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Experiences of Hearing Loss and Audiological Rehabilitation for Older Adults with Comorbid Psychological Symptoms: A Qualitative Study

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Conflict of Interest

The authors have no relevant conflicts of interest to report

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ABSTRACT

21 **Purpose:** There is a well-established relationship between hearing loss and psychological symptoms. To
22 ensure audiological rehabilitation is provided appropriately for older adults with comorbid psychological
23 symptoms, a greater understanding of their preferences and experiences is needed. This study sought to
24 understand experiences of hearing loss and audiological rehabilitation from the perspective of older
25 adults with comorbid psychological symptoms (e.g. depression, anxiety, psychosis).

26 **Design:** A qualitative study using in-depth semi-structured interviews was conducted with older adults
27 who had attended audiological rehabilitation within the last year and scored above established cut-offs
28 on measures of depression, anxiety and psychosis. A thematic analysis generated themes that related to
29 participants' experiences of hearing loss and audiological rehabilitation.

30 **Results:** Participants included 14 older adults (eight males and six females) with an average age of 70.5
31 years (SD = 4.45, range = 64-80) who received hearing aids or a cochlear implant. Three major themes
32 emerged from the analysis of participant interviews. *The cumulative impact of hearing loss and*
33 *psychological symptoms* theme describes the two-way, additive relationship between hearing ability and
34 psychological symptoms. *The experience of loss throughout hearing loss and audiological rehabilitation*
35 captures subjective losses, the impact they have and how participants cope with them. In contrast, *The*
36 *experience of gain throughout hearing loss and audiological rehabilitation* describes the participants'
37 reported gains, their related impacts and coping strategies.

38 **Conclusions:** The experiences of participants revealed that the presence of comorbid psychological
39 symptoms can influence the experience of hearing loss and audiological rehabilitation. These findings
40 have implications for how audiological rehabilitation is provided to ensure optimal outcomes for adults
41 with hearing loss and comorbid psychological symptoms.

42

INTRODUCTION

43 Hearing loss is highly prevalent globally; approximately 15.9% of the US population are affected by some
44 degree of hearing loss, with a similar prevalence reported in Australia (14.5%) and other developed
45 nations (Deloitte Access Economics, 2017). This percentage also increases with age, with the estimated
46 prevalence of hearing loss rising to 58% in people aged 61-70 years and 74% in people aged 71 years and
47 older (The Senate Community Affairs References Committee, 2010). Hearing loss has been ranked as the
48 third leading cause of years lived with disability globally (GBD 2016 Disease and Injury Incidence and
49 Prevalence Collaborators, 2017), and imposes significant costs on budgets and healthcare systems
50 (Deloitte Access Economics, 2017).

51 Hearing loss, and the associated breakdown of communication, can have a variety of physical, cognitive,
52 behavioral, social and emotional consequences that negatively affect individuals and their families
53 (Cherko, Hickson, & Bhutta, 2016). Studies have demonstrated a link between hearing loss and
54 embarrassment (Barker, Leighton, & Ferguson, 2017), social isolation (Backenroth & Ahlner, 2000),
55 loneliness (Mick et al., 2018), reduced time outside of home (Mikkola et al., 2016), smaller social networks
56 (Kramer, Kapteyn, Kuik, & Deeg, 2002) and a reduction in meaningful spousal conversations (Ask, Krog, &
57 Tambs, 2010). Given the extensive and pervasive impact of hearing loss on an individual's life, it is not
58 surprising that a body of literature has also explored the relationship between hearing loss and
59 psychological symptoms or mental disorders, particularly symptoms of depression, anxiety and psychosis.

60 Depressive symptoms and disorders have been the most extensively researched psychological
61 phenomena in relation to hearing loss (Adigun, 2017) and many studies have demonstrated a significant
62 correlation between hearing loss and depression (Abrams, Barnett, Hoth, & Schultz, 2006; Andreeva et
63 al., 2017; Capella-McDonnall, 2005; Gopinath et al., 2009; Kim et al., 2017; Y. Kim, Kwak, & Kim, 2015;
64 Saito et al., 2010). Other research shows no correlation (Andreeva et al., 2017; Mener, Betz, Genther,

65 Chen, & Lin, 2013; Tambs, 2004), or even that hearing loss is associated with a decreased prevalence of
66 depressive symptoms (Kim et al., 2015). Most of this research has been cross-sectional and therefore
67 unable to establish a causal or directional relationship between psychological symptoms and hearing loss.
68 One study to date has utilized a prospective cohort study design to measure perceived hearing loss at a
69 baseline time, followed by a measure of depressive symptoms 2-3 years later (Saito et al., 2010). The
70 researchers reported that hearing loss significantly increased the future risk of developing symptoms of
71 depression (OR = 2.45, 95% CI = 1.26 – 4.77).

72 Inconsistencies in research findings with regard to the relationship between hearing loss and depression
73 may be attributed to differences in measurements of hearing loss (e.g. subjective report vs audiometry),
74 depressive symptoms (e.g. diagnosis of depression vs a variety of self-report measures) or a range of study
75 variations (e.g. longitudinal vs cross-sectional) (Chang, Ho, & Chou, 2009; Crawford, Cayley, Lovibond,
76 Wilson, & Hartley, 2011). Overall, a recent meta-analysis of 35 studies reported a statistically significant
77 association between hearing loss and depression, with greater odds of depression in hearing impaired
78 older adults (OR = 1.47, 95% CI = 1.31 – 1.65) (Lawrence et al., 2019). Therefore, taken together, research
79 does suggest the presence of a relationship between depression and hearing loss.

80 Methodological concerns also arise in studies exploring the association between hearing loss and anxiety.
81 Once again, the methods by which hearing loss or anxiety symptoms are measured can alter the reported
82 associations. Some studies have examined the diagnosis of specific anxiety disorders, such as generalized
83 anxiety disorder or panic disorder; whereas other studies have utilized an assortment of self-report
84 questionnaires to establish anxiety symptom scores. Several studies reported a significant association
85 between hearing loss and diagnosed anxiety disorders (e.g. panic disorder, agoraphobia, specific phobias,
86 social phobias, obsessive–compulsive disorder, post-traumatic stress disorder, and generalized anxiety
87 disorder) (Bernabei et al., 2011; Chung, Hung, Lin, & Sheu, 2015; Hsu et al., 2016). Hearing loss was also
88 significantly related to symptoms of anxiety as measured by self-report questionnaires (Cetin, Uguz,

89 Erdem, & Yildirim, 2010; Ciesla, Lewandowska, & Skarzynski, 2016; Contrera et al., 2017; Cosh et al., 2017;
90 Hallam, Ashton, Sherbourne, & Gailey, 2006; Vancampfort, Koyanagi, Hallgren, Probst, & Stubbs, 2017).
91 Only two studies did not find a significant relationship between hearing loss and anxiety (Andersson &
92 Green, 1995; Contrera et al., 2017). Once again, very few studies have provided evidence of a directional
93 relationship between hearing loss and anxiety symptoms. Chung et al. (2015) found that participants
94 presenting with a sudden sensorineural hearing loss were significantly more likely to have had an anxiety
95 disorder diagnosis in the past (OR = 1.49, 95% CI = 1.34 – 1.66). A recent systematic review conducted by
96 Shoham et al. (2019) reported that anxiety was significantly more prevalent in people with hearing loss
97 compared to those without hearing loss in eight of the 10 studies that compared samples. A meta-analysis
98 was not conducted so further research is needed to confirm this relationship.

