REVIEW ARTICLE

Auditory Rehabilitation Programmes for Adults: What Do We Know About Their Effectiveness?☆

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Abstract
Introduction and objective: Hearing loss ranks third among the health conditions that involve disability-adjusted life years. Hearing aids are the most commonly used treatment option in people with hearing loss. However, a number of auditory rehabilitation programmes have been developed with the aim of improving communicative abilities in people with hearing loss. The objective of this review was to determine the effectiveness of auditory rehabilitation programmes focused on communication strategies.

Materials and methods: This was a narrative revision. A literature search using PUBMED was carried out. This search included systematic reviews investigating the effectiveness of auditory training and individual and group auditory rehabilitation programmes with the main focus on counselling and communicative strategies for adults with hearing loss. Each study was analysed in terms of the type of intervention used and the results obtained.

Results: Three articles were identified: one article about the effectiveness of auditory training programmes and 2 systematic reviews that investigated the effectiveness of communicative programmes in adults with hearing loss. The "Active Communication Education" programme appears to be an effective group programme of auditory rehabilitation that may be used with older Spanish-speaking adults.

Conclusions: The utility of hearing aid fitting and communicative programmes as rehabilitation options are associated with improvements in social participation and quality of life in patients with hearing loss, especially group auditory rehabilitation programmes, which seem to have good potential for reducing activity limitations and social participation restrictions, and thus for improving patient quality of life.

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Introduction

According to the World Health Organisation, hearing loss ranks third among the health conditions that involve years lived with disability (YLD) after depression and unintentional injuries. This poses a challenge both in terms of the action to be taken to prevent hearing loss and in the implementation of effective treatments to improve the quality of life of the people who suffer from the condition.

It has been observed that this condition is more prevalent in developing countries, which poses a particular challenge for public health. There are many causes for this, and the proportion of people with hearing loss increases progressively with age; older adults are the group which is most affected. As the population ages it is to be expected that the number of people living with hearing loss will increase over time.

The most usual treatment is to fit hearing aids; however, a significant number of patients end up not using them; therefore, there have been progressive studies regarding the role played by different auditory rehabilitation programmes towards improving these patients’ hearing, their adherence to the use of hearing aids and their quality of life.

The objective of this non-systematic bibliographic review is to learn the effectiveness of these auditory training and rehabilitation programmes focusing on communication strategies taking an evidence-based practice approach. The goal is to promote auditory and communicative training programmes, which have been shown to be effective and which are complemented with the fitting of hearing aids for older adult patients.

Hearing Loss in Older Adults

Older adults are a particularly significant patient population for ear nose and throat and hearing specialists, as the most commonly observed sensory alteration in this group is hearing loss associated with age or presbycusis. Presbycusis can be defined as the set of changes to the central and peripheral hearing structures associated with the ageing process. The signs of changes in peripheral hearing structures are well known; however, those produced in the central hearing structures are not, which limit rehabilitation interventions in older adults.

Speech comprehension is one of the problems which are most commonly present in older adults, especially when there is background noise or reverberation. These problems, referred to in literature as oral communication problems, are directly associated with reduced quality of life, both for those suffering these difficulties and for the people around them and also represent the main reason prompting older adults to seek help for their hearing problems. In this context, oral communication refers to the ability of a person to participate actively and effectively in a conversation in different listening modes.

Due to the importance of oral communication and the difficulties with it observed in older adults, in 1988 the Committee on Hearing, Bioacoustics, and Biomechanics proposed a model on the aspects which adversely affect oral communication in older adults. According to this model, age-related changes to peripheral and central hearing structures and reduced cognitive functions, such as memory and
effectiveness of auditory and synthetic auditory training programmes, and a combination of both, in people between 19 and 85 years of age; only 3 of the studies included older adults. In analytical auditory training, speech was broken down into its parts (consonants and vowels), and the objective of this technique was to improve discrimination between parts of speech and their recognition. Synthetic approximation fundamentally sought to improve listening skills using keys associated with linguistic and contextual redundancy. Therefore sentences are usually the auditory verbal material used. In this review 6 studies were analysed which fulfilled the inclusion criteria. It was found that in general training which used synthetic approximation showed improvements in the perception of speech in the presence of background noise and better use of active listening strategies. However, less evidence was found of the effectiveness of analytical training. The authors conclude that there is still not enough evidence to assess the effectiveness of individual auditory training programmes.

