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A Comparative Study on Gender Differences in the Level of Multisensory Approaches among Hearing Impaired Children

Syed Kamran Ali Razi[1] Umme Habiba[2]

Correspondence:
ummhabiba98@gmail.com

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Affiliations

[1] Lecturer (Hearing Impairment), Department of Special Education, Punjab, Pakistan

https://orcid.org/0009-0006-0831-6095

[2] Researcher, Govt. Training College for Teachers of the Deaf Gulberg II Lahore

https://orcid.org/0009-0003-1926-5965

Abstract

This comparative study investigated gender differences in the level of multisensory approaches among hearing-impaired children. Research indicates that females often display a greater willingness to participate in studies, which may be influenced by cognitive abilities and societal expectations. Using the Sensory Profile Standardized Assessment Tool, this study investigates gender differences in the integration of children with hearing loss, including age, a strong family, and an education environment. Strong measurement tools and descriptive statistics reveal differences in participant success. Results indicate no significant differences between males and females regarding hearing quality, behavioral responses, or scores. Although mean scores changed little, effect sizes were small to moderate. Possible reasons for these no significant findings include size limitations, within-growth differences, measurement precision issues, gender overlap, and different risk factors. While gender did not significantly impact emotional and behavioral outcomes in children with hearing impairments, subtle differences warrant further investigation. These findings highlight the complexity of individual differences in this group and emphasize the need for a nuanced approach to meet their diverse needs.

Keywords: Gender Differences, Multisensory Approaches, Hearing Impaired Children, Sensory Profile Assessment, Cognitive Behavior Response

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Introduction

Special education is an education that studies about the individual differences and needs of students with special needs. It covers a wide range of disabilities including social, physical, emotional and intellectual disabilities. The main and primary purpose is to tailor educational strategies, resources and assist so that every student with disability can meet with his or her potential, overcome academic difficulties and participate fully in society. Early childhood education is a form of education that primarily concentrate on all aspects of a child's development. In fact, this requires assist, cooperation, and guidance from schools, parents, and communities. This study aims to inquire the impact of various teaching strategies on language development in children with hearing impairments. According to Oktafianto et al. (2018) gender differences in hearing loss present a significant challenge in audiology. Research has demonstrated notable differences between males and females regarding the prevalence, severity, and underlying causes of hearing loss. Studies indicate that men are more prone to hearing impairment than women across all age groups. The variance in hearing loss between genders is influenced by biological, environmental, and cultural elements. In the biological point of view, hormonal differences provide impact to the hearing ability variations. In case of hearing loss, estrogen provide assist to cochlear hair cell maintenance and improve the sensory nerve conduction by supply of a protective effect. In vice versa, testosterone has been linked with increase the sensitivity of hearing loss by noise exposure.

The main purpose of the multisensory approaches is to enhance the learning achievements and encourage the inclusive learning environment by accommodate of senses such as sight, touch and hearing. Recent researches recommended that gender differences may influence the productiveness use of these approaches among the children with hearing loss. From the recent studies, knowledge of these gender differences is essential for enhancing the educational interventions and promote fairness for everyone. In educational system, the creativity to enhance learning and development has been identified when it related to meeting the needs of individuals with hearing loss. Understanding, memory retrieval and overall learning is improving by technology using the incorporation of multiple senses such as sight, touch and hearing.

Multisensory technology provides a valuable academic performance for the individual with hearing loss who may have difficulty to obtain information related to hearing. Understanding of how psychological changes and gender impact the cognitive abilities are varying. Many studies have shown that there are gender differences in multisensory uses, have many suggestions for areas, for example language development, understanding and reasoning.

The main goal of this study is to evaluate the influence gender related learning styles and cognitive differences on the performance and consequences of multisensory approaches in learning environment for hearing-impaired children. It included:

i. Identifying the sensory profile of hearing-impaired children by using multisensory approaches.

ii. Investigate the gender differences in the level of emotional and behavioral responses among hearing-impaired children.

Research Questions

i. What gender-based differences observed in the emotional and behavioral responses of hearing-impaired children?

ii. How do these responses correlate with sensory profiles identified through multisensory methods?