99 Overall, there has been largely consistent evidence of an association between hearing loss and psychotic
100 symptoms. A recent comprehensive meta-analysis of 49 cross-sectional and longitudinal studies analyzed
101 the relationship between hearing loss and psychotic symptoms (Linszen, Brouwer, Heringa, & Sommer,
102 2016). The meta-analysis revealed that hearing loss was significantly related to hallucinations (cumulative
103 OR = 1.40, 95% CI 1.18-1.65, n = 227,406), delusions and paranoia (cumulative OR = 1.55, 95% CI 1.36-
104 1.78, n = 250,470), psychotic symptoms (cumulative OR = 2.23, 95% CI 1.83-2.72, n = 229,647) and
105 psychotic disorders (cumulative OR = 2.79, 95% CI 1.25-6.22, n = 8,793). For example, one study included
106 in the meta-analysis compared a cohort of patients (mean age of onset 68 years) with late-onset
107 schizophrenia, which the researchers termed paraphrenia, with matched controls and revealed that
108 hearing loss was four times more likely to be present in those with schizophrenia (Almeida, Howard, Levy,
109 & David, 1995). A longitudinal study found that older adults (≥ 65 years) with self-reported hearing loss
110 were 76% more likely to have symptoms of paranoia three years later, compared to those without hearing
111 loss (Blazer, Hays, & Salive, 1996). Overall, these findings are supportive of an independent relationship
112 between hearing loss and psychosis. Minor inconsistencies across study results may again be due to

113 methodological variations, sample differences and the specific psychotic feature being examined. Whilst
114 there has been some evidence of hearing loss being a risk factor for psychological symptoms, previous
115 research has been unable to establish a causal or directional relationship due to the predominately cross-
116 sectional nature of these study designs.

117 **Audiological rehabilitation and psychological symptoms**

118 The core aim of audiological rehabilitation is to reduce activity limitations and participation restrictions
119 associated with hearing loss; generally, this involves the optimization of hearing and communication
120 ability in people experiencing difficulties as a result of hearing loss, usually through the provision of
121 hearing aids or cochlear implants (Aazh & Moore, 2017). Ideally, audiological rehabilitation will also
122 translate these improvements in hearing and communication ability to improved quality of life for clients
123 and their significant others (Ekberg, Meyer, Scarinci, Grenness, & Hickson, 2015; Montano, 2009). Patient-
124 centred care, which considers the treatment and rehabilitation of the client within their entire life context
125 (Engel, 1977), is the recommended approach to audiological rehabilitation (American Academy of
126 Audiology, 2006; Audiology Australia, 2013; British Society of Audiology, 2016). The audiologist should
127 therefore provide rehabilitation that addresses not only the hearing loss, but the impact of the hearing
128 loss on the emotional, physical and social aspects of that person's life (Erdman, Wark, & Montano, 1994;
129 Hickson & Scarinci, 2007; Grenness, Hickson, Laplante-Lévesque, & Davidson, 2014b).

130 Given the association of hearing loss and psychological symptoms, it could be suggested that an
131 improvement of subjective hearing ability may also be associated with a reduction of psychological
132 symptoms. Some studies have demonstrated this, with evidence that psychological symptoms have been
133 reduced after the provision of hearing aids or cochlear implants. For example, several studies found that
134 self-reported depressive symptoms were significantly reduced in hearing aid users and cochlear implant
135 recipients from baseline to post-fitting (3, 4, 6 and/or 12-months) (Acar, Yurekli, Babademez, Karabulut,

136 & Karasen, 2011; Boi et al., 2012; Bruggemann et al., 2017; Castiglione et al., 2016; Choi et al., 2016;
137 Contrera et al., 2015; Mulrow et al., 1990). In contrast, Knopke et al. (2016) found no significant change
138 in depressive symptoms upon provision of cochlear implants. The authors acknowledge however, that the
139 participant cohort already had low scores of depressive symptoms at pre-implantation and thus any
140 further changes were likely to be small. Moreover, a recent meta-analysis found no significant difference
141 in depression symptoms between studies that included some participants with hearing aids and studies
142 where no participants used hearing aids, however the authors stated this finding should be interpreted
143 with caution as there were no specific comparison groups (Lawrence et al., 2019). Studies that employed
144 measures of stress and anxiety found no significant changes with hearing device usage (Bruggemann et
145 al., 2017; Contrera et al., 2017; Knopke et al., 2016). It is possible that anxiety and stress are less
146 responsive to the provision of hearing devices compared with depression. It is also possible that
147 differences in methodology, samples and measurements may contribute to the variable results obtained.
148 Overall, hearing devices alone do not fully, nor can reasonably be expected to, overcome psychological
149 symptoms or predict audiological rehabilitation success (Hickson, Meyer, Lovelock, Lampert, & Khan,
150 2014; Kobosko, Jedrzejczak, Pilka, Pankowska, & Skarzynski, 2015).

151 Despite a move towards patient-centered audiological rehabilitation, current practice still focusses heavily
152 on the provision of devices, and services that might acknowledge or address psychological symptoms are
153 rarely offered (Ekberg, Grenness & Hickson, 2014; Grenness, Hickson, Laplante-Lévesque, Meyer, &
154 Davidson, 2015a; Grenness, Hickson, Laplante-Lévesque, Meyer, & Davidson, 2015b). Depression and
155 anxiety can influence rehabilitation success in other settings such as physiotherapy, nursing and primary
156 health care (Mumford, Schlesinger, & Glass, 1982; Nicholas & George, 2011; Nichols, 1985). It is possible
157 that understanding client psychological concerns could help audiologists modify their delivery of
158 rehabilitation to optimize outcomes. However, more needs to be understood about the experience of

159 hearing loss or audiological rehabilitation for older adults with comorbid psychological symptoms. Thus
160 far, no study has explored the lived experience of this specific population.

