



Adaptation of mothers of hearing-impaired children to cochlear implantation: A qualitative study for identification of effective factors

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Abstract

Background and aims: Studies have indicated a considerable change in the trend of families' adaptation to the hearing impairment of their children following the application of hearing screening programs in the past few years. This study was conducted in line with increased rehabilitation service quality and family-based intervention. It was performed to identify factors affecting the adaptation of mothers to hearing-impaired (HI) children with cochlear implants.

Methods: This qualitative-descriptive research was performed with a phenomenological approach and involved 16 mothers of two to seven-year-old HI children with cochlear implants. The research setting was the centers for speech therapy of HI children in Shiraz, Iran. Data were collected through in-depth interviews with the subjects, and data analysis was performed in MAXQDA (2018) using Colaizzi's seven-step method.

Results: The mean age of the subjects was 34 years, and the children of these parents were two to seven years old. The mean age of the earliest known diagnosis was 12 months. Moreover, the mean age at cochlear implantation was 2.5 years. Based on the subjects' experiences, the researchers extracted factors affecting mothers' adaptation, leading to four main themes. These factors facilitated mothers' adaptation and included the quality of medical services, condition normalization, individual capabilities of mothers, and effective use of the environment.

Conclusion: Improving the quality of medical services, condition normalization, individual capabilities of mothers, and effective use of the environment led to an improvement in mothers' adaptation to HI children with cochlear implants.

Keywords: Adaptation, Mother, Cochlear implant, Children, Hearing impairment

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Introduction

Hearing loss is a major physical disability that affects a person's daily life. According to global statistics, more than 360 million people have hearing disorders. According to the World Health Organization, the prevalence of hearing loss of 41 decibels or more worldwide was equal to 21.2 per thousand (1). In the detailed report on disability in the country based on the census in 1365, the prevalence of profound hearing loss was 1.4 per 1000. Among the types of disabilities reported, 15.7% of the country's disabled population was made up of deaf people (2). Recent hearing screening programs have altered parents' adaptation to the hearing loss of their children, mainly because parents are aware of their child's hearing loss from birth and lose

the opportunity to live with a normal kid (3,4). Parents start appreciating and loving their deaf child gradually only after fully accepting their hearing loss (5). Then, they dedicate efforts to creating a life in which they can meet their child's special needs (6,7). Mothers' ability to adapt to their child's hearing loss affects the infant's life in various ways (8). More self-confident mothers can bring up children who will have better emotional adaptation during childhood and will obtain more academic achievements in the following years (9). For a hearing-impaired (HI) child to have a normal childhood, parents are required to accept this problem in their infant (10). There are rarely regulations that can be generalized to all HI children regarding education, rehabilitation, and

other issues (11).

Cochlear implantation has significantly reduced the disabilities of HI individuals and has considerably changed their quality of life (12). Various factors are involved in the success of treatment and the possibility of gaining communication and verbal skills in children undergoing the cochlear implementation operation, some of the most important of which include family support and treatment and speech therapy follow-ups by parents (13). To carry out family-centered and parent-centered intervention and treatment programs for families, it is necessary to identify the factors that facilitate the empowerment of parents with hearing disorders and, based on them, educational interventions to empower parents on the child's speech development process and promote public health. Parents should be organized (14,15).

Considering that in Iranian culture, mothers have the main role of raising their children and can communicate better with their children, we need first to understand that the experiences of these families about having a disabled child and what are the facilitating factors in their participation in the treatment process of their children? To address this question, considering that no similar study has been conducted in Iran in this regard, This point raises the necessity of qualitative research in this field, because qualitative research has a greater tendency to search deeply for phenomena about which little knowledge is available. Conducting qualitative research in cases such as deep exploration of processes and complexities, lesser-known phenomena, informal and unstructured processes, problem discovery, and Etcetera is significant (16,17).

Materials and Methods

Due to the need to understand the experience of adaptation of mothers with children to cochlear implantation as a human experience, the descriptive phenomenology method was used in this study. Descriptive phenomenology involves direct investigation, analysis, and description of a phenomenon free from unconfirmed presuppositions. Descriptive phenomenology emphasizes the depth of experiences and increases our understanding of life experiences (18).

Participants

The research setting was centered on speech therapy for HI children in Shiraz, Iran. Subjects were selected from mothers of HI children aged 2 to 7 years referred to the centers above for speech therapy services using purposeful and theoretical sampling methods.

