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CLINICAL NOTE

Individualised active communication education (I-ACE): another clinical option for adults with hearing impairment with a focus on problem solving and self-management

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ABSTRACT

Objective: This clinical note describes the Individualised – Active Communication Education (I-ACE) programme designed to improve problem solving and self-management in adults with hearing impairment.

Design: The I-ACE was offered to adult clients seeking help for the first time and effects were measured for participants using self-report questionnaires: the Client Oriented Scale of Improvement (goal attainment), the Hearing Handicap Questionnaire (hearing disability), and the International Outcome Inventory – Alternative Interventions (outcomes) immediately after programme completion and 3 months later. Participants also provided qualitative feedback about I-ACE.

Study sample: Twenty-three participants completed I-ACE, with 22 completing all self-report questionnaires and 23 participants providing qualitative feedback.

Results: The participants reported positive outcomes and goal attainment, but no change in hearing disability post-programme. The effects were maintained 3 months later. Qualitative feedback indicated that I-ACE supported participants in recognising and increasing awareness of their hearing difficulties and in developing potential solutions to these difficulties. Participants also enjoyed the opportunity to involve communication partners.

Conclusion: I-ACE is an appropriate option for adults with hearing impairment who wish to become more aware of their hearing difficulties and how to solve them.

Abbreviations: ACE: Active Communication Education; COSI: Client Oriented Scale of Improvement; HHQ: Hearing Handicap Questionnaire; I-ACE: Individualised Active Communication Education; IOI-AI: International Outcome Inventory – Alternative Interventions

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Hearing impairment; problem solving; self-management; communication strategies; aural rehabilitation; eHealth

Evidence indicates that in clinical practice in audiology adult clients are most commonly offered a single treatment option: the fitting of amplification devices (Grenness et al. 2015; Preminger et al. 2015). The limitation of this approach is that many adults who experience hearing and communication difficulties in everyday life, and who are unable or unwilling to proceed with hearing aid fitting at a particular point in time, do not receive any intervention services. We developed the group Active Communication Education (ACE; Hickson, Worrall, and Scarinci 2006, 2007) programme to provide an evidence-based alternative to hearing aid fitting, as a complementary intervention for people who needed more assistance than hearing aids alone could provide, or as an alternative to hearing aids for those who do not wish or cannot access them. A number of other such group programmes have been produced and evaluated (Chisolm and Arnold 2012 for review), however the focus of this clinical note is on the ACE programme and a version of it that was developed for use with individual clients (I-ACE: Individualised Active Communication Education), rather than for groups.

ACE is a 5-week interactive group programme, facilitated by a health or education professional, which focuses on developing participants' problem-solving communication skills so that they can apply strategies to self-manage communication breakdowns

in everyday life. ACE is suitable for people with hearing impairment (with and without hearing aids) and their significant others. ACE begins with a group goal-setting activity which allows participants to prioritise their hearing and communication needs and subsequently sets the agenda for the sessions that follow. Participants then work through modules that address the goals they have set, with common topics including “conversation around the house”, “understanding conversation in background noise”, “communication with difficult speakers”, “listening to other signals” and “listening to public address systems”. For each topic, participants are encouraged to identify the source of communication difficulty, problem-solve possible solutions, and to practice these solutions both in the ACE group setting and when they return home between group sessions. Peer discussion and peer support are key elements of the programme. All programme materials, including YouTube videos demonstrating its application, are available for free at <https://shrs.uq.edu.au/active-communication-education-ace>.

ACE was evaluated in a double-blind randomised-controlled trial (Hickson, Worrall, and Scarinci 2007) with 178 adults (mean age = 74 years) with mild to moderate hearing impairment; half completed a placebo social group intervention for 5 weeks before undertaking ACE and the other half completed

ACE only. The findings demonstrated the effectiveness of ACE in that participants reported less hearing disability post-programme and this was maintained at a 6-month follow-up. ACE continues to be used in our clinical practice and others around the world and has also been translated into a number of languages including Swedish (Öberg, Bohn, and Larsson 2014), German, French, Portuguese, Spanish, and Korean, as well as being delivered in online format (Thorén et al. 2014). Outcome studies from the Swedish translations of ACE support positive improvements for participants who undertook ACE in terms of goals achieved post-programme (Öberg, Bohn, and Larsson 2014; Öberg 2017) and increased activity and participation (Thorén et al. 2014).