161 Previous qualitative studies have provided a phenomenological understanding of hearing loss or
162 audiological rehabilitation from the perspective of older adults. Hallberg and Carlsson (1991) conducted
163 a qualitative grounded theory analysis with 12 participants to understand how people may cope with
164 hearing loss. Two distinct management strategies were identified, controlling the social scene and
165 avoiding the social scene. Participants that controlled the social scene described how they would optimize
166 their environment (e.g. make requests of their communication partners, reduce background noise) or
167 dominate the conversation to minimize listening time. Those that avoided the social scene reported a
168 reduction of participation by not attending situations or by mentally withdrawing from conversations
169 around them. Knudsen, Nielsen, Kramer, Jones, and Laplante-Lévesque (2013) provided an understanding
170 of the experience of audiological rehabilitation via a qualitative thematic analysis of 34 client interviews.
171 Their analysis established an overall theme of *client labor*, which explained the type of effort that
172 participants felt was needed to participate in audiological rehabilitation. *Client labor* was divided into
173 three sub-themes: *emotional labor* (e.g. reaching out, persistence), *cognitive labor* (e.g. problem solving,
174 decision making, adjustment) and *physical labor* (e.g. maintaining hearing device, payments). Other
175 qualitative studies also explored factors influencing audiological rehabilitation decisions (Laplante-
176 Lévesque, Hickson, & Worrall, 2010), barriers and facilitators to audiological rehabilitation (Barnett et al.,
177 2017) and perspectives of patient-centered care in audiological rehabilitation (Grenness, Hickson,
178 Laplante-Lévesque, & Davidson, 2014a). Although these studies have contributed to a general
179 understanding of audiological experiences for older adults, the voices of those with comorbid
180 psychological symptoms have not yet been heard.

181 The aim of the current study, therefore, was to develop an understanding of the experience of hearing
182 loss and audiological rehabilitation for hearing-impaired older adults with comorbid psychological

183 symptoms (e.g. depression, anxiety, psychosis). These findings will facilitate improvements in how
184 audiological rehabilitation is provided to meet the needs of older adults with hearing loss and comorbid
185 psychological symptoms and improve their hearing rehabilitation outcomes.

186 **METHODS**

187 A qualitative study using in-depth semi-structured interviews was conducted with older adults who scored
188 above established cut-offs on measures of depression, anxiety, and psychosis. This qualitative study
189 design was guided by the descriptive phenomenological method (Taylor & Francis, 2013) which focuses
190 on understanding individuals' lived experiences (their subjective experience) of a phenomenon. A
191 thematic analysis generated themes that related to participants' experiences of hearing loss and
192 audiological rehabilitation.

193 **Participants**

194 Potential participants were recruited through three Australian audiology clinics. Recruitment invitations
195 were sent to potential participants who satisfied the following inclusion criteria:

- 196 a) Adults aged 60 years and older. Sixty was chosen as the cut-off for old age as this is widely
197 used internationally (United Nations, 2017) and because acquired hearing loss becomes more
198 prevalent at this age (The Senate Community Affairs References Committee, 2010).
- 199 b) Participation in audiological rehabilitaton in the previous 12 months. Audiological
200 rehabilitation involved the provision of a hearing aid, cochlear implant or other services
201 provided by an audiologist for the management of hearing loss. Recency of attendance was
202 required to optimize participant recollection of the process.

203 Potential participants who satisfied the inclusion criteria were provided with an invitation to participate
204 and mailed psychological screening questionnaires. Participants who met the questionnaire screening

205 criteria were invited to participate in an interview, all other participants' involvement was concluded.
206 Participants were prioritized for interviews in order to obtain the greatest diversity of views via maximum
207 variation sampling. A sampling matrix was produced that ensured diversity of age, gender, hearing device
208 and reported psychological symptoms (see Text, Supplemental Digital Content 1, which shows sampling
209 matrix). Once maximum variation was satisfied, interviews were conducted until theoretical saturation
210 was reached (i.e., until new themes were no longer being generated with additional interviews) (Mason,
211 2010). Figure 1 provides a flowchart of recruitment numbers and rates.

212 **Procedure**

213 Semi structured interviews were conducted with 14 participants in a private room at The University of
214 Melbourne or in participants' homes. Interview locations were selected for the privacy and comfort of
215 participants, i.e., quiet location, adequate lighting and no interruptions. One participant attended the
216 interview with a family member. Interviews were conducted by one member of the research team (E.C.L),
217 who is a practicing clinical audiologist with an undergraduate psychology degree. An initial pilot interview
218 was also reviewed by C.A.B, a practicing clinical psychologist, to ensure the interview was conducted
219 appropriately. The interviews were guided by a predetermined topic guide containing initial open-ended
220 questions e.g. "What is your experience with hearing loss?" and follow-up prompts to encourage further
221 discussion e.g. "How do you feel about your hearing loss?" (see Text, Supplemental Digital Content 2,
222 which shows interview guide). Interviews lasted an average of 64 minutes (SD = 31.5, range = 27-137) and
223 were audio-recorded and transcribed verbatim for analysis.

224 **Materials**

225 Participants completed and returned three postal questionnaires upon recruitment.

226 *a) Demographic questionnaire*

227 This questionnaire collected data on gender, age, hearing history (type of audiological
228 rehabilitation received) and mental health history (diagnoses, treatment). Participants who
229 reported a current psychiatric diagnosis were eligible for an interview.

230 *b) The Depression, Anxiety and Stress Scale (DASS 21)*

231 The DASS 21 is a 21-item self-report questionnaire commonly administered by non-psychologists
232 (Lovibond & Lovibond, 1995). This questionnaire contains seven items in three symptom scales:
233 depression, anxiety, and stress, with individual symptom scale scores ranging 0 to 42. Items are
234 scored on a four-point Likert scale for the frequency / severity of a symptom over the last week,
235 with response choices “Never”, “Sometimes”, “Often” or “Almost Always”. Psychometric
236 properties in older adults (≥ 60 years) reveal acceptable to excellent reliability [internal
237 consistency: DASS 21 total score ($\alpha = .94$), subscales for depression ($\alpha = .87$ to $.90$), anxiety ($\alpha = .69$
238 to $.77$) and stress ($\alpha = .88$ to $.89$)], acceptable three-factor model construct validity, and significant
239 convergent validity with scales of similar constructs (Gloster et al., 2008; Gomez, Summers,
240 Summers, Wolf, & Summers, 2014). Scores are considered outside of normal range with a
241 depression scale score ≥ 10 , anxiety scale score ≥ 8 or a stress scale score ≥ 15 . Participants who
242 scored above the cut-off in any symptom scale were eligible for an interview.

243 *c) The Psychosis Screening Questionnaire (PSQ)*

244 The PSQ is a research screening tool administered by non-psychologists to identify possible
245 symptoms of hypomania, thought control, paranoia, unusual experiences and hallucinations
246 (Bebbington & Nayani, 1995). The original interview script (questions and answers conducted
247 verbally) was adapted into a self-report questionnaire suitable for written completion. The
248 questionnaire contains five probe questions with one or two follow-up questions for those who
249 answer positively. Items are scored “Yes”, “Unsure” or “No” for the presence of an experience
250 over the last year. The original PSQ has demonstrated good sensitivity (96.9%) and specificity

251 (95.3%) for identification of psychosis in in-patient, out-patient and non-clinical adult samples
252 (Bebbington & Nayani, 1995). Participants who answered “Yes” on Questions 3, 5, 8, 10, or 12,
253 indicating the presence of psychotic symptoms, were eligible for an interview.