Literature Review

The effect of gender, age and family background on hearing loss have examined by many early

studies. Females commonly showing more hearing capacity than males by observing the gender differences. Age is an essential factor with hearing capacity which is reduced as individual grows up, mostly in males. Family background with hearing issues also plays an essential role in the multisensory approaches, rather than a family background having a higher chance of better hearing. Many factors including age, gender and family background all of which provide the chance of hearing impairment which is determined with the development of hyperacusis.

The effect of gender, age and family background on hearing loss is explored by the study of Barrero et al. (2020), approximately 360 million individuals in the world are affected by hypoacusis that is leading to different disabilities levels including physical, social and emotional challenges. The affected individuals face difficulty in conversations in different auditory environments due to condition that can particularly affect the speech development. Moreover, it has been also related to cognitive diminish including dementia and mental health issues for example depression and anxiety, which may rise the probability of death.

Previous studies recommended that the acuteness and the effect of hypoacusis based on many factors such as the age at which is exhibit and the affected frequencies. This condition can seriously inhibit the speech, language and cognitive development while it is present in Prelingual individuals. Approximately 1-2 out of every 1000 newborn baby's exposure to severe to profound hearing loss by the recommended studies. Additionally, hearing impairment has been revealing the impact of children's educational achievement as well as the capability to save and continue the implementation later in life. Hearing loss can prompt hurdles in social communication, which is leading to particular social challenges, isolation and stigmatization in all over age groups and genders.

The main purpose of the recent study is to explore the aspects which impacting an individual's hearing ability, mainly pointing on gender, age and family background of hearing problems. The study revealed that females normally having greater hearing capacity than males by analyzed each aspect separately. The concerning about age, teenage individuals (below 29) leads to having greater hearing although with the increase of age, the chance of hearing impairment also increases. Furthermore, children who have not hearing problems in family history are a little more chances to maintain a better hearing as compared to those who have hearing problems in family history.

The one more research also examined the combined effect of age and gender, which reveal that women generally showed greater hearing than men within the same age group. Additionally, women show higher chances of improving better hearing with this possible extraordinary of initial approximate of 89.04%. Depend on the results, it can be said that the explore aspects offers to the development of hearing loss, which get more common results with the increase of age, especially in men and is further impacted by a family history of hearing impairment.in special

In another previous research, Daniel & Siddiqui (2023) explored the gender differences in special education services, results show that females were often underestimated in disability identification. Another study by Desmond et al. (1997) emphasized the significance of multisensory approaches in enhancing the communication for deaf children, and also highlight the assist for visual cues alongside with hearing input.

The purpose of multisensory approaches in early literacy development show that within initiate multiple senses particularly influence language development explored by Kurnia et al. (2018). Correspondingly role of pronunciation program for students with hearing impaired also influences the purpose of multisensory integration in speech development examined by Putri et al. (2023)

The study of Hettiarachchi et al. (2021) explored the effect of multisensory storytelling on vocabulary development among hearing-loss

children, resulting that integration of multiple sensory experiences particularly enhance the educational performances. Similarly, how visual and touch cues are integrated into learning improve the memory and understanding is also explored in the study of Boers and Lindstromberg (2012)

The study of Flynn and Rahbar (1994) investigate negligence of reading in boy's contrast to girls, illustrating that boys frequently hard working more with learning development due to differences in cognitive abilities. Likely, the study of Quinn & Wagner (2015) also explore that rise of male occurrence in reading difficulties, recommending that cognitive differences in gender may increase the multisensory learning predictions.

The recent study of Davis (2018) explored the sensorineural hearing loss, describing how biological mechanism impact the auditory function. The study highlights the function of estrogen in safeguarding of cochlear hair cells, contribute to possible describing for noticeable gender differences in hearing impairments. Moreover, Ensor and Phelps (2019) examined gender differences in cognitive abilities among deaf individuals, emphasizing differences in learning predications that may influences educational interventions.

Freeman (2023) and Geers et al. (2003) studies explored the early language intervention and cochlear implantation consequences, respectively. Their results assist the notion that gender differences in hearing processing can emphasize language acquisition, further strengthen the significance of individualized educational interventions.

