

## FAMILY-BASED TRAINING PROGRAM: THE ROLE OF MOTHERS' EMPOWERMENT IN THE SPEECH DEVELOPMENT OF CHILDREN WITH HEARING IMPAIRMENTS

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### ABSTRACT

**Introduction:** Family-centered care in children suffering from hearing impairments requires looking at the family as the center and core of care, whereas less attention is paid to such care in practice despite the numerous advantages it may have. Accordingly, this study aims to present a family-based training program to empower mothers and evaluate its effectiveness in the speech development of children with hearing impairments.

**Materials and Methods:** This study was a randomized controlled trial. The individuals referring to the service providing centers of speech therapy to children with hearing impairments in Shiraz (Iran) were selected as the sample units of this study via convenience sampling method. The participants were assigned to the control and experimental groups (35 ones in each group) through block randomization design. Family-based intervention was conducted in nine 80-minute sessions. In this study, a researcher-constructed questionnaire was used to assess mothers' empowerment. Moreover, Newsha Developmental Scale was used to assess the speech development of children's speech.

**Results:** In this study, 35 subjects in the intervention group and 33 patients in the control group were evaluated. The repeated measures test shows that the interactive effect of group and time (three stages: pre-test, post-test, and follow-up) is significant in the variables of mothers' empowerment, self-efficacy, and adaptation. Within-group pairwise comparison test indicates a significant difference in terms of mothers' empowerment and self-efficacy between pre-test and follow-up (respectively  $P=0.02$  and  $P=0.04$ ). The evaluation of children's speech development in pre-test & post-test comparison, as well as pre-test-follow-up comparison, is representative of a significant reduction in this variable (respectively  $P=0.003$  and  $P<0.001$ ).

**Conclusion:** This study showed that family-based intervention program can lead to an increase in the empowerment of the mothers with children suffering from hearing impairments and, thereby, it can bring about the improvement of children's speech development.

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### Introduction

The diagnosis of severe hearing loss in children will have various consequences for families and influence the whole family. In such a situation, the main purpose is to maintain normal and appropriate interactions at home. This onus is on all members

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of the family. From the familial perspective, hearing loss is the most complex sensory injury that makes parents experience permanent stress. The care given to the children with developmental disorders, including hearing-impaired children in environments outside the home involves families and children with some problems and difficulties due to the low-quality services offered to them. Taking care of children in such circumstances will put this group of people at risk of developing mental health during adulthood [1, 2]. The success of hearing-impaired children in communicating begins at home through their acceptance and welcome by parents. Hearing-impaired children are very different from each other and each of them should be viewed differently [3]. Although the nurturing of hearing-impaired children appears to resemble that of other children, there are many different aspects in practice. Parents should learn to take the right decisions about their child's communication practices and training and should put him/her at the exposure of new experiences. In addition, the degree of parental attention to the siblings of children with hearing loss, the family's place of living, and parental relations with friends and family are affected in this regard [4].

The parents of hearing-impaired children should gain a lot of information about hearing loss. The information needs of parents will influence the rearing method of their children to a great extent. Much specialized information presented by experts is in the scientific language and, thereby, is completely incomprehensible to parents. Many parents will realize that they have had other choices ahead in the next years. Some parents work hard to obtain this information while some of them do not hold the directness and determination required gaining the information, and some others obtain this information by chance. To this end, some parents join the support groups composed of other parents with hearing-impaired children or contact special communities and centers [4, 5].

In many of the studies that were carried out with the participation of parents of children with hearing loss, the parents acknowledged that they were desperately in need of and interested in full information about the hearing impairment of their children [6]. Based on research findings, the mothers who receive emotional and practical support from family and friends will get better compatibility with their situation. Mothers' ability to cope with their children's hearing loss affects the child's life in different ways. If mothers possess higher self-confidence, their children will have greater emotional adjustment in childhood and better academic achievement in later years [7].

In order to realize universal health care for all people in the field of rehabilitation, the World Health Organization has designed modern strategies, named community-based rehabilitation (CBR) and has proposed it to the subscribed countries for implementation [8]. One of the important components of CBR matrix is empowerment, which is a dynamic and inclusive process. The main objective of the empowerment process is to make appropriate changes in all aspects of the lives of individuals, families, groups, and social strata [9, 10].