Group Auditory Rehabilitation Programmes (Communicational Strategies)

Group auditory rehabilitation programmes, unlike individual auditory training programmes, are based on guidance and communicational strategies to better confront the lack of social participation. From a clinical perspective, these are usually provided to adults after they have been given hearing aids as supplementary help. The great majority of these programmes are basically group therapy for follow-up after fitting hearing aids.

This type of rehabilitation was initially introduced by Carhart in the Deshon General Hospital as part of the post-World War Two military personnel programme. Different authors have mentioned the importance of incorporating communication and guidance strategies as part of the holistic management of adults with hearing loss using an efficient method, in time and cost, in the context of group rehabilitation, where participants can share their feelings, problems, and solutions in order to tackle communication difficulties. Group auditory rehabilitation programmes usually include directed classes including information on hearing, loss of hearing, lip reading, communicative strategies, and personal assistance devices. Some of these programmes also include practice in the use of communicational strategies, the use of relaxation techniques and stress management, psychosocial aspects and the involvement of partners.

Hawkins performed a systematic review in 2005 on individual adults with hearing loss in order to determine whether participating in group auditory rehabilitation programmes for hearing aid users translated into self-perceived benefit and satisfaction both short and long term as with hearing aids. Measurements of the result of the therapy included procedures to assess personal adjustment, self-perceived hearing handicap, and benefit and/or satisfaction with hearing aids perceived by the user. A total of 12 studies fulfilled the inclusion criteria. The majority of the studies showed benefits for group auditory rehabilitation programmes, in terms of reducing restricted social participation. Despite there being an improvement in the use of communicative strategies, the data were limited for personal adjustment and better use of hearing aids and had not been

Individual Auditory Training

Sweetow and Palmer performed a systematic review of the effectiveness of both analytical and synthetic auditory

Attention, in isolation or combined, result in difficulties with oral communication.

At present, external hearing aids are the most available rehabilitation options for people suffering age-related hearing loss. Hearing aids can amplify the input sound pressure level of acoustic signals, improving the hearer’s detection of sounds which has been affected by peripheral hearing loss. However, as mentioned, peripheral hearing loss is the only one aspect of age-related hearing loss, and therefore also only one of the aspects which result in the oral communication difficulties observed in older adults. This is probably one of the fundamental reasons why around 30%–45% of older adults using hearing aids for the first time do not continue to use them. As shown by Humes, if the difficulties in oral communication presented by older adults are chiefly due to age-related changes to the central hearing structures, then it is very probable that prosthetic adaptation for these patients will show no benefit.

Therefore, both the high numbers of older adults who gain no benefit from hearing aids and the complexity of the anatomophysiological and cognitive aspects which result in oral communication difficulties in this age group mean it is necessary to complement the fitting of hearing aids with communication-based auditory training and/or rehabilitation programmes for older adults.

There is evidence that auditory rehabilitation programmes which are implemented as additional treatment to the use of hearing aids result in significant improvements in the perception of hearing disadvantage compared to the use of hearing aids alone, these sorts of interventions are also more cost effective. However, some authors suggest that these benefits are only present short term group. With regard to the specific content of the programmes, Preminger and Yoo demonstrated that there are no significant differences between different contents in terms of the benefits gained, and therefore a rehabilitation programme should contain information as well as interventions and psychosocial training.

The reasons why patients with hearing loss decide to undergo a rehabilitation programme, decide to enhance their hearing capacity with hearing aids or decide not to accept any form of intervention have also been studied. In the study by Laplante-Lèvesque et al., it was observed in patients over 50 that some of the factors influencing whether or not people decided to participate in rehabilitation programme included being of a higher socio-economic group, receiving state-subsidised hearing aids and the perception of the greater effectiveness of communication programmes. Twenty-four percent of the patients studied did not pursue the intervention which they had initially chosen, which also reflects that intentions do not always translate into behaviour. Finally, the most significant predictors of successful outcomes were the patients’ self-perceived hearing loss and the period of change they were undergoing.

