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# Analysis of the effectiveness of an intervention program for families of children with hearing impairment

## *Análise da efetividade de um programa de intervenção para famílias de crianças com deficiência auditiva*

### Descritores

Reabilitação da Deficiência Auditiva  
Fonoaudiologia  
Família  
Aconselhamento  
Avaliação da Eficácia-Efetividade de Intervenções

### Keywords

Correction of Hearing Impairment  
Speech, Language and Hearing Sciences  
Family  
Counseling  
Evaluation of the Efficacy-Effectiveness of Interventions

### RESUMO

**Objetivo:** Avaliar a efetividade de um programa de intervenção para famílias de crianças com deficiência auditiva. **Método:** Pesquisa de intervenção, com delineamento longitudinal e análise estatística inferencial. Foram realizadas 20 sessões de intervenção, durante oito meses; destas, 19 ocorreram em situação de grupo e uma sessão foi individual. Para a análise dos dados pré e pós-intervenção, foram aplicados instrumentos específicos e realizado o registro em vídeo da interação da família com a criança após quatro e oito meses. **Resultados:** Houve mudança clínica positiva confiável nas interações comunicativas das famílias com seus filhos, após 8 meses de intervenção. A necessidade de informações das famílias se modificou ao longo da intervenção e diminuiu para todas as famílias. **Conclusão:** verificou-se a efetividade da proposta de programa de intervenção para famílias de crianças com deficiência auditiva.

### ABSTRACT

**Purpose:** to evaluate the effectiveness of an intervention program for families of children with hearing impairment. **Methods:** Intervention research, with longitudinal design and inferential statistical analysis. There were 19 intervention sessions, for eight months, that occurred in a group situation and an individual session. For the analysis of pre and post intervention data, a video recording of the family interaction with the child was performed and instruments were applied. **Results:** There was a reliable positive clinical change in the communicative interactions of families with their children, after 8 months of intervention. The need for information from families changed during the intervention and declined for all families. **Conclusion:** The effectiveness of the proposed intervention program for families of children with hearing impairment was verified.

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## INTRODUCTION

Scientific evidence suggests that intervention programs for the hearing-impaired child population should be focused on the family<sup>(1-10)</sup>.

It is therefore justified to follow the families of children with hearing impairment in programs that consider their emotional needs and information on how to deal with the situation of being parents of a child with hearing impairment. Thus, due to the cascade of feelings experienced by families after diagnosis of hearing impairment, providing an adequate educational and support environment for families is crucial<sup>(6,10-13)</sup>.

The understanding that hosting and orientations to the families are key points for adherence to the speech-language intervention process<sup>(1-15)</sup> in auditory habilitation and/or rehabilitation is essential, and studies that seek to define effective intervention models of this nature are desirable.

The presence of a multidisciplinary team with a common knowledge base on hearing impairment, the active involvement of families based on adequate information and a strong connection between the services and the network of care for hearing impaired children are highlighted as relevant when there is a proposal for intervention with families<sup>(1,8,12,13)</sup>.

In addition, the literature emphasizes the importance of the in-service evaluation of such interventions<sup>(6,8,14,16)</sup>.

The present study sought to guide the recommendations for best practices in programs for the population of hearing-impaired children that include:

- a) Access to the coordinated entrance in programs that follow the best practices of accompanying the families from the confirmation of the hearing impairment in a timely manner<sup>(6,10,17,18)</sup>.
- b) Strengthening of families as an integral and active part of the intervention programs<sup>(19,20)</sup>.
- c) Emotional support that includes the meeting with other relatives of the children with hearing impairment and adults with hearing impairment<sup>(5-7-12,17)</sup>.

Some of the initiatives described in the literature, including the Brazilian reality, embrace parental support groups<sup>(20,21)</sup>, parenting courses, intervention through video-feedback, among other proposals<sup>(6,7,22)</sup>, however, there is still the need for research

that analyzes the effectiveness of interventions aimed at the families of children with hearing impairment.

In view of the above, the present study aimed to analyze the effectiveness of an intervention program for families of children with hearing impairment.

## METHODS

Intervention study, with longitudinal design, with inferential statistical analysis. This research was approved by the Research Ethics Committee, with number registered in Plataforma Brasil 1,144,295.

As inclusion criteria, all mothers with children with hearing impairment of any type or degree of hearing loss, in the age range of zero to four years, who used the Hearing Aids (HA) and/or Cochlear Implant (CI), inserted in a program of auditory rehabilitation of a high complexity hearing health service.

