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**Investigating the Relationship between Non-verbal Intelligence and Adaptive Behavior in Hearing Impaired Children**

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Darain Sikandar<sup>1\*</sup>, Momina Abid<sup>2</sup>, Iqra Khalid<sup>3</sup>**Abstract**

The present study intended to find out the relationship between nonverbal intelligence and adaptive behaviors in children with pre-lingual and post-lingual hearing loss. A total of 200 hearing impaired children were purposively selected from Government Special Education institute in district Khanewal who aged between 6 to 11 years. The Vineland Adaptive Behavior Scale, and Raven's Colored Progressive Matrices were used to collect the data from participating hearing impaired children. Results showed that intelligence has significant positive relationship with daily living and motor skills, and significant negative relationship with communication and socialization skills. The independent samples *t* test revealed a significant difference in prelingual and post lingual children in intelligence levels with little effect size. Further, the prelingual children showed more motor behavior as compared to children in post lingual group. It is important to gather a wide range of data on adaptive behavior and intelligence, including information on performance in various contexts, from various sources, and using varied techniques.

**Keywords:** Adaptive Behavior, Non-verbal Intelligence, Post-lingual Impairment, Pre-lingual Impairment, Special Children

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**Introduction**

The capacity to pick up new information, understand it, or handle challenging situations is known as intelligence. Alternatively, the capacity to use knowledge to manage one's condition or think creatively as determined by goal criteria is also intelligence (Gottfredson, 2020). Non-verbal

intelligence is the mental capacity to break down data and take care of issues utilizing visual, or hands-on thinking. Thinking skills and critical thinking abilities that are not fundamentally demonstrated by verbal dialect creation and appraisal are depicted by nonverbal intelligence. This sort of intelligence includes controlling or critical thinking about visual data and may shift in the measure of disguised, unique, or applied thinking and aptitudes that are required to finish an errand (Miller & Fagan, 2021).

Adaptive behavior is defined as conduct that enables a man (usually used in reference to children) to function in his or her circumstance with the greatest degree of success and the least amount of conflict with others. This phrase is used in the fields of bespoke curriculum and brain research. Adaptive behavior is associated with aptitudes or tasks that a typical person can consistently complete, such as the concept of core talents (Andrew, 2008). Adaptive behavior includes age-appropriate behaviors

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that are necessary for people to live freely and to function safely and appropriately in daily life. Adaptive behaviors encompass basic skills such as dressing, preparing, taking care of oneself, eating, working, handling money, cleaning, forming relationships, social skills, and the moral obligations associated with their age and social groupings (Harrison & Oakland, 2021).

There are evident associations between adaptive behaviors and intelligence, and it would appear an error basically to expect that adaptive behavior and intelligence are diverse parts of a similar general development. The two constructs might be critical segments of children general improvement and, all the more particularly, of their instructive programming. On one hand, some kind of connection between adaptive behavior and intelligence appears glaringly evident, given the similarities in their definitions and in their assumed causes. (Schneider & Preckel, 2022). Cognitive ability and behavioral adaptability are different, yet related, constructs that can affect youth advancement. Both are regularly decreased in off-springs of hearing impaired guardians. Moreover, parental despondency is ordinarily seen because of parent-child communication troubles that can prompt guardians' sentiments of insufficiency and dissatisfaction (Kushalnagara & Poona, 2015).

Another study uncovered information from Vineland adaptive scales and the Wechsler intelligence scales and showed higher relationship among IQ and single adaptive behavior areas. Discoveries demonstrate the connection amongst adaptive and cognitive functioning interceded by the nearness of a subjective decrease of intelligence (Bolt & Poustka, 2002).

### Research Gap

This research is different to them because there are two important points that make this unique. First gap is that no previous research

related to these variables has been done in South Punjab part of Pakistan. This research has the sample of South Punjab Pakistan that makes it more different from other researches. Other gap is that in other researches different scales like used for intelligence. However, in this study, children with hearing impairments had their nonverbal IQ tested using Raven's Color Progressive Matrices.

### Objectives of Study

- 1 To measure the relationship between nonverbal intelligence and adaptive behaviors among hearing impaired children.
- 2 To find out the relationship between nonverbal intelligence and adaptive behaviors in children with pre-lingual and post-lingual hearing loss.

