

1 **Abstract**

2 **Purpose:** To evaluate the feasibility of *Hear-Communicate-Remember*, a training program
3 developed for family caregivers of people with dementia and hearing impairment that
4 integrated hearing, communication, and memory strategies, which was intended to be
5 delivered via telehealth.

6 **Materials and Methods:** Participants included six dyads consisting of adults with dementia
7 and hearing impairment and their family caregivers. Data collection involved a combination
8 of semi-structured interviews, self-report questionnaires, and field notes.

9 **Results:** Analysis of the qualitative interviews revealed four themes: appropriateness of
10 intervention resources, considerations for the delivery of intervention via telehealth,
11 knowledge and application of intervention strategies, and impact of the intervention on day-
12 to-day life. Results from the Satisfaction Survey indicated that caregiver participants were
13 mostly satisfied with all aspects of the intervention except the use of some technological
14 components. The field notes described challenges with implementation via telehealth.

15 **Conclusions:** Future research involving a cohort comparison study with a larger cohort of
16 dyads is needed to establish treatment efficacy.

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19 **Keywords**

20 hearing loss, dementia, communication disability, family caregivers, intervention, telehealth

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23 **Introduction**

24 Worldwide, approximately 5.2% of adults over the age of 60 have a diagnosis of dementia
25 (Alzheimer's Disease International, 2015) and nearly one-third of adults over the age of 65
26 have a disabling hearing impairment (World Health Organization, 2013), meaning that both
27 conditions frequently co-occur in older adults. Strong evidence of an association between
28 hearing impairment and incident dementia has also emerged from a number of epidemiology
29 studies (Davies, Cadar, Herbert, Orrell, & Steptoe, 2017; Deal et al., 2017; Ford et al., 2018;
30 Fritze et al., 2016; Lin et al., 2011; Loughrey, Kelly, Kelley, Brennan, & Lawlor, 2018; Su et
31 al., 2017; Wei et al., 2017). Both these health conditions can negatively impact
32 communication (Dalton et al., 2003; Garstecki & Erler, 1996, 1999; Granberg et al., 2014;
33 Savundranayagam, Hummert, & Montgomery, 2005; Woodward, 2013), and when they co-
34 occur, hearing impairment can exacerbate the communication difficulties attributable to
35 dementia, resulting in excess disability (Slaughter & Bankes, 2007; Slaughter, Hopper, Ickert,
36 & Erin, 2014). It has been recommended that excess disability be a primary focus of
37 management for adults with dementia living in the community to minimise functional decline
38 (Larson, 1997). Given the complexity and multidimensionality of the communication and
39 cognitive changes that occur for people with hearing impairment and dementia, a
40 multidisciplinary approach (i.e., audiology, speech pathology, and psychology) to
41 communication rehabilitation in people with both dementia and hearing impairment has been
42 advocated (Hopper et al., 2013; Lind, Meyer, & Young, 2016; Pichora-Fuller, Dupuis, Reed,
43 & Lemke, 2013).

44 There is a growing body of evidence to support the use of communication training and
45 memory training for people with dementia and their caregivers. A systematic review found
46 that communication skills training interventions for family caregivers resulted in fewer
47 communication problems, an improved quality of life for people with dementia, and increased

48 caregiver knowledge of communication problems and strategies (Eggenberger, Heimerl, &
49 Bennett, 2013). Similarly, a systematic review conducted by Hopper et al. (2013) found that a
50 variety of cognitive interventions have been trialled with people with dementia and these have
51 the potential to improve outcomes relating to memory and recall and activity of daily living
52 procedures for individuals with dementia. One study has integrated communication skills
53 training with memory support training. Liddle et al (2012) evaluated two video-based training
54 programs designed for family caregivers: MESSAGE communication strategies for people
55 with dementia, and RECAPS memory strategies for people with dementia (Smith et al.,
56 2011). Results indicated that the MESSAGE and RECAPS training program increased
57 caregiver knowledge of facilitative communication and memory strategies, with a trend
58 towards observing less frequent disruptive behaviours and experiencing more positive aspects
59 of caregiving (Liddle et al., 2012).

60 Within the field of hearing rehabilitation there is also evidence to support the use of
61 communication training to address everyday communication difficulties for adults with
62 hearing impairment (Hickson, Worrall, & Scarinci, 2007; Kramer, Allessie, Dondorp,
63 Zekveld, & Kapteyn, 2005; Preminger & Meeks, 2010). For example, the Active
64 Communication Education (ACE) program provides older adults with hearing impairment
65 with a set of modules that address everyday communication difficulties commonly faced by
66 older adults due to a hearing impairment (Hickson et al., 2007). Hickson et al. (2007) reported
67 that ACE resulted in significant improvements on measures of communication function,
68 hearing handicap and psychosocial well-being.

69 When it comes to providing communication and/or hearing rehabilitation for people with
70 combined dementia and hearing impairment, there is inconsistent evidence available (Dawes,
71 Wolski, Himmelsbach, Regan, & Leroi, 2018; Mamo et al., 2018). A quasi-experimental pre-
72 post study showed that hearing aid use can result in improved speech perception and

73 decreased hearing disability in adults with dementia and hearing impairment, but not
74 improved behavioural or psychiatric symptoms (Allen et al., 2003). In contrast, a study that
75 employed a single subject design demonstrated that hearing aid use can result in a reduction
76 in the number of problem behaviours exhibited by patients with dementia and hearing
77 impairment (Palmer, Adams, Bourgeois, Durrant, & Rossi, 1999). Findings from a recent
78 double-blind, randomized controlled trial that examined the impact of active hearing aid use
79 on neuropsychiatric symptoms, activities of daily living, and patient and caregiver quality of
80 life, revealed only one significant group difference; individuals with dementia and hearing
81 impairment in the “active hearing aid” group reported significantly better quality of life,
82 relative to participants in the placebo group, at 12-months post-fitting (Adrait et al., 2017).
83 Overall, however, the authors concluded that hearing aids alone were insufficient to address
84 the psychosocial impacts of dementia and hearing impairment (Adrait et al., 2017).

85 One reason why device use may not result in improved psychosocial functioning in
86 individuals with dementia and hearing impairment may be because hearing aids in isolation
87 address the hearing impairment, but not the associated communication disability. One
88 investigation has more specifically targeted communication and hearing rehabilitation for
89 people with dementia and hearing impairment by adapting an existing hearing intervention for
90 use with this population (Mamo et al., 2016). Adaptations were made to make the training
91 shorter and simpler, and devices were preselected in keeping with the person’s cognitive
92 capacity. The person with dementia and hearing impairment attended a single training session
93 with their caregiver, where they set a communication goal at the start of the session. The
94 remainder of the session incorporated education about hearing impairment and
95 communication strategies, the provision of personal amplification devices and instructions on
96 their use and maintenance, and an opportunity for the caregiver to ‘teach-back’ what they had
97 learned to improve retention (Mamo et al., 2016). Mamo et al. (2016) reported that the

98 majority of participants with dementia (79%) and caregivers (90%) benefited from the
99 program, demonstrating the potential for intervening with a person with dementia and hearing
100 impairment in order to support their communicative function. However, this investigation was
101 focused only on hearing-related communication changes, and did not target the additional
102 communication changes associated with dementia (e.g., word finding difficulty) or the need
103 for cognitive support, that would also impact a person's everyday communication function
104 (e.g., reduced ability to participate in conversations).