These studies underline the effectiveness of multisensory learning and possibly impact of gender differences, strengthen the importance for continued research work in this area.

Methodology

This study consists of a quantitative research that is utilizing to explore the gender differences among hearing impaired children by the use of multisensory approaches. It is conducted through a comparative research design. Many occupational therapists and researchers often work with a Sensory Profile assessment tool, a standardized instrument that is used to assess sensory patterns and preferences. of children. The essential insights into responses to environmental stimuli such as touch, movement, sight and hearing is contributed by this tool. The population involves the parents or guardians of children (aged between 9-10) living in Pakistan. For the collection of data, researcher visits to institutions such as the Govt. Girls Central High School for the Deaf and Govt. Deaf and Defective School for Boys. Then collect the information about sensory profile from the parents of hearing-impaired children. A purposive sampling method was used, in which 30 parents are selected from schools setting who activity contribute in the study. Collected data was analyzed by using SPSS (Statistical Package for the Social Sciences) and other statistical software such as Cronbach Alpha used for reliability testing, within descriptive statistics and T-tests to investigate gender differences in sensory profile and behavioral responses.

Results

A questionnaire was developed for the study, which consisted of 14 sections which is subdivided into questions related to sensory profile of the Gender Differences in level of multisensory approaches among hearing impaired children. Statistical analysis was performed using SPSS by calculating The Cronbach Alpha, computing descriptive statistics, percentage distributions, and T-test comparisons.

Cronbach's Alpha

Table 4.1

Reliability Statistics Cronbach's Alpha for All the Scales Used in the Study

Instruments	*No. of items*	*A*
Sensory profile	99	.861
Behavioral response assessment	26	.801
Overall	3	.914

Findings indicate minor variations in mean scores between males and females, with no statistically significant differences in sensory processing or behavioral responses. However, observed effect sizes suggest potential practical implications for educational interventions.

Descriptive Statistics

Table 4.2

Descriptive Statistics of Gender Differences in the Level of Multisensory Approaches among Hearing Impaired Children

	N	*Mean*	*Std.deviation*
Sumap	30	22.3000	3.49532
Sumvp	30	26.0333	4.70131
Sumvbp	30	33.7000	6.72181
Sumtp	30	52.9000	6.83475
Summp	30	20.8667	5.23077
Sumosp	30	34.3333	4.69287
Sumspre	30	26.0667	4.91257
Summrbpm	30	31.0333	4.25468
Summmaal	30	19.7000	3.55402
Summsier	30	10.3667	3.03410
Summvaer	30	10.1667	2.99521
Sumesr	30	49.9667	7.93718
Sumbosp	30	16.2000	3.58541
Sumiitr	30	8.1333	2.41737
Sumsensory	30	284.7667	31.00688
Sumbehaviour	30	74.3000	12.05204
Total	30	361.7667	39.56198

Note: N(sample size) ,sumap(auditory processing) sumvp(visual processing), sumvbp(vestibular processing), sumtp(touch processing) ,sump(multisensory processin), sumops(oral sensory processing), sumspre (sensory processing releated to endurance/tone), summbpm (modulation releated to body position and movement), summmaal (modulation of movement affecting activity level), summsier(Modulation of sensory input affecting emotional responses), summvaer (modulation of visual input affecting emotional response and activity level), sumesr(emotional social response), sumbosp (behavioural outcomes of sensory processing) and sumiitr (item indicating thresholds for response).