Considering that in the purposeful sampling, there was a need to select people who have faced the phenomenon of having children with hearing disorders and who, in addition to the desire, can share with the Thus, the first participant, a 35-year-old woman, was selected. The information obtained from this interview helped to select the next participant. Most of the emerging concepts will help in the future, as necessary. Interviews were

conducted with mothers, fathers, and therapists involved as participants to achieve data saturation and complete the data. Interviewer the details of their experimental information about the phenomenon under study.

Overall, 16 interviews were made with the participants. The inclusion criteria were speaking Farsi, being a hearing parent, having a two to seven-year-old child with a cochlear implant, having no disabilities other than hearing impairment and speech disorder, and being willing to participate in the research voluntarily. Attempts were made to choose a wide range of subjects with different characteristics. Therefore, mothers with various characteristics in terms of duration of involvement with the phenomenon, age, level of education, and occupational status were enrolled in the study (maximum variation sampling). One of the research team members interviewed the eligible individuals, explained the research objectives, and received informed consent from them.

Data collection

Data were collected by conducting semi-structured, in-depth interviews encompassing open questions that allowed the participants to explain their experiences regarding the phenomenon under study fully. Before conducting the interview, the researcher established a proper relationship with the participants, and during the interview, whenever the participant felt tired, needed not to record a part of the interview, or stopped the interview, the interviewer respected the interviewee and prepared the place and conditions of the interview based on their convenience and wishes.

After getting the demographic information, the interviewer started the interview with general questions like this: "Describe your experience of having a child with a cochlear implant" and continued with more specific questions "regarding the care of What are your child's needs, issues and problems?", "How compatible are you with your child's needs and issues?" Moreover, "what factors influence this compatibility?" The research was continued based on the themes and to achieve the goals. Based on the participants' answers, more open questions were asked during the interview to clarify the details of their answers. Also, by asking in-depth and follow-up questions at the right time, the researcher advances the interview toward clarifying the phenomenon under study. The researcher directed his questions based on the prominent and important classes created. In other words, classes were created gradually by analyzing the data, which determined the course of the subsequent interviews. In the end, the interviews ended with a few other questions, such as if you remembered something after I left or changed your opinion about what you said, you can contact me again. Notably, the interview was conducted according to the environmental factors, time, existing conditions (tolerance level), therapists' conditions, and their willingness, individually in one to two rounds in a calm environment and at a suitable time and place where the

participants felt comfortable. Each interview lasted 60-80 minutes, and the mean of interviews was estimated at 72 minutes. Notably, the interviews were recorded with the subject's consent and transcribed verbatim immediately to be analyzed. Considering that the researcher must immerse themselves in the information in qualitative research, they listened to the interviews several times and reviewed their typed text many times.

Data analysis

The method of analysis in this study, according to the objectives and method of qualitative research (descriptive phenomenology), was the seven-stage method of analysis, which includes the following steps: 1) The descriptions of all participants are read to empathize with them. 2) Each protocol is referred to, and important phrases are extracted. 3) The researcher forms the meaning or concept of each important phrase mentioned under the title of regulated concepts. 4) The set concepts are organized into thematic categories. 5) The findings are integrated into a comprehensive description of the phenomenon. 6) A comprehensive description of the researched phenomenon is prepared as a clear statement. 7) In the last stage, the results are returned to the participants, who are asked questions about the findings (19, 20).

During the research, methods have been used to ensure the accuracy and reliability of the study. In this regard, the four criteria proposed by Strabert and Carpenter have been taken into consideration, and the way of applying them is mentioned below:

1) **Credibility:** The data and findings of qualitative research should be acceptable and reliable. The following methods were adopted to increase the acceptability of this study's data: I. Prolonged Engagement & Persistent Observation II. External checks: Another way to accept data is to use additional comments from colleagues and review manuscripts by contributors. In this study, the results, analyses, and summaries have been presented to ensure a similar understanding of the continuity of the analysis process to others. III. Researcher Credibility: In qualitative research, the researcher, in addition to being the designer and analyst of the research, is also a tool for collecting information, so his skill, experience, accuracy, and diligence can have a significant impact on the result of the research. In this part, in addition to passing the relevant unit and reviewing and The study of reliable sources to increase the information and knowledge of the executive, the presence of experienced advisors and consultants and the use of their experiences have been helpful. IV. Bracketing, the researcher's ideas and opinions were written in advance.

2) **Dependability:** It is the data's stability and reliability simultaneously and under the same conditions. In this study, an external observer was unrelated to the research, and his perception was checked with the project manager.

3) **Confirmability:** When the reports, manuscripts, and notes of the research are given to another researcher,

both of them extract similar findings. In this research, the codes and themes extracted at each stage were placed at the disposal of the researcher's colleagues and people familiar with qualitative analysis to clarify the validity of the process.