Below we shall review the main modes of hearing rehabilitation and the evidence supporting their use.

Individual Auditory Training
systematically replicated. Hawkins concluded that few studies were well controlled and that there was variability in the results; therefore, he suggested that randomised clinical trials should be run with adequate numbers of participants.

A recent systematic review undertaken by Chisolm and Arnold,24 completed between May and August 2010 in adult individuals, only included randomised clinical studies, in which measurements were taken to assess the effect of rehabilitation, in terms of reducing restricted social participation and improved quality of life. The results yielded a total of 10 studies, of which 7 were included in Hawkins’ review of 2005, plus 3 recent studies. Table 1 shows the 10 selected studies. The study with the greatest number of participants identified in this review was by Hickson et al.,25 which included 100 adults with an average age of 74 who participated in the experimental training programme Active Communication Education (ACE), and 78 older adults who received placebo training followed by the ACE programme. Fifty-four percent of these older adults had been fitted with hearing aids. ACE is a commercially available programme16 and has been specially designed for older adults with or without hearing aids. This programme is widely used in Australia and currently has been translated into French Canadian and Swedish, and is therefore applied in these countries as well as in English-speaking countries. Due to these characteristics, the ACE programme seems to be an effective group auditory rehabilitation programme which could be implemented in older Spanish-speaking adult patients. Therefore, the content of the ACE programme and the scientific evidence of its effectiveness are discussed in greater detail below.

Active Communication Education Programme

The ACE programme was created in Australia by the authors Louise Hickson, Linda Worral, and Nerina Scarinci. This programme is aimed at older adults with hearing loss and is based on problem-solving strategies. It comprises 6 modules around daily communication activities, which have been demonstrated to be problematic for older adults with hearing loss and their close family members, such as: using the phone, listening to television, going to a restaurant and holding a conversation over dinner. The specific modules which are dealt with during the programme sessions depend on the communicative needs identified by the group of participants during the first session. This programme is, therefore, less prescriptive than other communication programmes, as the content varies depending on the specific communication difficulties described by participants.

The ACE programme is introduced during the first session and communication needs are analysed where participants discuss the communication difficulties that they encounter on a daily basis as a consequence of their impaired hearing. The needs identified by participants in this session will determine the communication modules to be developed over the following weeks. There is a detailed discussion in each module of the communication activity itself, the source of the difficulties in the activity, possible solutions, practical exercises, exercises to be done at home, and written information. The ACE sessions are structured to put aspects of daily communication under the individual’s control by means of demonstrations, practical exercises, discussions, and problem-solving strategies. The main objectives of this programme are to teach individual problem-solving strategies and approach the use of communication strategies, lip reading, clarification strategies, and assistance technology. In the time between sessions participants are encouraged to use the new strategies they have learned in their daily communication.

The effectiveness of the ACE programme was studied as part of a project funded by the Australian National Health and Medical Research Council (NHMRC). The total number of participants in the research study was 178; the mean age was 73.8 and the range was from 53 to 94. The average audiometric thresholds of the participants (500, 1000, 2000, and 4000 Hz) in the better ear was 41.3 dB HL. Approximately half of them had been fitted with hearing aids in the past. The participants were assessed before and immediately after they completed the ACE programme. And 167 participants were reassessed 6 months after having completed the ACE programme. All the assessments consisted of self-perception tools.27–32 The association was also examined between the response of the participants to the ACE programme and the different personal variables such as age, gender, hearing loss, use of hearing aid, attitudes to impaired hearing and the commitment of the partners of the participants in the therapy was also examined.

The results showed significant improvement in participants who completed the ACE programme; these improvements were maintained 6 months after assessments. Furthermore, those participants who were more aware of their hearing difficulties gained greater benefit from the programme. All of these suggest that implementation of the ACE programme, as well as fitting hearing aids for older adults could be helpful in improving quality of life.