254 **Data analysis**

255 Interviews were analyzed via an inductive thematic analysis (Braun & Clarke, 2006), where data is coded
256 into meaningful units of information and grouped into categories of similar descriptions or ideas. Patterns
257 across the codes and categories are identified to formulate overall themes within the data (Braun &
258 Clarke, 2012). Each theme captures an important meaning across the data in relation to the research
259 questions (Braun & Clarke, 2006). Codes and categories were assigned by one researcher (E.C.L) and a
260 random 10% of codes were cross-checked with interview transcripts by two other researchers (C.A.B and
261 C.M.B). Any discrepancies were discussed until consensus was reached. Several strategies were
262 implemented to acknowledge and overcome reflexivity or researcher biases: a detailed journal of
263 interviews was kept to increase triangulation of findings, results were discussed across the
264 multidisciplinary research team so that interpretations were considered in both the context of audiology
265 and psychology, and the interviews were listened to and re-read on several occasions.

266 **Ethical approval**

267 This study received ethical approval from The University of Melbourne Behavioural and Social Sciences
268 Human Ethics Sub-Committee (1749305) and the Royal Victorian Eye and Ear Hospital Human Research
269 Ethics Committee (17/1361H). All participants signed informed consent forms prior to both questionnaire
270 and interview participation. Participants were assumed to be intellectually competent and linguistically
271 capable to participate if informed consent, psychological questionnaires and interviews were successfully
272 completed.

273

RESULTS

274 Participants were 14 older adults (eight males and six females) with an average age of 70.5 years (SD =
275 4.45, range = 64-80) who had screened above established cut-off scores for symptoms of depression,
276 anxiety or psychosis. All participants had received audiological rehabilitation via provision of hearing aids
277 (duration of hearing aid use <1 year - 51 years) and four participants had additionally received a cochlear
278 implant within the last year. No other audiological rehabilitation (e.g. assistive listening devices or
279 speechreading training) was reported. Participant characteristics are presented in Table 1.

280 Three major themes emerged from the thematic analysis of participant interviews: *The cumulative impact*
281 *of hearing loss and psychological symptoms*, *The experience of loss throughout hearing loss and*
282 *audiological rehabilitation* and *The experience of gain throughout hearing loss and audiological*
283 *rehabilitation*.

284 *The cumulative impact of hearing loss and psychological symptoms* theme describes the two-way, additive
285 relationship between hearing ability and psychological symptoms. *The experience of loss throughout*
286 *hearing loss and audiological rehabilitation* is a theme that explores subjective losses, the impact they
287 have and how participants cope with them. In contrast, the final theme, *The experience of gain throughout*
288 *hearing loss and audiological rehabilitation*, describes the participants' reported gains, their related
289 impacts and coping strategies. Table 2 provides an overview of the themes, categories and examples of
290 codes that contributed to the thematic analysis. Each theme will be described below using participant
291 quotes for illustration.

292 **Theme 1: The cumulative impact of hearing loss and psychological symptoms**

293 Participants described the cumulative impact of psychological symptoms and changes in hearing ability,
294 i.e. the loss of hearing and the improvement of hearing with audiological rehabilitation. Most participants
295 described hearing loss as an additive factor that contributed, at least to some extent, to their psychological
296 symptoms. As illustrated in the following quotes, participants described how hearing loss had a negative

297 impact on their psychological wellbeing, reporting an exacerbation of symptoms such as frustration,
298 inadequacy, worry, paranoia and suicidal ideation.

299 *"I was terribly antisocial [before obtaining the cochlear implant]. My poor boys come around and...
300 they said very little to me... because I couldn't hear them... And it was affecting me very badly,
301 actually."* (Female, 73 years)

302 *"[Hearing loss] can exacerbate your anxiety a little bit because you... you don't hear very well... it
303 limits your communication skills. But that's improving [with the cochlear implant]."* (Male, 63
304 years)

305 *"I'm sure [my experience is different to those without psychological symptoms] ... I can only go
306 on what I've experienced, so... it's umm... I'm not particularly happy with what I've experienced
307 [with hearing rehabilitation], so... It's as simple as that. You get umm... very disheartened with
308 everything... There's uhh... there's not many days of the week, in fact there's none, that I don't
309 think about committing suicide."* (Male, 69 years)

310 Many participants also described an improvement in psychological symptoms due to optimized hearing
311 ability following audiological rehabilitation.

312 *"I'm much more confident now [with hearing aids] in joining in a crowded situation and discussions
313 with various members. I'm much more confident now in joining that situation rather than
314 remaining on the periphery and just smiling throughout quietly at people."* (Male, 80 years)

315 *"I'm not happy, of course. But you know, I'm happier than I was before [hearing aids]. And, and I
316 like to converse, you know, as you probably noticed now, you know, I don't stop talking."* (Female,
317 79 years)

318 *"I think the only kind of overall thing I'd say is how pleased I am I've got [hearing aids]. How much*
319 *they have made a difference. And when I, I wear them almost all the time. So there's been a*
320 *definite, definite improvement in the quality of my life."* (Male, 66 years)

321 Conversely, several participants felt that their psychological symptoms were negatively impacting their
322 subjective hearing ability and communicative abilities.

323 *"I guess I tense up and look for trouble ... not so much look for trouble but worry. Whereas,*
324 *someone who expects everything to be just fine... it's very hard to relax to see how the hearing*
325 *aid's working if you're anxious about the whole environment."* (Female, 68 years)

326 *"I noticed when I'm relaxed now and happy, I can hear better. But if, if I'm upset about something*
327 *and I'm, really angry about something; buzzzz, my head goes, you know, and it feels like my, my,*
328 *my head is being squashed."* (Female, 79 years)

329 *"Because if they're a person with depression and they're going to get an implant, it's not going to*
330 *be positive for them. And being that mechanical noise or computer-generated sort of voice, you*
331 *know, you hear it as robots. I feel that they probably wouldn't cope with that sort of thing, so that*
332 *they really need to get help before they went any further in the process [of cochlear implantation].*
333 *Because I think if you're really depressed you're not gonna cope with change, and I've said I*
334 *managed quite well... but it's not easy... accepting that."* (Female, 69 years)

335 **Theme 2: The experience of loss throughout hearing loss and audiological rehabilitation**

336 All participants shared instances of loss throughout their life with hearing loss and audiological
337 rehabilitation. Participants associated many losses with hearing loss: that is, participants reported a loss
338 of communicative ability, social relationships and reduced understanding of meaning behind
339 conversations. Some participants also reported losses that resulted from participation in audiological

340 rehabilitation; one participant needed to deal with the loss of residual hearing due to cochlear
341 implantation and several others reported the loss of natural sound with use of hearing devices. Many
342 reported experiences of loss were not only unique to those with comorbid psychological symptoms but
343 were more widely applicable to any older adults with hearing loss.