In the course of evaluating ACE, it became apparent that some clients would have preferred individual rather than group sessions to learn about problem-solving and self-management and some clients could not attend group sessions for practical reasons (e.g. incompatible schedules, mobility issues, transport time and costs). In response, we developed I-ACE. The educational aims and content of I-ACE are the same as for ACE; however, the method of delivery is different. I-ACE is essentially a modular written programme that prompts clients to problem solve and self-manage their hearing and communication problems. Although we were concerned that peer discussion and support would not feature in such a programme, we felt that offering the individual alternative to the group ACE was important in the context of client-centred care and providing options that matched client needs. In addition, there is evidence from other studies of the benefits of individual home programmes. For example, Kramer et al. (2005) evaluated a home education programme for older adults and their significant others focussed on communication strategies and reported improved quality of life for those who had been randomly assigned to undertake the programme after hearing aid fitting, compared to a control group who had received hearing aid fitting only. Ferguson et al. (2016) evaluated a comprehensive suite of interactive multimedia learning materials (see Ferguson et al. 2018) addressing topics related to hearing aid use, communication tactics and use of hearing aids with other listening devices. In a randomised controlled design of first time clients, they found improved knowledge and skills about hearing aids and improved knowledge about psychosocial issues related to hearing impairment in the experimental group (hearing aid fitting and the programme) compared to the control group (hearing aid fitting only).

Laplanche-Lévesque et al. (2010, 2011, 2012a) included I-ACE in a research project that investigated intervention decisions and outcomes of 153 adults with hearing impairment who were help-seeking for the first time and were offered the following options: (1) hearing aids; (2) ACE (described to participants as the “group program”); (3) I-ACE (described to participants as the “written program”); and (4) no intervention. The majority of participants (73%) were eligible for fully subsidised hearing aid fitting from the Australian Government based on their pension status. Six months after the options were presented to participants, 66 (43%) had been fitted with hearing aids, 5 (3%) had completed ACE, 23 (15%) completed I-ACE, and 59 (39%) had received no intervention. Participants appreciated, as expected, the convenience of I-ACE in terms of transport and scheduling and that it was free of charge. They also mentioned that adherence to the 5-week programme required significant commitment (see Laplanche-Lévesque et al. 2010 for the factors that the participants reported as influencing their intervention

decisions). Multivariate analyses of the participants’ intervention decisions corroborated these findings: participants who decided to pursue ACE or I-ACE, compared to participants who decided to pursue hearing aids or no intervention, were less likely to be eligible for free hearing aids and found the communication programmes more likely to help them and more suitable to them (Laplanche-Lévesque et al. 2011).

This short paper describes I-ACE and outlines the results obtained for clients who undertook it as part of the Laplanche-Lévesque et al. research project. Our motivation for publishing further detail about I-ACE is that the outcomes of the programme have not been described in previous publications (results for ACE and I-ACE were presented together in earlier publications). Furthermore, I-ACE forms the basis of an intervention being applied in a randomised controlled trial in the United States. The trial, referred to as Aging, Cognition, and Hearing Evaluation in Elders (ACHIEVE), aims to determine if hearing impairment treatment reduces cognitive decline in older adults (Lin et al. 2015, 2016; Deal et al. 2017).

Methods

Participants

In total, 23 participants (19 men and 4 women) started and completed the I-ACE. They had a mean age of 68, and ranged in age from 53 to 81 years. In terms of highest levels of educational achievement, 3 had completed secondary school, 9 technical/vocational training, 6 undergraduate university and 5 postgraduate university degrees. Participants reported having a hearing impairment for an average of 10 years, with a range from 1 to 40 years. It was a requirement for inclusion in the study that the participants presented with a hearing impairment (defined as an average of air conduction thresholds at 0.5, 1, 2, and 4 kHz greater than 25 dB HL in at least one ear) and had never used hearing aids or completed any other form of audiological rehabilitation.

Most ($n = 20$) had a mild bilateral hearing impairment; one had a moderate bilateral hearing impairment; and two had an asymmetrical hearing impairment with either moderate or profound hearing impairment in the worse ear.

Materials

Individualised – Active communication education (I-ACE)

The ACE modules were converted into written chapters on problem-solving strategies to improve communication. Each chapter followed the same structure as the group ACE programme: objectives; table of contents with a tick box for participants to keep track of their progress through the chapter; thinking back (identification of own difficulties and of problem-solving used); activities including information, reflection, and practical exercises; application to own difficulties; and feedback on the chapter. Chapters were written with simplified sentence structures and with large sans serif font to improve ease of reading. The programme is available for free download at <https://shrs.uq.edu.au/active-communication-education-ace>. Audiologists at the Audiology Clinic of The University of Queensland offered the I-ACE free of charge. The facilitator tailored the written programme to each participant by using the COSI goals (Dillon et al. 1997) of the participants as a starting point: for example, the facilitator created modules specific to the theatre or to work meetings as they were the situations most important to some participants. Significant others

were encouraged to participate in I-ACE, with participants being prompted in the first chapter to discuss their hearing loss with their significant others, and some chapters including listening activities that required the participation of a significant other. Each of the five chapters was completed at home at the participant's pace and once completed the participant contacted the facilitator who responded to any questions participants had and gave feedback. After each chapter was completed, the facilitator sent the next chapter via mail or e-mail, according to the participant's preference. The participants were asked to provide written qualitative feedback following I-ACE completion by answering four open-ended questions.