Family-centered care involves looking at the family as the center and core of care, whereas less attention is paid to such care in practice despite the numerous advantages it may have. Despite its applicability in most specialties which are concerned with patients, it has unfortunately received solely cursory attention in Iran. Except being used in some research studies, it has not been used in any of the medical and private centers so far and has not been even piloted, which can be due to such reasons as a lack of awareness and absence of enough education about family-centered services, lack of applied training materials, and the weak foundation of medical treatment and rehabilitation in Iran [11-13]. Accordingly, this study aims to provide a family-based training program to empower mothers and to evaluate the effectiveness of this program in the verbal development of children with hearing impairments.

## Methods

### Participants

This study was a parallel-group randomized controlled trial. The research environment included the service providing centers of speech therapy to children with hearing impairments in Shiraz (Iran), and the mothers of hearing-impaired children who had referred to the centers for speech therapy constituted the target population of the research. The present study was carried out in 2016. This study was registered in the trials registration system (No.: Irct2016111230857N1) and was approved by the Ethics Committee of Isfahan University of Medical Sciences (No.: 393789).

The sample units were selected from the clients referring to two major service-providing centers for children with hearing loss through convenience sampling method. The criteria for the inclusion of participants in the study were the healthy hearing ability of parents, having a hearing-impaired child with speech problems for 1 to 7 years, no hearing loss in other children, the absence of other disabilities other than hearing and speech disorders in the child, and willingness to participate in the study on a voluntary basis. Moreover, if individuals were absent more than two sessions or were not willing to cooperate and participate in the intervention, they would be excluded from the study. Based on the established framework, the participants were divided into the control and experimental groups through block randomization design. A hidden randomization process was carried out by someone outside the research team. According to the research findings obtained by Samadi et al. (106) and using the quantitative formula for determination of the sample size, the following values were considered to determine the sample size in this study: type I error of 5%, power of 80%, and a minimum score difference of 1.4 in the verbal development of hearing-impaired children, 35 participants in each group, and a total of 70 participants. The framework of the study is shown in Table 1.

## Intervention

It is noteworthy that the researcher had embarked on examining the effective factors in parental empowerment in a pilot study in advance of the conduct of the current study. Accordingly, the training package was developed based on the dimensions extracted from these factors. This package includes the training protocol pertaining to the reasons revealed during the nine 80-minute sessions. The headlines of sessions content include initial evaluation, mothers' awareness and knowledge regarding the necessary interventions in hearing-impaired children, parenting, resilience, increased self-confidence, and parental empowerment. The sessions were held with the participation of researchers, a speech therapist, and a psychologist. Each of the participants was offered a notebook to follow up and do homework after each training session. In addition, a brochure entitled "How can I help" was offered to the mothers. The sessions were held at regular intervals in two centers. The training was the same in both centers and was performed by the same persons. In each session, various theory-based methods and practical applications were used. The content of sessions and the applied methods are presented in Appendix 1. Both intervention and control groups in this study received the common services of the centers, including counseling and speech therapy.

## Data collection instruments

The data in this study were gathered through two instruments. A researcher-constructed questionnaire, including demographic information and family empowerment measure (mother) was used to investigate the effect of the training program on mothers. The demographic information included mothers' age, the number of children, parents' job and education, the age of the problem diagnosis in the child, the age of cochlear implant, child's gender, and status of life. The section pertaining to mothers' empowerment consisted of three sub-scales, namely self-efficacy (16 items), parental adaptation (13 items), and the interaction and application of environmental factors (10 items). The items were designed based on Likert scale (strongly agree, agree, no idea, disagree, and strongly disagree) and the five alternatives were assigned a score from 1 to 5, respectively. The face validity and content validity of the study were investigated by a panel of experts through a qualitative study. Accordingly, the questionnaire was offered to seven experts and their opinions on the use of appropriate and understandable words, ease of responsiveness, and relevance of the sections with the research objectives were assessed and applied in the instrument. Moreover, the questionnaire was also offered to six non-participant mothers in the study and their comments, hints, and ambiguities were evaluated and, thereby, the pertinent amendments were made in the items. The reliability of the instrument was assessed through internal consistency and it was confirmed with the Cronbach's alpha coefficient of 0.82. In addition, the examination of the relationship of each subscale with the total score of empowerment indicated a high correlation (0.87).

