

# ***EVALUATING PARTICIPATION RESTRICTION IN ELDERLY PATIENTS BEFORE AND AFTER AUDIOLOGICAL REHABILITATION***

## ***Avaliação da restrição de participação, em idosos, antes e após a intervenção fonoaudiológica***

Ruth Magalhães <sup>(1)</sup>, Maria Cecília Martinelli Iório <sup>(2)</sup>

### **ABSTRACT**

**Purpose:** to study the effects of audio logical rehabilitation through the fitting of hearing aids in participation restriction in daily living activities, according to gender and age. **Method:** the study included 50 seniors, 23 females and 27 males. The elderly were divided in two groups: Group 1 – with 24 seniors, 11 females and 13 males, aged between 60 and 74 years, Group 2 – with 26 seniors, 12 females and 14 males aged less than 75 years. The elderly were assessed before and one year after as for the adaptation of hearing aids through HHIE. Bi-monthly follow-ups were performed, making up a total of seven meetings, in order to ensure the effective use of hearing aids. The statistical method included descriptive statistics and variance analysis. **Results:** the analysis revealed that there was HHIE significant reduction of participation restriction in Social and Emotional scales in the post intervention in both age groups, both males and females. **Conclusion:** there is minor perception of participation restrictions after audiological rehabilitation in the Scales of Social and Emotional HHIE.

**KEYWORDS:** Aged; Hearing Loss; Hearing Aids; Questionnaires

### ■ INTRODUCTION

The IBGE estimated that there were nearly 21 million elderly (60 years of age or older) people in 2008. The aim of the national policy for the elderly is to ensure their social rights and to create conditions that promote their independence, integration and effective participation in society and generally maintain their quality of life. According to the Brazilian Institute of Geography and Statistics (Instituto Brasileiro de Geografia e Estatística – IBGE), given the trends in fertility rates and life expectancy within the Brazilian population, the elderly population may exceed 30 million people within the next 20 years, at which point it would represent almost 13% of the population <sup>1</sup>.

The National Health Policy for People with Disabilities refers to the international literature, probably due to the lack of population-based studies at the national level. It defines presbycusis as age-related hearing loss. Presbycusis has been identified as the main cause of hearing impairment in the elderly, with a prevalence of approximately 30% in individuals over 65 years of age <sup>2</sup>.

Sensorineural hearing loss is a frequent consequence of aging. Hearing impairment in the elderly is one of the three most prevalent chronic conditions, less frequent only than arthritis and hypertension. Presbycusis leads to a decrease in the ability to understand speech. One of the most frustrating consequences of this difficulty is that it gradually reduces the social interactions of elderly people and frequently leads to psychosocial changes <sup>3,4</sup>.

The negative consequences of hearing loss in adulthood are not limited to impairment; they may also involve other limitations and participation restrictions. These limitations may be related, for example, to the lack of ability to perceive speech in situations such as in noisy environments and on television. Correspondingly, the restrictions that individuals

<sup>(1)</sup> Speech therapist in Hearing Health of the Santa Casa de Misericórdia de Santo Amaro; Masters in Science by the Federal University of São Paulo – UNIFESP/EPM.

<sup>(2)</sup> Speech and hearing therapist; Head of the Department of Speech and Hearing Therapy, Federal University of São Paulo – UNIFESP/EPM, Associate Professor of the Speech Pathology Department – UNIFESP/EPM.

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with hearing loss experience are consequences of their hearing impairment, which prevents them from adequately performing their roles in society by restricting their participation in daily activities<sup>5</sup>.

According to the WHO, reduced participation in daily activities can have a negative impact on the elderly and affect their health and quality of life. The use of amplification through hearing aids can positively impact the process of *speech-therapy* intervention, improve audibility, optimise hearing and reduce participation restrictions. The ICF indicates that hearing aid users can quantify their levels of hearing impairment and that the results can be assessed using objective tests. Activity limitations and participation restrictions can be evaluated using subjective measures, such as self-assessment questionnaires<sup>6-11</sup>.

It is clearly necessary to measure the impact of hearing impairment on the elderly and to consider their opinions on issues that they consider important.

