

The Effect of Early Family-Centered Psychological and Educational Interventions on the Cognition and Social Skills Development in Children with Hearing Loss

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Received: September 3, 2014

Accepted: November 6, 2014

ABSTRACT

The purpose of this study was to examine the impact of family-based psychological and educational early interventions on the development of cognition and social skills of children with hearing impairment (HI). The method of the study was experimental. For this purpose, using multi-stage random sampling method, thirty children with HI under five years old were selected and assigned to experimental and control groups. In order to collect data, first, Newsha Development Evaluation Test was implemented on the subjects. Consequently, the intervention program was conducted on their mothers during five months, and data was analyzed using covariance analysis. The findings indicated that there was significant difference between control and experimental groups in cognition and social skills. The intervention program had also different effects on cognition and social skills development in children with various severity levels of hearing loss. The results revealed that there were not significant differences between different age groups, in utilizing the intervention program. Thus, it can be concluded that early interventions have affected positively on the cognition and social skills development of children with HI.

KEYWORDS: Early interventions, Cognition skills, Social skills, Family-centered, Children with hearing impairment

INTRODUCTION

The primary focus in the implementation of EI services is on the potential to reduce negative effects of a condition or risk factor and thus to promote optimal development over time. Combined with early detection, EI is critical for children identified with hearing loss. (1-2-3-4-5-6-7). Most professionals, especially those directly involved in providing rehabilitation services for young children, are aware of the critical significance of intervention onset in infancy to reduce the negative effects of hearing loss on the child (8-9-10). Both the theoretical models dealing with intervention programs for exceptional children as well as the professionals in the field who operate them have come to regard the family itself as the central agent and crucial partner in the child's rehabilitation process (11-12-13).

Within a family-centered model, the focus shifts from direct intervention with the child by the professional to promotion of a context that will promote optimal development in the child. The child and the family are central to the context, so in this sense, the intervention is also child-centered. The orientation away from direct intervention with the child by the professional and toward the adults who have responsibility for the child requires significant changes in attitude, practice, and skills. (14-15). More than 50 years of research support the effectiveness of intervention for infants and young children with disabilities (16-17-18-19-20). Studies have shown that knowledge of a broader range of useful services in early education, awareness of the role that he/she and specialists in early education should play, teaming up with the Specialist in Early Education (SEE) are all directions of actions to increase the efficiency of this type of intervention and development of cognitive, psychomotor, behavioral progress of children with disabilities (21). While early identification and early intervention make big differences in the lives of most children, continued support from families, skilled professionals, and specialized programming is necessary to ensure that these children do not fall behind (22-23). In this regard, researchers have found that infants and families who participated in quality early intervention programs before their first birthday outperformed their peers who did not receive similar services until later (3-24-25-26). Also, children enrolled in early intervention programs by six

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months of age did better on measures of language (signed or spoken) and social-emotional development than later identified peers regardless of their gender, ethnicity, socioeconomic status, communication modality, degree of hearing loss, or presence of multiple disabilities (26). These children tend to have a better language (both signed and spoken), as well as better emotional-behavioral adjustment and social development. Not only do children benefit, but families who receive support through early intervention appear to adjust more quickly to their child's hearing status than families whose children's hearing abilities were not identified until later (27). The literature indicates that early exposure to sign communication can facilitate the linguistic, cognitive, social, emotional and educational development of children with hearing loss (28-29-30-31).

This is very important because evidence is consistent that early intervention is critically important for the language and communication, cognitive, social and emotional development of children with hearing loss (32-5-33).

Suarez (34) found that a social skills intervention program resulted in significant improvement of assertive behavior in deaf students' school life, as well as increased emotional adjustment, social adjustment, and self-image as observed by the students' teachers. She asserted that the deaf children became better adjusted when greater attention was given to social-emotional aspects of the students' development. These studies suggest that it is critical for teachers of the deaf to devote time and attention to the social and emotional development of their students before they enter a mainstream environment with hearing peers.