4) **Transferability & Fittingness:** It is similar to the generalizability of the results in quantitative studies, and despite not claiming the same generalizability as quantitative studies, the results must have this feature to some extent, which has been followed by Morse's suggested methods to achieve this goal:

- Appropriate samples
- Collection and Analyzing Data Concurrently
- Methodological Coherence
- Thinking Theoretically (21-23).

Ethical consideration

After completing the administrative procedures and delivering a letter of introduction issued by the university to the research environment, the purpose and method of the research were explained to eligible parents, and they were asked to provide verbal and written consent. In the written consent form, participants were fully informed that participation is completely voluntary, their right to withdraw from the research at any stage, the confidentiality of the gathered information, and the fact that whether or not they participate in the research has no impact on the treatment of their child. In the written form, participants were given numbers instead of names.

Results

In this research, the mean age of the subjects was 34.32 ± 4.21 years, and the mean age of the earliest known diagnosis was 12 months. Moreover, the mean age at cochlear implantation was 2.5 years. The characteristics of the parents and experts participating in the study are given in Tables 1 and 2. The data obtained from the analysis of the interviews regarding parents' experiences with cochlear implant children regarding the facilitating factors in mothers' ability about children's speech development. It is collected into 4 main themes and nine sub-themes, which are shown in Table 3. Facilitating factors in the empowerment of parents with children with hearing disorders refers to factors that could facilitate the process of adaptation and empowerment of mothers, including communication, education, and participation in the treatment of their children. The four themes of the main cluster include 1- "Quality of medical services," 2- "Condition Normalization," 3- "Individual capabilities of mothers," 4 - "Effective use of the environment."

Quality of medical services

Service quality was one of the main themes of facilitating factors. This quality was related to medical services and consisted of two sub-themes: satisfaction with the child's progress and efficiency of experts.

Table 1. Profile of parents participating in the study

Age of cochlear implant surgery (year)	Diagnosis of hearing impairment in children (month)	Gender of child	Child age	Occupation	Education	Age (year)	Participants number
2	8	Boy	6	Housewife	Diploma	35	Mother 1
3	18	Boy	5	Housewife	Diploma	37	Mother 2
2	At birth	Boy	2	Housewife	Diploma	33	Mother 3
1	At birth	Boy	2	Housewife	Diploma	25	Mother 4
2	7	Girl	4	Housewife	Diploma	32	Mother 5
3	24	Girl	3	Housewife	Primary	23	Mother 6
3	3	Boy	7	Housewife	Secondary guidance	33	Mother 7
2	18	Boy	6	Teacher	Bachelor	42	Mother 8
3	5	Boy	7	Emergency medical services	Diploma	31	Father 1
4	18	Girl	6	Farmer	Primary	33	Father 2
3	32	Girl	5	Teacher	Bachelor	49	Father 3

Table 2. Profile of experts participating in the study

Work experience (year)	Age (year)	Specialty	Education	Participants number
6	31	Speech therapist	Bachelor	Specialist 1
2	28	Speech therapist	Bachelor	Specialist 2
7	29	Speech therapist	Bachelor	Specialist 3
19	42	Speech therapist	Master	Specialist 4
8	45	Psychologist	Bachelor	Specialist 5

Table 3. Themes and sub-themes related to factors facilitating mothers' capabilities

Themes	Sub-themes
Quality of medical services	Satisfaction with the child's progress Efficient experts
Condition normalization	Acceptance of the child's condition Coordination and cooperation of parents Maternal demographic characteristics
Mothers' capabilities and conditions	Emotional state Individual capabilities
Effective use of the environment	Effective use of environmental information Use of support resources

Satisfaction with the child's progress

Satisfaction with the speech and therapy progress of the child indicated the parents' satisfaction with various services. One of these services included cochlear implantation. In this respect, one of the participants mentioned: "The cochlear implantation process was carried out at the age of two and five months. Thank God, my child's hearing has become better." (M 5) Another thing mentioned by the mothers was their satisfaction with the speech therapy program. One of the subjects affirmed: "I was able to cope with it because I was satisfied with the speech therapy program, which motivated me to include my child in every session." (M 4)

Efficient experts

The efficiency of experts refers to their proper interactions, accuracy, and expertise. Proper interaction with the therapists included trust and emphasis on the words of the therapy staff on behalf of the parents. In this regard, one of the subjects expressed: "Other people's opinions do not matter to me, and I only listen to the doctor's opinions..." (M 6)

The quality of the experts' work was another item of this sub-theme. In this regard, the experience of speech therapists was emphasized. One of the participants stated:

"Talking about family education, parents' needs, and acceptance would be enough. A novice person lacks the amount of experience seen in a person with ten years of experience. I learned a lot from things that happened in the past few months." (D 1)

Condition normalization

Condition normalization was another main theme of factors affecting the adaptation of mothers. This concept refers to the stage in which the mother defeats the problems related to the child and, in addition to having adaptive reactions, manages the situation such that they have a perfectly normal kid. At this stage, they will also actively participate in the treatment and rehabilitation process of the child. This theme included two sub-themes of adaptation to the child's conditions and coordination and cooperation of parents with each other.