The objective of this research is to study the effects of *speech-therapy* intervention through hearing aids and analyse the self-perceived participation restrictions that affect the daily activities of elderly people. The sample population was analysed according to gender and age.

## ■ METHOD

The study was a longitudinal cohort study in which data were collected twice: at the start of the process and a year after the *speech-therapy* intervention.

### Ethical Aspects

The Ethics Committee of the Federal University of São Paulo evaluated and approved this study under CEP # 0913/08. This research was conducted at the Association for Prevention, Specialist Care and Inclusion for People with Disabilities (Associação de Prevenção, Atendimento Especializado e Inclusão da Pessoa com Deficiência – APRAESPI), with prior approval in city of Ribeirão Pires – SP, which is accredited as a service provider according to the Hearing Health Ordinance of the Ministry of Health through the Authorisation for High Complexity Procedures (Autorização para Procedimentos de Alta Complexidade – APAC). The patients were informed of the purpose of the research and provided their consent to participate. Those who agreed to participate in the study were instructed and signed a consent form prepared based on Resolution 196/96, which specifies guidelines and standards regulating research involving human subjects.

### Sample Characterisation

The sample included 23 females (46%) and 27 (54%) males who were 60 years of age or older. The subjects were divided into two age groups as follows: Group 1 (G1) consisted of 24 (48%) elderly people (11 females and 13 males) whose ages ranged between 60 and 74 years; and Group 2 (G2) consisted of 26 (52%) elderly people (12 females and 14 males) who were older than 75 years.

We established the following sample eligibility criteria. We included only people older than 60 years who were literate, had up to a severe degree of bilateral symmetrical sensorineural hearing loss, scored at the 50% level or higher on the Speech Recognition Index (SRI), required a binaural hearing aid fitting and did not present evidence of any other impairment.

### Procedures

For this study, we used the Hearing Handicap Inventory for the Elderly (HHIE) questionnaire, which was developed to evaluate the psychosocial, emotional and social consequences of hearing loss in elderly individuals. The HHIE was originally written in English and was translated and adapted into Portuguese<sup>12,13</sup>. The questionnaire was distributed as a hard copy.

Because it is a self-assessment, the HHIE allows valid reproducible measures of the social and emotional impairment resulting from hearing loss and has the advantage of eliminating interference by the evaluator in the sorting process. The HHIE consists of 25 questions, 13 of which explore the emotional consequences of hearing impairment and 12 of which analyse the effects of social/situational impairment. The HHIE questions have three possible answers: “yes”, “no” and “sometimes”. The answer “yes” is assigned four points, the answer “no” is assigned zero points and the answer “sometimes” is assigned two points. The total score can vary from 0% (suggesting the absence of perceived participation restriction) to 100% (suggesting total perceived participation restriction). The higher the score, the greater the individual’s perceived participation restriction and the greater the hearing and non-hearing difficulties imposed by the hearing impairment. The scores are interpreted as follows: 0 to 16 indicates no perceived restriction; 18 to 42 indicates mild-to-moderate perceived restriction and > 42 indicates severe-to-significant restriction.

Regular evaluations were scheduled every two months (with seven meetings scheduled in total) to monitor the patients’ progress in adapting to their hearing aids. The patients received instructions regarding the use, care and handling of their hearing

aids; they also received information regarding communication strategies.

During the first evaluation, the elderly individuals completed the HHIE. After this meeting, during the month of August 2008, the elderly individuals were fitted with bilateral hearing aids. All of the hearing aids were of the digital BTE (behind-the-ear) type and had been previously selected by APRESPI. In the second evaluation, the participants received their hearing aids and answered questions regarding their use, handling and care. During the evaluations, the participants reported their experiences with their hearing aids up to that time. At the third evaluation, the participants received guidance regarding correct telephone usage. This information is important because communicating on the phone is difficult for hearing-impaired individuals and because the proper use of the telephone can facilitate communication with family and friends. In the fourth evaluation, hearing aid accessories were offered to the participants. Questions about hearing aid handling and care were also discussed. By the sixth evaluation, the participants had already used the hearing aids for more than six months. However, information about the care and handling of the hearing aids was once again provided during this session. The sixth evaluation facilitated group interaction. The better-adjusted participants assisted those who were experiencing more difficulty. In the last evaluation, all of the participants completed the HHIE after having used their hearing aids for approximately one year, a period that is considered more than sufficient for use acclimatisation.