Three questionnaires documented the effects of I-ACE immediately post programme and 3 months later: the Client Oriented Scale of Improvement, the Hearing Handicap Questionnaire, and the International Outcome Inventory – Alternative Interventions.

Client Oriented Scale of Improvement (COSI)

The COSI (Dillon et al. 1997) enables every participant to set *a priori* and evaluate after intervention, the attainment of up to five goals. For each goal, the respondent completes two scales: (1) degree of change in hearing ability and (2) final hearing ability. Only the degree of change in hearing ability scale was used here as it is a better indicator of the intervention effect than final hearing ability. The five response options are Worse (1), No different (2), Slightly better (3), Better (4), or Much better (5). Each respondent's scores are averaged across the intervention goals and the overall score ranges from 1 to 5 with higher scores indicating greater benefit.

Hearing Handicap Questionnaire (HHQ)

The HHQ (Gatehouse and Noble 2004) measures hearing disability through 12 items (e.g. How often do you feel tense or tired because of your hearing difficulty?). The five response options are Never (1), Rarely (2), Sometimes (3), Often (4), and Almost always (5). Total scores range from 12 to 60 with higher scores indicating greater disability. The HHQ was administered before and after the intervention.

International Outcome Inventory – Alternative Interventions (IOI-AI)

The IOI-AI (Noble 2002) is a composite questionnaire which measures seven dimensions of hearing intervention outcomes: (1) daily use; (2) benefit; (3) residual activity limitations; (4) satisfaction; (5) residual participation restrictions; (6) impact on others; and (7) quality of life. The IOI-AI questionnaire contains seven items (one item for each of the seven dimensions listed earlier), with five response options scored from 1 to 5. In the present study, the five numerical response options (e.g. 1–4 hours/day) of the IOI-AI first item (targeting daily use) were replaced with five word response options (e.g. “Sometimes”; Laplante-Lévesque et al. 2012b). Scores for each item are averaged and total scores range from 1 to 5 with higher scores indicating more successful outcomes.

Data and its analysis

All 23 participants who started the I-ACE completed its five modules and shared written qualitative feedback upon completion. The

most common pace at which I-ACE was completed was one module per 1 to 2 weeks, for a total duration of 5 to 10 weeks. However, some participants chose to adopt a quicker or slower pace due to personal commitments such as travels.

Of the total of 23 participants, 22 participants reported quantitative outcomes upon I-ACE completion and 3 months later.

Descriptive statistics were used to summarise the COSI and IOI-AI scores. T-tests were conducted to compare HHQ scores at baseline, upon I-ACE completion, and 3 months later. For each of the four questions that was used to collect qualitative feedback, inductive thematic analysis was conducted. Inductive thematic analysis describes patterns (themes) that appear within a dataset without a *a priori* preconceptions or theoretical frame (Braun and Clarke, 2006).

Results

COSI

On the COSI, participants reported either 1 ($n=2$), 2 ($n=5$), 3 ($n=9$), 4 ($n=1$), or 5 ($n=5$) goals. For each participant, degree of change was averaged over the number of goals they reported. After programme completion, no participant reported their hearing ability being worse, 4 participants no better, 10 participants slightly better, 6 participants better, and 2 participants much better. The results were similar 3 months later, with no participant reporting their hearing ability being worse, 6 participants no better, 9 participants slightly better, 5 participants better, and 2 participants much better.

HHQ

Prior to I-ACE, participants' mean reported hearing disability was 24.65 (Range = 16–35; Standard Deviation = 5.26). They reported similar hearing disability upon I-ACE completion (Mean = 25.59, Standard Deviation = 5.89) and 3 months after completion (Mean = 23.91, Standard Deviation = 4.98). HHQ scores at baseline and after I-ACE completion were not significantly different ($t=0.5572$, $p=0.5803$) nor were HHQ scores at baseline and 3 months after I-ACE ($t=0.4808$, $p=0.6332$).

