

The relationship between parenting styles and hearing development in children with cochlear implants

A relação entre estilos parentais e desenvolvimento auditivo em crianças com implante coclear

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ABSTRACT

Purpose: The purpose of this study was to investigate the relationship between parenting styles and hearing skills in children with hearing loss who use cochlear implants. **Methods:** This is an observational analytical study. The participants were the children's main caregivers divided into a study group (N=50) and a control group (N=28). The children's ages were between 3 and 7 years old. Subjects in the study group provided a past medical history (PMH), and completed the Parenting Styles and Dimensions Questionnaire (PSDQ) and the Infant-Toddler Meaningful Auditory Integration Scale (IT-MAIS) or the Meaningful Auditory Integration Scale (MAIS). Subjects in the control group also provided a PMH and completed the PSDQ. The Mann Whitney test, the Spearman coefficient, and the Kruskal-Wallis test were used for data analysis, utilizing the JASP 0.8 and SPSS 23 softwares. **Results:** Results showed that The authoritarian parenting style and punishment dimension revealed a statistical significance, with higher scores for children with altered auditory development. **Conclusion:** It was concluded that the practice of authoritarian parenting style with punitive dimensions and physical coercion were related to altered hearing development. Regulation dimension presented a significant correlation with hearing development. The outcome suggested the importance of psychotherapeutic strategies for caregivers who are responsible for children with hearing loss.

Keywords: Child psychology; Parents; Child; Cochlear implant; Speech, Language and Hearing Sciences

RESUMO

Objetivo: O objetivo deste estudo foi investigar a relação entre estilos parentais e habilidades auditivas em crianças usuárias de implante coclear. **Métodos:** Este é um estudo analítico observacional. Os participantes foram os cuidadores principais das crianças divididos em grupo estudo (N=50) e grupo controle (N=28). As idades das crianças estavam entre 3 e 7 anos. Os indivíduos do grupo estudo forneceram uma história médica pregressa (HMP) e preencheram o Questionário de Estilos e Dimensões Parentais (QEDP) e a Escala de Integração Auditiva Significativa Infantil-Toddler (IT-MAIS) ou a Escala de Integração Auditiva Significativa (MAIS). Os sujeitos do grupo controle também forneceram um PMH e preencheram o QEDP. O teste de Mann Whitney, o coeficiente de Spearman e o teste de Kruskal-Wallis foram utilizados para análise dos dados, utilizando-se os softwares JASP 0.8 e SPSS 23. **Resultados:** Os grupos estudo e controle não apresentam diferenças significativas em relação aos estilos parentais ($p < 0,05$). A dimensão estilo parental autoritário e punição revelou significância estatística, com escores mais elevados para crianças com desenvolvimento auditivo alterado. **Conclusão:** No presente estudo foi possível verificar que a prática do estilo parental autoritário com dimensões punitivas e coerção física esteve relacionada ao desenvolvimento auditivo alterado em crianças usuárias de implante coclear.

Palavras-chave: Psicologia infantil; Pais; Criança; Implante coclear; Fonoaudiologia

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INTRODUCTION

The analysis of parenting styles can help guide child development, especially in populations with impaired/altere development, such as children with hearing loss. The Parenting Styles and Dimensions Questionnaire (PSDQ) is a tool used to classify parenting styles and dimensions in families according to their behavior towards their children. Each style has dimensions based on the theory proposed by Baumrind⁽¹⁾, characterized by the relationship of affection and control that caregivers demonstrate during children's upbringing⁽²⁾.

The democratic parenting style is made up of support and affection dimensions, as well as regulation and autonomy. This style is considered to be the most advantageous for the child's psychosocial development due to a relationship balance of affection and control with the child⁽³⁾. The authoritarian style is composed of physical coercion, verbal hostility and punishment dimensions and it is characterized by a relationship based on control⁽²⁾⁽³⁾. The permissive style focuses on an affectionate relationship with the child and is characterized by an indulgence dimension⁽²⁾⁽³⁾. The PSDQ allows the investigation of the relationship between parenting practices within a study sample.