Acceptance of the child's conditions

Accepting the child's condition refers to the effective exposure of the parents, especially the mother, to the child's problem and the absence of any projection. Some parents, faced with the child's problem, used to project it instead of accepting it. This issue was especially mentioned as one of the basic needs of mothers, as one

of the fathers mentioned regarding the resistance of the child's mother in terms of the acceptance of the child's problem: "I realized that the mother insisted on not seeing any problems in the child because of how they talked. It is normal to see negative resistance to the situation..." (F1) This was observed in some of the mothers even after the passage of some time. In this regard, one of the subjects expressed: "I do not know (sighs). I cannot accept that all the children around me are healthy and my child has this problem. I have not accepted it yet." (M 6)

Acceptance of the situation could be important in mothers' search for treatment. A subject marked: "As soon as I was informed about my child's hearing problems, I immediately started to search for treatment because I knew that it was treatable. From day one, I did my best to practice with my child and never gave up." (M3)

Coordination and cooperation of parents

Coordination and cooperation of parents were another sub-theme. The cooperation of parents, especially father and mother, and the coordination of activities and training required at home played an important role in improving the child's condition and the mothers' greater adaptation. In some families, the problem of the child caused the deterioration of the relationship and brought the family members closer together. A subject pointed out: "We feel we have become more intimate. I mean, the relationship between my wife and me has improved because of this problem, and our children get along better, which has positively impacted my wife" (F1). Notably, fathers' cooperation is important in mothers' hope and motivation to participate more in the child's treatment and education than before. A subject asserted: "...I also appreciate my husband's dedication. For instance, he is considerate toward me even though he is tired from work." (M4)

Mothers' capabilities and conditions

Another sub-theme of the main facilitator was the condition and ability of mothers. This theme comprises three sub-themes: mother's demographic characteristics, emotional state, and individual capabilities.

Demographic characteristics of the mother

Maternal demographic characteristics were an important factor in mothers' level of participation. In this regard, a factor was maternal age; younger mothers were more motivated to be involved in the child's activities and treatment process. One of the therapists mentioned: "Mothers' age is also very important. Younger mothers are more tolerant when faced with their children's problems. They generally participate more in all areas and seek to gain more information." (D7)

Fathers also believe that their spouse's age plays an important role in their participation in the treatment process. One of the subjects marked: "I realize that my spouse's involvement in the activities is much more than

others, which is why our child's condition has improved greatly...I think my wife's motivation, young age, and higher activity level play an important role." (F3)

Another important demographic factor was the number of children, which could play a vital role in mothers' capabilities and participation. A subject mentioned: "I thank God for having only one child because I wouldn't be able to take proper care of my kid in case of having more children. If I had more than one child, I would need to dedicate more efforts." (M8) In this regard, therapists said: "mothers who have more than one child are not that successful, and everything is harder in this situation" (D3). Parents' level of education was also important. A subject affirmed: "The parent has a low level of education, has received faulty information, or has no information to help the child." (D2)

Regarding the importance of socioeconomic factors and education, one of the therapists stated: "Families who have higher socioeconomic levels, and higher education understood what we were saying when we told them that language learning has a golden time, which is very critical for the child and nothing can be done after that. Their children's progress is important to them, so we are very satisfied with these parents' attitude." (D4)

Emotional state

Emotional status and mental health were another sub-theme in this study. Mothers with mental health are more adaptive and have higher motivation. The positive effect of the mother's emotional balance on the child also had good effects and led to the child's clear progress. In this regard, one of the subjects mentioned: "I have changed mentally, meaning that I have passed the difficult part and have become better. I have changed, which has led to my child's change. Everything got better." (M2)

Individual capabilities

Parents' capabilities were another sub-theme. These capabilities refer to working with the child and reacting to the environment adaptively. Some mothers have learned the methods of working at home well and use them. A subject expressed: "I taught the exercises to my kid from day one; I did not want to lose another second. I used anything for teaching, and I made sounds. I knew that I had to talk to my child...I work with them for a while. Others would say this is pointless because they do not hear you. I would not listen and do what I thought was best." (M 3)

