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CLINICAL NOTE

Adaptation of the "active communication education" programme into Spanish for older adults with hearing loss

Sebastián Rivera[a,b], Anthony Marcotti[c,d], Adrian Fuente[e], Eduardo Fuentes-López[c] and Louise Hickson[f]

[a]Escuela de Fonoaudiología, Facultad de Salud, Universidad Santo Tomás, Viña del Mar, Chile; [b]Escuela de Fonoaudiología, Facultad de Ciencias de la Rehabilitación, Universidad Andrés Bello, Viña del Mar, Chile; [c]Departamento de Ciencias de la Salud, Facultad de Medicina, Pontificia Universidad Católica de Chile, Santiago, Chile; [d]Escuela de Fonoaudiología, Facultad de Ciencias de la Salud, Universidad de las Américas, Santiago, Chile; [e]Department of Speech and Hearing Sciences [Departamento de Fonoaudiología], Faculty of Medicine, Universidad de Chile, Santiago, Chile; [f]School of Health and Rehabilitation Sciences, The University of Queensland, Brisbane, Queensland, Australia

ABSTRACT

Objective: To adapt the Active Communication Education (ACE) programme into Spanish. In addition, this study aimed at determining the effects of the adapted ACE programme on the social/emotional impacts of hearing loss and hearing functioning in a group of older adults with hearing loss who do not wear hearing aids.

Design: This was an exploratory cohort study. Study group participants received the newly adapted ACE programme and control group participants received a cognitive stimulation programme. The Shortened Hearing Handicap Inventory for the Elderly in Spanish (HHIE-S) and the Spanish version of the Amsterdam Inventory for Auditory Disability and Handicap (S-AIADH) were carried out before and after each programme.

Study sample: Sixty-six older adults with hearing loss and who did not wear hearing aids were randomly assigned to either an ACE group ($n = 30$) or a cognitive stimulation group ($n = 36$).

Results: Participants who received the ACE programme showed a significantly larger improvement for the S-AIADH than did the cognitive stimulation group participants.

Conclusions: The ACE programme has been adapted into Spanish for use with Chilean older adults with hearing loss. The results show that older adults report better functioning in listening situations after attending the sessions of the adapted ACE programme.

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Age-related hearing loss; aural rehabilitation; Active Communication Education; group intervention

Introduction

Age-related hearing loss (ARHL) has adverse effects on oral communication, cognition and psychosocial functioning (e.g. Kramer et al. 2002; Arlinger 2003; Loughrey et al. 2017). Older adults face listening difficulties in several situations, including following conversations in the presence of multiple talkers, understanding the speech of unfamiliar people, understanding fast speech and understanding speech in noisy environments (Lee 2015).

Currently, most aural rehabilitation services provided to older adults focus on hearing aids. These devices improve audibility and, consequently, speech perception in quiet environments; however, they have limitations in challenging listening environments. In addition, older adults should be offered a variety of rehabilitation options for their listening problems (Laplante-Lévesque, Hickson, and Worrall 2010), such as educational programmes about communication strategies like the Active Communication Education (ACE) programme (Hickson, Worrall, and Scarinci 2007b). This educational programme was developed in Australia and comprises five modules that can be used in different orders depending on participants' communication needs. The aim of the programme is for participants to develop the problem-solving skills necessary to improve everyday communication. The ACE programme has also been adapted into Swedish and applied to a population aged from 39 to 82 years (Öberg, Bohn, and Larsson 2014).

Several studies have shown the ACE programme to be effective at reducing communication difficulties (Hickson, Worral, and Scarinci 2006, 2007a; Öberg, Bohn, and Larsson 2014; Öberg 2017). For example, Hickson, Worrall, and Scarinci (2007a) conducted a randomised control trial with the ACE programme. A group of 100 older adults received the ACE programme and a control group of 78 older adults received a social programme. The results showed that after applying the ACE programme, participants significantly reduced their participation restrictions, as measured by the Hearing Handicap Questionnaire (HHQ) and the Quantified Denver Scale of Communicative Function (QDS). Significant effects were also observed regarding a reduction of limitations of communicative activities (measured with the Self-Assessment of Communication questionnaire) and improvement in general well-being (measured with the consensual version of the Ryff Psychological Well-being Scale). The control group participants showed significant improvements only in aspects relating to participation restrictions (measured with the QDS) and quality of life (measured with the Short Form-36 questionnaire). Also, Öberg (2017) conducted a multicentre study with the Swedish version of the ACE programme. A group of 77 older adults from five different Swedish regions received the ACE

CONTACT Anthony Marcotti anthony.marcotti@uc.cl Departamento de Ciencias de la Salud, Facultad de Medicina, Pontificia Universidad Católica de Chile, Santiago, Chile

programme. No control group was used in Öberg's research (2017). Several questionnaires were administered before and after the intervention (i.e. the ACE programme in Swedish). Such questionnaires included the full version of the Hearing Handicap Inventory for the Elderly (HHIE), the Communication Strategies Scale (CSS), a modified version of the Client-Oriented Scale of Improvement (COSI), the International Outcome Inventory for Alternative Interventions (IOI-AI) and the Hospital Anxiety and Depression Scale (HADS). Participants showed short- and long-term significant improvements in the use of communication strategies (i.e. CSS), along with a reduced handicap associated with hearing loss (HHIE).