Hearing impairment greatly interferes with communication skills and is responsible for social development impairments, as it directly interferes with interpersonal communication, educational and professional impacts⁽⁴⁾. Early identification of hearing loss is advantageous because it allows for intervention and continuous treatment from the beginning of life⁽⁵⁾. Individuals with hearing loss may be referred to cochlear implant surgery, if necessary, depending on the degree and type of hearing loss⁽⁶⁾.

Intra-family communication becomes a challenging aspect for parents of children with hearing loss. These children may present with difficulties in hearing and speech development. As such, negative feelings may appear throughout the child's upbringing, such as nervousness, a feeling of giving up, frustration, insecurity and persistence. Children with hearing impairment are also more predisposed to develop rebellious, disinterested and irritable behaviors, which may further increase family conflict⁽⁵⁾. Verbal and non-verbal family communication is crucial in child development. As such, partial or total hearing loss in children can generate intra-family relationship difficulties during the child development period⁽⁷⁾.

Parental practice plays a similar role to educational practice, which seeks to suppress behaviors considered inappropriate and encourage the occurrence of desired behaviors⁽⁸⁾. However, in current research there is a gap on the use of dimensions and influences of parenting practices in parents of children with hearing impairment. Therefore, identifying the parenting style related to educational practices in raising children with hearing impairment can help in planning the speech therapy and interdisciplinary therapeutic process, indicating possible interference in the development of children's auditory skills.

The authors of this research are interested in identifying the relationship between democratic parenting styles and hearing development in children with cochlear implants. A further interest of this study is to observe the practice of maladaptive parenting styles of parents of children with hearing loss and their negative association with the children's auditory skills development.

The purpose of this study was to compare caregivers' parenting styles of children with hearing loss to caregivers'

parenting styles of children without hearing complaints and to investigate the relationship between parenting styles and auditory skills (normal ou abnormal) in children with cochlear implants. The study's hypothesis is to identify a significant relationship between maladaptive parenting practices more frequently in the group of parents of children with hearing impairment and its negative association with the development of auditory skills in the studied group.

METHODS

Study design

This was an observational analytical study. The project was approved by the Research Ethics Committee of UFMG, protocol number 09699119.8.0000.5149. Data collection was carried out in three scenarios: On a virtual platform, and in two physical cochlear implant locations:

- a) Hearing Health Care Service, Cochlear Implant Outpatient Clinic, Hospital das Clínicas, UFMG. The institution is accredited by the Ministry of Health. It assists patients with severely profound deafness who were unsuccessful in using individual sound amplification devices and who were referred for cochlear implants after a multiprofessional evaluation;
- b) The Hearing Rehabilitation Center of Minas, known by its acronym *CEMEAR*, is a non-profit and associative institution that seeks to guarantee access to diagnostic and therapeutic resources for patients undergoing hearing (Re)habilitation. *CEMEAR* has specialists in the areas of speech-language pathology, psychology, psychopedagogy, and social work.

Two strategies were adopted to assemble the control group: The use of data already collected from another project "Adaptation, Validation and Standardization of the Parental Styles and Dimensions Questionnaire for a Brazilian population", and recruitment of volunteers.

Sample

78 participants were evaluated. Participants were divided into Study Group and Control Group. The Study Group was further subdivided according was divided according to the pattern of development of the children's auditory skills, that is, normal or altered.

- 1- Study group (n=50), formed by parents and/or main caregivers of children using cochlear implants. These guardians answered the survey based on the care and observations of their children, who were aged between 3 and 7 years old and underwent cochlear implant surgery and were undergoing speech therapy at Hospital das Clínicas, UFMG, or at *CEMEAR*. This group was initially recruited in person and then, due to the period of the COVID-19 pandemic, by videoconference, and the evaluation protocol was applied in person and also by videoconference;

- 2- The control group (n=28) consisted of parents and/or main caregivers of children of the same age, but without hearing impairment, recruited through an online platform from an existing sample of another research project. This group was recruited through an online protocol restructured through another research pilot project, which was developed in the same institution by two of the same researchers of the present research. All evaluated participants received an online informed consent form and agreed to participate in the research.