One of the adaptive reactions was not being discouraged by the negative opinions of others. A subject asserted: "I do not start a conversation with those who say there is no cure for this condition. I do not want to hear their negative statements... because they have not seen a successful person and question my efforts. From the first months of my child's birth, I have not seen these people after hearing what they have to say about my child's condition. I do not care about them. I only think about treatment and the possibility of curing my child." (M3)

Use of environmental resources

The use of environmental resources was another key theme of factors facilitating the adaptation of mothers. This topic consists of sub-topics, including the effective use of environmental information and the use of supporting resources:

Effective use of environmental information

Some mothers learned the advice and experiences of other mothers effectively and used them. Receiving information from other mothers was one of the main sources of information. Mothers more motivated to use experiences also participate more in treatment and rehabilitation. In this respect, a subject marked: *“My uncle’s neighbor, who had the same experience, helped me by saying that do not surrender to the situation and start taking your child to class...”* (M6) In some other mothers, visiting and getting to know other mothers motivated them to get more information from different sources. One of the mothers expressed: *“When I learned about this center, I got to know some other mothers who had the same situation. Being consulted helped me emotionally and increased my knowledge, so I decided to study myself...”* (M2) Using the web space to meet information needs was also one of the things mentioned by parents. A participant mentioned: *“Information is received both from the center and the internet, to which we have access at home.”* (F1)

Use of support resources

The use of support resources as one of the sub-themes refers to parents’ efforts to receive support from different sources. Family support from different aspects, such as spirituality and information, could help parents. This support could play an important role in improving the participation and then the speech development of children by adapting parents and especially mothers. It was one of the important sources of support for parents, family, and their close relatives. This was mentioned as one of the important sources by mothers and fathers. A subject affirmed: *“My family plays a crucial role. Their advice helped me when I was sad and disoriented. One of my sisters, a nurse, particularly helped me in this area emotionally and based on her experiences...”* (M2)

In some cases, especially regarding the operation, getting financial help from the family was one of the points mentioned by the parents. A subject asserted: *“We had financial problems when our daughter was supposed to undergo surgery. We needed six million Tomans, which was a lot. My mother-in-law gave us one million Tomans, and my brother gave us 700,000 Tomans.”* (M5). Therapists played an important role in cooperation and adaptation. In this regard, one of the participants stated: *“We visited a psychologist whose talk affected me and my wife. They both gave us information and helped us cope with the situation. We referred to them whenever we felt sad and felt good afterward.”* (F3)

Discussion

According to the participants’ experiences, the factors affecting the adaptation of mothers included the quality of medical services, normalization of conditions, individual capabilities of mothers, and effective use of the environment. Quality of medical services is one of the most important factors that facilitate the empowerment and education of parents about the relevant activities. In this regard, service quality refers to treatment activities, specialized suggestions, and training provided at the center. This can increase parents’ awareness and affect their activities regarding treatment follow-up, regular referrals, and doing exercises at home. One item the participants mentioned was their satisfaction with various services, such as the speech therapy program. The quality of the specialists’ work and the experience of the speech therapist were emphasized.

Many studies that have yielded results consistent with our findings have considered the quality of rehabilitation services and advice to parents to be necessary factors for providing proper education at home. Proper interaction with therapists was another point mentioned by the participants. The quality of services and therapists is important in the child’s rehabilitation process. The importance of this becomes clear when empowerment is realized to include the professional communication of the treatment staff with the family so that the family maintains a sense of control over the situation or is receptive to positive changes in behaviors created due to the expansion of abilities and functions. Since the participation of family members in childcare is one of the key principles of family-oriented empowerment, the therapist helps clients and family members understand their existing abilities that are necessary to meet the needs of the child and the family. Therapists’ work quality plays an important role in providing ways to help individuals and families take an active role in their health care (24). In another study, he showed the effect of the family-centered empowerment model on the physical, emotional, educational, and social dimensions of the quality of life of 8-12-year-old children with rheumatoid arthritis. Finally, this model was used to empower children with this disease or other diseases. Chronic and their caregivers advised (25).