The ACE programme has not yet been formally adapted into Spanish for either older adults or other age populations. The population of older adults is particularly important, especially in the context of Latin America. This is because older adults are likely to present with listening difficulties and, if they are eligible for hearing aids from the public healthcare sectors in Latin American countries such as Chile, must wait many months to be fitted with the devices. From 2007, older adults in Chile who present with a pure-tone average (0.5, 1, 2 and 4 kHz) equal to or worse than 40 dB HL in the better ear are eligible to be monaurally fitted with a hearing aid. Depending on the person's income level, the hearing aid may be provided for free or the user must pay up to 20% of the hearing aid cost. When hearing loss is suspected, the family doctor must refer the older adult to an ENT doctor and the latter must refer the older adult to an audiologist for a hearing test. Subsequently, the ENT doctor must again see the user to prescribe the hearing aid. Once the hearing aid has been prescribed, a private company (i.e. external to the hospital) handles the hearing aid fitting and follow-up appointments. According to data provided by the institution where this study was carried out, it takes on average 6 months from the time the hearing loss is suspected by the family doctor until the hearing aid is fitted. Note that this only applies to older adults who do not pay privately for the hearing aid(s). 81.6% of older adults are users of the public healthcare system in Chile (Ministerio de Desarrollo Social y Familia 2017). In this context and within the scope of audiological practice, it seems reasonable to provide older adults with rehabilitation programmes as soon as hearing loss is suspected. The ACE programme can be applied to older adults with hearing loss and/or listening problems in daily-life situations while they wait to be fitted with hearing aids. This would likely provide older adults with communication strategies that can work in tandem with hearing aids. In addition, as the ACE programme involves group sessions with older adults who present with hearing loss, having contact with people with similar problems is likely to reduce stigma and enhance self-confidence (Hétu 1996). All this may even have potential benefits for the outcomes with hearing aids.

Therefore, the aim of this study was to adapt the ACE programme into Spanish to be used with Chilean older adults with hearing loss who had not yet been fitted with hearing aids. The effects of the adapted ACE programme on the social/emotional impacts of hearing loss and self-reported hearing functioning were also investigated.

Methods

Adaptation of the ACE programme into Spanish

To adapt the ACE programme into Spanish, we considered the recommendations suggested by Hall et al. (2018) for translating and adapting questionnaires related to hearing. In the initial stage, we searched for possible adaptations of the ACE programme into Spanish. No documented Spanish version of the ACE programme was available. Then, the entire programme (including the handouts) was translated into Spanish independently by two of the authors of the present study. During the translation process, lay language in Spanish was used. Both translations were compared, and discrepancies were reconciled to ultimately produce one single translation. This single translation was then compared with the original version in English. The aim of such a comparison was to determine possible discrepancies between the original ACE programme in English and the translation into Spanish. In addition, at this stage, some linguistic and cultural modifications were made to the Spanish translation of the ACE programme. Any linguistic modifications introduced to the Spanish version of the ACE programme were compared with the original ACE programme in English in order to maintain the same meaning as the original version. Considering the average educational level of older adults in Chile (8.3 years of formal education), the language was simplified by making the explanations shorter and more precise and by always using simple and common words. Thus, familiar and non-technical vocabulary was used throughout the adapted version of the ACE programme. For example, the word "dispositivo auditivo" [hearing device] was replaced with the word "audífono" [hearing aid] and the word "crónica" [personal chronicle] was replaced with the word "historia" [history], which are both words that everybody in Chile can easily comprehend. Cultural adaptations were necessary considering the local context of how older adults obtain hearing aids from the Chilean public healthcare system, the socio-economic level of the target population and the settings and situations in which listening and communication take place. Thus, we added content about how older adults can access hearing aids in Chile and what local policies exist regarding hearing care for older adults. Also, several cultural adjustments were made regarding the examples of listening and communication situations for each module. For example, the original ACE programme gives examples of listening situations taking place in environments such as theatres; these were replaced with examples such as listening to religious services and loudspeakers at public services. The conversational situations in the original ACE programme take place in restaurants and taxis or private cars; these were replaced with conversational situations taking place on public transport (e.g., buses, subway) and in healthcare centres and municipal senior clubs. In addition, understanding people with a foreign accent was incorporated as a difficult speaker situation, considering the multiculturalism that has resulted from recent immigration to Chile (Departamento de Extranjería y Migración 2016).

Regarding the number of handouts, 14 of the 30 handouts proposed by the original version of the programme were maintained for the Spanish version of the ACE. Handouts that contained information directly complementary to the sessions were selected, especially those that facilitate the use of problem-solving strategies and that privilege concrete content over abstract ideas. Handouts of greater length or with greater amounts of content were shortened and simplified to facilitate reading. This was done in consideration of the poor reading habits of the general Chilean population (CERLALC 2012) and the low level of education of older adults in Chile. In all handouts, when referring to the second-person pronoun "you", the formal pronoun in Spanish "usted" was used. This is because in Chile, older adults are addressed using the formal personal pronoun in Spanish.

In addition, handouts about the sale of hearing aids in the private sector were excluded. The sale of hearing aids in the private sector was not applicable to the sample of older adults in this study, as all of them used the Chilean public healthcare system. In this context, older adults are fitted with hearing aids that have been previously acquired by the local hospital.