Newsha Developmental Scale was used to measure the severity of speech disorders. This instrument assesses seven skills, namely hearing, receptive language, expressive language, speech, social communication, and motor domains in children from birth to 72 months. In this study, the speech skills of this tool was used in 13 age groups. In this test, each item is assigned one score and the range criterion is used after the test completion at each developmental level. In case of achieving the minimum score and higher, the child is most likely to enjoy the development skill consistent with his/her age group. However, if a score lower than the minimum is observed in two times of the test completion in less than a week, it is necessary to assess the child in lower age groups so that his/her developmental delays relative to the natural children of the same age can be specified in the desired developmental domain. This instrument has been designed in the Iranian community and, thereby, its validity and reliability have been reviewed and approved in Iranian population. This instrument was completed by speech therapists and therapists.

## Procedure

To recognize the individuals interested in participating in the training course, the receptionist and counselling partner embarked on notifying and the voluntary mothers were enrolled after being provided with an explanation about the objectives of the program. Before the start of the research, the written consent was obtained from all participants. Randomization was fulfilled through random allocation software in five equal blocks. The intervention was performed within a month. The development of speech in both groups was measured before the intervention, three months following the intervention, and six months following the intervention. The degree of mothers' empowerment was measured before the intervention, one month following the intervention, and three months following the intervention.

## Data analysis

The results of the study have been reported in the form of descriptive statistical indices in order to describe the characteristics of the research sample and also in the form of inferential statistics and analyses in order to test the hypotheses on the current intervention design in the pre-test, post-test, and follow-up. Data analysis was carried out through repeated measures ANOVA in SPSS version 23.

The first assumption for using repeated measures analysis of variance is random sampling or random assignment of the participants to the research groups. As it was mentioned above, the allocation of subjects to the groups was done randomly in this study, which is indicative of the satisfaction of this assumption. Another assumption is the normal distribution of the scores in the dependent variable. Kolmogorov-Smirnov test was used to check the normality of the distribution of scores in the groups. Moreover, Levene's Test of Equality was employed to evaluate the equality of variances.

## Results

In this study, the data pertaining to 35 individuals in the intervention group and 33 individuals in the control group were analyzed. It is notable that two subjects were excluded from the control group due to their reluctance to participate in the post-test and follow-up stages. The mean values of participating mothers' age in the intervention and control groups were equal to  $29.47 \pm 4.12$  and  $29.72 \pm 4.47$  years, respectively ( $P=0.80$ ) and these values for fathers were  $33.66 \pm 4.53$  and  $34.39 \pm 5.31$  years in the intervention and control groups, respectively ( $P=0.16$ ). In terms of gender, 55.6% of the children in the intervention group and 45.5% of the children in the control group were boy ( $P=0.27$ ).

The descriptive features of mothers' empowerment and its components, including self-efficacy, adaptation, and interaction and application of environmental factors as well as the development of children's speech have been expressed in three stages on the basis of group membership. In the control group, the scores benefit from a relative stability in the evaluation of the dependent variables. However, incremental changes have come true in the post-test and follow-up stages of the experimental group compared with the pre-test scores (Table 2).

The investigation of these differences by repeated measures test shows that the interactive effect of group and time (three stages: pre-test, post-test, and follow-up) is significant in mothers' empowerment, self-efficacy, and adaptation. The significance of the interaction of time and group represents the overall difference between the groups in mean values over time. Moreover, the children's speech development was significantly different between the two groups at the time intervals of the research (Table 3). Within-group pairwise comparison test indicates a significant difference in terms of mothers' empowerment and self-efficacy between the pre-test and follow-up stages (respectively  $P=0.02$  and  $P=0.04$ ). The evaluation of children's speech development in pre-test & post-test comparison, as well as pre-test-follow-up comparison, is representative of a significant reduction in this variable (respectively  $P=0.003$  and  $P<0.001$ ) (Table 4).

## Discussion

The results of this study showed that family-based training to the mothers of children with significant hearing loss is significantly effective in the mothers' empowerment and its components (efficacy and adaptation). Various studies have shown that, in addition to the need for taking the children with hearing loss into account, it is required to pay attention to the environment and the people around them, including parents, siblings, peers, and other connected individuals. Indeed, this point should be considered in assessments and prioritization of the measures [14].