Furthermore, it is important to clarify that control group and study group were matched for age and sex. Recruitment began in June 2019, after receiving approval by the Ethics and Research Committee and the following procedures were performed:

Procedures

1- Study Group

- a) History: Structured interview with the purpose of obtaining participants' information, divided in three sections:
 - Participants' information (name, age, relationship, education);
 - Information about the child and characteristics of the hearing loss (name, age, date of birth, gender, type/degree/configuration of hearing loss, date of hearing loss diagnosis, associated impairments, and medication use);
 - Cochlear implant information: When surgery was performed, type of implant, use of bimodal adaptation, use and/or interruption of the device since activation for technical or other problems, child's follow-ups within the multidisciplinary network (e.g., speech-language pathologist, psychologist, occupational therapist, physical therapist).
- b) The Brazilian version of the Parental Styles and Dimensions Questionnaire (PSDQ)⁽⁹⁾. This tool is used to classify families' parenting styles according to their behavior towards their children. The PSDQ is a self-assessment instrument consisting of thirty-two (32) questions (short version adapted to Brazil). Fifteen (15) questions on democratic parenting style, twelve (12) on authoritarian parenting style, and five (5) on permissive parenting style. Each style presents with dimensions that influence the total score. The democratic style possesses dimensions of affection and control, and regulation and autonomy. The authoritarian style possesses dimensions of physical coercion, verbal hostility and punishment. The permissive style possesses the dimension of indulgence. Result comparison and data analysis of parenting styles and dimensions allow to investigate the relationship between parenting practices and speech development of children with hearing loss who use cochlear implants. The objective of the PSDQ is not to predict parents' permeability in the cochlear implant process, despite assessing parenting styles and dimensions.

- c) The Infant-Toddler Meaningful Auditory Integration Scale (IT-MAIS) and Meaningful Auditory Integration Scale (MAIS) are measures used to assess the auditory perception evolution of children with cochlear implants with age less than 4 years and over 4 years of age respectively. The questionnaire carried out with parents consists of 10 interview questions. Parents are asked to report the child's auditory behavior based on proposed situations, offering as many examples as possible and describing the child's attitudes. The result is calculated by adding the total number of points accumulated in each question, which may range from zero (0) to forty (40) points. This also allows the identification of the children's speech perception through the Infant-Toddler Meaningful Auditory Integration Scale – IT-MAIS (for children up to 4 years old) and the Meaningful Auditory Integration Scale – MAIS (for children over 4 years old). To classify the results as normal or abnormal, previously published works were used as a reference^(10,11). For children up to 4 years old, applied IT-MAIS, the classification analyzes were based on the results from Comerlato⁽¹⁰⁾. As for older children, when MAIS was applied, the results came from Alves et al.⁽¹¹⁾. The study group was classified as normal or altered according to the auditory development of the children and the time of use of the cochlear implant.

Participants read and signed the free and informed consent form, and completed the PSDQ, IT-MAIS, and MAIS, all within a 40-minute session. In-person data collection was carried out in a private room, on the same day the children received treatment at one of the two above-mentioned institutions. Remote data collection was carried out via videoconference with the children's responsible caregivers, in a suitable environment for the application of the protocol. All responses were recorded in specific protocols and properly transferred to a database for further study and statistical analyses.

2- Control Group

The control group consisted of twenty-eight (n=28) participants. The analyzed sample was extracted from another research project carried out at the UFMG, entitled "Adaptation, Validation and Standardization of the Parental Styles and Dimensions Questionnaire for a Brazilian Population" with the approval of the Ethics Committee. Researchers from both projects provided the database for the present study. Selection of subjects for the control group was based on matching information to study group participants.

- a) Information about the participants and the children
 - Participant: (age, relationship, education) ;
 - Child: (full name, age, date of birth, gender).

All information used was contained in the project database "Adaptation, Validation and Standardization of the Parental Styles and Dimensions Questionnaire for a Brazilian Population"

b) PSDQ

Inclusion and Exclusion Criteria

Inclusion criteria for the study group were adults aged 18 years and over and parents and/or caregivers of children aged between 3 and 7 years, users of cochlear implants and who are regularly monitored at the hearing health service. and speech therapy.