Some structural modifications were also made. A duration of 1 h and 30 min for each session was used as opposed to the 2-h sessions suggested in the original ACE programme. Tea breaks were not incorporated during the sessions due to logistic reasons. Problem-solving strategies and communication strategies were considered central themes, so these were addressed in the first session. Thus, they could be applied in each of the situations addressed later. Also, a sixth session was added to this adapted programme (the original ACE programme has 5 sessions). The aim of this additional session was to encourage participants to share their experiences applying the communication strategies covered during the 5 previous sessions. In addition, activities for practicing lipreading were incorporated in this last session.

A pilot field study with the initial adapted version of the ACE programme containing 6 sessions as described above was conducted with a sample of 3 women and 2 men between 65 and 80 years old, none of whom used hearing aids. The audiometric data was not available, but all were under suspicion of bilateral hearing loss due to self-reported auditory difficulties that were confirmed by family members. Participants suggested some modifications to the programme, such as a larger font for the handout text, extra audiovisual support and basic explanations about both the hearing process and age-related hearing loss. The programme facilitator suggested reducing the load of written homework, further engaging with communication partners during the sessions (e.g. significant others, children) and a predetermined order for the sessions. No suggestions regarding the clarity of the texts were given by the participants or the facilitator. Therefore, the language used in the adapted version of the ACE programme was considered adequately appropriate. All previously mentioned suggestions were included in the final version of the adapted ACE programme in Spanish. For example, brief explanations about the human auditory system, hearing and age-related hearing loss were incorporated in the second session of the programme.

Experimental design

The present research was an exploratory cohort study that was single-blinded and conducted in a community- and family-centred healthcare unit in Algarrobo (Chile). Participants were randomly assigned to either the ACE group or a cognitive stimulation group (i.e. control group). The research protocol was approved by the Ethics Committee of Santo Tomás University in Chile.

Participants

Eligible participants were all adults over 65 years of age who were users of the community- and family-centred healthcare unit in the town of Algarrobo (Chile). They were all registered in the list of older adults referred for hearing problems to the Otorhinolaryngology Service of San Antonio Hospital in the city of San Antonio. This list included older adults who may potentially benefit from hearing aids. From the aforementioned list, the medical records department from this healthcare unit selected prospective participants who did not present with acute auditory conditions such as obstructive cerumen or middle-ear problems. In addition, participants without cognitive impairments of moderate degree and above (i.e. Mini-Mental State Examination scores of 24 or below; Braekhus, Laake, and Engedal 1992) were selected by the archivists. A list of 114 older adults was then generated after applying the exclusion criteria mentioned above. This list of 114 prospective participants, containing their names, sex, date of birth and telephone numbers was accessed by the researchers. The study took place at the facilities of the aforementioned healthcare unit.

Group assignment

As mentioned above, this exploratory cohort study comprised a group of older adults who received the ACE programme and a control group who received a cognitive stimulation programme. Both programmes were implemented in groups of 6 older adults. This number was considered to be adequate due to the nature of the ACE programme and the physical space available to conduct the sessions. Initially, a number (from 1 to 114) was assigned to each person in the list of 114 older adults. Then, participants were selected at random using a web-based random number generator (www.random.org). Each selected participant was contacted by telephone to explain the study and invite participation. The first 6 older adults who were contacted and who agreed to participate in the study were assigned to the cognitive stimulation programme (i.e. control group). Then, the following 6 participants who agreed to take part in the study were assigned to the ACE programme, and so forth until completing 6 groups for the cognitive stimulation programme and 5 groups for the ACE programme. The ACE group was finally left with that number of groups, because the rest of the users on the list refused to participate in the study or their schedule did not allow them to attend most of the sessions. Thus, the cognitive stimulation group (i.e. control group) comprised 36 participants divided into 6 groups of 6 participants each (16 women) and the ACE group (i.e. experimental group) comprised 30 participants divided into 5 groups of 6 participants each (22 women).

Intervention

For the ACE programme, either an audiologist or speech pathologist was the facilitator for each group. All 5 groups of 6 older adults each received 6 sessions (one session of 90 min per week). During session 1, the programme's aims and the communication needs were discussed. Such needs included the identification of difficult situations in communicative contexts. Then, strategies for problem-solving were discussed in the context of the specific communication problems identified by group members. During session 2, the problem of understanding speech in the presence of background noise was addressed. This session included the three main communication strategies proposed in the original ACE programme (i.e. to recognise the problem, to explain the problem and to suggest ways to improve communication). This session also included explanations about the problems associated with hearing loss and lay explanations about the auditory system and age-related hearing loss. For session 3, conversations around the house and other listening situations where communication strategies can be applied were discussed. During session 4, communication with difficult speakers and strategies for overcoming this problem were discussed. Session 5 covered listening to other signals. In addition, during this session, compensatory strategies such as lipreading were introduced. Finally, during session 6,

activities for practicing lipreading were given to participants. In addition, during this session, the participants shared their experiences with applying some of the strategies learned during the programme. For each session, written summaries were provided to the participants, along with an introduction to some of the content to be discussed in the following session.