105 There are a number of factors that need to be considered in the design of an educational
106 intervention for family caregivers of individuals with dementia. Ideally, interventions should
107 be individually tailored, due to the diversity of the population group who are diagnosed with
108 hearing loss and dementia. The inclusion of strategies in the support package should be
109 explained using a psychoeducational approach, explaining what the strategies are as well as
110 the reason why they would be useful (Lawlor, 2002). Additionally, given the demands placed
111 on family caregivers, interventions should also be time-efficient and cost-effective.

112 Technology-based interventions for caregivers, such as interventions that use
113 videoconferencing and web-based information, can provide flexible, individualized care (Sin
114 et al., 2018) and save travel costs for family caregivers (Chi & Demiris, 2015).

115 Accordingly, the current study aimed to develop and evaluate the feasibility of *Hear-*
116 *Communicate-Remember*, a multidisciplinary, telehealth intervention for family caregivers of
117 people with dementia and hearing impairment designed to promote memory, communication,
118 and hearing aid use. Our specific research questions were to what extent (1) is *Hear-*
119 *Communication-Remember* considered acceptable to caregivers of people with dementia and
120 hearing impairment; and (2) can *Hear-Communication-Remember* be delivered successfully
121 to caregivers of people with dementia and hearing impairment via telehealth?

122 **Materials and Methods**

123 *Design*

124 In the context of Robey's (2004) five-phase model for clinical outcome research, the current
125 study constituted a Phase I feasibility study, where the primary aim was to evaluate the
126 feasibility of delivering '*Hear-Communicate-Remember*' in the way it was intended. The two
127 foci, as defined by Bowen et al. (2009), were "acceptability" and "implementation". The
128 study was approved by The University of Queensland Behavioural and Social Sciences
129 Ethical Review Committee, and the Australian Catholic University Human Research Ethics
130 Committee.

131 *Participants*

132 Dyads consisting of a family caregiver and an adult with both dementia and hearing
133 impairment were recruited from public and private hearing centres in Queensland, community
134 care organisations, and The University of Queensland's 50 Plus Registry (a database of
135 people aged over 50 years willing to participate in research). Caregiver participants needed to
136 live in the community, care for a person with a diagnosis of dementia and a diagnosis of
137 hearing impairment, and have functional English to participate in the study. Individuals with
138 dementia and hearing impairment needed to have the dual diagnosis and live in the
139 community to be eligible to participate. Written, informed consent was obtained for all
140 participant dyads.

141 Six dyads participated in the study. Five caregivers were spouses and one was an adult
142 daughter. Of the people with dementia and hearing impairment, the time post-diagnosis of
143 dementia ranged from one to eight years, and mean age was 81 years. All dyads lived together
144 at home in the community. Details of the participant-dyads are presented in table 1.

145 [table 1 near here]

146 ***Materials***

147 Caregivers provided demographic information about themselves and the family member with
148 dementia and hearing impairment, including age, gender, education level, relationship to the
149 person with dementia, and health status. They also completed a 7-item Satisfaction Survey,
150 where caregivers were required to rate their satisfaction with different aspects of the
151 intervention on a scale ranging from 1 (very dissatisfied) to 5 (very satisfied). The aspects of
152 the intervention that were rated included: module content, video length, length and timing of
153 face-to-face sessions, delivery of the intervention, use of technological components to view
154 videos, and completion of outcome measure surveys. A comments section was provided for
155 each question for participants to provide feedback. The maximum obtainable score was 35,
156 with higher scores indicating higher levels of satisfaction with the intervention program.

157 ***Procedure***

158 As part of a larger study, participants took part in pre-intervention assessment, the
159 intervention, immediate post intervention assessment, and a three-month follow-up
160 assessment. In line with the aims of the present study, only post-intervention data will be
161 presented that relates specifically to the acceptability and implementation of *Hear-*
162 *Communicate-Remember*. Data collection took place between September 2015 and February
163 2016.

164 *Hear-Communicate-Remember Intervention*. The intervention was designed for family
165 caregivers of people with both dementia and hearing impairment and is reported below
166 according to The Intervention Description and Replication (TIDieR) Checklist (Hoffmann et
167 al., 2014) (see Appendix 1).

168 The intervention used a psychoeducational approach (Lawlor, 2002) and comprised four
169 modules: (1) Helping with Hearing Aids, (2) Memory Strategies for Hearing Aid Use, (3)
170 Communication Strategies, and (4) Putting it Together. The modules were designed to be
171 delivered within participants' homes weekly, across four weeks, by a speech-language
172 pathologist, audiologist, or psychologist, via telehealth. A number of behaviour change
173 techniques, as defined by the Behaviour Change Technique Taxonomy (v1) (Michie et al.,
174 2013), were incorporated into the intervention. We incorporated techniques associated with
175 goals and planning (e.g., goal setting), feedback and monitoring (e.g., feedback on behaviour),
176 shaping knowledge (e.g., instruction on how to perform a behaviour), comparison of
177 behaviour (e.g., modeling of the behaviour), and repetition and substantiation (e.g.,
178 behavioural practice/rehearsal) (Michie et al., 2013). Details of the modules in the training
179 package are presented in table 2.

180 [table 2 near here]

181 Over the course of the intervention, caregivers were required to watch five training videos
182 (10-20 minutes), three at home and two during the face-to-face sessions, using an iPad. Two
183 of these videos had been developed by Smith et al. (2011) for caregivers of people with
184 dementia, which outlined evidence-based communication strategies (MESSAGE) and
185 memory strategies (RECAPS). The other three videos were developed for the purpose of this
186 study; amateur actors demonstrated the basic steps involved in hearing aid management,
187 strategies that could be used to encourage regular hearing aid use, and strategies to promote
188 effective communication with a person with dementia and hearing impairment. The videos
189 were complemented by a written booklet, used to individualise the intervention for each dyad.
190 For example, the written booklet included goal setting and weekly action plans specific for
191 that dyad. The written booklet was prepared according to best practice guidelines for written

192 health information (e.g., headings, simple language, and diagrams and captions) (U.S.
193 Department of Health & Human Services, 2002).

194 *Data Collection.* One week prior to starting the intervention, caregivers completed the
195 demographic questionnaire in pen and paper format.

196 To address RQ1, each participant-dyad participated in an in-depth, semi-structured qualitative
197 interview immediately following the intervention to explore the appropriateness of the
198 intervention. The interviewer (CM) was a speech pathologist who is trained in communicating
199 with people with hearing impairment and dementia and who is an experienced qualitative
200 researcher. A topic guide was used to guide the interview sessions (see Appendix 2). For two
201 dyads, the person with dementia could not participate in the interview; one was too fatigued
202 and one had minimal verbal communication and found it difficult to sustain attention. The
203 interviews were audio-recorded and professionally transcribed. The length of the interviews
204 ranged from 24 to 66 minutes.