Exclusion criteria were withdrawal from participation in the research or not responding to the two proposed questionnaires.

Inclusion criteria for the control group were adults aged 18 years or older, parents and/or caregivers of children between 3 and 7 years of age who did not have self-reported sensory impairments. Exclusion criteria were withdrawal from participation in the research or not responding to the two proposed questionnaires.

Statistical analysis

The mean, standard deviation, median, minimum and maximum values were calculated for continuous variables (child's age). The study group was classified as normal or altered according to auditory development and time of CI use. The Mann-Whitney test was used to compare similarities between the control and study groups. Spearman's correlation analysis was used between the PSDQ results (total score of parenting styles and dimensions) and the results obtained in the IT-MAIS and MAIS scales in order to test the correlation between parenting styles and children's auditory skills. The Kruskal-Wallis test was used to verify the association between parenting styles, within the two groups, classified according to normal or altered auditory integration index. The significance level considered was $p \leq 0.05$ ⁽¹²⁾. The Jasp 0.8⁽¹³⁾ and SPSS 23⁽¹⁴⁾ softwares were used for the above-mentioned analyses.

The Mann Whitney test was used to compare the study and control groups, in an attempt to analyze the relationship between parenting styles and auditory skills of children with cochlear implants. The Spearman's coefficient was used to assess the relationship between parenting styles and hearing skills in the study group. The Kruskal-Wallis test was used to verify the association between parenting styles and dimensions of the PSDQ and the evaluated groups⁽¹²⁾.

RESULTS

The study group (N=50) sample consisted mostly of mothers (80%), aged between 25 and 34 years (40%) mean = 29,5, with a completed high school education (50%). All children were

cochlear implant users between ages 3 and 7 years old and mostly female (56%). Some families (46%) were not able to provide an accurate etiology of the child's hearing difficulties. Etiologies identified by caregivers were genetics (14%), antibiotic use (8%), meningitis (6%), cytomegalovirus (6%), jaundice (4%), Waldenburg syndrome (4%), hydrocephalus (2%), anoxia (2%), Qtlong Syndrome (2%), Turner Syndrome (2%), CHARGE Syndrome (2%), and Kjer Syndrome (2%).

Most children underwent Neonatal Hearing Screening (92%). The minority of evaluated children presented with mixed diagnoses (20%), characterized by Autism Spectrum Disorder (ASD), Attention Deficit Hyperactivity Disorder (ADHD), Cerebral Palsy, Aniridia, Qtlong Syndrome, Down Syndrome, CHARGE Syndrome, Turner, Waldenburg Syndrome, and Kjer Syndrome. Four children (8% of the sample) underwent medication follow-up due to the diagnoses of Qtlong Syndrome, Cerebral Palsy, and ASD. Among the drugs used were Neuleptil, Propanolol, Artane, Valproic Acid, Aripiprazole, Imipramine, Risperidone and Anafranil.

A large part of the studied sample participated in regular therapy sessions, such as speech-language pathology (94%), followed by psychotherapy (30%), and other therapies, such as psychopedagogy, physical therapy, occupational therapy, and Brazilian sign language. Children had received cochlear implants from two months to six years prior to the time of the research. Most children used a unilateral cochlear implant (66%) with continuous use of the device (82%).

The control group (N=28) has mostly mothers over 35 years (57.14%) and with a completed high school education (46.43%). Most children were female (53.57%). Table 1 describes the breakdown of responses by participants in the control and study groups and their respective percentages in relation to the total value. All responses identified in this table were extracted from the structured interview protocol with the participants.

Table 2 presents the clinical data of the study group (N=50) according to the clinical follow-ups performed by the children, the type, frequency, time and age of cochlear implantation.

Table 3 presents the results of the Kruskal-Wallis test of the association between the results obtained in the PSDQ between the children in the study group with normal and abnormal auditory performance and the control group. The "authoritarian" parenting style and the "punishment" dimension were statistically significant.