344 Every participant discussed a loss of hearing and the resultant reduction in communicative ability. Some
345 participants also related hearing loss with disablement (a loss of ability) or the process of aging (a loss of
346 youth).

347 *“Over a period, with my increasing [hearing] loss, those sounds became muted and I found I didn't*
348 *really have the same feeling of inclusiveness in my lifestyle that I had initially.” (Male, 80 years)*

349 *“... I can only think the word frustration [in response to hearing loss]. [Hearing loss] is quite*
350 *debilitating. Really makes you feel like you're disabled.” (Male, 67 years)*

351 *“...my experience of the aging process is a loss of friends and not very much gaining of new ones.*
352 *So your social world does decline. And the hearing loss doesn't help that process.” (Male, 66 years)*

353 *“A sort of decline is occurring, and the hearing loss represents that.” (Male, 69 years)*

354 Many participants also emphasized the social degradation and isolation that resulted from hearing loss.
355 Some participants reported a physical withdrawal, no longer attending social events that caused previous
356 difficulties.

357 *“You're missing out on everything... Everything. I can talk on a one-on-one basis... usually,*
358 *depending on the pitch of the voice. Umm. It just depends, but... Crowds... I might as well walk*
359 *away and go home.” (Male, 69 years)*

360 *“You gradually say no to going to things [due to hearing loss]. You don't go shopping as much as*
361 *you would have. You just get the bare essentials because it's too traumatic.” (Female, 73 years)*

362 Other participants would continue to attend social events but would mentally withdraw from
363 conversations.

364 *"I got to the stage with my deafness when I couldn't hear something, I just turned off."* (Female,
365 69 years)

366 *"You just sit there and eat and drink and you hope everybody else is talking. [Hearing loss] does
367 isolate you."* (Female, 67 years)

368 *"So I'd sit there like a zombie, you do withdraw when you become deaf."* (Female, 73 years)

369 Some participants described losing the meaning behind conversations, where they would miss segments
370 of conversation or miss the correct intonation. This resulted in misunderstandings and misinterpretations
371 of spoken content.

372 *"Well, when you approach people, or even a shopkeeper or the bank, you have a perception before
373 you go of how that's going to eventuate... And because you don't hear properly, when you leave
374 that group, you think, "I've messed that up." Or "I haven't quite comprehended." Because you miss
375 words, you don't get the true meaning of what people are saying to you..."* (Female, 73 years)

376 *"That's one thing about deafness is.. it's... comedy disappears. Like music, you know, you can't
377 hear music properly anymore. It's just lost... And also comedy. Because it takes you so much longer
378 to piece together a conversation, cause you're only getting so much of it... You have to, you have
379 to make all these assumptions."* (Male, 63 years)

380 *"We've worked it out that the brain's not hearing what I'm hearing, if you get what I mean? My
381 other sister was staying with me at one stage and I said, that tractor's working that paddock again,
382 she said, the fridge has just started up... The nerves were not working properly, the brain's not*

383 *registering properly with what I'm hearing, it's putting another label to it... So that has been very*
384 *frustrating.*" (Female, 67 years)

385 Thus far, the losses that participants described were related to hearing loss, however, several participants
386 also discussed loss with regards to audiological rehabilitation.

387 Some participants reported an initial loss of natural hearing with the use of hearing aids or cochlear
388 implants.

389 *"I never knew that I was going to get normal sound back [after cochlear implantation], so it was*
390 *very hard thinking that this is what I'm gonna hear for the rest of my life."* (Female, 69 years)

391 *"...if you go to a hearing aid specialist or something like that, and you go in there with the*
392 *expectation that you're going to get good hearing back and it can be a umm... it can be pretty*
393 *frustrating, actually. If you don't know that, it can be a pretty frustrating experience."* (Male, 63
394 years)

395 *"With these hearing aids I've got now, I had a hollow sound and I couldn't understand, especially*
396 *when I watch television."* (Female, 79 years)

397 Of note, only one participant reported difficulty accepting the loss of residual hearing when obtaining a
398 cochlear implant.

399 *"[The audiologist and doctor said] most people are so excited and I said, "well I'm not"...then [the*
400 *audiologist] told me that when you put the cochlear implant in you destroy the hearing of the ear...*
401 *that was an issue that I had to work around. So I said I don't really want to have it, but then, when*
402 *I go places I know I have to have it because you can't hear a damn thing that's going on or being*
403 *said to you. But I said "No, I'm not excited."* And [the audiologist and doctor] *all thought that was*
404 *strange."* (Female, 69 years)

405 **Theme 3: The experience of gain throughout hearing loss and audiological rehabilitation**

406 Participants not only shared their experiences of loss, they also discussed ways in which they had gained
407 throughout hearing loss and audiological rehabilitation. In contrast to the losses, most of the reported
408 instances of gain were associated with audiological rehabilitation. Besides gaining a hearing device (i.e.
409 hearing aid or cochlear implant), participants also described gaining increased social interaction, social
410 inclusion and confidence. These experiences of gain were, again, not unique to only those with comorbid
411 psychological symptoms, but to the wider population of older adults with hearing loss. Not all gains,
412 however, were regarded positively, with some participants describing a gain of unwanted auditory input
413 from their hearing devices. Participants reported that hearing loss was also accompanied by largely
414 negatively associated gains, with some participants describing the onset of phantom auditory perceptions
415 (the perception of sound without external auditory input e.g. tinnitus).

416 Obtaining a hearing aid or cochlear implant was, for most participants, a positive experience that allowed
417 them to communicate more effectively.

418 *"I could hear them [talking]. And I thought, bloody hell, this is marvelous. I can actually hear what*
419 *they're saying! I was expecting to have to kind of guess."* (Male, 66 years)

420 *"When I got the hearing aids, and I put them on, I could hear conversations from about 40 meters*
421 *away."* (Male, 71 years)

422 Additionally, several participants found that hearing rehabilitation restored, at least to some extent, their
423 sense of inclusion and social identity.

424 *"I'm much more confident now [with hearing aids] in joining that situation rather than remaining*
425 *on the periphery and just smiling throughout quietly at people."* (Male, 80 years)

426 *"My relationship with my friends is fabulous now [with hearing aids]."* (Female, 73 years)

427 *“These [hearing] aids have really restored my capacity and confidence in that way.”* (Male, 80
428 years)

429 Some participants found that the addition of the hearing device was somewhat a burden, another piece
430 of technology that needed to be incorporated into their lives.