205 To further address RQ1, caregiver participants completed the Satisfaction Survey 3 months
206 post-intervention, allowing them time to implement the strategies demonstrated in their day-
207 to-day lives.

208 To address RQ2, field notes that were recorded by the research team following each
209 intervention session were examined, with particular attention given to mode of delivery,
210 session duration, technical issues, connectivity issues, and any other issues.

211 *Qualitative Data Analysis*

212 The semi-structured interviews were analysed using template analysis (Brooks, McCluskey,
213 Turley, & King, 2015). This method was chosen as it provided structured coding of data
214 according to an outline template, while allowing flexibility in modifying the sub-themes in

215 the template if indicated by the data. The initial template was developed through extensive
216 discussion between three members of the research team (CM, SK, AH). The initial coding
217 template consisted of three *a priori* themes that were based on the topic guide for interviews:
218 impact of the intervention, appropriateness of intervention resources, and considerations for
219 delivery via telehealth. Preliminary coding of the data was carried out in relation to these *a*
220 *priori* themes. As the initial coding template was applied to more data, these themes were
221 further redefined and modified (Brooks et al., 2015). Participants spoke extensively about
222 their increase in knowledge of strategies as well as their experiences with the application of
223 these strategies. Hence, a new theme was developed to reflect this aspect of data: knowledge
224 and application of intervention strategies. The final template, consisting of four main themes,
225 was then applied to the full dataset. Second author, SK, was the primary coder; however, to
226 increase the rigour of data analysis, SK met regularly with CM and AH to review the coding
227 template and establish group consensus with coding. The final template that included themes,
228 sub-themes and supporting quotes from the data can be found in Appendix 3.

229 **Results**

230 ***Research Question 1***

231 The analysis of the in-depth, semi-structured qualitative interviews resulted in four themes
232 that related to participants' acceptability of the intervention. The four themes were: (1)
233 appropriateness of intervention resources, (2) considerations for the delivery of intervention
234 via telehealth, (3) knowledge and application of intervention strategies, and (4) impact of the
235 intervention on day-to-day life.

236 ***Theme 1: Appropriateness of intervention resources.*** Theme 1 consisted of three sub-themes
237 about participants' perceptions of the content and length of the intervention resources.

238 ***1.1 Caregiver participants were satisfied with the content of information resources.***

239 Participants reported satisfaction with the demonstration of strategies in common everyday
240 scenarios included in the videos. They reported that they could identify and learn from these
241 situations portrayed in the videos:

242 *HCR02: I liked the bit where someone did the wrong thing talking to their*
243 *grandfather, shouting across the room, then they did the right thing and it was so*
244 *obvious.*

245 Caregivers also expressed benefit in having the videos to refresh their memory about
246 strategies if needed, even after the intervention had ended.

247 *HCR03: Well, I can go back and then watch the videos and refresh my memory.*

248 Some caregivers also indicated that they had recommended these videos to their friends and
249 family:

250 *HCR02: Yes, it was the communication one. That was excellent. I also sent it to a*
251 *friend of mine whose husband has a hearing aid and dementia.*

252 Many caregivers noted that the written booklet and the videos complemented each other well,
253 where strategies learnt from the videos were reinforced by the booklet content:

254 *HCR02: I found the booklet very, very good. I'd watch the video and then I'd read the*
255 *booklet, then I would fill it in. They just seemed to go hand in glove with me and they*
256 *complemented one another.*

257 Caregivers were satisfied with the content in the written booklet. However, some caregivers
258 preferred the videos to the written booklet, suggesting that they felt the videos were better
259 able to demonstrate the strategies, as compared to the written information:

260 *HCR03: I think the videos were the main part of it because to me the videos, you*
261 *know, illustrated the communication techniques and how they should be applied much*
262 *better than the way you could read about this in the work book so to speak.*

263 ***1.2 Caregiver participants were satisfied with the amount of information and length of***
264 ***videos.*** Overall, caregivers noted that the amount of information in each module was not too
265 overwhelming:

266 *HCR06: All the modules are nice bite-sized chunks. The information's easy to read*
267 *and understand and digest.*

268 Caregivers were also satisfied with the length of the intervention videos. Many noted that the
269 videos were not too long, and acknowledged that the gradual build-up in the length of the
270 videos helped to ensure that they were not overwhelmed:

271 *HCR02: It was a build up, what, seven minutes I think for the first one. No, I thought*
272 *that was good because if you'd bombarded you with 20 minutes to start off with, but*
273 *the slow build up, I think it was a good idea.*

274 ***1.3 Some aspects of the content resulted in differing feedback from the participants.*** There
275 were varied views among the caregivers regarding the use of actors in the intervention videos.
276 Most caregivers did not mind the use of actors, and thought that they managed to adequately
277 demonstrate the strategies:

278 *HCR03: So, you know, whether it's done by actors or not, the main part is the*
279 *techniques and I thought the videos were good.*

280 However, one caregiver participant was particularly dissatisfied with the use of actors as she
281 felt that they were “too nice” and did not portray people with dementia realistically:

282 *HCR01: I felt that they were too nice. That's my way of putting it mildly because it*
283 *doesn't work like that when you're with the real people that have the problem.*

284 **Theme 2: Considerations for the delivery of intervention via telehealth.** Theme 2 consisted
285 of two sub-themes about the use of technological components in the current intervention and
286 the potential delivery of the intervention via telehealth.

287 **2.1 Caregiver participants' experiences of technological components in the intervention**
288 **were varied.** Despite their initial apprehension, most participants found the use of
289 technological components, such as iPads and laptops, manageable in the intervention.

290 *HCR02: Well, at first it felt very daunting because I don't even have an iPhone. I*
291 *looked at this iPad when it all came out and I thought oh dear. Then I thought there's*
292 *nothing else on it, there's just these modules that I'm going to do, so I can't really*
293 *muck it up, so I was fine.*

294 Caregivers reported that the technological components involved in watching the videos
295 worked well when they followed the instructions:

296 *HCR05: But it did do what it said. The iPad reacted properly when I pressed the right*
297 *buttons.*

298 It was also originally intended that the entire intervention session be conducted via telehealth,
299 however, caregivers reported that technical problems prevented the use of telehealth. One
300 caregiver participant noted that the intervention process took longer than usual due to the
301 technical problems.