Table 1. Description of Participants in the Study and Control Group

	Study Group (N=50)			Control Group (N=28)		
		N°	%		N°	%
Relationship	Mother	40	80	Mother	28	100
	Father	5	10			
	Other	5	10			
Education	Complete Primary Education	9	18	Complete Primary Education	7	25
	Complete High School	25	50	Complete High School	13	46
	Complete Technical Education	3	6	Complete Technical Education	8	29
	Complete Higher Education	13	26			
Child's Age	3 years	11	22	3 years	1	4
	4 years	8	16	4 years	3	10
	5 years	4	8	5 years	3	10
	6 years	12	24	6 years	9	33
	7 years	15	30	7 years	12	43
Child's Gender	Female	28	56	Female	15	54
	Male	22	44	Male	13	46

Table 2. Clinical description of children in the study group

		N°	%
Side Diches	Speech Therapy	47	94.0
	Psychology	15	30.0
	Others	19	38.0
Tyoe of Adaptation With Cochlear Implant	Unilateral	33	66.0
	Simultaneous Bilateral	11	22.0
	Sequenced Bilateral	6	12.0
Implantation Age	<1 year	4	8
	1 a 2 years	17	34
	2 a 3 years	12	24
	3 a 4 years	5	10
	4 a 5 years	8	16
	5 a 6 years	4	8
Implant Activation Time Cochlear	<1 year	9	18
	1 a 2 years	4	8
	2 a 3 years	9	18
	3 a 4 years	13	26
	4 a 5 years	10	20
	5 a 6 years	1	2
	>6 years	4	8
Results	IT MAIS	19	38
	(Average ± SD)	29.5	10.4
	MAIS	31	62
	(Average ± SD)	30.48	8.33

Subtitle: Standard Deviation = SD; IT MAIS = Infant-Toddler Meaningful Auditory Integration Scale; MAIS = Meaningful Auditory Integration Scale

Table 3. Association Between Parenting Styles and Dimensions (PSDQ) with evaluated Groups: control group and Study group with normal performance, study group with altered performance

	control group (n= 28)	Study group with normal performance (n= 27)	study group with altered performance (n=23)	p-valor
Parental Dimension				
Regulation (average ±SD)	4.37 ± 0.54	4.22 ± 1.09	4.13 ± 0.67	0.26
Support and Affection (average ± SD)	4.40 ± 0.40	4.55 ± 0.50	4.51 ± 0.37	0.281
Autonomy (average ± SD)	3.67 ± 0.79	3.79 ± 0.95	3.79 ± 0.77	0.739
Physical Coercion (average ± SD)	2.07 ± 0.79	2.36 ± 0.95	2.59 ± 0.84	0.172
Verbal Hostility (average ± SD)	2.70 ± 1.01	2.25 ± 0.78	2.94 ± 0.98	0.05
Punishment (average ± SD)	2.24 ± 0.75	1.89 ± 0.68**	2.54 ± 0.91**	0.024*
Parental Style				
Democratic (average ± SD)	4.15 ± 0.44	4.19 ± 0.71	4.14 ± 0.43	0.46
Authoritarian (average ± SD)	2.32 ± 0.71	2.15 ± 0.65**	2.68 ± 0.73**	0.040*
Permissive (average ± SD)	2.52 ± 0.68	2.63 ± 0.83	3.12 ± 0.96	0.073

Kruskal Wallis Test; **Kruskal-Wallis test and Dunn's post-test; *There was statistical significance between the groups study with normal performance and with altered performance in the same aspect analyzed

Spearman's Correlation was used in Table 4 to correlate the results obtained in PSDQ, which cover parenting styles, and the results obtained in IT MAIS and MAIS, which cover children's auditory skills. The only relationship that proved to be significant was between auditory skills and parental parental regulation (p -value < 0.05), which includes the democratic parenting style group. The p -value of the authoritarian and permissive styles results did not show significant difference for the sample.

Table 5 presents the results of the Spearman Correlation performed by separating the clinical group with normal and abnormal auditory development with the PSDQ. Statistically

significant results were found between physical coercion and the authoritarian style in the group of children with altered results.