Suarez (34) suggested that a social skills intervention program may be a useful tool in enabling deaf children to: (a) become aware of the need to stop and think before making a decision, and avoid impulsive behavior, (b) avoid rash choices when they know their actions will have consequences, (c) link decision-making with personal reflection rather than group pressure, (d) not break down when they fail to achieve an objective, but rather posit alternative solutions for the next occasion. The social skills program that Suarez implemented was equally effective in facilitating comprehension of the steps involved in solving interpersonal problems, as well as helping profoundly deaf students to develop more effective patterns of social behavior. Given the evidence that explicit instruction in the area of social skills can be helpful for deaf children.

As a result, these children will be more likely to enter a mainstream environment in kindergarten, or even preschool, ready to participate fully in all activities and engage in meaningful social interactions with peers and teachers (35).

Available scientific evidence indicates that early intervention can alter the developmental trajectories of children at risk for later cognitive and social developmental problems.

In this regard, Rauh *et al.* (36) suggest that an interventional effect on child's cognitive development is expected to be found first after the second year of age as the infant has developed more complex cognitive skills and language. Also, studies have shown that the qualities of early social interaction seem to impact the child's language skills, cognitive, social and emotional development (37-38-39-40).

Greenberg and Kusche (41) in their studies on 57 school age deaf children suggested that the intervention led to significant improvements in students' social problem solving skills, emotional recognition skills and both teacher and parent ratings in social competence.

In this regard, Carpenter (42) has reported that, effective early intervention and support can produce improvements in children's health, social and cognitive development and help tackle some of the many social and physical barriers families of disabled children face to full participation in society.

In addition, early-identified children with appropriate early intervention services can maintain language development and social-emotional development commensurate with their nonverbal development and their chronological age matched hearing peers. Better language development is associated with less parental stress and better parental emotional attachment (26). In this regard, Lloyd & Trnacek (43) suggests that the timing of intervention and the type of education and support received by a deaf child have a direct and significant impact on their future, from the level of literacy they attain to the extent of their social development.

Furthermore, many programs and schools are incorporating social skills into the curriculum which could add to improvement in social skill awareness.

Despite the fact that the major issues for parents of children with hearing loss are in the domains of communication and language development, learning and social development, and the inclusion of their child in the community and researches clearly emphasize the critical importance of the family context for each of the above developmental domains, however, in early intervention for children with hearing loss, the role of the family is rarely acknowledged as the first and most important inclusive environment for the child (44).

According to what was said, the challenge for future research is to ensure that within the philosophy of inclusion all deaf children are able to acquire the critical and foundational language skills needed for their social, emotional, and cognitive development.

In this regard, the role of the family in promoting early social and emotional attitudes and appropriate behavior is crucial for stimulating the potential of children with disabilities. Therefore, the purpose of this study is to examine the impact of family - centered psychological and educational early interventions on the cognitive and social skills development in children with hearing loss.

METHODS

The current research was designed based on an experimental study. The statistical population were all children with hearing impairment (HI) under five years of education centers in Isfahan that were enrolled in 2012 - 2013 years. For this purpose using multi-stage random sampling method, two out of four Isfahan deaf education centers were selected randomly. Meanwhile, thirty children with HI under five years were selected and assigned to experimental and control groups. The method of the study was experimental. For this purpose, using multi-stage random sampling method, thirty children with hearing impairment (HI) under five years were selected and assigned to experimental and control groups. By the way, the standards to exit from the research were: Unilateral deafness, slight deafness, affliction with many disabilities. It is worth mentioning that the written consent of parents were obtained for participation in this research.

Research instruments

The Research instrument used is based on Newsha Development Assessment Scale Malayeri et al(45) as the integrated scale to measure the growth of cognitive, social, hearing and speech for Persian speaking children. This scale is made up of seven developmental areas and is provided in 13 growth tables. Each item has a score in this scale.