### Statistical method

The sample was divided by gender and age. Tables of descriptive statistics by period, gender and age were constructed for the HHIE questionnaire scores. The means and standard errors were plotted. A repeated measures analysis of variance was used to compare the mean scores on the questionnaire by gender and age over the two assessment periods<sup>14</sup>. The mean differences between the pre – and post – evaluations were calculated, and 95% confidence intervals were estimated. The analysis was performed using the “Minitab” function of the SPSS statistical software (version 15 and version 11). A significance level of 0.05 was used for hypothesis tests, and statistically significant p-values were highlighted using the asterisk (\*).

### RESULTS

The sample consisted of 23 females (46%) and 27 males (54%). Twenty-four subjects (48%) were between 60 and 74 years of age, and 26 (52%) were 75 years of age or older.

Initially, pre- and post-intervention descriptive statistics were calculated for the HHIE total scores. The average score in the post-intervention period (8.8%) was significantly lower than that in the pre-intervention period (32.9%).

**Table 1 – Descriptive statistics for the HHIE total scores before and after the hearing aid fitting**

Variable	N	Mean	Standard deviation	Minimum	Median	Maximum
Total pre	50	32.9	5.9	20	34	42
Total post	50	8.8	5.1	0	8	22

Pre x Post – p = 0.000

Descriptive statistics by age and gender were created for the scores on the HHIE emotional scale before and after speech-therapy intervention. We used an analysis of variance model to investigate whether there were differences between the scores associated with the age group, gender or evaluation period. The differences between the mean scores on the emotional assessment scale for the pre- and post-intervention periods were significantly different

by gender ( $p = 0.021$ ) and age ( $p = 0.008$ ), and the perceived participation restrictions were significantly lower in the post-intervention period. The analysis of variance of the scores on the HHIE emotional scale also revealed a significant interaction between the gender and age groups and the pre- and post-intervention periods.

**Table 2 – Descriptive statistics for the HHIE emotional scale scores by gender and age**

Gender	Age group	Period	N	Mean	Standard deviation	Minimum	Median	Maximum
Female	60 to 74	Pre	11	12.7	3.6	8	12	18
		Post	11	4.0	2.0	0	4	6
	75 or +	Pre	12	15.2	4.0	10	16	20
		Post	12	3.8	3.8	0	3	12
	Total	Pre	23	14.0	3.9	8	14	20
		Post	23	3.9	3.0	0	4	12
Male	60 to 74	Pre	13	15.8	3.8	10	18	20
		Post	13	4.9	2.5	0	6	8
	75 or +	Pre	14	17.6	2.7	12	18	20
		Post	14	3.4	3.1	0	2	12
	Total	Pre	27	16.7	3.3	10	18	20
		Post	27	4.1	2.9	0	4	12
Total	60 to 74	Pre	24	14.4	4.0	8	14	20
		Post	24	4.5	2.3	0	4	8
	75 or +	Pre	26	16.5	3.5	10	17	20
		Post	26	3.6	3.3	0	2	12
	Total	Pre	50	15.5	3.8	8	16	20
		Post	50	4.0	2.9	0	4	12