### Hypotheses of Study

1 There will be a significant relationship between nonverbal intelligence and adaptive behavior among hearing impaired children.

2 Compared to children with pre-lingual hearing loss, children with post-lingual hearing loss will exhibit higher levels of nonverbal intelligence and adaptable behaviors.

### Method

#### Participants

The sample was consisted of 200 hearing impaired children from Government Special Education institute in district Khanewal with an age range of 6-11years. A purposively sampling technique was used. Children were taken from KG I to grade five.

#### Instruments

#### Vineland Adaptive Behavior Scale (VABS)

The Vineland Adaptive Behavior Scale is intended to assess people's adaptive behavior up until the age of 90. Each of the five domain names in the Vineland has two to three subdomains. The most popular domain names include: motor skills, socialization, communication, everyday living skills, and maladaptive behavior (elective). A composite

of adaptive behavior is produced by the area ratings. The reliability of the instrument proved to be good in the total population and the subgroups. The construct validity was high in all groups. The implications of these findings are discussed with respect to the usefulness of the Vineland for the special population (Sparrow et al., 2005).

### **Raven's Colored Progressive Matrices (RCPM) (1998)**

John Raven is credited for creating three crucial intelligence assessment tools that are frequently applied in discriminating situations. All together, these are referred to as Raven's Progressive Matrices. It is designed for those with mental and physical impairments, the elderly, and youngsters ages five to eleven. This test includes sets A and B from the standard matrices along with set Ab, which is an additional set of 12 devices added between the two. The majority of the objects are displayed against a colorful backdrop to

provide participants with a visually engaging inspection. Nevertheless, set B's final few items are only available in black and white. The test-retest correlation coefficient for the RCPM test was .89, which is considered to be a high level of reliability and the split-half reliability coefficient was .91.

### **Procedure**

A total of 200 children with hearing impairment, aged between 6 to 11 years from Government Special Education institute in district Khanewal were sampled. Data was collected through two survey questionnaires; first, Vineland Adaptive Behavior Scale was filled by class teacher to check the adaptive behavior of children and second Raven's Colored Progressive Matrices (RCPM) was administered to the children to assess the child nonverbal intelligence. Informed consent was obtained from the teachers and children. Participants were free to leave the study at any stage if they chose to.

## **Results**

### **Table 1**

*Correlations Matrix on the Scores of Nonverbal Intelligence and Adaptive Behaviors Subscales (Communication, Daily living, Socialization and Motor) among Children with Hearing Impairment (N=200)*

<b>Scale</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Intelligence	-	-.15*	.23**	-.18**	.25**
Communication		-	.33**	.80**	.45**
Daily living			-	.24**	.49**
Socialization				-	.33**
Motor					-

\*\* $p < 0.01$

The Table 1 shows both positive and negative correlation of nonverbal intelligence and adaptive behaviors. Values indicate that intelligence is negatively correlated with communication and socialization and positively correlated with daily living and

motor skills. It depicts that as intelligence in hearing impaired children will increase communication and socialization skills will decrease and if intelligence in hearing impaired children will increase, then daily living and motor skills will also increase.

**Table 2**

Mean, Standard Deviation, and *t* value of Score of Prelingual and Post lingual Hearing Loss on Intelligence Test (Colored Progressive Matrices) (*N*=200)

Type of Hearing Loss	<i>N</i>	<i>M</i>	<i>SD</i>	<i>t</i> (198)	<i>p</i>	Cohen's <i>d</i>
Prelingual	62	27.65	4.59	-.27	.01	-0.03
Post lingual	138	27.41	5.81			

The Table 2 shows the *p* value is less than .05 and identify the difference in the level of intelligence among Prelingual and Post lingual hearing loss children. The Table 2

also shows that post lingual hearing loss children have high level of intelligence than prelingual hearing loss.