One of the important factors for improving mothers’ adaptation was the normalization of conditions by these individuals. In proper conditions, mothers concluded that they had no choice but to accept their child’s disorder after going through different reactions, thinking and fighting with themselves, searching for information, and receiving different information from different sources. However, accepting the child’s disorder was often more difficult than this, so it causes doubt about the physician’s diagnosis and leads to referral to other specialists (26). Lack of acceptance of a disorder or illness in a person or close people is one of the usual reactions (27). The support of therapists and the provision of appropriate information encourage mothers to participate in the treatment and

care of their children. Acceptance of the child's disorder is accompanied by mothers' efforts to learn more about its treatments. Even though mothers have information about the disorder before its emergence, this information is limited. At this stage, mothers attempt to realize the benefits of cochlear implants. Various types of efforts are made to increase information and awareness among mothers. Finally, this increase in information solves mothers' confusion regarding accepting the treatment and encourages them to start normalizing the treatment and rehabilitation of the child. The normalization of conditions increases mothers' hope for the future of their child's life despite the disorder. This acceptance is effective in decision-making and informed choices and creates a way to establish more communication and interaction with caregivers and increase life expectancy in mothers (28). Numerous studies, both in hearing and deaf populations, show how lack of access to language affects children's emotional development (29). Another factor facilitating mothers' ability was the coordination and cooperation of parents, especially between father and mother, and the coordination of activities and training needed at home.

In some cases, the joint effort of the parents had brought them closer together (30). Mothers' capabilities refer to their abilities and self-confidence related to their responsibilities toward their children. This self-confidence and individual skills in education, as well as education, could be facilitating factors in the adaptation process of mothers. These factors strengthen the mother's emotional state and increase her efficiency and tolerance in dealing with the child. Various studies have shown that increasing the ability of mothers to work with their children increases their self-confidence, and they take responsibility for learning in interaction with their surroundings. Studies show that problem-based learning, small-group discussions, individual learning, and role-playing can increase mothers' self-confidence and skills (31,32). In a study, a positive relationship between breastfeeding empowerment and self-confidence in the role of a mother showed that breastfeeding empowerment can be used to improve self-confidence in the role of a mother (33).

The use of environmental resources was recognized as one of the most important facilitating factors, one of which was family and relatives. Studies show that in all demographic groups, family members are considered the most important environmental resources for a person facing various problems and diseases (34). Accordingly, it is emphasized that attention should be paid to relatives of children, such as brothers, sisters, and peers, and the environment in addition to the child (35). Therefore, increasing and employing the mother from the family and especially the wife or other children in child education could positively affect mothers' mental health and quality of life and facilitate the education process. In line with our findings, other studies have mentioned

the importance of using various resources, such as family support, in the child's education process (36). Results showed that mothers of children with cochlear implants have multiple needs to adapt to the situation. In general, family needs are extremely affected by the family's performance. In our culture, mothers play the main role in raising their children. Efforts to improve the quality of medical services, normalization of conditions, individual capabilities of mothers, and effective use of the environment can improve the adaptation of mothers of children with cochlear implants.

Conclusion

According to the results, improvement in the quality of medical services, condition normalization, individual capabilities of mothers, and effective use of the environment improved mothers' adaptation to HI children with cochlear implants.

Limitations and Suggestions

Among the limitations of the study, we can mention these things. In the field under study, the participants were limited to government centers. Therefore, it is suggested that in future research, the experiences of patients in private centers should also be explored, and considering the quality of the study, the possibility of not expressing feelings and forgetting some of the experiences of the participants can also be considered as a limitation of the study.

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Authors' Contribution

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Competing Interests

The authors declare that there is no conflict of interest.

Ethical Approval

Ethical considerations in this study included obtaining permission from the Ethics Committee of Isfahan University of Medical Sciences (Ethical code 393789) and obtaining written consent to participate in the study from the participants.