Analysis of Variance

Pre x Post x Gender →  $p = 0.021$  \*

Females x Pre x Post →  $p = 0.000$  \*

Males x Pre x Post →  $p = 0.000$  \*

Pre x Male x Female →  $p = 0.003$  \*

Post x Male x Female →  $p > 0.999$

Pre x Post x Age Group →  $p = 0.008$  \*

G1 (60 to 74 years) x Pre x Post →  $p = 0.000$  \*

G2 (75 years or +) Pre x Post x →  $p = 0.000$  \*

Pre x G1 (60 to 74 years) x G2 (75 years or +) →  $p = 0.026$  \*

Post x G1 (60 to 74 years) x G2 (75 years or +) →  $p = 0.916$

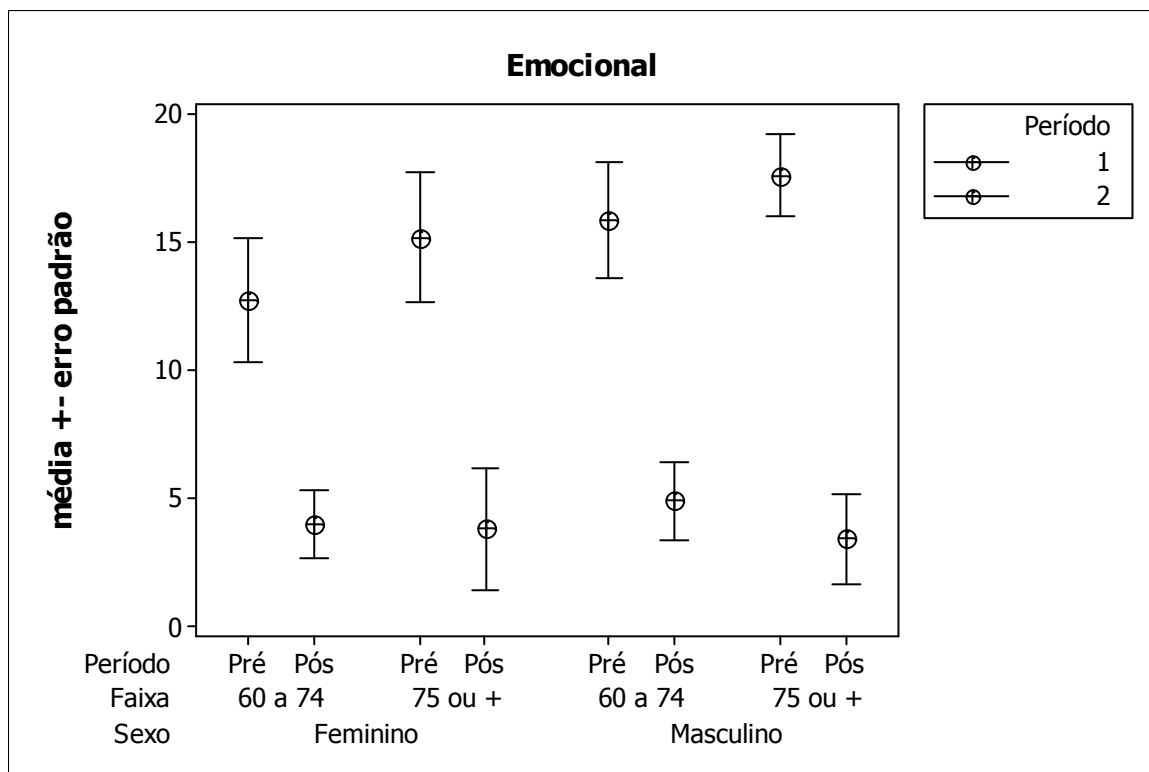


Figure 1 – The means and standard errors of the HHIE Emotional scale scores by gender and age group