The descriptive statistics reveal considerable variability across the variables. The mean scores for sumbehaviour (*M* = 74.30) and total (*M* = 361.77) indicate relatively high levels of behavior-related and total multisensory scores, respectively, among the participants. On the other hand, the mean scores for summsier (*M* = 10.37) and summvaer (*M* = 10.17) suggest lower levels of sensory integration and visual auditory

Table 4.3

Comparative difference of Gender Differences in the Level of Multisensory Approaches among Hearing Impaired Children

Variables	Minimum	Maximum	*Differences*
Sumap	16.00	30.00	14.00
Sumvp	15.00	34.00	19.00
Sumvbp	22.00	47.00	25.00
Sumtp	38.00	65.00	27.00
Summp	14.00	32.00	18.00
Sumosp	24.00	44.00	20.00
Sumspre	16.00	37.00	21.00
Summrbpm	24.00	40.00	16.00
Summmaal	12.00	25.00	13.00
Summsier	6.00	16.00	10.00
Summvaer	6.00	17.00	11.00
Sumesr	38.00	68.00	30.00
Sumbosp	11.00	25.00	14.00
Sumiitr	4.00	15.00	11.00
Sumsensory	236.00	349.00	113.00
Sumbehaviour	57.00	102.00	45.00
Total	297.00	446.00	149.00

Note: sumap(auditory processing) sumvp(visual processing), sumvbp(vestibular processing), sumtp(touch processing) ,sump(multisensory processin), sumops(oral sensory processing), sumspre (sensory processing releated to endurance/tone), summbpm (modulation releated to body position and movement), summmaal (modulation of movement affecting activity level), summsier(Modulation of sensory input affecting emotional responses), summvaer (modulation of visual input affecting emotional response and activity level), sumesr(emotional social response), sumbosp (behavioural outcomes of sensory processing) and sumiitr (item indicating thresholds for response).

For the variable "Sumap" (Sum of Auditory Perception), scores ranged from 16.00 to 30.00, yielding a 14.00-point difference. Similarly, "Sumvp" (Sum of Visual Perception) scores ranged from 15.00 to 34.00, with a 19.00-point difference. The total scores for "Sumsensory" and "Sumbehaviour" highlighted considerable variations, with differences of 113.00 and 45.00, respectively. These findings suggest that gender may influence multisensory approaches among hearing-impaired children, affecting sensory perception and behavioral responses to varying degrees. Understanding these differences can help in designing effective educational strategies tailored to individual needs.

T -Test (independence sample test)

Table 4.4

Comparison of Variables in Males and Females

	Males		Females				
Variables	*M*	*SD*	*M*	*SD*	*t (28)*	*p*	Cohen'sd
Sumofsensory	288.0	36.2	281.5	25.5	0.56	.57	0.20
Sumofbehavioural	78.1	13.5	70.4	9.2	1.80	.81	0.66
total	369.0	46.4	354.4	31.1	1.01	.32	0.36

Note: sumofsensory (sum of sensory response) , Sumofbehavioural (sum of behavioural response)

Table revealed minor mean differences in the sum of sensory profile scores, with t(28) = 0.56, p > .05. Female participants from family-based backgrounds had lower sensory profile scores (M = 281.5, SD = 25.5) than their male counterparts (M = 288, SD = 36.2). The Cohen's d value of 0.20 suggests a small effect size. Similarly, females scored lower in behavioral response assessments (M = 70.4, SD = 9.2) compared to males (M = 78.1, SD = 13.5), but the differences were statistically non-significant (t(28) = 1.80, p > .05). The effect size for behavioral response (Cohen's d = 0.66) was moderate. Overall, total scores indicated no significant differences between genders, though some variations were noted, with Cohen's d = 0.36, indicating a medium effect size. These findings suggest that gender differences do not significantly impact sensory processing and behavioral responses in hearing-impaired children, but small variations warrant further exploration.

Discussion

The primary objective of the present study was to investigate the gender differences in the level of multisensory approaches among hearing impaired children. Many essential aspects are needed to clearly demonstrate the findings which revealed that no statistically significance differences between females and males related to sensory profile scores and behavioral responses. The analysis of findings from the sensory profile which utilize the sensory processing and behavioral responses among hearing impaired children proceed not show significant gender differences. It is against to the few prior studies which recommend that gender differences impact the cognitive skills and learning preferences (Flynn and Rahbar, 1994; Quinn and Wagner,2015)