Discussion

Hearing loss greatly restricts the lives of older adults, leading to limited social participation, and a poorer quality of life. It was detected in a recent critical review that the implementation of hearing aids and the communicational programmes as interventions in the rehabilitation of people over 60 are helpful and works positively to improve their social participation and quality of life; however, availability and adherence remain low.33 Two changes are highlighted which are needed to change the current situation: improved availability with interventions beyond hearing aids and an active commitment on the part of adults with hearing loss to the rehabilitation process. In this regard, one recent article suggests that the quality of life and adhering to the use of hearing aids in adults over 65 who undertake a group programme of adaptation and monitoring would be similar to individual monitoring; this would save costs in a rehabilitation programme of this type, and would make it possible to improve the availability of these strategies.34

Various research studies have been completed with a view to determining the effectiveness of auditory training programmes and group auditory rehabilitation which focus on guidance and communicational strategies in adults with hearing loss; both those who are hearing aid users and those
<table>
<thead>
<tr>
<th>Reference</th>
<th>Design</th>
<th>Participants</th>
<th>Intervention</th>
<th>Tools</th>
<th>Results</th>
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<tbody>
<tr>
<td>Abrams et al. (1992)</td>
<td>Controlled clinical trial (3 groups) All the patients were new hearing aid users</td>
<td>Control group No.=9 Hearing aids alone No.=11 Hearing aids and group rehabilitation No.=11</td>
<td>Group auditory rehabilitation once a week for one and a half hours over 3 weeks</td>
<td>HHIE</td>
<td>The hearing aids alone and hearing aids plus group rehabilitation groups showed better reduction in hearing handicap compared to the control group (HHIE total score), a greater change was seen in the hearing aid plus group rehabilitation group than in the only hearing aid group</td>
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<td>Abrams et al. (2002)</td>
<td>Controlled clinical trial (2 groups) All patients were new hearing aid users</td>
<td>Hearing aids alone group No.=52 Hearing aids plus group rehabilitation group No.=53</td>
<td>Group auditory rehabilitation once a week for one and a half hours. Four sessions in total</td>
<td>SF-36</td>
<td>MCS were better improved in the group which received group rehabilitation compared to the group with hearing aids alone, but there were no statistically significant differences. No effect on the PCS score was observed</td>
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<td>Andersson et al. (1995a, 1996b)</td>
<td>Controlled clinical trial (2 groups) The patients were experienced hearing aid users</td>
<td>Control group No.=12 Auditory rehabilitation group No.=12</td>
<td>Group auditory rehabilitation once a week for 2 h. Four sessions in total</td>
<td>HCA</td>
<td>No statistically significant differences were seen between the groups, measured using HCA. Two year follow-up showed no differences between the groups (No.=20)</td>
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<td>Benyon et al. (1997)</td>
<td>Controlled clinical trial (2 groups) New hearing aid users</td>
<td>Hearing aids alone group No.=25 Hearing aids and group auditory rehabilitation group No.=19</td>
<td>Group auditory rehabilitation of 4 sessions (the number of days and hours not reported)</td>
<td>QDS</td>
<td>A greater reduction in the mean QDS was seen in the group of hearing aids plus group rehabilitation compared with the hearing aid alone group</td>
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<td>Reference</td>
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<td>Chisolm et al. (2004)</td>
<td>Controlled clinical trial (2 groups)</td>
<td>New hearing aid users</td>
<td>Group auditory rehabilitation once a week for one and a half hours. Four sessions in total</td>
<td>CPHI, subscale and factorial scores</td>
<td>Short term improvements were observed in the rehabilitation group with regard to reaction factors and use of communication and interaction strategies. The benefit was maintained a year after completing the rehabilitation. However, the group with hearing aids alone improved after a year and therefore a year after completing the therapy there were no significant differences between both groups</td>
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<td>Hallberg and Barreras (1994)</td>
<td>Controlled clinical trial (2 groups)</td>
<td>Control group No.=12</td>
<td>Group auditory rehabilitation for 3 h a week. Four sessions in total</td>
<td>HMS, HSS</td>
<td>A short term reduction in self-perceived handicap was observed through HMS and HSS in the experimental group. Four months post-intervention no differences were seen between the experimental group and the control group</td>
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<td>Hickson et al. (2007)</td>
<td>Controlled clinical trial (2 groups)</td>
<td>Placebo group No.=78</td>
<td>Group auditory rehabilitation (ACE) for 2 h a week over 5 weeks. Social programme (placebo followed by the ACE programme) for 2 h a week over 10 weeks in total (placebo plus ACE programmes)</td>
<td>HHQ, QDS, SAC, reduced Ryff’s scale, SF-36</td>