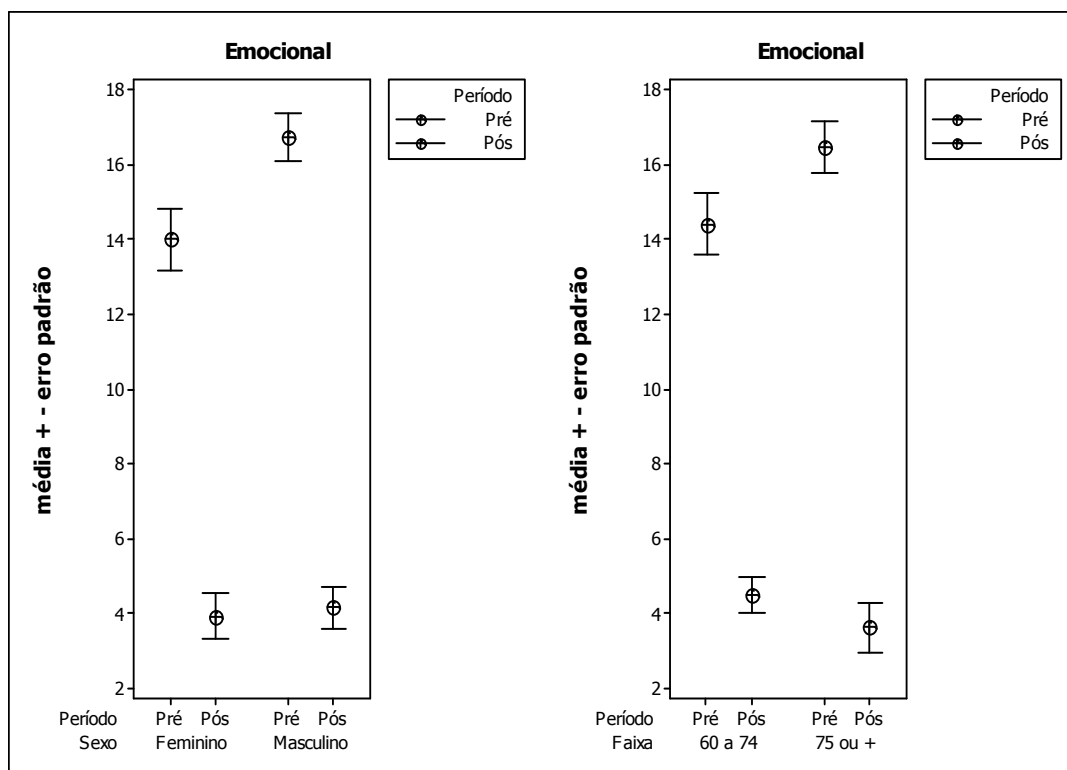


Figure 2 – A graph of the means and standard errors of the HHIE Emotional scale scores

After analysing the scores on the HHIE emotional scale, the researchers analysed the results of the social/situational scale. The differences between the mean scores on the social/situational scale for the pre- and post-intervention periods varied significantly by gender ( $p = 0.004$ ) and demonstrated a significant interaction between the evaluation period

and gender. No significant differences by age group ( $p = 0.061$ ) or period ( $p = 0.076$ ) were found for the mean scores on the social/situational scale. The analysis of variance revealed a significant interaction between gender and evaluation period for the mean scores on the HHIE social/situational scale.

**Table 3 – The analysis of variance and descriptive statistics for the HHIE social/situational scale scores by gender and age group**

Gender	Age group	Period	N	Mean	Standard deviation	Minimum	Median	Maximum
Female	60 to 74	Pre	11	14.2	4.2	8	16	20
		Post	11	4.4	3.9	0	4	10
	75 or +	Pre	12	17.0	2.6	12	16	20
		Post	12	4.8	2.8	2	4	10
	Total	Pre	23	15.7	3.7	8	16	20
		Post	23	4.6	3.3	0	4	10
Male	60 to 74	Pre	13	18.5	2.0	14	20	20
		Post	13	5.1	3.0	0	6	8
	75 or +	Pre	14	19.3	1.5	16	20	20
		Post	14	4.7	2.8	2	4	12
	Total	Pre	27	18.9	1.8	14	20	20
		Post	27	4.9	2.8	0	6	12
Total	60 to 74	Pre	24	16.5	3.8	8	18	20
		Post	24	4.8	3.4	0	6	10
	75 or +	Pre	26	18.2	2.4	12	20	20
		Post	26	4.8	2.7	2	4	12
	Total	Pre	50	17.4	3.2	8	18	20
		Post	50	4.8	3.0	0	4	12