However, it is followed by research that underlines the complexity of gender differences within this group, highlight the importance for supported approaches to address their diverse needs. Although the findings were statistically insignificant, small to moderate effect sizes mean that there could be valuable understandings for tailoring instructional strategies. It is vital to believe these small differences, as they allow possible insights into by means what various education experiences and outcomes arises. The sample size in the study allow permission be a providing aspects to the non-important finding related gender differences, as there were only 30 parents, making it challenging to assess differences. The Proper sample size might tell more noticeable differences. Moreover, the specific age range (9-14age) and specific characteristics related to the study also be one of the reason. The research focuses on the significance of multisensory approaches in the educational environment of hearing-impaired children, regardless the absence of statistically meaningful gender difficulties. The incorporation of touch, vision and hearing modalities can enhance learning, memory, and comprehension

(Kurnia and others. 2018; Putri and associates, 2023).

Many educators and therapists utilizing the multisensory approaches to modify the individual's sensory processing preferences. Furthermore, aspects like age, family background and gender differences among hearing loss should be all around so the only gender aspect can not the primary factor for the effectiveness of multisensory approaches (Barrero, J. P. Lopez-Perea, E. Mdot). Tailoring instructional strategies and increases the outcomes require a comprehensive understanding of each child's sensory profile.

By compare with prior research, gender differences within hearing loss and learning are two together confess and argue about current study. The present inquiry did not display significant differences in sensory processing or observable responses between women and men with hearing loss, regardless of some studies signifying gender differences in the prevalence and acuteness of hearing loss (Oktafianto, Masitoh and Hendratno 2018).

Limitations and Future Research

The finding of this study should be explained with many limitations that is considered for future work. The participants were taken from a specific educational environment in Pakistan and the number of participants were also being limited. So, the larger sample sizes should be employed and different samples form different settings must to be explored in future research to improve the validity of findings.

Moreover, the study is mainly inhibited to only a few concerned with sensory profile and manner of behaving responses. Future research should inquiry a many range of sensory processing and concerned with manner of behaving responses that assist to measure cognitive processes, which allow the permission to show the gender differences in the level of multisensory approaches. The impact of the multisensory interventions on the academic and social interaction development of children within hearing impairments maybe examined by the prolonged studies

Conclusion

This study examined the gender differences in multisensory approaches among hearing-impaired children. In conclusion, this case study has revealed that gender differences in the level of multisensory approaches have an enlarge effect on the lives of children with hearing issues. I used the tool Sensory Profile for this comparative study. The Sensory Profile is a standardized assessment tool which is generally utilized by occupational therapists and researchers to assess the sensory processing patterns and preferences in children to measure this difference. The findings conclude that gender difference and level of multisensory approaches make things complex for children with hearing problems, not just in terms of hearing but also how they feel emotionally and mentally. Sensory Profile assist in giving knowledge about how children utilize their senses and behavioral responses. It revealed the noticeable differences in children's behavior responses and sensory processing patterns to find out the particular responses. It is vital to support hearing impaired children to utilizing their maximum multisensory approaches for the assist of children wit hearing issues. Depend on the insights from the sensory profile and behavioral responses, tailored instruction strategies could be accommodating. For the support to promote valuable multisensory learning experiences, interventions which may include creating inclusive learning settings that modify many sensory patterns and preferences, executing targeted sensory integration therapy and providing individualized supports can be beneficial for them. Within the utilization of these strategies, we can improve the educational performances and encourage the comprehensive development for children with hearing impairment. Only from this way, we can work for individuals with hearing issues to live happier and more connected lives in the future.

Recommendation

i. First of all, need to correctly measure the findings, include a larger sampling size from various areas (in terms of educational settings, socio-cultural and geographical settings). The currently sampling size is very small.

ii. To give permission in which may be sensory profiles seen are unique to children with hearing impairments, but also include a comparison group of children who are normally increase in size.

iii. For demonstrate the sources, study about "multisensory approaches" and build studies which provides evaluation precisely and clearly describe interventions.

iv. For the guarantee of exact quality, deliberately review all the document's Citations and rewrite the passage that is essential for study.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Author Contributions

Syed Kamran Ali Razi: Conceptualization (equal), Methodology (equal), Qualitative Analysis, Writing –original draft, Writing –review & editing

Umme Habiba: Methodology (equal), Analysis, Writing –review & editing

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