**Table 3**

Mean, Standard Deviation, and *t* value of Prelingual and Post lingual Hearing Loss on the Scale of Adaptive Behaviors (Subscales of Adaptive Behaviors, Communication, Daily living, Socialization and Motor) (*N*=200)

Subscales	Type of Hearing Loss	<i>N</i>	<i>M</i>	<i>SD</i>	<i>t</i> (198)	<i>p</i>	Cohen's <i>d</i>
Communication	Prelingual	62	35.92	20.21	-3.82	.06	-0.05
	Post lingual	138	48.84	22.87			
Daily living	Prelingual	62	62.37	31.38	-.89	.02*	-0.12
	Post lingual	138	67.38	38.53			
Socialization	Prelingual	62	33.65	15.01	-4.55	.50	-0.64
	Post lingual	138	44.83	16.51			
Motor	Prelingual	62	43.21	6.82	.57	.00***	0.82
	Post lingual	138	42.39	10.18			

\**p* < .05, \*\*\**p* < .001

Table 3 shows that *p* value is high than .05 in communication and socialization skills and less in daily living and motors skills. This indicates the significant difference in the

level of adaptive behaviors among post lingual hearing loss as compared to prelingual hearing loss.

## Discussion

This study was conducted to check the relationship between nonverbal intelligence and adaptive behaviors among hearing impaired children. The research finding showed that intelligence has significant impact on adaptive behavior (Timothy et al., 1987). Timothy et al. (1987) conducted research on relationship between intelligence and adaptive behavior. These findings support our hypothesis. It depicts that as intelligence in hearing impaired children will be high, communication and socialization skills will decrease and if intelligence in hearing impaired children will be high, then daily living and motor skills will also increase. Abraham & Osman, (2009) also worked on adaptive behavior and intelligence. These findings showed also support our hypothesis that there is certain connection among intelligence and adaptive behavior or performances. Thus, previous researches support this current research and suggest that adaptive behavior and intellectual ability should be considered as separate but related, constructs.

Similarly, the results from a recent study with 57 young individuals also demonstrated a significant correlation between intelligence and different facets of adaptive behavior (Tasse & Kim, 2023). Balas-Baconschi & Dobrican (2020) conducted research on people with hearing deficiency to assess association between intelligence and adaptive behavior. The results showed that intelligence had significant association with facets of adaptive behavior. The results of the current study are correlated with this study.

Further, research findings showed that there is significant difference between intelligence and adaptive behavior in prelingual and post lingual hearing loss. Similarly, Carnes (2012) conducted research on children's intelligence with mental imbalance and hearing impaired by birth. Their findings showed that early treatment and family contribution delivered

beneficial outcomes on children physical, intellectual, social, and language abilities. Current findings showed that post lingual hearing loss children have high level of intelligence and adaptive behavior than prelingual hearing loss. Thus, intelligence and adaptive behavior is varying among prelingual and post lingual hearing loss.

A study by Emmett et al. (2015) showed a significant association between non verbal intelligence and hearing loss. The study was conducted with 764 young individuals living in Nepal who were either suffering from unilateral or bilateral hearing loss. Male sex, and having higher education were associated with higher intelligence scores. The young individuals with unilateral hearing loss exhibited higher levels of intelligence as compared to young individuals with bilateral hearing loss. The current study also demonstrated a higher level of intelligence in prelingual participants as compared to post lingual participants.

## Limitations and Suggestions

The data collection was little bit difficult because there were large questionnaires. The study was carried out at Khanewal. Therefore, the current study cannot be applied to Pakistan as a whole. A larger sample size could produce better results. It is important to gather a wide range of data on adaptive behavior and intelligence, including information on performance in various contexts, from various sources, and using varied techniques.

## Conclusion

The results revealed a significant positive relationship between intelligence and daily living and motor skills, while a negative relationship was found with communication and socialization skills. Children with pre-lingual hearing loss displayed higher motor behaviours compared to those with post-lingual hearing loss. Overall, the findings highlight the need to consider timing of hearing loss when assessing and supporting

hearing-impaired children. Future research should focus on gathering diverse data to deepen our understanding of adaptive behaviour and intelligence in this population.

### Contribution of Authors

Darain Sikandar: Conceptualization, Investigation, Methodology, Data Curation, Formal Analysis Writing - Original Draft

Momina Abid: Methodology, Writing - Reviewing & Editing, Supervision

Iqra Khalid: Methodology, Formal Analysis, Writing – Original Draft

### Conflict of Interest

There is no conflict of interest declared by the authors.

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The authors declared no source of funding.

### Data Availability Statement

The datasets of the current study are not available publicly due to ethical reasons but are available from the corresponding author [D.S.] upon the reasonable request.

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