302 *HCR03: Even though it was only supposed to be four or five sessions, it took two or*
303 *three sessions to get things working.*

304 **2.2 Caregiver participants had mixed perceptions regarding the potential delivery of the**
305 **intervention via telehealth.** Many caregivers highlighted the potential benefits of cost and
306 convenience for delivery of the intervention via telehealth, particularly for people who live in
307 rural areas:

308 *HCR03: And that's [delivering intervention through telehealth] good, you know. I*
309 *mean it's easy for us. We live in the city so you can easily come and visit if need be but*
310 *you couldn't if someone was in Toowoomba or something. Further afield then it gets*
311 *to be impossible.*

312 However, some caregivers had concerns regarding the delivery of the intervention by
313 telehealth. One common concern that emerged from the interviews was the risk of losing the
314 “human touch” when using telehealth:

315 *HCR03: I mean, there's always an advantage I guess of human contact...So you'd lose*
316 *that aspect of it.*

317 Participants also expressed concerns that people who were unfamiliar with technology may be
318 apprehensive about telehealth:

319 *HCR04: Well you've got the other problem too that a lot of people don't use the*
320 *computer...They're not aware of what you can do on the computer, not everybody has*
321 *them. So that would be the big problem there...*

322 Some caregivers even highlighted that intervention via telehealth would not be possible as
323 internet was not available in their homes:

324 *HCR05: Would have been impossible because there's no internet here.*

325 Despite these concerns, most caregivers were still open to both face-to-face and telehealth
326 delivery of the intervention. Particularly, caregivers who were more familiar with technology
327 perceived that the intervention would be similar across both methods of delivery:

328 *HCR03: [Researcher: So if we had've been able to do this online over the Internet*
329 *using the iPads, how would've that worked for you compared to face-to-face?] Well,*
330 *probably similar I guess because there still would've been the face-to-face contact*
331 *over the iPad - just sitting here at the table so, you know, it's much the same way as*
332 *talking to someone on Skype or FaceTime on an Apple phone.*

333 One caregiver participant who experienced both face-to-face and telehealth delivery also
334 noted that there was little difference between the two methods:

335 *HCR01: [Researcher: Did you notice any difference between when you were face to*
336 *face when she did come out and when she was over the internet?] No, it was just like*
337 *we saw her yesterday, it was good.*

338 **Theme 3: Knowledge and Application of Intervention Strategies.** Theme 3 consisted of two
339 sub-themes about learning and using hearing, memory and communication strategies in
340 everyday life.

341 **3.1 Caregiver participants learnt strategies to improve hearing aid use and to improve**
342 **communication.** Many caregivers described the strategies that they had learnt from the
343 intervention. These included strategies for the management of hearing aids, such as
344 identifying the hearing aid for the left and right ears, and troubleshooting when problems with
345 the hearing aid occur:

346 *HCR05: Well yes, I learnt about red for right...Blue for left. Red for right was easy.*
347 *So that was really good and then I understood also about the noise because I'd never*

348 *understood about that before. Sometimes my mother would just take the battery out*
349 *and there'd be this terrible noise in there.*

350 Caregivers also reported learning memory strategies that promoted hearing aid use, such as
351 the use of routines to help family members with dementia remember to wear their hearing
352 aids.

353 *HCR02: We have a daily list and it starts off with shower. The second thing is the*
354 *hearing aids.*

355 Furthermore, caregivers highlighted the communication strategies that they had learnt from
356 the intervention:

357 *HCR06: You really have to tailor exactly what you want to say and... you don't make*
358 *the conversations or questions too difficult. No compound sentences.*

359 While participants learnt many new strategies through the intervention, some reported that
360 several strategies were already familiar to them. Of these participants, some expressed the
361 benefit of having familiar strategies reinforced during the intervention:

362 *HCR06: I thought the MESSAGES thing was good because it helps reinforce what*
363 *you're already doing although you probably didn't realise you were doing it.*

364 ***3.2 Caregiver participants had positive experiences with the application of new strategies.***

365 Some caregivers managed to integrate new strategies learnt into their daily lives. They
366 reported changing the way they speak, for example, in everyday conversations, to improve
367 their communication with family members with dementia and hearing impairment:

368 *HCR01: I can't say to him in the kitchen to the bathroom are you going to respite,*
369 *you'd better hurry up and have a shower, he won't hear a thing. So now I know I've*

370 *got to do face-to-face to everything I say to him, everything I tell him I want to do or*
371 *everything that is going to happen on the day.*

372 Some caregiver participants also adopted new routines that promoted the effective use of
373 hearing aids:

374 *HCR02: Sometimes he doesn't know how long the hearing aid's been in, if the hearing*
375 *aid's causing a problem, so we now regularly change the batteries, so we know that*
376 *they must be alright.*

377 **Theme 4: Impact of the intervention on day-to-day life.** Theme 4 consisted of four sub-
378 themes about the impact of the application of strategies in participants' lives and factors that
379 could have affected this impact.

380 **4.1 Participants reported changes to their day-to-day lives.** Most caregivers reported positive
381 communication changes between themselves and the family member with dementia and
382 hearing impairment following the intervention, most commonly reporting that they were
383 talking more with their family members with dementia and hearing impairment after the
384 intervention:

385 *HCR02: We used to sit here and have a cuppa and I didn't talk to him because I knew*
386 *that he was either tuned out or he couldn't hear me. But now we carry on a*
387 *conversation.*

388 Some participants also experienced positive changes in their psychosocial well-being since
389 participating in the intervention. In particular, one caregiver expressed that she was less
390 stressed because she was able to manage her spouse's dementia and hearing impairment
391 better:

392 *HCR02: I have people telling me they notice a difference in me, that I'm not so*
393 *stressed...It's not because the birthday's over, it's because I am able to handle the*
394 *hearing aid and the dementia much, much better. I'm really serious about this. It has*
395 *made a difference to my life.*

396 Another participant-dyad reported how the intervention had made a difference to the
397 participant with dementia and hearing impairment's psychosocial well-being. Since
398 incorporating memory and communication strategies learnt in a daily plan, anxiety levels
399 were reduced for the participant with dementia and hearing impairment:

400 *HCR03: Well, we had a whiteboard. I used to leave notes on a whiteboard. It did work*
401 *but then sometimes she'd miss or she couldn't read my writing on the whiteboard... We*
402 *still use the whiteboard at times but basically now I do up a daily plan. Because*
403 *sometimes I go off cycling or to the gym in the morning and then [PWD] knows that*
404 *I'm doing this and I'll be back by a certain time and she can reach me at this mobile*
405 *number. [Researcher: That's excellent. So then you don't wake up and feel anxious*
406 *if [HCR03]'s not home?] PWD03: No, and that's very important to me.*

407 **4.2 Caregiver participants reported changes in the use of hearing aids.** Caregivers noted
408 that intervention strategies learnt had helped them in the management of hearing aids, which
409 in turn helped to promote more frequent use of the hearing aids:

410 *HCR04: Being involved in the project helped me quite a bit particularly in the use of*
411 *the hearing aids because I wasn't using them for reasons being that they got lost and*
412 *it ended in an endless search and waste of time. So now that I've got the strap for the*
413 *back [PWD04] gets them on first thing in the morning and takes them off last thing at*
414 *night.*

415 **4.3 Strategies may not be effective all the time.** Despite efforts to apply strategies learnt into
416 their daily lives, several caregivers noted that the strategies did not always equate to a
417 successful communicative interaction. One caregiver participant mentioned that while he
418 attempted to “keep things simple” in his conversations, it did not work all the time:

419 *HCR06: It doesn't guarantee an answer.*

420 **4.4 Timing of the intervention affected its impact on participants' daily lives.** While many
421 caregivers noted positive impacts of the intervention on their daily lives, some caregivers
422 expressed regret that the positive impacts may have been limited by the timing of the
423 intervention. This was especially so for individuals who were at later stages of dementia. One
424 caregiver participant expressed that while the intervention had helped him encourage his wife
425 to wear her hearing aids more frequently, he felt there was little benefit in wearing hearing
426 aids for his wife who was at a later stage of dementia:

427 *HCR06: Her cognitive ability isn't very good at all. So, I'm not against – I encourage*
428 *her to wear them but find that experience has taught me that she'll leave them on for*
429 *10 minutes or a quarter of an hour and then she'll just take them off. So, that's kind of*
430 *the framework of the setting.*

431 Overall, caregivers agreed that the intervention would be best delivered soon after the
432 diagnosis of dementia, preferably when the individual is still able to “carry on a
433 conversation” and successfully use his/her hearing aids.