Twenty-five families were invited, of which 20 families signed the Free and Informed Consent Term (FICT) and were enlightened about the objectives of the study, in accordance with the ethical principles.

In all, six mothers of 2- to 3-year and 5-month-old children, diagnosed with severe to profound sensorineural hearing impairment, users of HA and/or CI, participated in the 19 group sessions and one individual session proposed by the study. The other families that signed the FICT and that, for different reasons, could not attend the 20 sessions proposed by the program were not inserted in the analysis of this study. Table 1 shows the demographic and characterization data of the families and their children with hearing impairment; whose results were eligible for the analysis.

The instruments used in the pre- and post-intervention analysis were:

- 1 *Family Needs Inventory (FNI)*<sup>(23)</sup>: An instrument used to evaluate the main information needs of the families before and after intervention. It covers seven topics: I - general information; II - information on hearing and hearing impairment; III - communication; IV - educational services and resources; V - family and social support; VI - community services and care; and VII - financial matters. In each topic there are related subtopics in which the families should respond if they needed to know about the topic or not and still

**Table 1.** Demographic and characterization data of families and their children with hearing impairment

Family	Age (mother)	Age (infant)	Age (auditory)	Hearing loss	Device type	AC	LC	EL	SEL
1	33	3 years old	14 m	BPS	HA	3	1	CES	E
2	30	2 years old	17 m	BPS	CI and HA	4	1	IES	E
3	26	2y5m	28 m	BPS	CI and HA	2	1	CES	E
4	22	2y5m	9 m	BPS	HA	1	1	IES	E
5	31	3y5m	20 m	BSS	HA	4	2	IHS	E
6	32	2y7m	17 m	BMSS	HA	5	3	CHS	E

**Subtitle:** BPS = Bilateral Profound Sensorineural; BSS = Bilateral Severe Sensorineural; BMSS = Bilateral Moderate to Severe Sensorineural; HA= Hearing Aids; CI= Cochlear Implant; AC = Auditory Category; LC = Language Category; EL = Educational Level; CES = Complete Elementary School; IES = Incomplete Elementary School; IHS = Incomplete High School; CHS = Completed High School; SEL = Socioeconomic Level; E = Family income is up to two minimum wages

had doubts about the topic that they would like to discuss. This instrument was adapted to Brazilian Portuguese in a previous study. Based on the families' responses to the FNI, a specific intervention was delineated regarding the information most frequently requested by the families, that is, the information in which the families marked YES or YES-DISCUSS (when they still had doubts about a certain topic). In this way, this instrument is an important auxiliary tool in intervention programs for families of children with hearing impairment.

- 2 *Checking Family Interaction*<sup>(24)</sup>: Adapted instrument used to analyze videos of mothers' interaction with children by three independent evaluators. The instrument is composed of two behavioral topics to be analyzed during the interaction: I - Child sensitivity and II - Conversation. Displays a scale from one to seven to score each observed item. The independent evaluators, EV1, EV2 and EV3, watched the video of the interactions of the families of children with hearing impairment and scored each item according to the aforementioned scale. When observing that a behavior would be rarely realized during the interaction, one, two or three were punctuated; if the behavior was frequently observed, five, six or seven were scored. The criterion of reliability was established among the evaluators who, for all the sessions, judged the interaction with variation of a point or equally. This instrument was also used in recent research, proving to be useful for therapeutic planning and guidance offered to the families of children with hearing impairment<sup>(19)</sup>.

The preparation of the materials for the intervention occurred from references of instruments used in the work with families of children with hearing impairment widely recognized, adapted to the reality of the study.

The organization of the data collection had three moments:

- (I) pre-intervention, (II) after four months of intervention and (III) after eight months of intervention.
- (I): After the hosting stage, the pre-intervention evaluation was scheduled, in which the families responded to the FNI and videotaped the interactions of those responsible with the children. Subsequently, the weekly group intervention sessions were started.
  - (II): After four months of intervention, the procedures were: reapplication of FNI and recording the interaction of families with children.
  - (III): After eight months of intervention, the application of the FNI and recording of the video of the family interaction with the child was performed.

Nineteen group sessions were conducted, with all sessions recorded in a fixed camera, installed on a tripod. The sessions lasted one hour and were conducted by two researchers: acting as moderators and/or performing a written record for later analysis of the results of the session. All sessions were described in a daily plan, with the goals, strategies used, and results observed. An individual session was held, for more direct orientations for

each family and for the analysis of a family interaction video with the child, at the end of the group intervention process.