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References

- Aliazami F, Gilani S, Farhud D, Naraghi M, Afshari M, Eslami M. Epidemiology, etiology, genetic variants in non-syndromic hearing loss in Iran: a systematic review and meta-analysis. *Int J Pediatr Otorhinolaryngol*. 2023;168:111512. doi: [10.1016/j.ijporl.2023.111512](https://doi.org/10.1016/j.ijporl.2023.111512).
- Uhlén I, Mackey A, Rosenhall U. Prevalence of childhood hearing impairment in the county of Stockholm - a 40-year perspective from Sweden and other high-income countries. *Int J Audiol*. 2020;59(11):866-73. doi: [10.1080/14992027.2020.1776405](https://doi.org/10.1080/14992027.2020.1776405).
- Ambrose SE, Appenzeller M, Mai A, DesJardin JL. Beliefs and self-efficacy of parents of young children with hearing loss. *J Early Hear Detect Interv*. 2020;5(1):73-85.
- Lieu JEC, Kenna M, Anne S, Davidson L. Hearing loss in children: a review. *JAMA*. 2020;324(21):2195-205. doi: [10.1001/jama.2020.17647](https://doi.org/10.1001/jama.2020.17647).
- Fatima G, Malik M, Ashraf S. Parental satisfaction and involvement in the provision of early childhood special education to their young children with deafness. *Journal of Business and Social Review in Emerging Economies*. 2020;6(4):1255-66. doi: [10.26710/jbsee.v6i4.1409](https://doi.org/10.26710/jbsee.v6i4.1409).
- Holcomb TK. *Introduction to Deaf Culture*. Oxford University Press; 2023.
- Opoku MP, Nketsia W, Benefo EB, Mprah WK. Understanding the parental experiences of raising deaf children in Ghana. *J Fam Stud*. 2022;28(4):1235-54. doi: [10.1080/13229400.2020.1815557](https://doi.org/10.1080/13229400.2020.1815557).
- Green VA. Parental reaction to diagnosis of infant hearing loss. *Adv Ment Health*. 2020;18(1):62-72. doi: [10.1080/18387357.2019.1651661](https://doi.org/10.1080/18387357.2019.1651661).
- Lytvynenko AO. Adaptation to the Role of the Mother as a Psychological Experience. 2020. Available from: <http://repository.hneu.edu.ua/handle/123456789/24301>.
- Syed IH, Awan WA, Syeda UB. Caregiver burden among parents of hearing impaired and intellectually disabled children in Pakistan. *Iran J Public Health*. 2020;49(2):249-56.
- Alduhaim A, Purcell A, Cumming S, Doble M. Parents' views about factors facilitating their involvement in the oral early intervention services provided for their children with hearing loss in Kuwait. *Int J Pediatr Otorhinolaryngol*. 2020;128:109717. doi: [10.1016/j.ijporl.2019.109717](https://doi.org/10.1016/j.ijporl.2019.109717).
- Sorrentino T, Donati G, Nassif N, Pasini S, Redaelli de Zinis LO. Cognitive function and quality of life in older adult patients with cochlear implants. *Int J Audiol*. 2020;59(4):316-22. doi: [10.1080/14992027.2019.1696993](https://doi.org/10.1080/14992027.2019.1696993).
- Dazert S, Thomas JP, Loth A, Zahnert T, Stöver T. Cochlear implantation. *Dtsch Arztebl Int*. 2020;117(41):690-700. doi: [10.3238/arztebl.2020.0690](https://doi.org/10.3238/arztebl.2020.0690).
- Murphy A, Pinkerton LM, Bruckner E, Risser HJ. The impact of the novel coronavirus disease 2019 on therapy service delivery for children with disabilities. *J Pediatr*. 2021;231:168-77.e1. doi: [10.1016/j.jpeds.2020.12.060](https://doi.org/10.1016/j.jpeds.2020.12.060).
- Thompson D, Leach M, Smith C, Fereday J, May E. How nurses and other health professionals use learning principles in parent education practice: a scoping review of the literature. *Heliyon*. 2020;6(3):e03564. doi: [10.1016/j.heliyon.2020.e03564](https://doi.org/10.1016/j.heliyon.2020.e03564).
- Akujubi UT. Learning from Scholarly Attributed Graphs for Scientific Discovery [dissertation]. KAUST Research Repository; 2020. doi: [10.25781/KAUST-6IIR9](https://doi.org/10.25781/KAUST-6IIR9).
- Kruse D. "It is the Theory Which Decides What Can Be Observed": Managing the Complexity of Social Problems at the Organisational and Individual Level. Logos Verlag Berlin GmbH; 2022.
- Lindgren BM, Lundman B, Graneheim UH. Abstraction and interpretation during the qualitative content analysis process. *Int J Nurs Stud*. 2020;108:103632. doi: [10.1016/j.ijnurstu.2020.103632](https://doi.org/10.1016/j.ijnurstu.2020.103632).
- Renjith V, Yesodharan R, Noronha JA, Ladd E, George A. Qualitative methods in health care research. *Int J Prev Med*. 2021;12:20. doi: [10.4103/ijpvm.IJPVM_321_19](https://doi.org/10.4103/ijpvm.IJPVM_321_19).
- Ngenye L, Krepes GL. A review of qualitative methods in health communication research. *Qual Rep*. 2020;25(3):631-45.
- Sabater K. Nurse Educator Scholarship & Qualitative Research. 2023. Available from: <https://mdsoar.org/items/f8cc3a28-1b41-49d3-b8cb-21b9fcd4f41>.
- Perngmark P, Waebuesa N, Holroyd E. Collaborative approaches to promote family caregiving for Thai-Muslim older adults. *J Holist Nurs*. 2023;41(1):17-29. doi: [10.1177/08980101221081228](https://doi.org/10.1177/08980101221081228).
- Farfán-Zúñiga X, Jaman-Mewes P. Understanding the experience of nursing students' internship at a palliative care unit: a phenomenological research study. *Nurse Educ Today*. 2021;100:104848. doi: [10.1016/j.nedt.2021.104848](https://doi.org/10.1016/j.nedt.2021.104848).
- Reitz SM, Scaffa ME, Dorsey J. Occupational therapy in the promotion of health and well-being. *Am J Occup Ther*. 2020;74(3):7403420010p1-p14. doi: [10.5014/ajot.2020.743003](https://doi.org/10.5014/ajot.2020.743003).
- Abdel-Salam AA, Aziz AE, Mohammed S, Arabie E, El Sayed M, Sharshour SM. Effect of implementing family empowerment model on the quality of life and self-efficacy of mothers of children with systematic lupus erythema. *Tanta Sci Nurs J*. 2023;29(2):216-44.
- Young S, Adamo N, Ásgeirsdóttir BB, Branney P, Beckett M, Colley W, et al. Females with ADHD: an expert consensus statement taking a lifespan approach providing guidance for the identification and treatment of attention-deficit/hyperactivity disorder in girls and women. *BMC Psychiatry*. 2020;20(1):404. doi: [10.1186/s12888-020-02707-9](https://doi.org/10.1186/s12888-020-02707-9).
- Prigerson HG, Kakarala S, Gang J, Maciejewski PK. History and status of prolonged grief disorder as a psychiatric diagnosis. *Annu Rev Clin Psychol*. 2021;17:109-26. doi: [10.1146/annurev-clinpsy-081219-093600](https://doi.org/10.1146/annurev-clinpsy-081219-093600).
- Willis E, Godbold R. Children's complex health: maternal experiences of care and decision making. *J Child Health Care*. 2023;13674935231158456. doi: [10.1177/13674935231158456](https://doi.org/10.1177/13674935231158456).
- Tsou YT, Li B, Eichengreen A, Frijns JH, Rieffe C. Emotions in deaf and hard-of-hearing and typically hearing children. *J Deaf Stud Deaf Educ*. 2021;26(4):469-82. doi: [10.1093/deafed/enab022](https://doi.org/10.1093/deafed/enab022).
- Ducy EM, Stough LM. Psychological effects of the 2017 California wildfires on children and youth with disabilities. *Res Dev Disabil*. 2021;114:103981. doi: [10.1016/j.ridd.2021.103981](https://doi.org/10.1016/j.ridd.2021.103981).
- Gün Kakaşçı Ç, Karabulut Ö, Abbasoğlu DE, Coşkuner Potur D, Doğan Merih Y, Demirci N. The effect of antenatal education on expectant mother's childbirth attitudes, maternal role attainment, and self-confidence levels. *Health Care Women Int*. 2023;44(10-11):1325-45. doi: [10.1080/07399332.2021.1935959](https://doi.org/10.1080/07399332.2021.1935959).
- Matare CR, Mbuya MNN, Dickin KL, Constan MA, Pelto G, Chasekwa B, et al. Maternal capabilities are associated with