IOI-AI

Figure 1 shows the outcomes of the I-ACE measured with the IOI-AI both immediately after programme completion and 3 months later. Participants reported most improvement in the dimension of the impact of hearing impairment on others. The quality of life dimension showed the least amount of improvement. The responses for items that stayed the same over time were as follows: **daily use**: sometimes (3 out of 5 scale points); **benefit**: helped moderately (3 out of 5 scale points); **satisfaction**: quite a lot worth it (4 out of 5 scale points); **residual participation restrictions**: affected slightly (4 out of 5 scale points); **impact on others**: bothered slightly (4 out of 5 scale points), and; **quality of life**: slightly better (3 out of 5 scale points). The modal response to the item on **residual activity limitations** (“When you use the strategies talked about in I-ACE, how much difficulty do you still have in that situation”) was slight difficulty (4 out of 5 scale points) upon I-ACE completion and moderate difficulty (3 out of 5 scale points) 3 months later. Overall, the results show that the outcomes of the I-ACE programme were positive and stable over time.

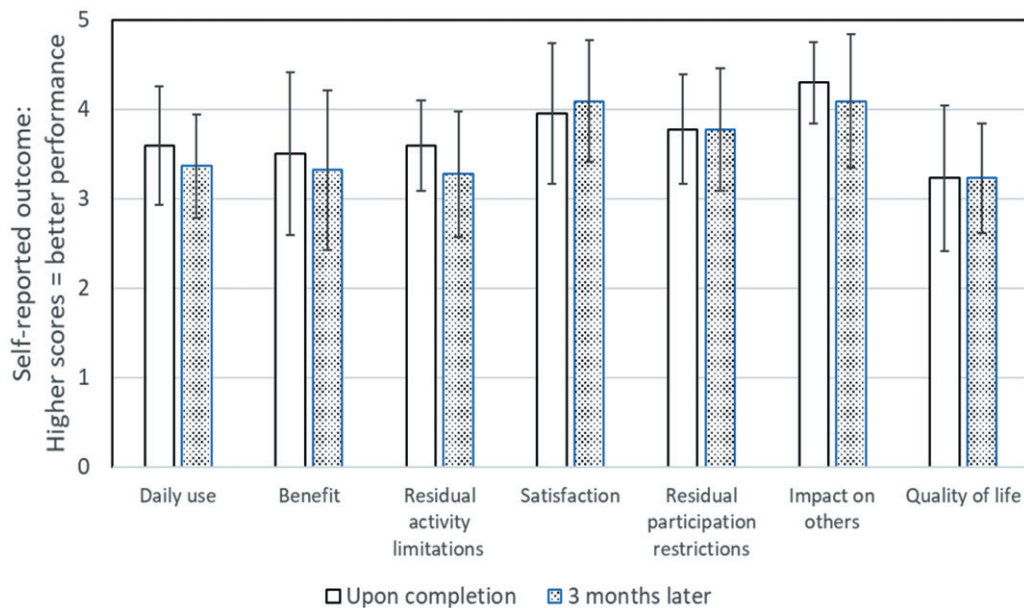


Figure 1. Mean I-ACE outcomes (and bars indicating 1 Standard Deviation either side of the mean) upon I-ACE completion and 3 months later ($n = 22$).

Qualitative feedback

All 23 participants provided written qualitative feedback following I-ACE completion. Their answers to the four questions are summarised below.

(a) What did you like about I-ACE?

Participants described the benefits of I-ACE as supporting their recognition of their hearing difficulties and of potential solutions: “It forced me to think about my hearing loss problems and to recognise the situations where it really mattered. Focusing on those situations and working on the suggested strategies was most useful.” and “It raised my awareness of my hearing difficulty and made me proactive to do the best I could in various situations.” They also appreciated the opportunity to involve communication partners into the programme: “Partner (wife) involvement [sic] was rewarding, as was the progress I made during the program” and “It also provided me with an opportunity to communicate with family and friends which improved many situations.” From a practical perspective, participants listed an individualised approach to learning (“Also it was useful to have the space to write down thoughts and ideas in the various situations presented”) and flexible learning regimen (“self-paced”, “pace of work to fit in with other demands”, and “no travel or parking”) as advantages of the programme.

(b) How could I-ACE be improved?

Some participants reflected that they would have liked information more specific to mild hearing difficulties and/or more in-depth information, but recognised that not all people would, so suggested tailoring based on degree of hearing difficulties and of education: “more tailored to individual’s degree of hearing loss” and “separate versions for people with different levels of education.” One participant also suggested presenting the programme on an online platform: “make it available over the internet.”

(c) What actions have you taken as a result of completing I-ACE?