The tabulation of all data (independent analysis of three evaluators of each pre and post interaction video and pre and post collected FNI) was followed by the inferential statistical analysis of the data in Software R, using the JT Method, initially proposed within the scope of Clinical Psychology for the investigation of the effectiveness of interventions. Described by Jacobson and Truax in 1991<sup>(25)</sup>, particularly aimed at analyzing the clinical significance of the results obtained with an intervention, although it is not possible to apply the treatment in a large number of individuals.

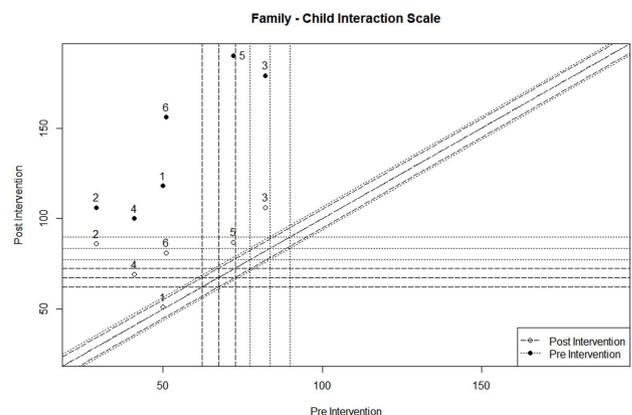
The JT Method provides a comparative analysis between pre and post intervention scores in order to establish if the distinctions between them represent reliable changes and if they are clinically relevant. This method is articulated in two basic concepts: clinical significance, more focused on external validity (production of effective changes from the point of view of the participant, the clinician or the family in the intervention) and the reliable change index related to the internal validity (factor that determines if the observed changes in the comparison between pre and post intervention may be related to the intervention procedures used or to measurement errors).

In this way, it was possible to affirm if the changes (occurred or not) were due to the intervention performed for each of the families<sup>(26)</sup>.

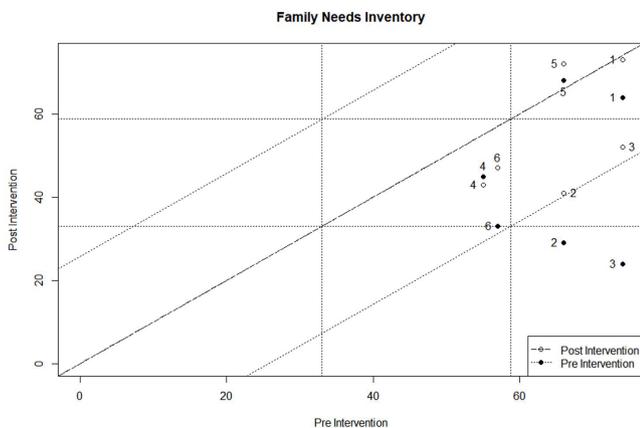
## RESULTS

After 8 months of intervention, all the families had a statistically significant positive clinical change, that is, they presented improvement in the interaction with their hearing-impaired children in all aspects observed by the proposed instrument for the analysis of the interaction (Figure 1).

Were observed, therefore, the indexes of reliable change of each participant of the intervention, determining a reliable positive clinical change. There was no negative change for the families studied. From the proposed analysis, it was noted that the participants who required intervention regarding their interaction with their children were families 1, 2, 4, 5 and 6.



**Figure 1.** Analysis of the family interaction in the pre- and post-intervention moments (4 months and 8 months)



**Figure 2.** Analysis of family needs in the pre- and post-intervention period (4 months and 8 months)

After 4 months, families 1 and 4 are still below horizontal lines (they did not present an acceptable score in the interaction analysis instrument), and only family 3 has an ideal score (above the horizontal lines). With this, we observed that 4 months of intervention for families 2, 3, 5 and 6 were enough to raise the families' interaction to an acceptable level, but not yet at the ideal level.

It is noteworthy that all families studied improved their interaction with their children after 8 months of intervention. The main points of improvement observed were the reduction of the intrusiveness of the mothers, greater joint attention, following the child's leadership, the use of communication strategies to minimize the breaks in the dialogue, the primary use of hearing as a communication channel and improvements in the pattern of intonation and speech velocity.

In the case of the Family Needs Inventory, caution should be taken in interpreting the data presented in Figure 2. The expectation, after an intervention program, is that the score in this protocol will decrease, since the families are informed and oriented on several aspects.

After 8 months of intervention, it was observed that all families, with the exception of family 4, had their information needs decreased, however, there were only two cases of reliable negative change, meaning that there was a statistically significant decrease in needs of information in two cases (families 2 and 3).