434 *HCR05: Probably as soon as possible...Just whilst they're still wearing their hearing*
435 *aids but the earlier the better probably because that would get them into a habit of, I*
436 *don't know, looking at you...*

437 Caregivers suggested that at these earlier stages of dementia, the impact of the intervention on
438 their daily lives might potentially be more significant.

439 *HCR06: For someone who hasn't progressed quite so far, I think there's a lot more*
440 *benefit in it.*

441 Based on the results of the Satisfaction Survey, the median rating of overall satisfaction with
442 the intervention was 28 (with a maximum obtainable score of 35). The detailed breakdown of
443 caregivers' responses in the satisfaction survey is displayed in figure 1.

444 [figure 1 near here]

445 ***Research Question 2***

446 A summary of the information obtained from the field notes is presented in Table 3. It was
447 originally intended that the intervention program would be delivered via telehealth into each
448 dyad's home. However, due to unanticipated technical and connectivity difficulties, one dyad
449 completed Modules 1 to 3 via telehealth, and two dyads completed only Module 1 via
450 telehealth, before switching to in-person sessions; three dyads completed all four modules
451 face-to-face (see Table 3). When completed in-person, the intervention continued to involve
452 technological components such as the use of an iPad to view videos. The telehealth sessions
453 ranged in length from 45 to 90 minutes; the in-person sessions ranged in length from 60 to
454 150 minutes. One common technological issue reported was low volume, either from the
455 telehealth system itself; or from the laptop or iPad when these were used to play videos (see
456 Table 3). Importantly, it became apparent that for two participants in particular, they
457 appreciated having the opportunity to speak with a health professional about their feelings
458 associating with caregiving and loss (see Table 3).

459 [table 3 near here]

460 **Discussion**

461 Overall, the findings from this study indicate that *Hear-Communicate-Remember* was
462 acceptable to caregivers of people with dementia and hearing impairment, although there was
463 some apprehension regarding the technological components of the intervention. This
464 apprehension may have been, in part, a by-product of the challenges experienced during
465 implementation of *Hear-Communicate-Remember* via telehealth.

466 Implementation via telehealth was challenging as a result of lack of familiarity with
467 technology, as well as issues associated with poor connectivity, such as videos freezing and
468 low volumes. A lack of skills or familiarity with particular technology has been frequently
469 cited as a barrier to the use of telehealth technologies in older adults (Foster & Sethares, 2014;
470 Russell et al., 2015); but encouragingly, participants in this study expressed that they found
471 the technological components manageable with appropriate instructions and training.
472 Likewise, technological problems, internet speed and software issues have also been cited as
473 common barriers to the implementation of telehealth interventions (Molini-Avejonas,
474 Rondon-Melo, de La Higuera Amato, & Samelli, 2015). For it to be feasible to deliver *Hear-*
475 *Communicate-Remember* via telehealth, the telehealth system will need to be capable of
476 playing videos at a higher volume and connectivity would need to be optimised. Additional
477 equipment such as speakers and/or headphones may be required at the participant-end.

478 When asked during the interviews about their perceptions related to delivering the
479 intervention via telehealth, participants gave varied responses. Most participants highlighted
480 the benefits of cost and convenience associated with telehealth delivery, which are consistent
481 with the benefits of telehealth commonly cited in the literature (Molini-Avejonas et al., 2015).
482 Many participants expressed concern that telehealth delivery might result in a loss of “human
483 contact”. However, for a caregiver participant that experienced both telehealth and face-to-

484 face delivery, little difference was reported between the two methods. It is likely that the
485 caregivers who did not experience telehealth delivery did not fully understand what this mode
486 of delivery would involve. Specifically, that telehealth interventions involve real-time
487 interactions between clinicians and participants in the form of video-conferencing (Chi &
488 Demiris, 2015). A systematic review of the use of telehealth in speech, language and hearing
489 sciences found that participants in telehealth interventions were mostly satisfied with their
490 level of interaction and rapport with the clinicians, and considered telehealth approaches
491 similar to face-to-face interactions (Molini-Avejonas et al., 2015). With a better
492 understanding of telehealth, and improvements in connectivity, it is possible that more
493 participants would have more positive perceptions regarding the delivery of the intervention
494 via telehealth.

495 Despite there being challenges associated with the implementation of *Hear-Communicate-*
496 *Remember*, the intervention itself appears suitable for family caregivers of adults with
497 dementia and hearing loss. Participants were satisfied with the type and amount of
498 information they received, and in particular, commented that it was beneficial to have access
499 to the intervention videos after the intervention had ended. Access to the materials after the
500 intervention ended enabled participants to refresh their memory, which is consistent with
501 research that has indicated that educational interventions for caregivers of people with
502 dementia should be combined with supportive features (e.g., refresher training) to improve its
503 sustainability (Eggenberger et al., 2013).

504 There was some suggestion from caregiver participants, however, that the intervention in its
505 current form might be more appropriate during earlier stages of dementia, when their family
506 member had more verbal output and could have benefitted more from increased hearing aid
507 use. This sentiment has been commonly reported in studies investigating the effectiveness of
508 education programs for caregivers of people with dementia (Done & Thomas, 2001;

509 Eggenberger et al., 2013). According to findings from Savundranayagam and Orange (2014),
510 the effectiveness of communication strategies seems to differ across the stages of dementia.
511 Several communication strategies such as “giving clear choices” were found to be less helpful
512 for people in later stages of dementia, whereas strategies like “pretending to understand”
513 seemed to be more helpful in later stages compared to earlier stages (Savundranayagam &
514 Orange, 2014). Similarly, personal amplification devices may be a more suitable option than
515 hearing aids for some people with dementia (Mamo et al., 2016). Therefore, future iterations
516 of *Hear-Communicate-Remember* should contain alternatives to Modules 1 and 2, which
517 currently focus on hearing aid use only.

518 Our findings indicate that *Hear-Communicate-Remember* has the potential to result in
519 improved knowledge and application of hearing, communication, and memory strategies. The
520 participants described being more knowledgeable about how to improve hearing aid use and
521 best support communication in this population, and provided examples of how they have
522 applied this knowledge in day-to-day life. For example, caregivers highlighted during their
523 interviews that they had learned strategies such as establishing a daily routine for hearing aid
524 use, keeping their sentences simple, and speaking face-to-face. The current results are in line
525 with the results of two systematic reviews conducted in the area of dementia (Eggenberger et
526 al., 2013; Hopper et al., 2013), and other studies conducted with adults with hearing
527 impairment (Hickson et al., 2007; Kramer et al., 2005), which have unequivocally
528 demonstrated improvements in caregiver knowledge of memory and/or communication
529 strategies after receiving memory and communication training.

