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Research article

Speech intelligibility and its influence on mental health and self-esteem of adolescents with hearing impairment

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Abstract

Aim: The study aimed to evaluate the relationship between speech intelligibility and mental health and self-esteem of adolescents with hearing impairment.
Materials and methods: The study sample comprised of 105 adolescents with hearing impairment, studying in selected special schools of Karnataka. The study employed a convenient sampling technique. The speech intelligibility was assessed by two naive listeners decoding adolescents as they pronounce twenty different digits from 0-99 and counting the percentage of a number of words correctly decoded by them. The self-esteem of hearing impaired adolescents was assessed by using a structured self-esteem rating scale, which was developed by the researcher. The mental health was assessed by using the Strengths and Difficulties Questionnaire developed by Robert Goodman in 1998.
Results: There was no significant relationship between the speech intelligibility and mental health of adolescents with hearing impairment (ρ= 0.04). There was no significant correlation between the speech intelligibility and self-esteem of adolescents with hearing impairment (ρ=0.0391, p= -0.09). There was a significant association between mental health and type of school (z= - 6.34, 'p'=0.000). There was a significant association between self-esteem and intensity of hearing loss (z = 6.94, 'p'=0.031).
Conclusion: Although almost half of the adolescents had abnormal mental health, there was no significant relationship between speech intelligibility and mental health and self-esteem of adolescents with hearing impairment. Most surprisingly, the majority of the adolescents had good self-esteem. Regular schooling and interaction with peers could be the contributing factor to higher self-esteem.

Keywords: speech intelligibility, mental health, self-esteem, adolescents, hearing impairment.

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1. Introduction

There are different ways in which hearing loss affects adolescents. The four main effects include delay in the development of receptive and expressive communication skills (speech and language), the language deficit causes learning problems that result in reduced academic achievements, communication difficulties often lead to social isolation and poor self-concept. Language skills of deaf children also determine their career aspirations and evaluations of their occupational competency. [1]
Many adolescents with hearing loss do not use their speech because of the fear that they will fail to communicate. Some others may use their speech but give up when they are not understood. [2] This will make them more or less withdrawn to themselves, reducing their social interaction. Social deprivation and communication being an important cause for mental health problems in adolescents with hearing impairment are of increasing interest for psychiatry. The relationship between language skills and

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psychosocial functioning of adolescents is widely been studied.

It is the lack of sensory input, which has a marked effect on the acquisition of language and communication skills. The degree of hearing loss and the onset and quality of technical and educational support together with individual and family-related factors determine the level of functional language that a deaf child can attain. A majority of adolescents with hearing impairment will acquire only lower levels of functional language compared with their hearing peers. These deficits frequently cause frustrating experiences with the reaction of mental distress and withdrawal. [3]

A study conducted in Norwegia to assess for symptoms of anxiety and depression among hearing and deaf individuals showed that there are significantly more symptoms of anxiety and depression in the deaf group than in the hearing sample of respondents. It is likely that some of the mental health problems may stem from childhood, or, for example, from different etiologies of deafness, socioeconomic issues, or different experiences related to stigma, communication, and discrimination.[4]

Speech intelligibility refers to "the degree to which the speaker's intended message is recovered by the listener" or "the comprehensibility of the specifically linguistic information encoded by a speaker's utterances".[10] Speech intelligibility plays an important role in determining the communication and social skills of adolescents with hearing impairment. The relationship between language skills and peer problems is complex. Adolescents with better-spoken language skills have significantly better peer relationship and mental health than those with fewer language skills. It will also influence their self-esteem and social functioning.[5]

A study was conducted in Austria to determine the influence of language skills on the mental health of teenagers with hearing impairment measured language skills using various parameters like speech intelligibility, language measures, spoken language grammar, receptive vocabulary and reading comprehension and mental health using strengths and difficulties questionnaire. The study findings revealed that the adolescents had impaired language skills relative to published norms, especially marked in segregated schools. Parents rated adolescents as having higher rates of mental distress whereas adolescents' self-reports showed problems mainly in peer relationships. Adolescents with a superior level of spoken language had fewer peer relationship problems than those with a lower level of spoken language. Speech intelligibility was also proved to have a significant effect on mental health.[7]

An early identification of mental health problems in adolescents with hearing impairment will help in undertaking timely actions to ensure a better future for them. Early and timely interventions will help the adolescents to improve their social functioning and thus preventing social withdrawal and discrimination. It will enhance their self-esteem and peer relationships. Therefore, this study is indented to identify the relationship between the speech intelligibility and mental health of adolescents with hearing impairment.

Objectives

Objectives of the study were to:

1. Assess the speech intelligibility of adolescents with hearing impairment.
2. Identify the mental health of adolescents with hearing impairment.
3. Determine the self-esteem of adolescents with hearing impairment.
4. Find the association between mental health and selected demographic variables like age, gender, duration of deafness, education of parents and class of study.
5. Find the association between self-esteem and selected demographic variables age, gender, duration of deafness, education of parents and class of study.
6. Find the relationship between speech intelligibility and mental health.
7. Find the relationship between speech intelligibility and self-esteem.