Participants reported how they applied the concepts of I-ACE to their hearing difficulties. Most reported having become more proactive when experiencing hearing difficulties: “I have learnt to be more attentive, to place myself when possible in a better position to hear and see the person speaking”, “At home I am aware of external noises and have used many communication strategies with the family (works well)”, and being “more forward with explaining to people that I have hearing difficulty, rather than being ashamed to admit it.” Participants also evaluated how non-technical strategies helped them and, where necessary, prompted them to acquire hearing aids or hearing assistive technology after the end of the study period: “While I found the strategies very helpful, I decided that they were not sufficient to meet my needs. The whole exercise made me realise I had been hiding the problem, and I have since invested in hearing aids”. None of the participants obtained hearing aids during the 3 month follow up period.

(d) Do you have any further comments?

Few participants had further comments. Those who did mostly thanked the audiologist for the programme. One participant reflected on “First, and for me most importantly, your questions [...] prompted me to ask: “Given that I have some degree of hearing loss what does this mean to me given my time of life, priorities, etc?” I found this a very worthwhile question to think about. Thinking about it enabled me – gradually – to realise – amongst other things – that my hearing loss had pluses as well as minuses and this realisation helped me get clear on which strategies that I-ACE offered to me be most valuable to me. So, I repeat, the most important spin off for me was that I-ACE and yourself prompted me to see my hearing loss within my life as it is now.”

Discussion and conclusions

This article described the I-ACE programme and summarises its outcomes for 23 participants with hearing impairment. Participants showed positive results on the COSI, a measure of

goal attainment, and on the IOI-AI, a measure of outcomes in seven dimensions; however, there was not a statistically significant change on the HHQ, a measure of hearing disability. Although caution is needed when comparing outcomes with I-ACE for a small sample to outcomes with ACE for 178 participants, some comparisons are discussed here as a means to understand why outcomes might be different for a home-based individual programme compared to a group programme facilitated by a clinician.

On the COSI, participants identified between 1 and 5 goals (Mean = 2.55). This number of goals is similar to what we have previously found with the ACE programme (Mean = 2.88; Hickson, Worrall, and Scarinci 2007). Goal attainment was positive for I-ACE with 18 of the 23 participants (78%) reporting that their abilities, on average across goals, were either slightly better, better or much better. Although this is a positive outcome for I-ACE, this result is not as positive as we obtained with ACE where 92.5% of 133 participants reported goal attainment of slightly better, better or much better (Hickson, Worrall, and Scarinci 2007). Likewise, when the modal responses on the IOI-AI obtained in this study with I-ACE were compared with our previous study of ACE outcomes, the scores were the same for three items (daily use, residual participation restrictions, quality of life) but 1 scale point lower for the remaining four items (benefit, residual activity limitations, satisfaction, impact on others). Thus, it seems that although I-ACE is associated with improvements for adults with hearing impairment, the outcomes are not as positive as those reported for ACE. The reasons for this most probably are that an interactive face-to-face group programme with a facilitator is likely to result in the development of more effective communication strategies than a written programme completed with only self and/or significant other involvement, and only occasional contact with a facilitator.

In addition to the post-programme measures (COSI and IOI-AI) the HHQ was administered pre and post I-ACE; however, no significant change in disability was found. Saunders et al. (2016) used a different type of individual home programme (computerized auditory training) and also reported no significant changes in self-reported hearing disability. In the original ACE study with a much larger number of participants ($n = 178$), disability was reduced significantly post-programme. The lack of a significant effect in the present study could be due to the smaller sample size or to differences between the individual and group format as mentioned above. In addition, the approach of the I-ACE is initially to help people identify their hearing difficulties and then to develop suitable problem-solving self-management techniques to address those difficulties. The content of I-ACE could have made people more aware of their hearing difficulties without providing sufficient self-management strategies. Behaviour change theories also suggest that strategies need to be tailored to each individual (Michie et al. 2014) and as some participants noted, they had a need for more information on mild hearing impairment or more in-depth information to match their educational levels. Further research is necessary to investigate optimal learning and behaviour change processes for improving communication skills in adults with hearing impairment as well as optimal parameters on which to tailor the programme. Obtaining feedback from significant others about the impact of the programme would also be useful in addition to measuring whether the programme had any effect on third-party disability that significant others experience.

I-ACE is an intervention option for adults with hearing impairment who are motivated to improve their communication

ability. It is a complement or alternative to hearing aids. In the future, programmes, such as I-ACE, could be further enhanced by digitising and personalising the content so it can be supported with videos and interactive exercises rather than text. An online format could also embed tailored information and involve family members and other communication partners in the communication problem-solving process.

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Declaration of interest

The authors report no conflicts of interest.

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