Analysis of Variance

Pre x Post x Gender →  $p = 0.004^*$

Females x Pre x Post →  $p = 0.000^*$

Males x Pre x Post →  $p = 0.000^*$

Pre x Female x Male →  $p = 0.000^*$

Post x Female x Male →  $p > 0.999$

Pre x Post x Age Group →  $p = 0.061$

G1 (60 to 74 years) x Pre x Post →  $p = 0.076$

G2 (75 years or +) x Pre x Post →  $p = 0.076$

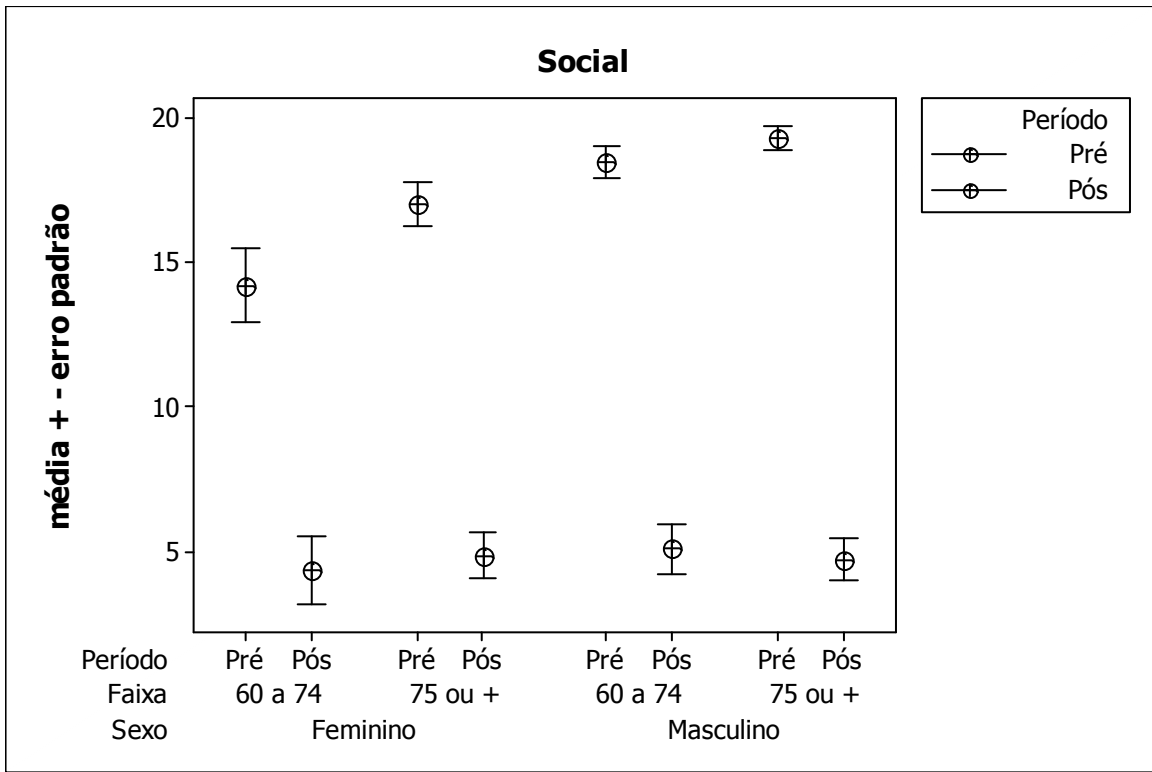


Figure 3 – The means and standard errors of the scores HHIE social/situational scale scores by gender and age group