Hypotheses

H_1: There will be a significant relationship between speech intelligibility and the mental health of adolescents with hearing impairment.

H_2: There will be a significant association between mental health and selected demographic variables like age, gender, duration of deafness, education of parents and class of study.

H_3: There will be a significant relationship between speech intelligibility and self-esteem.

H_4: There will be a significant association between self-esteem and selected demographic variables like age, gender, duration of deafness, class of study and parent's education and occupation.

2. Materials and Method: The study adopted a descriptive survey design.

Sampling technique: Sampling technique adopted for the present study was a convenient sampling technique.

Data collection technique: Demographic data were collected using a structured demographic proforma. The speech intelligibility was assessed by two naive listeners decoding adolescents as they pronounce twenty different digits from 0-99 and counting the percentage of a number of words correctly decoded by them. The self-esteem of hearing impaired adolescents was assessed by using a structured self-esteem rating scale, which is developed by the researcher. The mental health was asses by using the Strengths and Difficulties Questionnaire developed by Robert Goodman in 1998.

The reliability of strengths and difficulties questionnaire as established by the author was 0.73. The reliability of the translated version of strengths and difficulties questionnaire and self-esteem rating scale was established by the researcher using Cronbach's alpha. The strengths and difficulties questionnaire had the reliability of r=0.75, and the self-esteem rating scale had the reliability of r=0.78.

Pilot study

After obtaining formal administrative permission from concerned school authority, the pilot study was conducted among 15 adolescents with hearing impairment, studying in a special school at Mangalore. The study was found to be feasible. These adolescents were excluded from the main study.

Method of data collection

Formal administrative permission was obtained from concerned school authorities to conduct the study. The data were collected by administering the demographic proforma, strengths and difficulties questionnaire and self-esteem rating scale. The speech intelligibility was assessed by making the adolescents to read 20 randomly selected numbers from 0-99. For this different sets of randomly selected numbers were prepared and the subjects were asked to select any one from those sets of numbers. Two naïve listeners decoded them reading those numbers and calculated the percentage of a number of words decoded correctly by them.

3. Results

Section I: Sample characteristics

The majority, 63.8% of the subjects were between the age group of 16-18 years. The majority, 57.1% had a profound hearing loss. The majority, 53.3% of fathers had a high school education. The majority, 61% of mothers were unemployed. All the subjects were using hearing aids and were using sign language as an alternative way of communication.

Section 2: Description of outcome variables

a. The self-esteem of adolescents with hearing impairment

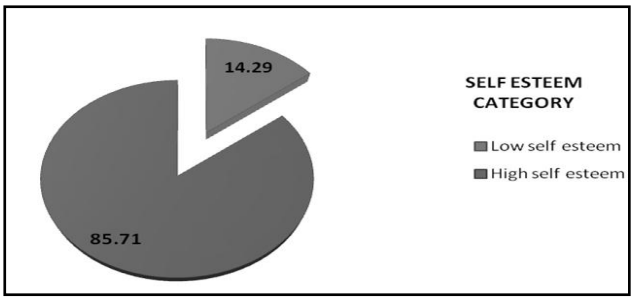

Figure no 1: Pie diagram showing the self-esteem of adolescents with hearing impairment

Data depicted in figure 1 show that the majority, 85.71% of the sample had high self-esteem and 14.29% had low self-esteem.

b. Mental health of adolescents with hearing impairment

Mental health was measured using the strengths and difficulties questionnaire. Based on the total score, the subjects were divided into three categories: normal (score of 0-15), borderline (score of 16-19) and abnormal (score of 20-40). The scale also had subcategories of mental health viz-emotional problems, peer problems, prosocial problems, conduct problems, and hyperactivity.

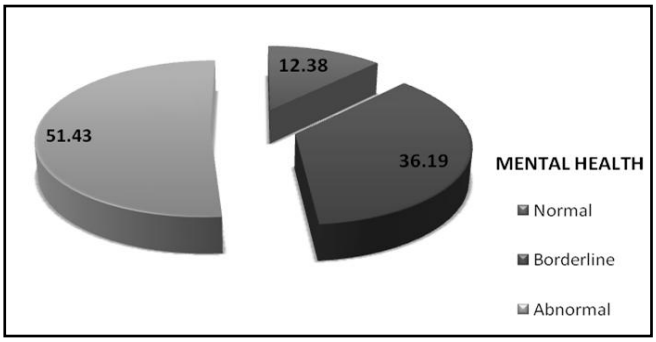

Figure no 2: Mental health of adolescents with hearing impairment

Data presented in figure 2 shows that the majority, 51.43 % of the samples had abnormal mental health and 36.19 % falls under the borderline category of mental health. Only 12.38% of the subjects had normal mental health.