530 Caregivers’ application of strategies into their daily lives led to reports of positive
531 communication changes and in some cases, improved psychosocial well-being for both
532 caregivers and people with dementia and hearing loss. For example, several caregivers
533 indicated that after applying the communication strategies, they were “*talking more*” and were

534 better able to “*carry a conversation*” with their family member with dementia and hearing
535 impairment. One caregiver reported that following the intervention she was better able to
536 cope with her family member’s dementia and hearing impairment, which reduced her stress;
537 and one person with dementia and hearing impairment suggested that the application of
538 memory strategies assisted in reducing her stress levels. These findings indicate that *Hear-*
539 *Communicate-Remember* has the potential to have good treatment efficacy with respect to
540 improved interactions with communication partners and reductions in caregiver burden;
541 however, these associations needed to be validated using psychometrically sound measures in
542 a larger cohort of participants.

543 ***Limitations and Future Directions***

544 Given the nature of a Phase I study, this study was based on a small sample size of just six
545 dyads and did not attempt to establish treatment efficacy. Therefore future research is needed,
546 that (1) involves evaluating the efficacy of a modified version of *Hear-Communicate-*
547 *Remember* with respect to changes in communicative interactions and caregiving experiences,
548 involving a larger sample of dyads as part of a cohort comparison study, (2) focuses on people
549 with a recent dementia diagnosis, and (3) uses more suitable technology which enables
550 optimal streaming of video during video conferencing. Importantly, the type and degree of
551 both hearing loss and dementia should be measured in future efficacy studies to allow specific
552 conclusions to be drawn on the basis of these.

553 ***Conclusion***

554 This is the first known study investigating the feasibility of a hearing, communication and
555 memory intervention for caregivers of people with coexistent dementia and hearing
556 impairment. The *Hear-Communicate-Remember* intervention was considered by caregivers of
557 people with both dementia and hearing impairment as being suitable for this population;

558 however, further consideration needs to be given to the technological components of the
559 intervention and the timing of the intervention. This Phase I study provides preliminary
560 evidence to suggest that the integration of hearing, communication, and memory strategies
561 may be beneficial for family caregivers of people with both dementia and hearing impairment.
562 Future research is needed to establish treatment efficacy for family caregivers of people
563 recently diagnosed with dementia and hearing impairment.

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569 **Declaration of Interest**

570 The authors report no conflicts of interest.

571

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739

740 **Appendix 2**

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742 Topic guide for qualitative interviews

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1. Tell me about your experiences of being involved in the project.

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2. The first two modules were focused on hearing aid management. How did you find

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those?

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3. The last two modules focused on communication. How did you find those?

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4. We initially hoped to deliver the intervention face-to-face over the internet. What do

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you think about that idea?

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5. Since joining the study, have you noticed any changes in your communication with

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your family member? How has this changed things for you?

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Appendix 3

Overview of themes, sub-themes and supporting quotes drawn from template analysis of in-depth semi-structured interviews

Themes	Sub-themes	Supporting quotes
1. Appropriateness of intervention resources	1.1 Caregiver participants were satisfied with the content of information resources	
	<ul style="list-style-type: none"> Caregiver participants could identify with and learn from situations portrayed in the videos 	<ul style="list-style-type: none"> HCR06: You can always identify parts of what they say, not necessarily everything, but you can always sort of take something from each particular little cameo.
	<ul style="list-style-type: none"> Caregiver participants expressed benefit in having the videos to refresh their memory about strategies when needed 	<ul style="list-style-type: none"> HCR02: They're still on the computer and I'm sure I will use them, especially the 20 minute one, the last one.
	<ul style="list-style-type: none"> Videos were shared by caregiver participants to other people 	<ul style="list-style-type: none"> HCR02: That one [communication strategies video] I sent to [PWD02]'s three daughters.
	<ul style="list-style-type: none"> Some caregiver participants preferred videos over the written booklet 	<ul style="list-style-type: none"> HCR05: I'm probably better at looking at a video than I am at a booklet. I don't know why that is. I don't think I'm a big reader although I've done a lot of reading since I've been caring for my mother.
	<ul style="list-style-type: none"> Written booklet and videos complemented each other well 	<ul style="list-style-type: none"> HCR06: Well I thought they were very complementary. I thought both the written and the videos were good.
	1.2 Caregiver participants were satisfied with the amount of information and length of videos	
	<ul style="list-style-type: none"> Amount of information in each module was manageable 	<ul style="list-style-type: none"> HCR02: It's been staggered out so it hasn't all come in the one instance where you're bombarded, staggered out step by step by step. It's been great, it really has.
	<ul style="list-style-type: none"> Caregiver participants were satisfied with the length of videos 	<ul style="list-style-type: none"> HCR05: It [videos] was a really good size I thought because there wasn't too much in the one thing.
	1.3 Some aspects of the content resulted in differing feedback from the participants	
<ul style="list-style-type: none"> Caregiver participants had varied responses to using actors in the videos 	<ul style="list-style-type: none"> HCR01: As I said to [Researcher] any actor can play the role they want to play you want to play it as nice as 	

2. Considerations for the delivery of intervention via telehealth

2.1 Caregiver participants' experiences of technological components in the intervention were varied

- Most caregiver participants found use of technological components manageable in the intervention despite initial apprehension
 - Some caregiver participants highlighted technological problems that prevented the delivery of the intervention via telehealth
- HCR03: They were quite good. They're quite realistic, you know, and then I found out that they were by actors.
 - HCR05: It was fine. After I got it switched on and thank God for the instructions. The instructions were very good, but this frail brain had to read it three or four times before I actually got all the ducks in a row.
 - HCR03: Well, the fact that we couldn't play the videos on the iPad. It was the iPad that was the problem. If the video's on the computer on the PC we're okay. It's using the iPad didn't seem to work. The volume was very low and it didn't seem like it could be adjusted.

2.2 Caregiver participants had mixed perceptions regarding the potential delivery of the intervention via telehealth

- Caregiver participants highlighted the potential benefits of cost and convenience
 - Some caregiver participants expressed concern with losing the 'human touch'
 - Some caregiver participants expressed concerns that caregivers who were unfamiliar with technology may be apprehensive about telehealth
- HCR03: Well, you can do it anytime you want...So there's no, you know, time constraints. It's much easier from your stand-point because you don't have to travel. So it makes the study I guess more time and cost effective.
 - HCR03: To some people, that maybe upsetting talking to a screen instead of face-to-face with the real person.
 - HCR06: But I'm probably a little bit of the old school. I like talking...The human part of it.
 - HCR03: **[Researcher: So you would have been comfortable with having it delivered in that [telerehabilitation] way?]** Yes, but because we're