<td>A greater benefit was observed for the ACE programme than the placebo programme in HHQ, QDS, SAC and Ryff’s measurements</td>
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<td>Reference</td>
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<tr>
<td>Preminger and Yoo (2010)¹⁹</td>
<td>Controlled clinical trial (3 groups)</td>
<td>Experienced hearing aid users</td>
<td>The group auditory rehabilitation consisted of once weekly sessions for 1 h over 6 weeks. All the patients completed at least 5 sessions</td>
<td>HHIE, WHODAS II</td>
<td>The communications strategies and psychosocial exercise group, and the psychosocial exercise and information group showed short and long term effects (6 months) on HHIE</td>
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<td>Communicative strategies alone group No.=18</td>
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<td>Communicative strategies plus psychosocial exercise group No.=17</td>
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<td>Psychosocial exercises plus information group No.=17</td>
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<tr>
<td>Preminger and Ziegler (2008)</td>
<td>Controlled clinical trial (3 groups)</td>
<td>Experienced hearing aid users</td>
<td>The group auditory rehabilitation consisted of once weekly sessions for 1 h over 6 weeks. All the patients completed at least 5 sessions</td>
<td>HHIE, WHODAS II</td>
<td>A significant effect was observed (F-test) in the total HHIE score between pre- and post-training both after 6 weeks and after 6 months, in the 3 groups studied. Also a decrease in the perception of handicap was also only observed in the auditory training groups measured using the HHIE emotional scale. No significant effects were found in any group for WHODAS II</td>
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<td>Control group No.=16</td>
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<td>Auditory training plus psychosocial exercise group No.=16</td>
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<td>Auditory training alone group No.=18</td>
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<td>Smaldino and Smaldino (1988)¹⁵</td>
<td>Controlled clinical trial (4 groups)</td>
<td>New hearing aid users</td>
<td>The group auditory rehabilitation groups received a total of 4 sessions (the number of hours and days were not reported)</td>
<td>HPI</td>
<td>Participation in group auditory rehabilitation sessions resulted in a reduction in self-perception of hearing handicap</td>
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<td>Control group No.=10</td>
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<td>Cognitive style groups No.=10</td>
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<td>Group auditory rehabilitation group No.=10</td>
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<td>Group auditory rehabilitation plus cognitive style group No.=10</td>
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HHIE: hearing handicap inventory for the elderly; SF-36: short form 36; HCA: hearing coping assessment; QDS: Quantified Denver Scale; CPHI: communication profile for the hearing impaired; HMS: hearing measurement scale; HSS: hearing satisfaction survey; HHQ: hearing health questionnaire; SAC: self-assessment of communication; WHODAS II: World Health Organization Disability Assessment Schedule II; HPI: hearing performance inventory.
who are not. On the basis of published articles, it seems that synthetic individual auditory training programmes result in improved speech perception skills in the presence of background noise. However, more evidence is required to determine more categorically the effectiveness of individual auditory training programmes.

Furthermore, there has been a notion for decades for the need to complement the fitting of hearing aids with programmes involving aspects associated with guidance, awareness of hearing and external hearing devices and communication strategies. There are a many published articles about different types of group auditory rehabilitation programmes, however not all of them show the same results of effectiveness. In line with the evidence reviewed for this article, this could basically be explained as a bias in the design of the studies. Finally, the studies which included appropriate methodologies to assess the effectiveness of group auditory rehabilitation programmes show that the potential for improving quality of life and reducing the hearing handicap remains limited. A group auditory rehabilitation programme has been identified in this non-systematic review which is used in English-speaking countries that included the greatest number of patients and showed improvements in quality of life, and which could be used in the future for older Spanish-speaking adults with hearing loss.

**Conclusion**

In conclusion, the use of hearing aids and communication programmes as interventions for people with hearing loss are positive in achieving improved results. Individual rehabilitation programmes principally improve listening and speech perception, whereas group auditory rehabilitation strategies show the potential to reduce limitation of activities and restricted participation and to improve quality of life. More evidence is required to continue assessing the effectiveness of these programmes.

**Conflict of Interests**

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**References**