Table no 1: Mean, standard deviation, minimum and maximum scores of mental health subscales

n = 105

	Emotional symptom	Peer problems	Prosocial problems	Conduct problems	Hyperactivity
Mean	4.905	3.152	6.952	5.486	6.276
Std. Deviation	1.547	1.598	1.596	2.158	1.632
Minimum	1.00	.00	3.00	1.00	3.00
Maximum	9.00	7.00	10.00	10.00	10.00

Data represented in table 2 shows that the pro-social problems had the highest mean (6.95), followed by hyperactivity (6.27) and conduct problems (5.49).

c. Speech intelligibility of adolescents with hearing impairment

Table 2: Frequency and percentage of speech intelligibility of hearing impaired adolescents

n=105

Speech Intelligibility	Frequency	%
Incomprehensible	6	5.71
Poorly Comprehensible	71	67.61
Moderately Comprehensible	23	21.90
Almost Comprehensible	2	1.90
Normal speech	3	2.85

Section 3: Relationship between speech intelligibility and mental health

Spearman's rank order correlation was used to assess the correlation between speech intelligibility and mental health.

Table no 3: Correlation coefficient and significance value of the correlation between mental health and speech intelligibility

Variables	P	p-value
Mental health Speech intelligibility	-0.041	0.680

The data presented in table 2 shows that the correlation coefficient is -0.041, i.e. there is no significant relationship between the speech intelligibility and mental health of adolescents with hearing impairment.

Section 4: Relationship between speech intelligibility and self-esteem

Spearman's rank order correlation was used to assess the correlation between speech intelligibility and mental health.

Table no 4: Correlation coefficient and significance value of correlation between self-esteem and speech intelligibility

Variables	P	p-value
Self-esteem Speech intelligibility	-0.085	0.391

The data presented in table 3 shows that the correlation coefficient is -0.085, i.e., there is no significant relationship between the speech intelligibility and self-esteem of adolescents with hearing impairment.

Section 5: Association between mental health and selected demographic variable

For computing association between mental health and selected demographic variables, the normality of all the variables was checked. Data appeared to be non-normal on Shapiro Wilk's test for normality for all the variables. Since mental health scores were continuous data and demographics were categorical, Mann Whitney U test (for 2 categories) and Kruskal Wallis test (for more than two categories) was done.

The computed values of Kruskal Wallis and Mann Whitney U test across the selected variables such as gender, mother's education, father's education, mother's occupation, father's occupation, mother's hearing status, father's hearing status and intensity of hearing loss do not have statistically significant association with mental health whereas only type of school (test value= -6.338, 'p'=0.000) shows statistically significant association i.e. mental health is independent of all the selected demographic variables except type of school.

Section 6: Association between self-esteem and selected demographic variables

For computing association between self-esteem and selected demographic variables, the normality of all the variables was checked. Data appeared to be non-normal on Shapiro Wilk's test for normality for all the variables. Since self-esteem scores were continuous data and demographics were categorical, Mann Whitney U test (for 2 categories) and Kruskal wallis test (for more than two categories) was done.

The computed values of Kruskal Wallis and Mann Whitney U test across the selected variables such as gender, type of school, mother's education, father's education, mothers occupation, father's occupation, mother's hearing status, father's hearing status and intensity of hearing loss do not have statistically significant association with self esteem whereas only intensity of hearing loss (test value= 6.944, 'p'=0.031) shows statistically significant association, i.e., self-esteem is independent of all the demographic variables except intensity of hearing loss.

4. Discussion

Adolescents with hearing loss or other auditory problems frequently miss out on conversation and information that is not part of their direct active communication. The result is that adolescents often miss out on verbal exchanges that carry important information. This might make them socially withdrawn and may predispose them to various mental health problems. [8,9] The present study assessed whether the speech intelligibility contributed to the mental health and self-esteem of adolescents.

Results of the study revealed that there is no significant relationship between speech intelligibility and mental health. This finding is contradicted by a study conducted in

Turkey to investigate the impact of student-related background and experiential characteristics, parent- related variables, school-related factors, and teacher-related variables on deaf students' psychosocial adjustment. The study showed that psychosocial adjustments of deaf students were negatively related to the degree of hearing loss, additional handicap, and age of onset of deafness. Revealed that degree of hearing loss, additional handicap, and age at onset of deafness were negatively related to the psychosocial adjustment of deaf students. However, there was a positive relationship between psychosocial variables and some of the independent variables, such as the use of hearing aids, speech intelligibility, academic achievement, parental hearing status, and communication methods used at school. [6]

The present study finding is also contradicted by another study conducted in Austria to determine the impact of language skills on mental health in teenagers with hearing impairment. Children with a superior level of spoken language had fewer peer relationship problems than those with a lower level of spoken language. Regression analysis confirmed that proficiency in language skills influences peer relationship problems (F=2.17, p=0.047). [5]

Conclusion

The study concluded that almost half of the adolescents had abnormal mental health and the majority of the adolescents had good self-esteem. Regular schooling and interaction with peers could be the contributing factor to higher self-esteem. Hence, the mental health issues among adolescents with hearing impairment need to be addressed and regular schooling and interaction with peers should be encouraged to prevent social deprivation, which in turn would promote positive mental health.

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