The other families (1, 5 and 6) remained with information needs on several FNI topics, which does not necessarily mean that the orientation process failed, since the needs assessed by families are dynamic and families already have a good level of information on a given topic may still require more specific information on this topic, without this representing lack of information or ignorance of the subject.

## DISCUSSION

The reliable clinical change observed in each family, under the effect of a group intervention, allowed the objective analysis of the intervention program for each one of them, contributing to the planning of individual guidance situations, also necessary

and important for families. This analysis tool<sup>(25)</sup> has proved to be useful for the refinement of clinical interventions with families of children with hearing impairment in both individual and collective settings, and their wide applicability is emphasized<sup>(25,26)</sup>.

The objectives of the intervention sessions with the families were, therefore, fulfilled, considering the changes observed in the statistical analysis of the data, using the JT Method.

It is worth noting that strengthening family-centered intervention and improving the preparation of family members for situations related to hearing impairment of their child<sup>(19-22)</sup>, through their reception and listening with the support of the other members of the group, were aspects reached in the proposed intervention, in agreement with the recommendations of the literature<sup>(1,9,14)</sup>.

The provision of information based on family needs<sup>(23)</sup> through the exchange of experiences and materials on children's development, neuroplasticity, hearing and hearing impairment, electronic hearing aids, communication strategies, how to enrich daily events, and family involvement in rehabilitation were important points in information counseling<sup>(14-16)</sup> and should also be part of routine guidance in individual auditory (re) habilitation therapy<sup>(2,19)</sup>, in addition to group visits<sup>(16)</sup>.

Through the analysis of pre-intervention and post-intervention interaction videos, a significant improvement in the quality of communication between mothers and their children was noticed, a fact that was highlighted in studies as a predictive factor of language development in children with hearing impairment, pointing out the importance of working with families to improve the prognosis and the abbreviation of auditory therapy<sup>(6,8,9,16,19)</sup>.

The fact that all families are classified in the same economic profile made it possible to consider that low-income parents can benefit from intervention programs of this nature, an important fact, given that this is the predominant income range in the population attended in the hearing health services in Brazil.

Regarding the educational level of the mothers, it is noticed that all the mothers obtained changes in the communication with their children, regardless of the schooling; however, it was observed that mothers 1 and 3, with incomplete primary education, had the lowest scores regarding the improvement of their interactions with their children, contrasting with mothers 5 and 6, with a higher level of education (incomplete and complete, respectively).

Economic and educational factors should therefore be considered in the organization of services to families<sup>(8,14,20,21)</sup>, especially as regards the strategies to be employed, the time required for positive changes, as well as the educational materials used, adapted to their reality, so that they are effective.

It was also observed that investigating parents' knowledge and their main information needs is fundamental for the planning of specific and personalized interventions<sup>(18,23)</sup>.

At the end of the program, some of the information needs have resurfaced, confirming the importance of continued support for families. It was found that the families' needs are dynamic and that permanent orientation programs are necessary to support the different needs of each family, even considering similar characteristics among them (in the case of the study group).

Thus, from the analysis of interaction data and family needs, it is considered that the combination of information counseling

(guidance) and personal adjustment<sup>(14)</sup> is extremely important for families to meet their need for information, as well as to have a space to reflect on their role and their parental experience in the universe of hearing impairment<sup>(6,10,13,17)</sup>.

## CONCLUSION

The intervention proposed to families of children with hearing impairment was effective, with the following positive effects:

- There was a reliable positive clinical change in the interaction of all families with their children after 8 months of intervention;
- Family needs changed and decreased for all families, with reliable negative clinical change for families 2 and 3, after 8 months of intervention.

It is also worth noting that the time of 4 months of intervention was insufficient to promote reliable clinical change for all the families participating in the group intervention, indicating, therefore, that the interventions of medium or long duration with the families of children with hearing impairment will promote positive effects, although other longitudinal studies and specific analysis are necessary to determine the therapeutic time for this intervention model, as well as to guarantee the maintenance of its results.

It is also necessary to improve the methodological nature of this study, with control groups and greater number of participants, which will enable more information to optimize the auditory (re)habilitation approach with the families of children with hearing impairment.

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### **Author contributions**

*MCOL: Literature review, writing of the research project, data collection and analysis, elaboration of the original article; ASS: data collection and analysis, elaboration of the original article; IRDS: review of the literature and elaboration of the original article; WLOC: data statistical analysis, contribution in the elaboration of the original article; JSB: design and study design, research orientation, data analysis, elaboration and review of the original article.*