The participants of the cognitive stimulation group were formed in groups of 6 participants. This programme was created for the purposes of this study and conducted by an audiologist, speech pathologist or occupational therapist. This programme comprised 6 sessions (one session of 1.5 h per week). During session 1, activities to improve attention, such as finding similar images, were carried out. Session 2 involved a group activity about planning a holiday. The aim of this activity was to improve executive function. For session 3, visuo-spatial skills were stimulated with activities such as trying to imitate a famous sculpture using modelling clay and drawing 3-dimensional shapes with the help of models such as a cube. During session 4, activities related to short- and long-term memory were carried out. During session 5, activities to stimulate working memory were introduced. Finally, during session 6, social cognition was addressed using activities such as telling aphorisms, jokes and metaphors.

Outcomes

Changes in both the social/emotional impacts of hearing loss and hearing functioning for daily-life activities were used as outcome measures for determining the effectiveness of the adapted ACE programme. The former was investigated using the shortened Chilean-Spanish version of the 25-item Hearing Handicap Inventory for the Elderly (HHIE, Ventry and Weinstein 1982). The abbreviated or screening version of the HHIE (HHIE-S) comprises 10 items and was initially introduced in English by Ventry and Weinstein (1983). Later, Lichtenstein and Hazuda (1998) adapted the 10-item HHIE-S into Spanish with a sample of Mexican-American Spanish speakers. Considering linguistic differences between the Spanish spoken in Mexico (including populations of Mexican-American adults) and the Spanish spoken in Chile, the Spanish version of the 10-item HHIE-S proposed by Lichtenstein and Hazuda (1998) was adapted into Chilean Spanish by the Chilean Ministry of Health (MINSAL (Ministerio de Salud) 2013). The Chilean version of the HHIE-S is very similar to the HHIE-S proposed by Lichtenstein and Hazuda (1998). There are some minor vocabulary differences between the two versions. The scoring system for the Chilean version of the HHIE-S is the same as that proposed by Lichtenstein and Hazuda (1998). Each of the 10 questions presents three possible answers: yes (4 points), sometimes (2 points) and no (0 points). Individual scores are summed to obtain an overall score that can be interpreted as either no handicap (0–8 points) or handicap (10–40 points). Note that the Chilean version of the HHIE-S is widely used in Chile, as its use for screening hearing loss in older adults is suggested by the Clinical Guidelines for the Management of Bilateral Hearing Loss in Older Adults published by the Chilean Ministry of Health (MINSAL (Ministerio de Salud) 2013).

Changes in hearing functioning for daily-life activities was investigated with the Spanish version of the Amsterdam Inventory for Auditory Disability and Handicap (S-AIADH) (Fuente et al. 2012). This is a 30-item questionnaire that explores a person's listening performance for several daily-life activities. Questions can be clustered in five domains or hearing functions: sound detection, sound discrimination, speech perception in quiet environments, speech perception in noisy environments and sound localisation. For each question, the person determines how frequently she or he can perform the listening situation being addressed based on four options (i.e. almost always, frequently, occasionally and almost never). The score for each question ranges from 1 (almost never) to 4 (almost always). The overall score for the S-AIADH is 120. However, question 18 (i.e. Do you find that music is too loud for you, while others around you do not complain about the loudness?) and 30 (i.e., Do you miss parts of music while listening to music or songs?) inquire about aspects other than the hearing functions mentioned above and thus were not considered in the analyses.

Participants from each group (ACE and cognitive stimulation) individually completed both questionnaires pre- and post-intervention. The pre-intervention baseline was obtained just before the commencement of session 1 for each programme. Questionnaires for post-intervention were completed immediately after the end of session 6 for each of the intervention programmes. The pre-intervention and post-intervention evaluations each lasted 30 minutes.

Implementation

One of the researchers of the present study was in charge of generating the randomisation sequence, participants' enrolments and assigning the group (i.e. ACE versus cognitive stimulation) to the participants.

Blinding

This study had a simple blind, since none of the participants knew which group, they were assigned to (ACE or cognitive stimulation) until the end of the study. The facilitators of the programme and the researchers in charge of analysing the data knew which group each subject belonged to.

Statistical analysis

Data were initially explored using the Shapiro–Wilk test to determine whether the results were normally distributed. Either parametric or nonparametric statistics were subsequently used depending on whether the values for the outcome measures were normally distributed. Between-group comparisons were carried out for both outcome measures (HHIE-S and S-AIADH) before and after the interventions. The nonparametric Mann–Whitney test was used for between-group comparisons for the HHIE-S and the independent samples *t*-test was used for between-group comparisons for the S-AIADH. The test statistic for the Mann–Whitney test is denoted U and the formula for calculating this statistic involves combining the two groups into one group and ranking the participants from top to bottom (Acock 2014). Then, the test computes the sum of the ranks for each group and compares this with what it is expected by chance (Acock 2014). Stata statistical software uses a normal approximation of the Mann–Whitney *U* statistic (by transforming it to a *z*-score) to obtain a *p value*. Finally, the *z*-score is compared to the standard normal distribution to obtain a *p*-value. The details of this approach can be reviewed in the original article by the authors (Mann and Whitney 1947). In addition, within-group comparisons for each outcome measure before and after the interventions were carried out. The nonparametric Wilcoxon signed-rank

test was used for within-group comparisons for the HHIE-S and the paired sample *t*-test was used for within-group comparisons for the S-AIADH. The effect size (Cohen's *d*) for the comparison between groups after the interventions was calculated. The achieved statistical power was computed for the statistical test carried out.