431 *“So [with a cochlear implant] you’re sort of living your life on batteries aren’t you.”* (Female, 69
432 years)

433 *“You’ve got to clean [the hearing aids] every day. They are a lot of work. I think it adds to my time
434 when getting out of the house... And remember to put them in, that’s something else.”* (Female,
435 68 years)

436 One participant described the onset of unwanted auditory inputs emanating from her hearing device,
437 querying whether her cochlear implant was misinterpreting environmental sounds as voices. Whilst only
438 reported by one participant, the potential emotional consequences of these experiences merit further
439 consideration.

440 *“...certain noises it interprets as words. There’ll be a noise and it just sounds like a voice or a word,
441 not that you can actually hear the word but that’s how it’s coming through as speech instead of
442 something else... As I’ve gone on that has got better because [the audiologist] said it just takes
443 your brain a while to train to identify what it is, but it still happens with just different things...”*
444 (Female, 69 years)

445 Lastly, some participants reported that their hearing loss was accompanied by the onset of phantom
446 auditory perceptions, that is, the subjective presence of sound when there was no external auditory input
447 present. These perceptions were sometimes described as simple ringing or buzzing sounds (i.e. tinnitus),
448 however, other participants reported phantom auditory perceptions that were accompanied by semantic

449 content or associated meaning (e.g. music, trucks, voices). Of these participants, most were aware that
450 the sounds were internally generated once provided with evidence that there were no externally
451 produced auditory inputs.

452 *“It was scary actually, in that I'm in the house by myself and I could hear somebody outside calling*
453 *my name... And I've got out, put my dressing gown on and gone out and nobody there. Another*
454 *time I heard probably three or four men talking outside, couldn't hear what they were saying but*
455 *they were talking amongst themselves, having a conversation and when I went out, nothing... So,*
456 *it's other noises that the brain is interpreting different ways, but it did really scare me when I*
457 *started hearing my name being called and conversation being held outside my house but there*
458 *was nobody there.” (Female, 67 years)“Umm, and I've realized it's not trucks, there's no trucks*
459 *passing. But it's inside the head, and then you get music in there, that plays on something, it's a*
460 *bit like a umm, a broken record. You know, and it plays inside the ear, inside the head... totally*
461 *different [to normal tinnitus], tinnitus with normal people is just a, a ringing in the ear. Most*
462 *people have got it. This. I've got, I've got very loud noises and music and trucks, and things like*
463 *that.” (Male, 69 years)*

464 *“I found my hearing deteriorated big time [during a high stress time]. To the point of a lot of*
465 *extreme head noise. Helicopters landing on the roof, ship bellowing, tractors working in the*
466 *paddock when they shouldn't have been, trucks changing gears outside, the whole gamut of so*
467 *much head noise. All the doctors did was put me onto depression tablets and anxiety tablets, all*
468 *those sorts of things, to try and get me through it, because I was a mess.” (Female, 67 years)*

469 One participant perceived these sounds to be caused by an external agent, that is, they perceived the
470 phantom auditory perceptions to be purposely placed into their head by another person. The participant
471 reported that these sounds were the cause of his hearing loss.

495 (e.g. using communication strategies, requesting communication partner assistance) was associated with
496 maintaining social interactions and a positive social identity. In contrast, avoiding the social scene was
497 linked with diminished social interaction and a negative social identity. It is possible that comorbid
498 psychological symptoms could influence the way participants cope with their hearing loss, with a skew
499 towards withdrawal and isolation. This could be of particular concern in older adults with comorbid
500 depression, where impaired social support and loneliness are significant contributors to depressive
501 symptoms (Aziz & Steffens, 2013).

502 Previous research has described the emotional, cognitive and physical effort that was required to
503 commence and persevere with audiological rehabilitation in the theme of *client labor* reported by
504 Knudsen et al. (2013). Participants in the current study reported similar physical effort (e.g. maintaining
505 hearing devices, financial outlay) and cognitive effort (e.g. deciphering speech with hearing device,
506 decision making) as the interviewees in Knudsen et al.'s study (2013). However, Knudson et al. (2013)
507 reported that emotional effort was required only when 'reaching out' to obtain audiological rehabilitation
508 and for persistence with hearing devices. The participants in the current study appeared to recall
509 emotional effort in greater detail, and throughout many aspects of their rehabilitation, as described
510 throughout the three themes of this study. This may be due to the presence of comorbid psychological
511 symptoms; however, the interview did encourage further discussion about emotional reactions to
512 audiological rehabilitation. This finding is consistent with research suggesting that psychological
513 symptoms can negatively impact motivation, goal attainment, concentration, energy and self-efficacy
514 (Dickson & Moberly, 2013; Hanson & Young, 2017). These findings imply that those providing audiological
515 rehabilitation need to be cognizant of the different support needs of this sub-population of older adults
516 with comorbid hearing loss and psychological symptoms.

517 *The cumulative impact of hearing loss and psychological symptoms* is a novel theme previously not
518 described in the literature. Whilst there has been quantitative evidence of an association between hearing

519 loss and psychological symptoms such as depression, anxiety and psychosis, there has been a lack of
520 understanding of the lived experience (Lawrence et al., 2019; Linszen et al., 2016). Participants in the
521 current study described their subjective experience of a bidirectional relationship between hearing loss
522 and psychological symptoms. That is, hearing loss was reported to negatively impact psychological
523 symptoms, and psychological symptoms were reported to interfere with subjective hearing ability. This
524 understanding of a bidirectional relationship has not yet been established in quantitative research, with
525 almost all studies reporting correlations, without evidence to support the directionality of the
526 relationship. The few longitudinal studies conducted previously offer some support for a bi-directional
527 relationship, for example, Saito et al. (2010) reported that hearing loss increased the risk of subsequently
528 developing depressive symptoms, whereas Chung et al. (2015) found that a previous anxiety diagnosis
529 was a risk factor for sudden sensorineural hearing loss. The underlying mechanisms of this directional
530 relationship are not yet understood; however, it has been suggested that the cochlea may be vulnerable
531 to the circulatory and sympathetic nervous system changes that can arise with anxiety disorders (Chung
532 et al., 2015). Further investigation of this relationship would offer audiologists the opportunity to better
533 understand and support their clients and ultimately obtain improved outcomes.

534 For most participants in this study, comorbid psychological symptoms largely pre-dated the onset of
535 hearing loss. This may suggest that hearing loss was an exacerbating or cumulative factor for psychological
536 symptoms. This finding is consistent with psychological theories that postulate that the presence of life
537 stressors may trigger or exacerbate predispositions for mental disorders or psychological symptoms
538 (Livingston & Hinchliffe, 1993; Patrick & Bernat, 2010; Aziz & Steffens, 2013). Hearing loss can have
539 considerable detrimental consequences on individuals and their families, undoubtedly acting as a stressor
540 and potential trigger for psychological symptoms in those who are susceptible (Arlinger, 2003). It is still
541 unknown, however, if pre-existing psychological symptoms could alter the perceived development,
542 severity or impairment of hearing loss. Participants in the current study discussed how their psychological

543 symptoms interfered with their subjective hearing ability. Further investigation into the impact of
544 psychological symptoms on self-perceived hearing ability is necessary as this has not yet been explored.