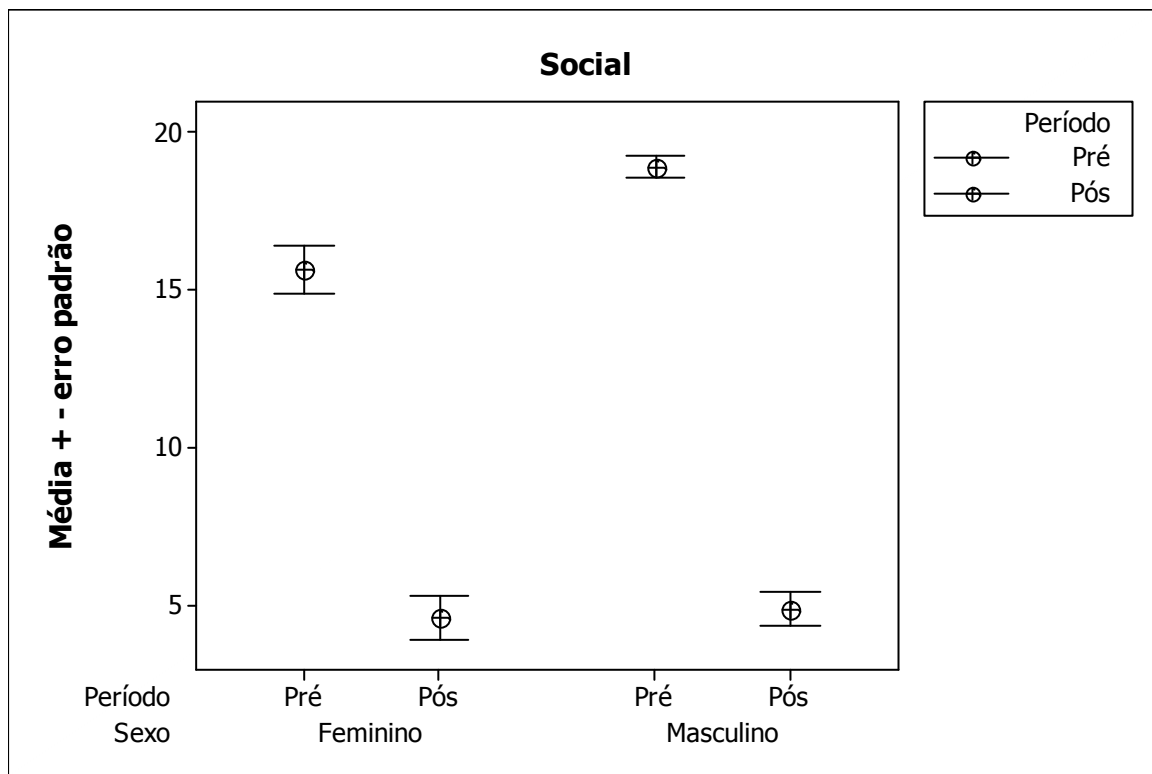


Figure 4 – A graph of the means and standard errors of the means of the pre- and post-intervention HHIE scores by gender

## ■ DISCUSSION

In the literature, several authors have reported that self-assessment questionnaires are effective tools for measuring the difficulties caused by hearing impairment in adults and elderly patients.

To some degree, these difficulties may be identified by assessing self-perceptions of hearing impairment and communication needs, which allows patients to establish their own treatment goals. It is possible to monitor and assess these difficulties during the process of adapting to hearing aid use by employing self-assessment questionnaires.

Researchers have reported that restrictions on the activities of daily living imposed by hearing impairments among the elderly affect their social and professional performance and therefore influence their quality of life. It has also been shown that this impairment is determined by the type and degree of the hearing and by the age of the patient at the time of installation. In a 2004 study, the authors found that there was a significant decrease in hearing difficulties after six months of effective use of hearing aids.<sup>(15)</sup>

The process of adaptation to hearing aids is critical in helping individuals develop their potential in their daily activities. Some studies have shown that evaluating patients through self-assessment questionnaires within monitoring and counselling programs is essential for adjusting to prosthesis use and for reducing hearing impairment<sup>16,17</sup>.

The results of the analysis of the mean scores revealed that a moderate level of participation restriction was perceived in the pre-intervention period, whereas there was no such perceived restriction in the post-intervention period.

Many of the studies that have used the HHIE self-assessment questionnaire have shown that to minimise the psychosocial reactions resulting from hearing impairment in elderly individuals, it is necessary to include them in rehabilitation programs. Notably, elderly individuals showed effective reductions in participation restrictions, demonstrating the importance of using hearing aids after participating in auditory rehabilitation programs<sup>18</sup>.

Our findings suggest that elderly individuals present fewer self-perceived participation restrictions one year after commencing hearing aid use, regardless of gender or age. This improvement can be attributed simply to the use of the hearing aids, as has been reported in many studies; bi-monthly patient follow-up is important, however, as it allows them to ask questions regarding hearing aid use. This factor undoubtedly explained the satisfactory results obtained in this study.

As has been reported by some authors, the benefits of using hearing aids can be measured by assessing the reduction in the participation restrictions caused by hearing impairment. These researchers have observed that the benefits can be evaluated after six weeks of effective hearing aid use, as this is considered a sufficient period for the benefits to become apparent<sup>19</sup>.

It is believed that adaptation time may influence these benefits; however, in the present study, the re-evaluations occurred after one year of use. This period was considered sufficient to repeat the administration of the questionnaire, given that adaptation occurs after 12 to 16 weeks of hearing aid use.