Results

The mean ages were 75 years for the ACE group (S.D. 6.3 years) and 76 years for the cognitive stimulation group (S.D. 6.5 years). All participants attended at least 3 of the 6 sessions. In the ACE group, 13.3% ($n=4$) of the participants attended 3 sessions, 40.0% ($n=12$) attended 4 sessions, 23.3% ($n=7$) attended 5 sessions and 23.3% ($n=7$) attended all 6 sessions. In the cognitive stimulation group, 13.8% ($n=5$) attended 3 sessions, 33.3% ($n=12$), 16.6% ($n=6$) attended 5 sessions and 36.1% ($n=13$) attended all 6 sessions. A Mann–Whitney *U* test showed no significant differences regarding attendance to sessions between groups ($Z=0.69$, $p=0.533$). Participants were encouraged to bring communication partners to the sessions. However, the participation of communication partners was not systematic and thus was not considered in further analyses.

Social/emotional impacts of hearing loss

HHIE-S scores were not normally distributed (Shapiro–Wilk test, $p<0.05$) and, thus, nonparametric statistics were used to explore the instrument results. At baseline, the observed mean scores for the HHIE-S were 30.80 (S.D. 7.72) and 31.33 (S.D. 6.89) for the ACE and cognitive stimulation groups, respectively (Figure 1). A between-group comparison using a Mann–Whitney *U* test did not show significant differences between groups for the HHIE-S before the interventions ($Z=-0.20$, $p=0.836$). After the intervention programme, the ACE group obtained a mean HHIE-S score of 20.60 (S.D. 7.63). A within-group comparison using a Wilcoxon signed-rank test showed a significant improvement in scores after the ACE programme ($Z=-3.78$, $p<0.0001$). After the intervention, the cognitive stimulation group obtained a mean HHIE-S score of 23.11 (S.D. 7.25). A within-group comparison using a Wilcoxon signed-rank test showed a significant improvement in scores after the cognitive stimulation programme ($Z=-4.64$, $p<0.0001$). Thus, both groups of participants showed significant reductions in self-perceived hearing handicap after the intervention programmes. In addition, a between-group comparison using the Mann-Whitney U test did not show significant differences for HHIE-S scores between the groups after the interventions ($Z=-1.17$, $p=0.23$). Therefore, both programmes (ACE and cognitive stimulation) have a similar positive impact on reducing the social/emotional impacts of hearing loss. The effect size for this mean comparison is small ($d=0.336$). Considering Cohen's *d* and $\alpha=0.05$, a statistical power was obtained ($1-\beta=0.26$). This is below the minimum power levels required by convention ($1-\beta=0.80$) and the probability of committing a type II error is 74% (Grissom and Kim 2012).

Hearing functioning in daily-life activities

All scores for the S-AIADH in both groups were normally distributed (Shapiro–Wilk test, $p>0.05$) and thus parametric statistics were used to explore the instrument results. Figure 2 shows that the mean overall scores for the S-AIADH at baseline (before the interventions) were 75.20 (S.D. 10.23) and 75.05 (S.D. 10.45) for the ACE and cognitive stimulation groups, respectively. No significant differences were observed between groups for the mean overall pre-intervention scores for the S-AIADH using the independent samples *t*-test ($t=0.05$, $p=0.95$). After the intervention, ACE group participants obtained a mean overall score for the S-AIADH of 85.30 (S.D. 10.86). A within-group comparison using a paired sample *t*-test revealed that after the ACE

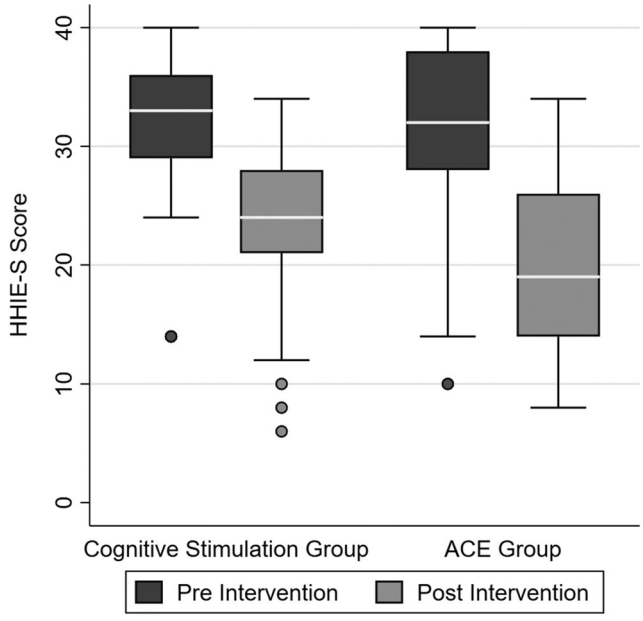

Figure 1. HHIE-S scores for cognitive stimulation ($n=36$) and ACE ($n=30$) groups before and after the interventions. Boxes represent between 25th and 75th percentile of the scores and the line within the box represents the median. Whiskers range from the 10th to the 90th percentile. Outlier points represented with circles fall farther than 1.5 box-lengths from the box edge.