545 *The experience of loss throughout hearing loss and audiological rehabilitation*, described the loss of
546 communicative ability, social involvement, meaning behind conversations and loss of natural sound with
547 hearing devices. Hearing loss is the loss of a primary sense in which most people rely upon heavily for
548 their social participation. Participants described how the loss of hearing ability precipitated further losses
549 in their lives, especially losses related to feeling connected with people and their environment. For
550 example, several participants described how losing segments of conversation due to hearing loss would
551 result in a misinterpretation of spoken content. Often this misinterpretation was accompanied by
552 frustration, embarrassment or arguments with the communication partner. While these consequences of
553 hearing loss are not exclusive to those with comorbid psychological symptoms (Kamil & Lin, 2015; H.
554 Abrams, 2017; Vas, Akeroyd, & Hall, 2017), what is unique to this participant group is how they managed
555 the misunderstandings. For example, it was reported that missing segments of conversation were
556 interpreted not only in the context of the sentence, but also within the context of the participant's
557 emotional state. When the participant was anxious or self-conscious, participants reported that their
558 interpretations were negatively skewed and often persecutory. Another example of the uniqueness to
559 this subgroup is that with a loss of hearing, an individual's capacity for testing reality can be diminished
560 (Barry Jr, 1957). In the case of paranoia, if an individual is capturing only segments of communication,
561 these gaps may be interpreted by subconscious paranoid ideation that may otherwise not present (Barry
562 Jr, 1957). One participant who screened positively in the Psychosis Screening Questionnaire reported that
563 her thoughts were being interfered with; when discussed further she clarified that hearing loss reduced
564 her ability to accurately evaluate social interactions; *"you have a perception before you go of how [the*
565 *conversation is] going to eventuate... Because you miss words, you don't get the true meaning of what*
566 *people are saying to you... [you will perceive the conversation negatively]"*. An experimental study by

567 Casanova, Katkovsky, and Hershberger (1988) revealed that simulating a hearing loss significantly
568 increases negative emotions and paranoid reactions to taped conversations, where participants believed
569 the content was a personal evaluation. Therefore, whilst losses associated with hearing loss are not only
570 experienced by those with psychological symptoms, it is important for audiologists to understand how
571 these may be compounded by psychological symptoms.

572 *The experience of gain throughout hearing loss and audiological rehabilitation* explored the gaining of
573 communication, social inclusion, a new device and unwanted auditory input. Many participants discussed
574 the gain of hearing and communicative ability following the provision of a hearing device. These gains
575 were often accompanied by an improvement in social interaction and, in turn, an improvement of
576 psychological symptoms, consistent with previous longitudinal studies (Acar et al., 2011; Boi et al., 2012;
577 Bruggemann et al., 2017; Castiglione et al., 2016; Choi et al., 2016; Contrera et al., 2015). However, gain
578 was not always regarded positively; obtaining a new device, and the associated difficulties of its
579 management, were mentioned by several participants as hurdles to continuing their audiological
580 rehabilitation. Additionally, some participants gained an array of unwanted auditory inputs, either
581 emitted from their hearing device (e.g. a cochlear implant would misinterpret some environmental noises
582 as speech sounds), or via phantom auditory perceptions (i.e. the perception of sound without external
583 auditory input) (Vanneste, Song, & De Ridder, 2013). When auditory perception is compromised, either
584 through hearing loss or hearing devices, it is possible that interpretation and comprehension of sounds
585 can be influenced by psychological symptoms. Participants reported phantom auditory perceptions in a
586 variety of ways; many participants reported simple phantom auditory perceptions (i.e. tinnitus) in which
587 they perceived simple sounds such as hissing or buzzing. Several participants also reported complex
588 phantom auditory perceptions, where sounds had semantic quality e.g. trucks, music, voices. It may be
589 beneficial for audiologists to differentiate types of phantom auditory perceptions, not only because some
590 participants reported anxiety, discomfort or frustration in response to these sounds, but also because

591 there are differences in their underlying psychopathology and mechanisms (Fischer, Marchie, & Norris,
592 2004; Vanneste et al., 2013; Hemming & Merrill, 2015; Rocha et al., 2015). No studies to date have
593 investigated perceptual misinterpretation with hearing devices, but several case studies and cohort
594 studies have identified complex phantom auditory perceptions (variously termed musical or auditory
595 hallucinations or pseudo-hallucinations) in acquired hearing loss (Balan et al. 1996; Bernard & Quante,
596 2011; Brunner & Amedee, 2015).

597 ***Clinical implications***

598 Participants described a bi-directional relationship between psychological symptoms and hearing loss,
599 including how psychological symptoms can impact on one's approach, adherence to, and ability to cope
600 with audiological rehabilitation. Thus, in order to provide optimal audiological rehabilitation, audiologists
601 need to identify and address the psychological needs of their clients in the audiology context; and it is the
602 audiologists' responsibility as healthcare professionals to ensure client mental health has been
603 considered. Audiologists can provide psychological support to their clients through providing
604 informational counselling, emotional support, involving significant others, and/or recommending
605 additional support outside of the audiology setting (such as a General Practitioner or psychologists)
606 (Bennett, et al. 2020a). In order to provide psychological support, the audiologist must first recognise that
607 the client requires psychological support. It is possible that the client might directly report their
608 psychological symptoms during client interactions; however, the audiologist may also need to recognise
609 signs and behaviours that indicate psychological distress. This could be facilitated through use of
610 psychological screening questionnaires, such as the DASS 21 (Lovibond & Lovibond, 1995), which has been
611 received positively by hearing aid and cochlear implant clients within a clinical setting (Muñoz, McLeod,
612 Pitt, Preston, Shelton & Twohig, 2017). However, recent research has demonstrated that audiologists lack
613 the knowledge and skills required to adequately detect and discuss mental health during audiology
614 consultations (Bennett et al., 2020a; Bennett et al., 2020b). This is likely due to the lack of mental health

615 education and counselling included in audiology training programs (Whicker et al., 2017), and thus
616 practicing clinicians may need to upskill with specific training. Mental Health First Aid (MHFA), for
617 example, is an international, evidence-based training program that teaches how to approach, assess and
618 assist with mental health crises via counselling, support and appropriate referral (Kitchener & Jorm, 2002).
619 With appropriate identification of psychological symptoms, audiologists can integrate discussion of
620 emotional and psychological difficulties into their appointments with clients, and ensure that their clients
621 obtain appropriate support for their psychological needs.