	<ul style="list-style-type: none"> • Some caregiver participants were open to both face-to-face delivery and delivery via telehealth 	<p>technology aware - in our case it maybe different than a lot of people who aren't technology aware.</p> <ul style="list-style-type: none"> • HCR03: Because we use Skype and FaceTime a lot, it probably wouldn't have made any real difference. Because that's a technology that we're used to. • HCR06: had the technology worked I would have been happy with that although I did enjoy meeting [Researcher];...But either way it's good.
<p>3. Knowledge and application of intervention strategies</p>	<p>3.1 Caregiver participants learnt strategies to increase hearing aid use and to improve communication</p>	
	<ul style="list-style-type: none"> • Caregiver participants learnt strategies for the management of hearing aids 	<ul style="list-style-type: none"> • HCR06: Matter of fact I will admit to my own embarrassment that [Researcher] did show me how to test the hearing aids. So I did learn some things along the way. So that was good.
	<ul style="list-style-type: none"> • Caregiver participants learnt memory strategies that promoted hearing aid use 	<ul style="list-style-type: none"> • HCR02: We've got into a routine that includes the hearing aid, putting in the batteries, he does it at a certain time every Saturday morning so if there's visitors on the weekend the hearing aids are new.
	<ul style="list-style-type: none"> • Caregiver participants learnt communication strategies 	<ul style="list-style-type: none"> • HCR03: Well, just the techniques of communicating with someone – of getting her attention and, you know, changing the way you communicate.
	<ul style="list-style-type: none"> • Strategies that were already familiar to caregiver participants were reinforced during the intervention 	<ul style="list-style-type: none"> • HCR02: Some of the other parts of the video I knew but I needed it reinforced.
	<p>3.2 Caregiver participants had positive experiences with the application of new strategies</p>	
	<ul style="list-style-type: none"> • Most caregiver participants successfully integrated the strategies into their daily routines 	<ul style="list-style-type: none"> • HCR03: Now I do a daily - tomorrow's plan every night...Yeah. For both of us it's helped. • HCR05: So when I really want to get my mother's attention and she's watching television, turn the television off.

4. Impact of the intervention on day-to-day life	<p>4.1 Participants reported changes in their day-to-day lives</p> <ul style="list-style-type: none"> • Positive communication changes between caregiver participant and PWD • Improvements in psychosocial well-being of participants <p>4.2 Caregiver participants reported changes in the use of hearing aids</p> <ul style="list-style-type: none"> • Intervention strategies helped in the management of hearing aids <p>4.3 Strategies may not be effective all the time</p> <ul style="list-style-type: none"> • Strategies may not be effective in reality <p>4.4 Timing of the intervention affected its impact on participants' daily lives</p> <ul style="list-style-type: none"> • Hearing aids bring minimum benefit at later stages of dementia 	<ul style="list-style-type: none"> • HCR04: We're talking more ... we sit on the back veranda of an evening and watch the sunset and have a drink while the sun goes down, watch the birds go home and that's been rather nice. • HCR02: It's just lifted my stress I think. It's quite stressful living with someone who either can't hear you, or doesn't listen. • HCR02: I didn't know about testing the batteries, I think that's magic. • HCR04: I always check to see that the hole was clear but I didn't wipe them properly every time I put them in there. So now I have the tissues there and have a clean-up with the tissues so they get cleaned which is probably good because it will probably stop irritation as well. • HCR06: I think I'm trying to be a little bit more mindful of what she's trying to say, but as you just experience it's not always easy to understand where she's coming from. • HCR06: I will admit that it has helped reinforce the fact, try and encourage [PWD06] to wear her hearing aids but given what I've just mentioned to you before, there's not a lot of upside I think in her wearing her hearing aids.
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- Intervention would be best delivered soon after the diagnosis of dementia
 - HCR06: [**Researcher: Looking back, when do you think it would have been a more appropriate time to receive this type of intervention?**] Well probably I mean with the benefit of hindsight, everything is crystal clear...But probably a year ago would have been better. Probably at first diagnosis probably would have been better. I'm not sure. I'm not saying that the outcome might have been different but it could have helped.
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Table 1.

Demographic data of participant-dyads, comprising family caregivers (HCR) and people with dementia and hearing impairment (PWD).

Participants	Age	Relationship	Highest Education	Self-reported health	Hearing Loss	Hearing Aids	Hearing aid worn hours/day	Dementia Type	Years since diagnosis
HCR01*	76	Wife	Year 9	Fair	Yes	Not required	n/a	n/a	n/a
PWD01*	81	Husband	Year 8	Fair	Yes	Bilateral	0 (only for visitors / going out)	?Alzheimer's	1;10
HCR02	80	Wife	Year 12	Good	No	Not required	n/a	n/a	n/a
PWD02	89	Husband	Bachelor degree	Excellent	Yes	Bilateral	>8	Alzheimer's & Fronto-temporal	1;1
HCR03	79	Husband	Bachelor degree	Very good	Yes	Yes	0	n/a	n/a
PWD03	74	Wife	Masters	Fair	Yes	Bilateral	0	Unsure	2-3
HCR04	84	Husband	Started diploma	Very good	Yes	Bilateral	0	n/a	n/a
PWD04	83	Wife	Bachelor degree	Poor	Yes	Unsure	Not stated	Unsure	Unsure
HCR05	66	Daughter	Year 12	Very good	Not sure	Not required	n/a	n/a	n/a
PWD05	91	Mother	Bachelor degree	Very good	Yes	Bilateral	0	Unsure	8
HCR06	64	Husband	Bachelor degree	Good	No	Not required	n/a	n/a	n/a
PWD06	68	Wife	Associate diploma	Good	Yes	Bilateral	0	Fronto-temporal	1;1

* Participant-dyad experienced the intervention via telehealth

Table 2.

Description of *Hear-Communicate-Remember* intervention modules.

Week	Module	Home Task	Face-to-Face Task
Week 1	Module 1: <i>Helping with Hearing Aids</i>	<ul style="list-style-type: none"> • Watched video that demonstrated the basic steps involved in hearing aid management • Completed a short homework question to link the video to caregiver participant’s own life 	<ul style="list-style-type: none"> • Collaborative goal-setting with clinician, based on the Goal Sharing for Partners Strategy (Preminger & Lind, 2012) • Discussion about new strategies learnt from video – <i>Helping with Hearing Aids</i> • Module 1 of <i>Hear-Communicate-Remember</i> written booklet completed <ol style="list-style-type: none"> i. Discussed hearing aid management ii. Discussed management in relation to the hearing aid used by his/her family member • Completed Module 1 action plan • De-brief and homework for next session
Week 2	Module 2: <i>Memory strategies for Hearing Aid Use</i>	<ul style="list-style-type: none"> • Watched video – <i>RECAPS: Memory Strategies in Dementia for Home Carers</i> video (Smith et al., 2011) • Completed a short homework question to link the video to caregiver participant’s own life 	<ul style="list-style-type: none"> • Module 1 action plan reviewed with clinician • Discussion about strategies learnt from the <i>RECAPS</i> videos • Module 2 of <i>Hear-Communicate-Remember</i> written booklet completed <ol style="list-style-type: none"> i. Watched video that highlighted how specific memory strategies could be applied to hearing aid use. ii. Discussed how strategies learnt could be applied to caregiver participant’s life • Completed Module 2 action plan • De-brief and homework for next session

Week 3	Module 3: <i>Communication Strategies</i>	<ul style="list-style-type: none"> • Watched video – <i>MESSAGE: Communication Strategies in Dementia for Home Carers</i> video (Smith et al., 2011) • Completed a short homework question to link the video to caregiver participants’ own lives 	<ul style="list-style-type: none"> • Module 2 action plan reviewed with clinician • Watched the <i>MESSAGE</i> video summary • Discussion about strategies learnt from the <i>MESSAGE</i> video • Module 3 in <i>Hear-Communicate-Remember</i> written booklet completed. <ul style="list-style-type: none"> i. Watched video that showed positive and negative examples of 5 communication strategies derived from the Active Communication Education program (Hickson et al., 2007). ii. Discussed how strategies learnt could be applied to caregiver participant’s life • Completed Module 3 action plan • De-brief and homework for next session
Week 4	Module 4: <i>Putting it together</i>	N/A	<ul style="list-style-type: none"> • Module 3 action plan reviewed with clinician • Reviewed goals and progress made to date • Watched the video: <i>Module 3 Testimonial</i> • Clinician made arrangements for home visit for follow-up data collection

Table 3.