- child caregiving behaviors among women in rural Zimbabwe. *J Nutr.* 2021;151(3):685-94. doi: [10.1093/jn/nxaa255](https://doi.org/10.1093/jn/nxaa255).
33. Sohrabi M, Azizzadeh Forouzi M, Mehdipour-Rabori R, Bagherian B, Nematollahi M. The effect of a training program on maternal role adaptation and self-esteem of mothers with preterm infants: a quasi-experimental study. *BMC Womens Health.* 2021;21(1):296. doi: [10.1186/s12905-021-01440-z](https://doi.org/10.1186/s12905-021-01440-z).
34. Jensen L, Monnat SM, Green JJ, Hunter LM, Sliwinski MJ. Rural population health and aging: toward a multilevel and multidimensional research agenda for the 2020s. *Am J Public Health.* 2020;110(9):1328-31. doi: [10.2105/ajph.2020.305782](https://doi.org/10.2105/ajph.2020.305782).
35. Caffaro J. Sibling abuse of other children. In: Geffner R, White JW, Hamberger LK, Rosenbaum A, Vaughan-Eden V, Vieth VI, eds. *Handbook of Interpersonal Violence and Abuse Across the Lifespan: A Project of the National Partnership to End Interpersonal Violence Across the Lifespan (NPEIV)*. Cham: Springer; 2022. p. 1295-322. doi: [10.1007/978-3-319-89999-2_11](https://doi.org/10.1007/978-3-319-89999-2_11).
36. Davis-Kean PE, Tighe LA, Waters NE. The role of parent educational attainment in parenting and children's development. *Curr Dir Psychol Sci.* 2021;30(2):186-92. doi: [10.1177/0963721421993116](https://doi.org/10.1177/0963721421993116).

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