *Neisseria meningitidis* and *Streptococcus pneumoniae* acquired in the postnatal phase. Abnormalities in the inner ear will affect the function of the transduction organ in the cochlea, resulting in damage to hair cells which is then called sensorineural deafness<sup>6-8</sup>.

More severe degree of hearing loss is known to worsen the quality of life of individuals. As compared to normal hearing children, children with hearing loss were found to have lower scores in

global general health, including emotional, physical, behavioral, and mental health, as well as family activity and cohesion, parental time, self-care, mobility, and social function<sup>9-11</sup>.

Hearing-impaired children who do not receive early intervention and rehabilitation will fall behind their normal-hearing peers in reading skills, cognition, and socio-emotional development. This gap might in turn result in modest educational achievements and employment levels in adulthood<sup>12-14</sup>.

## MATERIALS AND METHODS

This study used an observational analytic design with a cross-sectional approach. The data obtained in this study were taken from January 4<sup>th</sup> to February 4<sup>th</sup>, 2023. The research was conducted at SLB Negeri Jember, Indonesia. The sample in this study was 23 students with hearing disabilities of SLB Negeri Jember who met the inclusion and exclusion criteria. The inclusion criteria included an active student at SLB Negeri Jember, aged 10-18 years old, the children and their parents/guardians were willing to be included in the study by filling out informed consent and willing to become respondents, and the students are suffering from hearing loss as evidenced by audiometry results. The exclusion criteria in this study were as follows: Students who use hearing aids and students with other disabilities. This study was approved by the Ethical Review Board of the Medical Faculty of Jember University with registration number 1667/H25.1.11/KE/2022. This study adhered to STROBE guidelines for reporting observational studies (<https://www.strobe-statement.org/>)<sup>15</sup>.

## RESULTS

The description of the sample characteristics in this study is classified based on gender, age, type of hearing loss, and the location of the ear that experiences hearing loss which can be seen in table 1.

**Table 1 Characteristics of the research sample**

Sample characteristics	Number (n)	Percentage (%)
<b>Gender</b>		
Male	10	43
Female	13	57
<b>Age</b>		
10 - 12 years	6	26
13 - 15 years	3	13
16 - 18 years	14	61
<b>Hearing impairment</b>		
Right	0	0
Left	0	0
Bilateral	23	100

Table 1, most of the students who are suffering from hearing loss are female, consisting of 13 students (54%) compared to male (46%). Based on age, most samples were found in the age range of 16-18 years, consisting of a total of 14 students (58%). All samples were diagnosed with bilateral hearing loss. Table 2 shows the distribution of hearing loss characteristics according to the types and the degree of hearing loss.

**Table 2 Distribution of hearing loss characteristics**

Sample characteristics	Number (n)	Percentage (%)
<b>Types of Hearing Loss</b>		
Sensorineural	13	54
Conductive	6	25
Mix	4	17
<b>Degree of hearing loss</b>		
Light	1	4
Medium	4	17
Medium Severe	1	4
Severe	1	4
Very Severe	16	67

Table 2 shows that 13 students (54%) under study presented with sensorineural hearing loss, whereas only 4 (17%) were those with mixed type hearing loss. Based on the degree of hearing loss most of the students had a very severe degree, which was found in 16 students (67%).

This research conducted at SLB Negeri Jember also measured the average value of four functions as the criteria to measure the quality of life of the students with hearing loss (Table 3). The four functions are physical, social, emotional, and school function. The physical and social functions were highly qualified, while the emotional and school functions were moderate.

**Table 3 Mean distribution of physical function, emotional function, social function, and school function**

Quality of Life	Average value (%)	Description
Physical	91.73	Very High
Emotions	68.69	Moderate
Social	87.82	High
School	55.13	Moderate

Correlation analysis is measured using three parameters, first, probability value or p-value used to represent that the correlation relationship between both variables had significant differences, if the value was less than 5% or 0.05. Then, Correlation coefficient or r value is used to determine the strength of correlation and how its effect on each variable. Correlation coefficient (r) of less than 0.20 were considered very weak correlation. Weak correlation was between 0.20 to 0.39, then 0.40 to 0.59 considered moderate correlation. Strong correlation was between 0.60 to 0.79 and over 0.80 were considered very strong correlation.

The positive and negative value of correlation coefficient (r) also had significance. The positive value means that the variables interact with each other in similar manner (increase-increase or decrease-decrease). The negative value means the variables interact with each other in opposite manner (increase-decrease or decrease-increase)<sup>16</sup>. The results of the statistical analysis using Spearman's Order-Rank Correlation Coefficient between the degree of hearing loss and quality of life of students who have hearing loss are listed in Table 4.

The analysis of the relationship between the degree of hearing loss and physical function revealed a significance

value of 0.184 ( $p > 0.05$ ), indicating no significant relationship. However, the degree of hearing loss and emotional function had a significance value of 0.005, indicating a significant relationship.

The degree of hearing loss and emotional function among students at SLB Negeri Jember had a correlation coefficient of -0.568, indicating a strong inverse correlation. This negative correlation implies that as hearing loss severity increases, emotional well-being decreases. However, the analysis of the relationship between hearing loss and social function yielded a non-significant correlation of 0.561.