The scores on the emotional scale of the HHIE in the post-intervention period were significantly lower than the pre-intervention scores, for both females ( $p = 0.000$ ) and males ( $p = 0.000$ ). In the pre-intervention period, however, the males had significantly higher scores than did the females ( $p=0.003$ ). In the post-intervention period, no differences were found between the mean scores for the two genders ( $p > 0.999$ ). Thus, the average decrease that occurred from the pre-intervention to the post-intervention period was significantly higher in males than in females, demonstrating that the elderly males had greater perceived participation restrictions before intervention than did the females and therefore obtained greater benefits from the intervention.

The mean scores on the emotional scale were significantly lower in the post-intervention period than in the pre-intervention period, both for those aged 60 to 74 years ( $p = 0.000$ ) and for those aged 75 years or older ( $p = 0.000$ ). In the pre-intervention period, the mean scores of those between the ages of 60 and 74 years were significantly lower than those of individuals who were 75 years or older ( $p = 0.026$ ), whereas there were no differences between the mean scores for the two age groups in the post-intervention period ( $p = 0.916$ ). Therefore, the average decrease that occurred from the pre- to the post-intervention period was higher in those 75 years of age or older, revealing that these individuals had a higher degree of perceived participation restrictions in the pre-intervention period and benefited more from the intervention.

### Table 2 and Figure 2

The mean post-intervention scores on the HHIE social/situational scale were significantly lower than those in the pre-intervention period for both age groups (60 to 74 years and 75 years or older) and for both males and females.

Significant differences between the two periods were observed in both females ( $p = 0.000$ ) and males ( $p = 0.000$ ). In the pre-intervention period, the average scores for the elderly males were



higher (indicating greater restrictions) than those for the females ( $p = 0.000$ ). There were no differences between the averages for the two genders ( $p > 0.999$ ) in the post-intervention period. Thus, the average decrease from the pre- to the post-intervention period was significantly greater in the elderly men, once again demonstrating that they reported greater perceived participation restrictions in the pre-intervention period and exhibited greater benefits in the post-intervention period.

Table 3 Figures 3 and 4

One study has found results similar to those of this research. It showed that elderly males experienced more significant perceived impairment (participation restrictions) than did elderly females<sup>20</sup>.

## ■ CONCLUSION

Based on the overall scores and scores on the HHIE emotional and social/situational scales, the elderly have lower levels of self-perceived restrictions on participation in daily activities after speech-therapy.

Elderly males experience greater perceived participation restrictions, as indicated by their scores on both the emotional scale and the social/situational scale in the pre-intervention period.

The older participants exhibited greater perceived participation restrictions, as indicated by their scores on the emotional scale before the hearing aid intervention

## RESUMO

**Objetivo:** estudar os efeitos da intervenção fonoaudiológica por meio da adaptação de próteses auditivas na restrição de participação em atividades de vida diária do idoso, segundo as variáveis sexo e faixa etária. **Método:** participaram do estudo 50 idosos, 23 do sexo feminino e 27 do sexo masculino. Os idosos foram distribuídos em dois grupos etários: Grupo 1 – com 24 idosos, 11 do sexo feminino e 13 do sexo masculino, com idade entre 60 e 74 anos; Grupo 2 – com 26 idosos, 12 do sexo feminino e 14 do sexo masculino, com idade igual ou superior a 75 anos. Os idosos foram avaliados antes e um ano após a adaptação das próteses auditivas, por meio de questionário HHIE. Foram realizados acompanhamentos bimensais, totalizando sete reuniões, a fim de garantir o uso efetivo das próteses auditivas. O método estatístico incluiu estatísticas descritivas e análise de variância. **Resultados:** a análise do HHIE revelou que houve redução significativa da restrição de participação nas Escalas Emocional e Social no período pós intervenção, nas duas faixas etárias, tanto no sexo masculino quanto no feminino. **Conclusão:** há menor autopercepção das restrições de participação após a intervenção fonoaudiológica nas Escalas Social e Emocional do questionário HHIE.

**DESCRIPTORIOS:** Idoso; Perda Auditiva; Auxiliares de Audição; Questionários

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Mailing Address:

Ruth Magalhães

Av. Adolfo Pinheiro 760, apt<sup>a</sup> 222 A – Santo Amaro

São Paulo – SP

CEP: 04734-001

E-mail: lces@terra.com.br