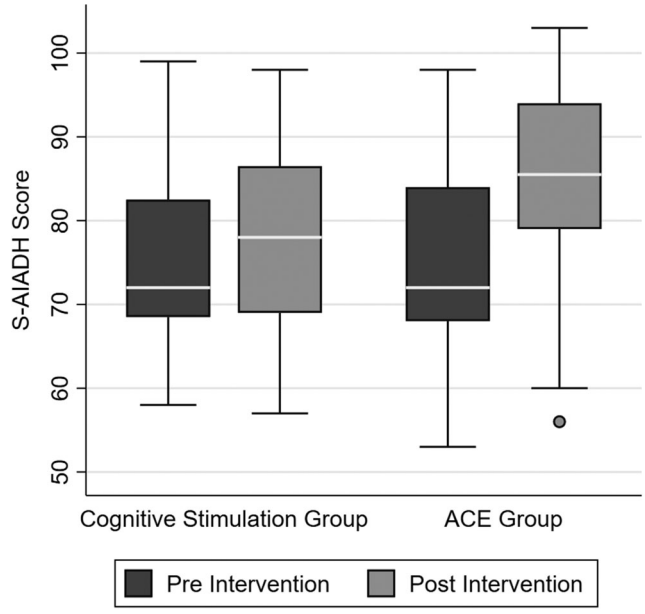

Figure 2. S-AIADH scores for cognitive stimulation ($n=36$) and ACE ($n=30$) groups before and after the interventions. Boxes represent between 25th and 75th percentile of the scores and the line within the box represents the median. Whiskers range from the 10th to the 90th percentile. Outlier points represented with circles fall farther than 1.5 box-lengths from the box edge.

programme participants showed a significant improvement in hearing functioning ($t = -5.67$, $p < 0.0001$). Regarding the cognitive stimulation group, participants obtained a mean overall score for the S-AIADH of 77.94 (S.D. 10.79). A within-group comparison using a paired sample t-test showed that after the cognitive stimulation programme, participants also showed a significant improvement in hearing functioning ($t = -2.05$, $p = 0.047$). In addition, a between-group comparison using the independent samples *t*-test for the post-intervention S-AIADH scores showed that the experimental group's scores were significantly better than the control group's scores ($t = 2.74$, $p = 0.0078$). Therefore, participants who received the ACE programme showed a significantly larger improvement in their hearing functioning for daily-life activities than participants who received the cognitive stimulation programme. The effect size for this mean comparison is medium ($d = 0.679$). Considering Cohen's d and an $\alpha = 0.05$, a statistical power was obtained ($1-\beta = 0.77$). The probability of committing a type II error is 23% (Grissom and Kim 2012).

Discussion

The primary aim of this study was to adapt the ACE programme for Chilean Spanish-speaking older adults. Improvements in two health-related domains associated with the adapted ACE programme were explored (i.e. the social/emotional impacts of hearing loss and the hearing functioning). The social and emotional impacts of hearing loss were assessed through the HHIE-S. At pre-intervention, no significant differences were observed between the ACE and cognitive stimulation groups. Post-intervention, both groups showed significant reductions in hearing handicap. However, no significant differences between groups were observed post-intervention. Considering that both groups of older adults improved in HHIE-S scores, we believe that this effect was generated by gathering older adults with a common health condition (i.e., hearing loss). This hypothesis is supported by the process of normalisation described by Hétu (1996). This process considers hearing loss as a stigmatising condition. The first step in the normalisation process is to interact with people who share the stigmatising feature of hearing loss. Within both groups, hearing loss was a common problem and, therefore, it ceased to be a socially deviant feature. In this context, negative stereotypes associated with hearing loss can be explored in a supportive environment. Therefore, considering that both programmes (i.e. ACE and cognitive stimulation) were targeted to older adults with hearing loss, we believe the normalisation process mentioned above reduced the social and emotional impacts of hearing loss in all participants. Öberg, Bohn, and Larsson (2014) adapted the HHIE-S into Swedish to determine the effects of the ACE programme on a sample of adults aged between 39 and 82 years. As in the present study, the authors found that the ACE programme in Swedish significantly reduced the social/emotional impacts of hearing loss by comparing the HHIE-S results before and 6 months after the intervention with the ACE programme. The research design was a within-group intervention study without a control group (Öberg, Bohn, and Larsson 2014).

Regarding hearing functioning, scores for the S-AIADH significantly improved after both the ACE programme and the cognitive stimulation programme. However, participants who received the ACE programme obtained significantly better results for the S-AIADH than did cognitive stimulation group participants after the interventions. At baseline (pre-intervention), no significant differences were observed for the S-AIADH between groups. We hypothesise that improvement among control group participants in listening performance was associated with the cognitive-related activities that were addressed during their intervention. It has been widely suggested that cognitive aspects, such as executive function, memory and attention, are associated with listening performance, especially in older adults (e.g. Cahana-Amitay et al. 2016; Ellis et al. 2016; Nuesse et al. 2018). However, the ACE programme outcomes suggest that it is better at inducing positive changes in listening performance among older adults. When group intervention programmes are focussed on communication strategies, participants can learn how to address everyday listening difficulties. They share the difficulties they have experienced because of their hearing loss and strategies they have used, with varying degrees of success, to overcome these challenges. As a result, participants in these groups feel more comfortable practicing effective communication strategies and can better manage the consequences of hearing loss (Wallhagen 2010). The focus of the intervention programme is therefore a factor that could explain the significantly greater improvement obtained by the experimental group in the functional aspects of hearing, as measured through the S-AIADH.