To determine the reliability and validity of content and structure, the test was conducted on 530 normal children. A correlation greater than 0.95 was obtained following studying both reliabilities: that of interviewers comments and of test-retest. In more than 90% of cases, the content validity was assessed as being full extent and very high in terms of construct validity based on Likert's Seven-Item Scale, showing the effect of age on test results. The reliability between interviewers comments in the area of receptive language is reported 82% and in the area of expressive language development 68% applying the SKI-HI Language Development Scale (LDS (46). However, Jafari and Ashayeri study(47) have reported the test reliability for receptive language was 70% and for expressive language was 76% using Test-Retest method.

The content validity index is obtained ranging from 0/8 to 1 in various developmental skills which indicates that the test has very high content validity.

In order to collect the data, Newsha Development Assessment Scale was first implemented on deaf children in both groups (pre-test) in the areas of expressive and receptive language development. The family-centered educational and psychological early intervention program designed by researcher was then implemented.

In 15 sessions of individual and group counseling were held during 5 months in order to increase the capacity of families in education and development of expressive and receptive language in deaf children and early intervention program content, was presented by using film screenings, lectures, power point presentations and educational CD. Then, Newsha development assessment scales were again implemented on the experimental and control groups and the obtained data was studied by co-variance analysis.

Table 1: A brief description on content of Psychological and Educational Family-Centered Early Intervention Programs is given in the table below.

Session	Subject	Issues discussed in the program
1	To get acquainted to characteristics of deaf children	Causes, cognitive, language, speech, motor, and emotional characteristics
2	Attitudes change in parents towards the deaf children	False beliefs modification, motivation and hope creation and diminishing negative feelings to accept disabled children with hearing loss, self-confidence strengthen methods, the relationship between parents and siblings, becoming familiar with services available in the community's supportive institutions
3	To get acquainted to the Issues of deaf children's education and rehabilitation	Features of education, educational programs, rehabilitation and treatment Issues, and hearing aids.
4	Relationship with Children	How to interact with a child in the first session, objectives and expectations from the deaf children and strengthening the parent - child interaction
5	Becoming Familiar with developmental skills	Cognitive, expressive – receptive language, hearing, and social skills.
6	The senses role in the deaf	Based on the oral - auditory and visual - auditory approaches.

children's learning		
7	Auditory training	Training of auditory training stages, the tasks of explore and distinguish speech and non-speech sounds and provided especial practical exercises in the games.
8	Auditory training	Teaching auditory training tasks related to identification and perception process of speech and non-speech sounds, auditory memory strengthening methods and providing especial practical exercises in the games.
9	Speech skills training	Features of voice, acoustic problems and improving their production, features of pronunciation and articulation, articulation problems and the methods of improving them.
10	Speech skills training	Features of fluency in speech and the types of problems and the methods of improving them.
11	Language skills training	Becoming familiar with language development stages, the factors affecting receptive and expressive language development, and ways to improve it, practical exercises in the games.
12	Language skills training	Becoming familiar with language development stages, the factors affecting receptive and expressive language development, and ways to improve it, practical exercises in the games.
13	Language skills training	Becoming familiar with language development stages, the factors affecting receptive and expressive language development, and ways to improve it, practical exercises in the games.
14	The importance of play in learning	Providing daily hearing and intellectual language games to develop perception of expressive - receptive language.
15	Happiness in the family and coping skills with crisis and stress	Defining happiness in the family, level of happiness in the family, the importance of happiness, Characteristics of happy couples, happiness test, What are stress and crisis? What are the sources of stress? What is stress? The effect of stress on the individual and coping techniques (Using of Cognitive- Behavioral Approach)

Findings

This study examines the impact of Family-Centered Psychological and Educational Early Intervention Program on the development of social and cognitive skills in children with hearing loss. The mean and standard deviation of cognitive and social skills in pre-test and post-test experimental and control groups are presented according to the study variables in Table 2.