Detailed field notes about implementation of *Hear-Communicate-Remember*.

PARTICIPANT	MODULE	MODE OF DELIVERY	*DURATION (MINS)	TECHNICAL ISSUES	CONNECTIVITY ISSUES	OTHER ISSUES
HCR01	1	Telehealth	90	None noted.	Start delayed by 15 mins due to login difficulties.	2 x interruptions (visitor, phone call)
	2	Telehealth	60	None noted.	Video streaming delays due to poor connectivity.	Participant raised concern PwD will lose hearing aid because he is a fiddler.
	3	Telehealth	60	None noted.	None noted.	None noted.
	4	Face-to-face	90	None noted.	N/A	1 x Interruption (phone call)
HCR02	1	Telehealth, using portable WIFI	60	Video sound was soft but manageable.	VC picture freezing due to poor connectivity.	None noted.
	2	Telehealth, using portable WIFI	30	Watched one video – sound soft but manageable.	Lost connection after 1 st video. Unable to re-establish, so session abandoned.	None noted.
	2 (cont)	Face-to-face	105	None noted.	N/A	None noted.
	3	Face-to-face	90	None noted.	N/A	None noted.
	4	Face-to-face	Not recorded	None noted.	N/A	None noted.
HCR03	1	Telehealth	45	Video sound too soft.	VC picture freezing due to poor connectivity. VC sound was good.	None noted.
	2	Telehealth	30	Long delay before able to connect due to appointment not visible in telehealth system. Video not audible so	None noted.	None noted.

	2 and 3	Face-to-face	150	session abandoned. Video sound on laptop too soft, needed to use speaker.	N/A	1 x interruption (storm warning)
	3	Face-to-face	90	No sound on any video from laptop -reason unknown. Unable to provide video feedback.	N/A	None noted.
	4	Face-to-face	75	Video feedback sound on laptop too soft. Used headphones to compensate, but meant both had to watch video separately.	N/A	None noted.
HCR04	1	Face-to-face	90	None noted.	N/A	PwD very restless, a little agitated with participant's attention being occupied.
	2	Face-to-face	60	None noted.	N/A	Daughter took PwD out for coffee. Difficult to keep on track, focused on video quality more than strategies.
	3	Face-to-face	90	Played 4 videos OK then problem with sound on final video.	N/A	Participant needed time to talk about caring/loss experience.
	4	Face-to-face	90	Replayed final video from Module 3.	N/A	Recorded conversation but needed to intervene as participant continued to ask 'testing' questions.
HCR05	1	Face-to-face	105	None noted.	N/A	Participant needed time to talk about caring/loss experience.

	2	Face-to-face	75	Provided iPad training prior to session. No problems viewing RECAPS on iPad.	N/A	None noted.
	3	Face-to-face	105	Playback of PRE video – sound too soft on laptop, used PC speakers.	N/A	None noted.
	4	Face-to-face	60	None noted.	N/A	PwD asleep, so not able to record conversation.
HCR06	1	Face-to-face	60	None noted.	N/A	Partner at respite. Participant needed time to talk about caring/loss experience.
	2	Face-to-face	55	None noted.	N/A	None noted.
	3	Face-to-face	75	None noted.	N/A	None noted.
	4	Face-to-face	Not recorded	None noted.	N/A	None noted.

Note: *recorded in 15min blocks. PwD = person with dementia.

Figure 1.

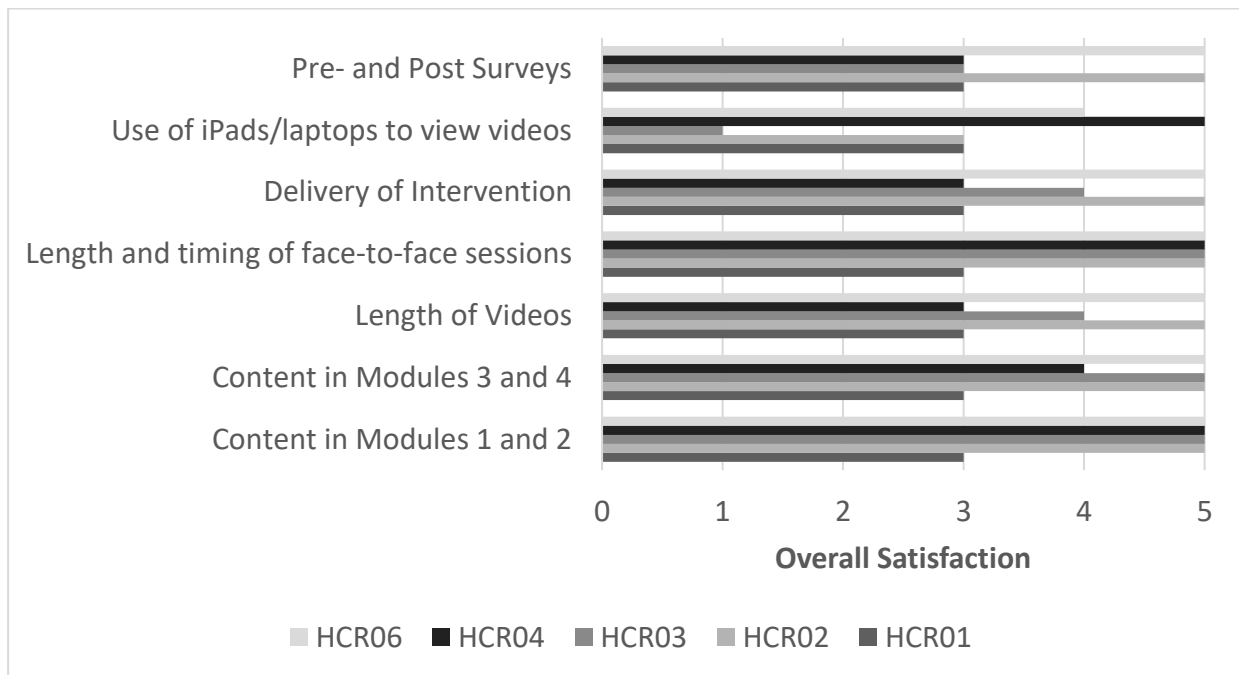


Figure Captions

1. *Figure 1.* Overview of individual caregiver participant's responses on the satisfaction survey (1 = very dissatisfied, 5 = very satisfied).