Limitations

Two major limitations can be identified in the present study. First, hearing loss was determined based on self-report and thus the degree of hearing loss among participants was not known. This is because all participants were on a waiting list for an ENT specialist and thus audiometric results were not available. It is suspected that most participants presented with sensorineural hearing loss, as they complained of hearing problems to their family doctors. However, the degree and configuration of hearing loss were unknown at the time of this study. In addition, some participants may have not been hearing aid candidates. Second, long-term effects of the ACE programme were not investigated. Thus, it cannot be concluded that the observed positive effects of the newly adapted ACE programme are maintained beyond the immediate completion of the programme (benefits of the original ACE were maintained at 6 months post programme, see Hickson, Worrall, and Scarinci 2007b). Further research should be conducted investigating long-term effects of the newly adapted ACE programme. Regarding the study design, the outcomes from this study may have been affected by differences in group dynamics associated with participants' personalities and different facilitators for the intervention groups. Such differences were not controlled and thus they may have biased the results. Finally, the lack of power for the HHIE-S results may well be associated with the absence of significant differences observed between groups after the interventions.

Conclusion

The ACE programme was adapted for Chilean Spanish-speaking older adults with hearing loss. The adapted programme was found to significantly improve self-reported hearing functioning compared with a cognitive stimulation programme. Both the ACE programme and the cognitive stimulation programme significantly reduced the social and emotional impacts of hearing loss, suggesting that important benefits can be achieved by bringing older adults with hearing loss together for group activities. Such an effect may be associated with the normalisation process. Further research with the adapted ACE programme should

investigate long-term outcomes. The Spanish adaptation of the ACE programme (including the handouts) used in this study can be accessed through the following web link: https://shrs.uq.edu.au/active-communication-education-ace. Note that caution should be exercised when using this Spanish adaptation of the ACE programme with populations other than Chilean adults, as vocabulary and/or cultural differences exist between Spanish-speaking countries.

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ORCID

Sebastián Rivera https://orcid.org/0000-0003-1823-0229
Anthony Marcotti https://orcid.org/0000-0003-1674-6846
Eduardo Fuentes-López http://orcid.org/0000-0002-0141-0226
Louise Hickson https://orcid.org/0000-0001-6832-4173

References

Acock, Alan. 2014. *A Gentle Introduction to Stata*. 4th Ed. College Station, TX: Stata Press.

Arlinger, Stig. 2003. "Negative Consequences of Uncorrected Hearing Loss – A Review." *International Journal of Audiology* 42 (sup2): 17–20. doi:10.3109/14992020309074639.

Braekhus, Anne, Knut Laake, and Knut Engedal. 1992. "The Mini-Mental State Examination: Identifying the Most Efficient Variables for Detecting Cognitive Impairment in the Elderly." *Journal of the American Geriatrics Society* 40 (11): 1139–1145. doi:10.1111/j.1532-5415.1992.tb01804.x.

Cahana-Amitay, Dalia, Avron Spiro, Jesse T. Sayers, Abigail C. Oveis, Eve Higby, Emmanuel A. Ojo, Susan Duncan, et al. 2016. "How Older Adults Use Cognition in Sentence-Final Word Recognition." *Aging, Neuropsychology, and Cognition* 23 (4): 418–444. doi:10.1080/13825585.2015.1111291.

CERLALC (Centro Regional para el Fomento del Libro en América Latina y el Caribe). 2012. "Comportamiento Lector y Hábitos. de Lectura." http://www.observatoriopoliticasculturales.cl/OPC/wp-content/uploads/2013/03/Comportamiento-Lector-y-Hábitos-Lectores-–-CERLALC.pdf

Departamento de Extranjería y Migración. 2016. "Migración En Chile 2005–2014." https://www.extranjeria.gob.cl/media/2016/02/Anuario-Estadístico-Nacional-Migración-en-Chile-2005-2014.pdf

Ellis, Rachel J., Peter Molander, Jerker Rönnberg, Björn Lyxell, Gerhard Andersson, and Thomas Lunner. 2016. "Predicting Speech-in-Noise Recognition from Performance on the Trail Making Test: Results from a Large-Scale Internet Study." *Ear and Hearing* 37 (1): 73–79. doi:10.1097/AUD.0000000000000218.

Fuente, Adrian, Bradley Mcpherson, Sophia E. Kramer, Ximena Hormazábal, and Louise Hickson. 2012. "Adaptation of the Amsterdam Inventory for Auditory Disability and Handicap into Spanish." *Disability and Rehabilitation* 34 (24): 2076–2084. doi:10.3109/09638288.2012.671884.

Grissom, Robert, and John Kim. 2012. "*Effect Sizes for Research*." *Univariate and Multivariate Applications*. 2nd ed. New York: Taylor & Francis Group.