DISCUSSION

Results obtained among participating children suggested a positive correlation between the parental dimension of regulation and the development of auditory skills. Findings showed that the project's alternative hypothesis was confirmed, albeit from a different perspective: The authoritarian style and the punishment and physical coercion dimensions showed statistical

significance for cochlear implant timing in the group of children with the worst performance. This finding is in agreement with the literature that highlighted the impact of parents' behavior on the development of children with disabilities⁽¹⁵⁾⁽¹⁶⁾⁽¹⁷⁾.

Through the analysis of the association between children's auditory development and parenting styles, this study revealed evidence of a significant association between authoritarian parenting style and the punishment and physical coercion dimensions within the group of children with the worst auditory performance. According to Falcke (2012), the use of violence is built when the individuals involved showed a reduced capacity for symbolization. As such, they tend to resort to an approach with more primitive attitudes⁽¹⁸⁾. People with hearing loss typically present with a hearing and speech development that differentiates them from the standard hearing population in terms of communication. This fact may impact intra-family communication between parents and the child, hence contributing to the development of authoritarian dimensions in parenting practices.

Hearing impairment coupled with maladaptive parenting practices can be doubly harmful to the child's development, as the hearing impairment itself already predisposes children to have fewer social interaction opportunities due to their language difficulties⁽¹⁹⁾. Children of parents who use authoritarian parenting practices tend to develop social and academic skills with low self-confidence, low self-reliance and low self-perception⁽²⁰⁾. In addition, these children tend to present with a greater chance

of developing psychopathological disorders⁽²¹⁾. Experience and context enable children to learn the meaning of a new word. However, once social behavior difficulties arise, children may experience a loss in the development of their communicative abilities⁽²²⁾.

This study found that the time of use of the cochlear implant showed a weak and non-significant correlation with the IT-MAIS and MAIS scores. However, other factors also influenced the language development of children with hearing loss. A study by Lynce et al.⁽²³⁾ stated that there are determining factors for the oral verbal language development and proficiency of deaf children with CI. Such factors include age of implant, CI time of use, and parental involvement in early intervention. The present study did not aim to analyze factors associated with the questionnaires' results, which may justify the lack of correlation between the variables.

Results did not identify a significant correlation between auditory skills development and time of use of the device. In other words, there was no significant evidence that longer time of use of the cochlear implant corresponded to better auditory integration scales results. Scarabello et al.⁽²⁴⁾ suggested caution in these types of correlational conclusions because bad scores by children with CI may not mean poor performance, but rather auditory skills still being in development, since children with implants may present with a late hearing age.

Children described in the chart as "poor performers" may not be wearing their cochlear implant device long enough daily, or they may have stopped using their device. It is noteworthy that all children were being followed up at the hearing health service in regular speech therapy and it is also emphasized that the comparison analyzes between the groups were carried out by subtracting the time that the child was without his device.

Continuous cochlear implant use allows children to reach developmental milestones. However, the age of implant is also a very important factor for their language development. The earlier the cochlear implant is performed, the better the child's auditory, speech and oral language development⁽²⁵⁾. As in the study by Scarabello, some children may not have reached the standard threshold of auditory development. Many other variables may also be interfering with the auditory acquisition results⁽²⁴⁾.

The present study showed that adaptive parenting dimensions were positively associated with auditory development, and that authoritarian parenting style had a significant correlation with the group of children with the worst performance. Results suggested the importance found in instructing caregivers of children with

Table 4. Spearman correlation between PSDQ and IT MAIS/MAIS in the study group

Parental Style/ Dimension	Correlation Coefficient	Sig.
Physical Coercion	-0.029	0.844
Verbal Hostility	-0.064	0.66
Punishment	-0.156	0.279
Authoritarian	-0.086	0.553
Permissive	-0.242	0.91
Autonomy	0.111	0.442
Regulation	0.36	0.01*
Support and Affection	0.142	0.325
Democratic	0.246	0.085

Subtitle: PSDQ = Parenting Styles and Dimensions Questionnaire; IT MAIS = Infant-Toddler Meaningful Auditory Integration Scale; MAIS = Meaningful Auditory Integration Scale; Sig. = meaningfulness. *Results with statistical significance