Table 2: Statistical indicators of deaf children performance in the experimental and control groups in terms of cognitive and social skills

Group	Indicators	N	Cognitive				social				
			Pretest		Posttest		Pretest		Posttest		
			M	SD	M	SD	M	SD	M	SD	
Group	Control	15	50.40	20.48	52.66	20.41	43.86	12.03	46.20	12.07	
	Experimental	15	48.73	13.54	61.66	12.59	45.73	8.64	58.80	7.27	
Severity of hearing loss	Moderate and Moderate to severe	Con	3	52.33	22.14	55	21.93	47.33	13.42	50.33	12.42
		Exp	3	49.33	14.64	63.66	13.20	43	9.84	59	9.84
	Severe	Con	7	55.83	22.05	58.16	21.83	45.66	13.47	48	13.89
		Exp	6	53.14	15.24	63.85	15.06	48.42	9.05	59.28	8.71
	Profound	Con	6	44	20.12	46	20.12	40.33	11.21	42	11.02
		Exp	5	42.20	9.90	57.40	9.65	43.60	8.14	58	4.63
Group of age	0-24 Month	Con	5	25.80	6.72	28	6.78	29	7.82	31.60	7.70
		Exp	4	32.75	4.42	46.25	6.02	33.25	2.27	48.25	2.06
	25-36 Month	Con	4	54.50	6.45	57	6.73	48.75	3.30	50.75	4.11
		Exp	6	46.50	6.83	60.83	6.58	47.66	3.38	60.33	2.42
	37-54 Month	Con	6	68.16	10.77	70.33	10.25	52.83	4.40	55.33	4.58
		Exp	5	64.20	2.58	75	3.53	53.40	2.60	65.40	2.30

As it can be seen in table 2, the average cognitive and social skills in control and experimental groups are different from each other and experimental group have language skills more than the control group. To examine the significance of these differences, after testing the assumptions of parametric tests, the analysis of covariance was used. One of the assumptions in applying parametric tests is the assumption of distribution normality of group scores with sample groups in the community. Shapiro - Wilkie test was used to test this hypothesis.

The results showed that the assumption of distribution normality of pre-test scores can not be ruled out in both control and experimental groups. Also, to examine equality of variances, the data were analyzed with Levin variance

homogeneity test. The findings of Levine test show that P is not significant in the level of $P < 0.05$. Thus, the variances of the experimental and control groups are equivalent at all the study variables.

Table 3: Correlation matrix of the linear relationship between pre-test and post-test scores in the study variables

Scales			Cognitive skills		social skills	
	Pretest	R	Pretest	Posttest	Pretest	Posttest
Cognitive skills	Pretest	R	1			
	Posttest	R	0.945*	1		
socialskills	Pretest	R	0.921*	0.915*	1	
	Posttest	R	0.752*	0.906*	0.863*	1

$P < 0.0001^*$

The correlation matrix shows that the correlation between pre-test and post-test scores of all variables is significant in level of $P < 0.0001$.

This means that there is the linear relationship between pre-test and post-test scores for all variables.

Covariance Analysis

The first hypothesis: The Psychological and Educational Family-Centered Early Interventions have positive effect on development of cognitive skills in deaf children.

Table 4 findings: Analysis of covariance effect of family-based early intervention on cognitive skills in deaf children under the age of five

Source changes	SS	df	MS	F	P	Eta	R ²
Covariate variable	942.213	1	942.213	584.559	0.0001*	0.978	1
Group	660.379	1	660.379	409.706	0.0001*	0.969	1
Severity of hearing loss	15.619	2	7.810	4.845	0.027	0.427	0.696
Age	0.447	2	0.223	0.139	0.872	0.021	0.067
Group * Severity of hearing loss	18.053	2	9.027	5.600	0.018**	0.463	0.762
Group* Age	2.650	2	1.325	0.822	0.461	0.112	0.161
Age* Severity of hearing loss	3.509	4	0.877	0.544	0.706	0.143	0.141
Group * Severity of hearing loss* Age	0.471	2	0.235	0.146	0.866	0.022	0.068
Error	20.954	13	1.612				
Total	106703	30					

$P < 0.0001^*$

$P < 0.01^{**}$

Findings in table 4 show that in view of the pre-test scores as a covariate variable, the difference between control and intervention groups performance in terms of cognitive skills is significant in level of $P < 0.0001$.