Darryn Sikora, et al. (2013) showed that familial factors should be also included in the design of treatment programs for children with disabilities, such as autism. In addition to the involvement of parents in the treatment process, the family performance should be considered. The parents' feelings of parenting, marital satisfaction, the role of other children, and the therapist's examination and support should be assigned credit, as well. In this way, the parents' attitude and self-efficacy will be improved and the risk of additional depression and stress is reduced [15].

Consistent with the current study, Sunil Deepak, et al. (2013) suggest that community-based rehabilitation program has been found to be effective in people with disabilities and its implementation has been followed with benefits and advantages for this group of population; therefore, they recommended the implementation of this program [16]. In Prizant et al.'s study (1993), it is suggested that speech and language pathologists need to be aware of the wide range of possible responses (such as guilt, anger, denial) provided by family members in the face of difficulties and children's speech disorders. It has been also pointed out that attention to requests, expectations, and concerns of parents are important and these needs should be met. Furthermore, some opportunities should be also provided to talk with parents about their problems in interaction and communication with their child. It should be borne in mind that these problems can affect the whole life of the family. In the same way, the parents' experiences should be also taken into consideration and parents should be always asked to express their expectations of their children's health care service and training [14].

The results of this study showed that the family-based empowerment program can retain its effectiveness in the long run. In this regard, Kelly N, et al. (2007) stated that the perceived loyalty to family-centered care systems and familial empowerment have independently predicted positive changes in children's behavior throughout a year. Family empowerment has a mediation mechanism between the family-centered care systems and positive changes in children's behavior [17].

In the current study, mothers' empowerment has come true while the results of children's speech development have shown a higher improvement in the intervention group compared with the control group. Consistent with this study, a survey conducted by Buschmann et al. (2008) revealed that family-based group speech intervention was effective in two-year children with delayed dialects [18]. These results show that mother's education can be effective in improving the speech of children with hearing impairments. Maria do Rosario Dias, et al. (2013) also put an emphasis on training as a means to raise awareness and promote understanding of the psycho-social stuttering as a speech disorder by speech therapists [19].

This study suffered from some limitations. The socio-cultural status was not evaluated in the present study. Since this study was carried out in the centers in Shiraz city, it is difficult to generalize the results. Moreover, the limited follow-up time is among the other factors that may question the long-term effectiveness of the results. Finally, the results of this study showed that the family-based intervention program in mothers can be effective in the development of speech in children with hearing impairments. The researchers hereby recommend the conduct of similar studies with increased duration of the follow-up stage.

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**Table 1.** Research design of the study

Group	N	Pre-test	Intervention	Post-test	Follow-up
Intervention group	35	T <sub>1</sub>	Routine program of the centers + empowerment program	T <sub>2</sub>	T <sub>3</sub>
Control group	35	T <sub>1</sub>	Routine program of the centers	T <sub>2</sub>	T <sub>3</sub>

**Table 2.** Descriptive indexes of mothers' empowerment, its components, and the development of children's speech in the studied groups

Component		Pre-test	Post-test	Follow-up
	Group	Mean ± SD	Mean ± SD	Mean ± SD
Mothers' empowerment (total index)	Intervention	136.61±16.63	145.13±15.49	151.02±17.42
	Control	138.06±20.77	139.18±21.97	138.78±22.58
Self-efficacy	Intervention	52.27±9.37	59.38±9.51	63.94±13.78
	Control	55.84±9.31	56.48±12.83	56.48±12.83
Adaptation	Intervention	45.72±7.02	49.94±7.16	50.80±6.76
	Control	46.60±8.89	46.06±10.01	46.18±10.20
Interaction and application of environmental factors	Intervention	35.61±4.44	25.80±3.58	36.27±3.63
	Control	35.60±4.11	36.69±4.72	36.12±4.82
Children's speech development	Intervention	0.58±0.20	0.74±0.19	0.74±0.21
	Control	0.52±0.17	0.57±0.19	0.62±0.19