Table 5. Correlation Results Distribution in the group of children using Cochlear Implants with normal and abnormal hearing performance

Parental Style/Dimension	Normal			Abnormal		
	C. Correlation	Sig. (bilateral)	N	C. Correlation	Sig. (bilateral)	N
Democratic	0.255	0.199	27	-0.084	0.703	23
Autonomy	0.327	0.095	27	-0.124	0.572	23
Regulation	0.267	0.179	27	0.11	0.617	23
Support & Affection	0.025	0.903	27	-0.383	0.071	23
Authoritarian	-0.088	0.661	27	-0.455*	0.029	23
Physical Coercion	-0.13	0.519	27	-0.452*	0.031	23
Verbal Hostility	-0.069	0.732	27	-0.316	0.142	23
Punishment	0.054	0.79	27	-0.391	0.065	23
Permissive	0.021	0.917	27	-0.372	0.08	23

Subtitle: C. Correlation = efficiency coefficient; Sig. = meaningfulness. *Results with statistical significance

cochlear implants to balance the relationships of affection and control. Parents of children with hearing impairment should have the right to access professional guidance as needed, from the time of diagnosis to the hearing rehabilitation process. Yamanaka et al.⁽⁷⁾ emphasized a need for a systematic and interdisciplinary guidance framework, aimed at achieving emotional balance for family members undergoing cochlear implant surgery preparation. The interdisciplinary hearing health team included, in its training, professionals in the field of speech-language pathology, psychology and social work⁽¹⁰⁾. In this way, the results of this study reinforce the importance of interdisciplinary work and the use of the PSDQ to guide the selection of cochlear implant candidates and the elaboration of the prognosis.

Parent training programs are used for parental readaptation and stimulation for democratic practices. It is difficult to document the real significant effect of this type of intervention. However, when the intervention changes the parents' behavior towards their children, the children's behavior consequently changes as well. Similar strategies can be adopted with caregivers of children with cochlear implants, implementing behavioral changes within the hearing rehabilitation treatment. Continuous caregiver monitoring is also important for directing authoritarian parenting styles, which are indicators of altered auditory development in children. According to Falcke et al.⁽¹⁸⁾, caregiver intervention aims to control children's behavior. This is necessary to establish limits between the "punitive education" and violent physical abuse, since the threshold that distinguishes one from the other can be quite subtle and associated with impaired hearing development.

Limitations to this study included the fact that not all variables were taken into consideration that might have played a role in the hearing and language development of the children with cochlear implants. The Parental Styles and Dimensions Questionnaire did not look into the socio-emotional analysis and the family's permeability in the auditory rehabilitation process. Questionnaires were carried out differently between the study and control groups. The study group completed the questionnaires in-person and via videoconference, while the control group completed them online, via Google Forms.

The form of evaluation was also a limitation to the study as it may have interfered with the results between the two groups. The coronavirus international pandemic (COVID-19) - declared by the World Health Organization (WHO) on January 30, 2020, resulted in the need to stop in-person activities at UFMG, due to lockdowns in an effort to reduce the virus spread⁽²⁶⁾.

From May to October 2020, sample collection of participants in the control group was carried out via videoconference. According to Paula⁽²⁷⁾ and de Paula et al.⁽²⁸⁾, remote data collection alternatives are continuously being explored. The use of virtual platforms for research data collection presents a variety of benefits, including speed, practicality and cost-effectiveness. The use of online research protocols was approved by COEP/UFMG starting on July 3, 2020. All remote research participants were contacted ahead of time to confirm the possibility of carrying out the online assessment, as resources like internet access and familiarity with social video-communication applications proved to be scarce within the Brazilian context⁽²⁷⁾.

CONCLUSION

In conclusion, authoritarian parenting style with punitive dimensions and physical coercion were correlated to altered auditory development, and the parental regulation dimension presented a significant correlation with the development of auditory skills in children with cochlear implants.

Continuous research is needed in the area of families of individuals with hearing impairment. Environmental factors in the development of auditory, psychosocial and cognitive abilities of individuals with deficiencies are also important in the search for effective parents and caregivers' reception and orientation strategies.

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