**Table 4 Correlations between degree of hearing loss and quality of life**

Degree of Hearing Loss	Quality of Life					Total	r	p-value
	Very Low	Low	Moderate	High	Very High			
Physical Function								
Light	0	0	0	0	1	1	0.184	
Medium	0	0	0	0	4	4		
Medium Severe	0	0	0	0	1	1		
Severe	0	0	0	1	0	1		
Very Severe	0	0	1	1	14	16		
Emotional Function								
Light	0	0	0	0	1	1	-0.568	0.005
Medium	0	0	0	3	1	4		
Medium Severe	0	0	1	0	0	1		
Severe	0	0	0	0	1	1		
Very Severe	0	2	5	8	1	16		
Social Function								
Light	0	0	0	0	1	1	0.561	
Medium	0	0	0	2	2	4		
Medium Severe	0	0	0	0	1	1		
Severe	0	0	1	0	0	1		
Very Severe	0	0	0	3	13	16		
School Function								
Light	0	0	0	1	0	1	-0.497	0.016
Medium	0	0	0	4	0	4		
Medium Severe	0	0	1	0	0	1		
Severe	0	0	1	0	0	1		
Very Severe	0	4	11	1	0	16		

The relationship between the degree of hearing loss and school function shows a significance value of 0.016, showing a significant relationship between both variables. The correlation coefficient between the variable degree of hearing loss and the school function was -0.497. This negative result on the correlation coefficient value indicated the opposite direction of the relationship, which means that the higher the degree of hearing loss, the lower the school function of students with hearing disabilities in SLB Negeri Jember.

## DISCUSSION

The statistical analysis revealed that physical function and social function had no relationship with the degree of hearing loss while emotional function and school function had a relationship with the degree of hearing loss. Assessment of the physical function of students with hearing disabilities in SLB Negeri Jember obtained very high-quality results, showing that the activities carried out every day at school were like the activities of the students at schools in general. Students with hearing disabilities only had limitations in hearing and pronunciation so that it did not affect their physical functions such as walking, running, or doing daily activities at school or home. This was in line with research conducted by Wibisana which stated that students of special schools (SLB) have good physical health<sup>17</sup>. Children with physical disabilities can have physical conditions like children in general if they have facilities, infrastructure, and educational support at school. The results showed that there was no significant relationship

between physical function and the degree of hearing loss of the students.

The result of the study showed the quality of emotions of SLB Negeri Jember students. This was very important in assessing children's attitudes, intentions, and emotional responses to their environment. Most students with hearing disabilities in SLB Negeri Jember did not feel easily afraid, or worried, and had high self-confidence, but some of them had a negative emotional function addressed by difficulty controlling anger and irritability. This was in line with research conducted by Nofiaturrahma, stating that this conflict can occur because children with hearing disabilities cannot interpret what other people are talking about so children with hearing disabilities are often suspicious and prejudiced<sup>18</sup>. Students with hearing disabilities have limitations in hearing and pronunciation so they consider themselves inferior to children with normal hearing. Research conducted by Widiana. states that barriers in communication due to a lack of understanding of spoken language, writing, and social situations can affect emotional function<sup>19</sup>. The emotional function of Jember State SLB students obtained from the results of the study, namely emotional function, had a strong relationship with the degree of hearing loss in a negative direction. This means that the higher the degree of hearing loss, the lower the quality of the student's emotional function.

Social function in the form of the ability to establish social contact in people with hearing disabilities in SLB Negeri Jember had very high quality. This good social interaction was shown by the ability to establish conversations with sign language. Social closeness could be seen



in their routine activities while playing and learning in class. This was in line with research conducted by Widiani, where the social abilities that exist between children with hearing disabilities and other children with hearing disabilities and normal children can be well established as shown by caring attitudes with their friends<sup>19</sup>. This was supported by teachers at the SLB Negeri Jember by involving their students in the activities of elementary school students in general through screening talented deaf students to be included in various academic and non-academic competitions. Another activity outside of school that supports the self-confidence of students with hearing disabilities is the existence of a deaf cafe where the manager is a group of students with hearing disabilities. This is related to previous research from Giovani which states that the involvement of students in a deaf community has a positive relationship so that the social function of deaf students is classified as a good quality of life<sup>20</sup>.

The results of research conducted by Silvanaputri state that there is no relationship between hearing loss and quality of life<sup>21</sup>. Education at an early age for students with hearing disabilities is very helpful in improving their quality of life in physical function, emotional function, social function, and school function. SLB Negeri Jember is a place for students with hearing disabilities to improve their quality of life. A good quality of life for students with hearing disabilities is the result of the student's inner abilities and also a supportive environment such as parents, teachers, and other school staff. The quality of life of students with hearing disabilities is strongly influenced by the support of the

school environment in directing students in a positive direction. Lack of guidance from parents can cause students with hearing impairments to have difficulty in doing schoolwork at home and delay their education. In addition to educational issues, family economic conditions and limited access to special schools also affect students' quality of life. Students who have special needs also have the same right to education, so it is necessary to equalize special school facilities in various regions. The lack of adequate facilities in SLB for people with hearing loss and the lack of socialization for parents of students slightly hampers the functioning of the school. This follows the results of the statistical analysis, which states that school function is moderately related to the degree of hearing loss with a negative value, where the higher the degree of hearing loss, the lower the quality of school function.

## CONCLUSION

Among students with hearing disabilities in SLB Negeri Jember, Indonesia, there was a relationship between the degree of hearing loss and the emotional and school functions, while there was no significant relationship between the degree of hearing loss with physical and social functions.

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### CONFLICT OF INTEREST

All Authors have no conflict of interest regarding to research, authorship nor publication of this article.

### ETHICS CONSIDERATION

This research had received Ethical Approval no. 1667/H25.1.11/KE/2022 issued by the Ethical Review Board of the Medical Faculty of Jember University.

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### AUTHOR CONTRIBUTION

All authors have contributed to all processes in this research, including initial conceptualization, data gathering, data processing, and writing this paper.

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