In other words, the difference between the two groups scores indicates that psychological and educational family-centered early interventions have positive effect on development of cognitive skills in deaf children less than 5 years of age.

In view of the Eta square it can be said that 96% of these changes are due to interference effects. The results of the co-variance analysis (Table - 4) also show that psychological and educational family-centered early interventions programs have had a different effect on the development of cognitive skills in children with various severity of hearing loss, and there is a significant difference ($p=0.02$) in the level of $P < 0.05$ among children with different severity of hearing loss.

According to the Eta square, it can be stated that 42% of these changes are due to the impact of hearing loss severity on deaf children's level of impressionability from the intervention program. By referring to Table 2 and in view of the experimental and control groups averages at pre-test and post-test, It can be concluded that although the intervention program has affected the development of cognitive skills in all children with different levels of hearing loss, the highest level of impressionability from the intervention program within the area of cognitive skills development can be seen in profound, moderate and moderate to severe, severe and deaf children respectively.

The interactive effect of group and the hearing loss severity are significant according to the value of ($P=0.018$) in the level of $P < 0.05$. In view of the Eta square it can be said that 46% of these changes are due the interactive effect of group and the hearing loss severity. According to the results of co-variance analysis in relation to age

variable and its interactive effect with group and hearing loss severity, there is no significant difference between children of age groups participating in the intervention program in terms of the level of impressionability from the program within the area of cognitive skills development. By the way, no interactive effect was observed among age, group, and the hearing loss severity.

The second hypothesis: Psychological and educational family-centered early interventions have positive effect on social skills development in deaf children.

Table 5 findings: Analysis of covariance effect of family-based early intervention on social skills in deaf children under the age of five

Source changes	SS	Df	MS	F	P	Eta	R ²
	279.350	1	279.350	167.096	0.0001*	0.928	1
Covariate variable							
Group	711.641	1	711.641	425.675	0.0001*	0.970	1
Severity of hearing loss	54.022	2	27.011	16.157	0.0001*	0.713	0.997
Age	3.279	2	1.640	0.981	0.401	0.131	0.184
Group * Severity of hearing loss	30.122	2	15.061	9.009	0.004**	0.581	0.930
Group* Age	21.315	2	10.658	6.375	0.012***	0.495	0.817
Age* Severity of hearing loss	17.992	4	4.498	2.691	0.078	0.453	0.578
Group * Severity of hearing loss* Age	9.290	2	4.645	2.779	0.099	0.299	0.452
Error	21.733	13	1.672				
Total	86661	30					

P<0.0001* P<0.001** P<0.01***

Findings in Table 5 show that in view of the pre-test scores as a covariate variable, the difference between the control and intervention groups performance in terms of social skills is significant in level of $P < 0.0001$. In other words, the difference between the two groups scores indicates that psychological and educational family-centered early interventions have positive effect on development of social skills in deaf children under 5 years of age. In view of the Eta square it can be said that 97% of these changes are due to interference effects. The results of the covariance analysis (Table- 5) also show that psychological and educational family-centered early interventions programs have had a different effect on the development of social skills in children with various severity of hearing loss, and there is a significant difference ($p=0.0001$) in the level of $P < 0.0001$ among children with different severity of hearing loss.

According to the Eta square, it can be stated that 71% of these changes are due to the impact of hearing loss severity on deaf children's level of impressionability from the intervention program. By referring to Table 2 and in view of the experimental and control groups averages at pre-test and post-test, It can be concluded that although the intervention program has affected the development of social skills in all children with different levels of hearing loss, the highest level of impressionability from the intervention program within the area of social skills development can be seen in moderate and moderate to severe, profound and severe deaf children respectively.

The interactive effect of group with the hearing loss severity and group with age are significant according to the value of ($P=0.004$) in the level of $P < 0.001$ and ($P=0.012$) in the level of $P < 0.01$ respectively.

Referring to Table 2 and in view of the experimental and control age groups averages at pre-test and post-test, It can be concluded that between children of age groups participating in the intervention program in terms of the level of impressionability from the program within the area of social skills development, the younger children are benefiting more from the program.