622 ***Strengths, limitations and future research***

623 There are several strengths and weaknesses that need to be discussed in relation to the current study. A
624 qualitative study of this scope has not previously been conducted, and the generated themes have
625 provided novel insight into the experience of hearing loss and audiological rehabilitation for older adults
626 with comorbid psychological symptoms. The input from a team of multi-disciplinary researchers from
627 audiology and psychology also enabled a rich interpretation of the qualitative data that was obtained.
628 While the results cannot be generalized to all older adults with hearing loss and psychological symptoms,
629 the themes capture the shared lived experiences for a diverse group of participants and offer previously
630 unreported perspectives. There was a considerable variation in the duration (less than 1 year to 51 years)
631 and type (hearings aids and/or cochlear implants) of audiological rehabilitation that participants
632 undertook; whilst this variation is helpful in capturing the diversity of experiences, there may be
633 differences in reports due to audiological rehabilitation that have not been captured in this study.
634 Participant recruitment bias is also an issue to consider in this study; there are likely to be differences in
635 the experiences between participants and those who chose not to participate, it is also possible that those
636 with significant psychological symptoms or disorders were not recruited due to inability or unwillingness
637 to participate.

638 The results of this study indicate that further research is required to better understand the relationship
639 between hearing loss and psychological symptoms. Given that a major theme of the current study
640 suggested a bidirectional relationship, further research is required to determine the extent and
641 applicability of this finding beyond this group of participants. It is also of interest to further investigate the
642 impact of psychological symptoms on self-perceived hearing ability. The themes of loss and gain
643 throughout hearing loss and audiological rehabilitation highlighted the influence of psychological
644 symptoms on the interpretation of missing or additional auditory information. Further research is needed
645 to understand these experiences as little is currently known. Lastly, it is recommended that an
646 investigation of the barriers and facilitators to audiological rehabilitation for older adults with comorbid
647 psychological symptoms be conducted to extend the understanding of the current study.

648 **CONCLUSION**

649 This study provides insight into the experiences of hearing loss and audiological rehabilitation for older
650 adults with hearing loss and psychological symptoms. The themes developed from the current participant
651 data add new perspectives to previous qualitative studies with broader samples of hearing-impaired
652 participants. The experiences of the current participants revealed that the presence of comorbid
653 psychological symptoms can influence the phenomenology of hearing loss and audiological rehabilitation.
654 These findings have implications for how audiological rehabilitation is provided. For example, due to the
655 potential impact of psychological symptoms on the experience of audiological rehabilitation, it may be
656 beneficial for audiologists to integrate discussion of emotional and psychological difficulties into their
657 appointments with clients. At the least, this enables the audiologist to better understand the client and
658 provide a patient-centered service and, at most, may potentially allow clients to obtain improved
659 rehabilitation outcomes.

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- 962

963 **Table 1.** Participant characteristics

Characteristics	Participants (N = 14)
Gender, <i>n</i>	
Male	8
Female	6
Age, <i>M (SD)</i>	70.5 (4.45)
Current psychiatric diagnosis reported, <i>n</i>	
Depression	4
Anxiety	4
Psychosis	1
Post-Traumatic Stress Disorder	1
Psychological symptoms reported, <i>n</i>	
DASS 21 Depression scale score ≥ 10	12
DASS 21 Anxiety scale score ≥ 8	6
DASS 21 Stress scale score ≥ 15	7
PSQ "Yes" on Question/s 3, 5, 8, 10, or 12	4
Hearing device, <i>n</i>	
Cochlear implant and hearing aid	4
Hearing aid/s	10
Duration of audiological rehabilitation, <i>n</i>	
Less than 1 year	6
1 – 9 years	3
10 – 19 years	2
20 years or longer	3

Note. DASS 21 = Depression, Anxiety and Stress Scale; PSQ = Psychosis Screening Questionnaire

964

965 **Table 2.** Thematic analysis results (themes and categories) and examples of content from participant interviews

Theme	Categories	Example Content
1: The cumulative impact of hearing loss and psychological symptoms	Hearing loss had negative impact on psychological wellbeing	<ul style="list-style-type: none"> Participant recognizes that past social anxiety has been in at least some part a result of hearing loss Hearing loss adds to the overall psychological symptoms and awareness of a declining body
	Audiological rehabilitation improved psychological symptoms	<ul style="list-style-type: none"> Improvement of hearing with hearing aids was noted as a factor in reducing anxiety for the participant Participant found a loss of confidence with hearing loss and confidence was restored with hearing aids
	Psychological symptoms had negative impact on subjective hearing ability	<ul style="list-style-type: none"> Participant feels hearing is better when happy and worse when upset or angry Anxiety makes hearing more difficult and hearing troubles exacerbates anxiety for participant
2: The experience of loss throughout hearing loss and audiological rehabilitation	Loss of communicative ability and social connection	<ul style="list-style-type: none"> Participant feels that there is no point going out to interact with people because of hearing loss Participant would unconsciously “switch-off” when unable to hear the conversation
	Loss of meaning behind conversations	<ul style="list-style-type: none"> Participant feels that mood has influenced the way missed sections of conversations are perceived Participant would pretend to understand conversation, but this caused misunderstandings and interpersonal problems.
	Loss of residual hearing with cochlear implantation	<ul style="list-style-type: none"> Participant found it very challenging accepting that the remaining hearing was going to be lost Participant had difficulty accepting any remaining hearing in the implant ear would likely be lost
	Loss of natural hearing with hearing device	<ul style="list-style-type: none"> Frustration with inability to have hearing restored to ‘normal’ with hearing aid Speech sounded computer generated and initially could not discriminate between different speakers
3: The experience of gain throughout hearing loss and audiological rehabilitation	Gain of communicative ability and social inclusion following audiological rehabilitation	<ul style="list-style-type: none"> Cochlear implant has improved life, increased social interaction and improved social bonds Hearing aid has in turn improved the experience of going out and communicating with other people
	Gain of another gadget (i.e. hearing device) to manage in life	<ul style="list-style-type: none"> Hearing aid maintenance seen as a lot of work and adds to the time it takes to get ready in the morning Hearing aids (particularly rechargeable ones) are another device that needs to be added to your life
	Gain of unwanted auditory inputs from hearing devices	<ul style="list-style-type: none"> Cochlear implant misinterprets some environmental sounds as words or indistinct voices Misinterpreted sounds with a cochlear implant when alone was source of anxiety (voices outside bedroom)
	Gain of phantom auditory perceptions (i.e. tinnitus, auditory hallucinations)	<ul style="list-style-type: none"> Phantom auditory perceptions (“head noise”) presented like auditory hallucinations of voices Participant experiences tinnitus in the form of loud trucks and music (like a broken record)

967 **Figure 1.** Flowchart of participant recruitment

968

969 **Supplemental Digital Content 1** (text): Sampling matrix containing number of participants fulfilling
970 criteria (gender, age, hearing device, psychological symptoms) to obtain maximum variation sampling

971

972 **Supplemental Digital Content 2** (text): Interview topic guide containing initial and follow-up open-ended
973 questions