**Table 3.** Repeated measures test to evaluate the main and interactive effects of time and group

Variable	Source of variation	Df	F	Sig.	Partial Eta Squared
Mothers' empowerment (total index)	Between-group	1	2.21	0.14	0.03
	Time effect	2	5.31	0.006	0.07
	Time & group effect	2	4.24	0.01	0.06
Self-efficacy	Between-group	1	2.63	0.03	0.04
	Time effect	2	4.82	0.01	0.06
	Time & group effect	2	3.35	0.03	0.05
Adaptation	Between-group	1	2.56	0.11	0.03
	Time effect	2	2.53	0.08	0.04
	Time & group effect	2	3.75	0.02	0.06
Interaction and application of environmental factors	Between-group	1	0.08	0.77	0.01
	Time effect	2	1.01	0.37	0.01
	Time & group effect	2	0.63	0.53	0.01
Children's speech development	Between-group	2	11.24	0.001	0.14
	Time effect	2	12.10	<0.001	0.15
	Time & group effect	1	0.65	0.19	0.02

**Table 4.** Within-group pairwise comparisons using Bonferroni test

Variable	Pairwise comparison	Mean difference	Standard error	Sig.
<b>Mothers' empowerment (total index)</b>	Pre-test-post-test	-4.82	2.31	0.12
	Pre-test-follow-up	-7.57	2.75	0.02
	Post-test-follow-up	-2.74	1.91	0.46
<b>Self-efficacy</b>	Pre-test-post-test	-2.34	1.45	0.33
	Pre-test-follow-up	-4.65	1.91	0.04
	Post-test-follow-up	-2.30	1.21	0.18
<b>Children's speech development</b>	Pre-test-post-test	-0.11	0.03	0.003
	Pre-test-follow-up	-0.13	0.03	<0.001
	Post-test-follow-up	-0.02	0.02	0.65

**Appendix 1.** The structure of family-based training program sessions

Session	Description	Theory-based methods and practical applications
First Session	<p><b>Title:</b> initial assessment</p> <p><b>Content of the session:</b> conduct of the initial interview and identification of the clients' problems, conduct of pre-test T1, more familiarity with the counselor and the status of counseling session, and specification of the schedule for the next session</p>	Persuasive communication method
Second Session	<p><b>Title:</b> awareness and knowledge of mothers on deafness and hearing loss</p> <p><b>Content of the session:</b> the natural development of children's speech and language, the golden age of child language acquisition, causes of deafness, fetal and hearing problems, characteristics of children with hearing impairment, and feedback</p>	Oral or verbal persuasion
Third Session	<p><b>Title:</b> awareness and knowledge of mothers on the essential interventions in children with hearing loss</p> <p><b>Content of the session:</b> the review and evaluation of the previous session, the first session feedback, screening tests to identify children, the available interventions in hearing loss, cochlear implant surgery, specialists' intervention, the required educational environment, the role of family support, use of hearing aids, and feedback</p>	Oral or verbal persuasion
Fourth Session	<p><b>Title: Parenting</b></p> <p><b>Content of the session:</b> the review and evaluation of the previous session, the basic principles of parenting, parenting models, the principles of successful parenting,</p>	Guided practice technique

	parenting skills, and feedback.	
Fifth Session	<p><b>Title:</b> Resiliency</p> <p><b>Content of the session:</b> the review and evaluation of the assignments pertaining to the previous session, what is resiliency, operational scope for resiliency, features of resilient people, resiliency solutions, task assignment and specification of the schedule for the next session, and feedback.</p>	Persuasive communication method- guide to action method- repeated exposure
Sixth Session	<p><b>Title:</b> increased self-confidence</p> <p><b>Content of the session:</b> the teaching of expression of one's own feelings and needs, self-confidence and strategies to increase it, task assignment and specification of the schedule for the next session, and feedback</p>	Reassessment- repeated exposure- direct experience method
Seventh session	<p><b>Title:</b> Parents' empowerment 1</p> <p><b>Content of the session:</b> review and evaluation of the previous session's assignments, communication with the children, storytelling and reading for children with hearing loss, task assignment and specification of the schedule for the next session, and feedback</p>	Guide to action method- reassessment- direct experience method
Eighth Session	<p><b>Title:</b> Parents' empowerment 1</p> <p><b>Content of the session:</b> review and evaluation of the previous session's assignments, strategies for positive interaction with children, identification of negative methods in coping with children, resolution of conflicts and problems, presentation of a successful model for parents, task assignment and specification of the schedule for the next session, and feedback</p>	Reassessment- direct experience method- through modelling
Ninth Session	<p><b>Title:</b> A written undertaking and implementation of the post-test</p> <p><b>Content of the session:</b> review and evaluation of the previous session's assignments, conduct of post-tests T2, specification of a follow-up session for a month later, and feedback on all the sessions</p>	General undertaking