Hall, Deborah A., Silvia Zaragoza Domingo, Leila Z. Hamdache, Spoorthi Thammaiah, Chris Evans, Lena L. N. Wong, and Deborah A. Hall; On behalf of the International Collegium of Rehabilitative Audiology and TINnitus Research NETwork. 2018. "A Good Practice Guide for Translating and Adapting Hearing-Related Questionnaires for Different Languages and Cultures Related Questionnaires for Different Languages and Cultures." *International Journal of Audiology* 57 (3): 161–175. doi:10.1080/14992027.2017.1393565.

Hétu, R. 1996. "The Stigma Attached to Hearing Impairment." *Scandinavian Audiology. Supplement* 25 (43): 12–24. https://www.ncbi.nlm.nih.gov/pubmed/8738641

Hickson, Louise, Linda Worral, and Nerina Scarinci. 2006. "Measuring Outcomes of a Communication Program for Older People with Hearing Impairment Using the International Outcome Inventory." *International Journal of Audiology* 45 (4): 238–246. doi:10.1080/14992020500429625.

Hickson, Louise, Linda Worrall, and Nerina Scarinci. 2007a. "A Randomized Controlled Trial Evaluating the Active Communication Education Program for Older People with Hearing Impairment." *Ear and Hearing* 28 (2): 212–230. doi:10.1097/AUD.0b013e31803126c8.

Hickson, Louise, Linda Worrall, and Nerina Scarinci. 2007b. *Active Communication Education (ACE): A Program for Older People with Hearing Impairment*. Brackley: Speechmark.

Kramer, Sophia E., Theo S. Kapteyn, Dirk J. Kuik, and Dorly J. Deeg. 2002. "The Association of Hearing Impairment Health Status in Older Age." *Journal of Aging and Health* 14 (1): 122–137. doi:10.1177/089826430201400107.

Laplante-Lévesque, Ariane, Louise Hickson, and Linda Worrall. 2010. "Rehabilitation of Older Adults with Hearing Impairment. A Critical Review." *Journal of Aging and Health* 22 (2): 143–153. doi:10.1177/0898264309352731.

Lee, Ji Young. 2015. "Aging and Speech Understanding." *Journal of Audiology and Otology* 19 (1): 7–13. doi:10.7874/jao.2015.19.1.7.

Lichtenstein, Michael J., and Helen P. Hazuda. 1998. "Cross-Cultural Adaptation of the Hearing Handicap Inventory for the Elderly-Screening Version (HHIE-S) for Use with Spanish-Speaking Mexican Americans." *Journal of the American Geriatrics Society* 46 (4): 492–498. doi:10.1111/j.1532-5415.1998.tb02473.x

Loughrey, David G., B. A. Hons, Michelle E. Kelly, George A. Kelley, Sabina Brennan, and Brian A. Lawlor. 2017. "Association of Age-Related Hearing Loss with Cognitive Function, Cognitive Impairment, and Dementia. A Systematic Review and Meta-Analysis." *JAMA Otolaryngology–Head & Neck Surgery* 144 (2): 1–12. doi:10.1001/jamaoto.2017.2513.

Mann, H., and D. Whitney. 1947. "On a Test of Whether One of Two Random Variables Is Stochastically Larger than the Other." *The Annals of Mathematical Statistics* 18 (1): 50–60. http://www.jstor.org/stable/2236101%0D doi:10.1214/aoms/1177730491.

Ministerio de Desarrollo Social y Familia. 2017. "Encuesta de Caracterización Socioeconómica Nacional (CASEN)." http://observatorio.ministeriodesarrollosocial.gob.cl/casen-multidimensional/casen/docs/Resultados_Adulto_Mayores_casen_2017.pdf

MINSAL (Ministerio de Salud). 2013. "Hipoacusia Bilateral En Personas de 65 Años o Más Que Requieren Uso de Audífono." https://www.minsal.cl/sites/default/files/files/Hipoacusiabilateralmayores65agnos.pdf

Nuesse, Theresa, Rike Steenken, Tobias Neher, and Inga Holube. 2018. "Exploring the Link Between Cognitive Abilities and Speech Recognition in the Elderly under Different Listening Conditions." *Frontiers in Psychology* 9: 1–17. doi:10.3389/fpsyg.2018.00678.

Öberg, Marie. 2017. "A Multicentre Study Evaluating the Effects of the Swedish ACE Programme." *International Journal of Audiology* 56 (11): 876–886. doi:10.1080/14992027.2017.1346304.

Öberg, Marie, Therese Bohn, and Ulrika Larsson. 2014. "Short- and Long-Term Effects of the Modified Swedish Version of the Active Communication Education (ACE) Program for Adults with Hearing Loss." *Journal of the American Academy of Audiology* 25 (9): 848–858. doi:10.3766/jaaa.25.9.7.

Ventry, Ira M., and Beth E. Weinstein. 1982. "The Hearing Handicap Inventory for the Elderly. A New Tool." *Ear and Hearing* 3 (3): 128–134. https://www.ncbi.nlm.nih.gov/pubmed/7095321. doi:10.1097/00003446-198205000-00006.

Ventry, Ira M., and Beth E. Weinstein. 1983. "Identification of Elderly People with Hearing Problems." *ASHA* 25 (7): 37–42. https://www.ncbi.nlm.nih.gov/pubmed/6626295.

Wallhagen, Margaret I. 2010. "The Stigma of Hearing Loss." *The Gerontologist* 50 (1): 66–75. doi:10.1093/geront/gnp107.