Also, according to the results of co-variance analysis, no interactive effect was observed among age, group, and the hearing loss severity.

DISCUSSION AND CONCLUSION

Within the developed world, the availability of early identification and specialized audiological, language and educational interventions to ameliorate the consequences of congenital or early-onset hearing loss represents the expected standard of care. Without such interventions, children with hearing loss will experience significant delay or disruption to the development of their language and communication abilities, their social and emotional development and, ultimately, their educational achievement and life options (47).

In this regard, this article has evaluated the effectiveness of psychological and educational family-centered early interventions on cognitive and social skills development of deaf children under 5 years of age. The results support the efficiency of intervention for infants and young children with hearing loss. The findings showed that psychological and educational family-centered early interventions have positive effect on cognition and social skills development of deaf children under the age of five. This finding is consistent with findings reached by Popa, 2009; Yoshinaga-Itano, 2003; Pipp-Siegel, Sedey&Yoshinaga-Itano, 1998; Andrews &Zmijewski, 1997; Drasgow, 1998; Padden&Ramsey, 1998; Kennedy et al., 2006; Watkin et al., 2007; Yoshinaga-Itano, 2004; Suarez, 2000; Bigelow et al., 2010; Cusson, 2003; Smith, Landry, & Swank, 2006; Tamis-LeMonda& Bornstein, 2002.(21,26,27,25,28,29,30,32,5,33,34,37,38,39,40). One reason for this finding is that family-centered early intervention with educate strategies to parents on how to grow and strengthen the cognitive and social skills of deaf children Not only creates a more promising than the future their infant, but also reduces anxiety and increase parental involvement.The family-based intervention program helps to parents with creating active learning natural environments with minimal restrictions in which all learning opportunities available to boost growth and developmental abilities existence, are protected.Another parent-child interaction, family-based intervention programs, social skills and cognitive foundations of things, is intended to facilitate promotion of the growth skills and opportunities necessary to provide.Another reason is that. the family-based intervention program also provides the necessary context to create natural or least restrictive settings in which all learning opportunities for strengthening and growing child's developmental skills are within the access. It is in turn, an issue based on which the family-based intervention program has formed.The results also show that educational and psychological family-centered early interventions programs had a different effect on cognition and social skills development of children with various hearing loss severity. In the present study, in view of the experimental and control groups averages at pre-test and post-test, it can be concluded that although the intervention program on cognition and social skills development in all children with different levels of hearing lose proved to be effective, the highest level of impressionability from the program in the area of cognition skills development is observed respectively in profound, moderate and moderate to severe and severe subjects and in the area of social skills in profound, sever and moderate and moderate to severe subjects. Although children with profound hearing loss - as is expected and obvious in this study - are lower than others in cognition and social skills development, took a higher level of impression ability from intervention program than children with severe and moderate and moderate to severe hearing loss. This is probably due to attitudes change and very negative beliefs in families of children with profound deafness towards their children's abilities, and therefore more parental involvement and participation or, it is a result of a more adjustment of the intervention program contents to this group of children's needs.As to the results, there is no significant difference among children of age groups participating in the intervention program in terms of program's influence on the area of cognition and social skills development in relation with age and its interactive effect on the group and hearing loss severity. This issue, with regard to the heterogeneous age groups in terms participants number and sampling limitations, requires further study.Given the relatively similar levels of impressionability from intervention program in different age groups, in most studies, early detection and intervention of hearing loss, however, have been recognized crucial before 12 months of age, and certainly bring about more usefulness for children and their families, it seems that family participation in educational intervention programs and the program's consistency with the needs of children and of their families are stronger factors in deaf children's language, cognition and social development.Given what has been said so far, it can be concluded that although there are evidences proving positive outcomes for children with hearing loss as a result of early identification and intervention, such services for families should be presented in a caring and teaching setting, e.g. child's natural environment, and the goals of family-centered intervention program relate not only to developmental outcomes for the child but also to parents and family benefits, and should facilitate the active participation of children and families.

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