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Hearing aid review appointment: Clients' reasons for attendance and non-attendance

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ABSTRACT

Objective: To investigate hearing aid owners' decisions to attend or not attend an annual hearing aid review (HAR) appointment. To investigate possible factors associated with appointment attendance, including age, gender, transportation, travel time, and hearing aid outcomes.

Design: A prospective cohort study. Potential participants were notified of their annual HAR appointment in the usual process employed by their clinic. Two months later, potential participants were identified as those who had attended and those who had not attended an appointment.

Study sample: One hundred and twenty adult hearing aid users ranging in age from 26 to 100 (M = 74, SD = 11) years recruited from a single hearing clinic in Perth, Western Australia.

Results: Factors found to be significantly associated with attendance at an annual HAR appointment included hearing aid funding source (government subsidised), participants valuing the importance and benefit of the appointment, and superior hearing aid outcomes.

Conclusions: Within a controlled practice setting, appointment attendance is influenced by some factors modifiable by the clinician, including providing better education about the process and purpose of the HAR appointment. The value of the HAR appointment was emphasised by the positive association between better hearing aid outcomes HAR appointment attendance.

INTRODUCTION

Hearing aids are the primary intervention for hearing loss. Typically, hearing aids are offered as part of an aural rehabilitation process, wherein a trained professional will program the hearing aid based on the individual's hearing sensitivity and communication needs. Best practice guidelines recommend that the process comprise of several activities, each with a different purpose: 1) the hearing assessment; 2) discussion about hearing aid options and hearing aid selection; 3) the initial fitting of the hearing aid; 4) follow-up fine-tuning (individuals may require one or several appointments); and 5) hearing aid review (HAR) (American Speech-Language-Hearing Association 2015; Audiology Australia 2013). Although HAR appointments are often provided on an annual basis, they have been reported to vary from 6 months to 5 years, or in some cases, HAR appointments are rarely offered at all (Bennett, Meyer, & Eikelboom, 2016; Kochkin et al., 2012; Goggins & Day, 2009; Valente et al., 2006).

The HAR appointment is an opportunity for the clinician to review the hearing aid and rehabilitation outcomes, to ensure that the client is receiving optimal benefits, and to investigate whether the client is experiencing any problems or whether there has been a change in their circumstances or needs. The HAR appointment has been described as important for ensuring that clients are using their hearing aid (Perez & Edmonds; 2012), managing their hearing aids optimally (Goggins & Day, 2009), and satisfied with the hearing aid and rehabilitation process (Knudsen, Oberg, Nielsen, Naylor, & Kramer; 2010). However, there is paucity in the literature regarding the HAR appointment and its benefits.

In many clinics, the process for recalling hearing aid owners for their HAR appointment is to send them a letter inviting them to call the clinic to make an appointment. Linnsen et al. (2013) reported that hearing aid owners do not always respond to invitations to annual review appointments recommended by their clinicians. They suggested that hearing aid non-users did not attend HAR appointments because: 1) they did not intend to use their hearing aids anyway; 2) due to a belief that their hearing aids were functioning properly and just not wanted; or 3) because they believed that their hearing-aid dispensers were unable to help them adequately. In some disciplines, appointment non-attendance is predictive of non-compliance to the greater treatment plan. For example, in psychiatric care up to 50% of patients who missed appointments dropped out of scheduled

care (Mitchell & Selmes, 2007). With respect to diabetes management, patients who do not attend regular appointments are more likely to be less compliant with self-management and adherence to clinical recommendations for medication and lifestyle choices (Jacobson, Adler, Derby, Anderson, & Wolfsdorf, 1991; Schechter & Walker, 2002). This may be the case in other chronic illnesses that require self-management, such as hearing loss; i.e. hearing aid owners who do not attend annual review appointments may have a higher rate of non-compliance and thus be the ones most needing the support. This is worthy of further examination.

The reasons for appointment non-attendance in other allied health disciplines tend to stem from certain attitudinal factors, including client beliefs about the personal costs of appointment attendance versus the benefits received from attending appointments (Crosby et al., 2009; Lacy, Paulman, Reuter, & Lovejoy, 2004). Patients appear more likely to miss their appointments if they perceive the appointment as less urgent (Barron, 1980) or less helpful (Blankson, Goldenberg and Keith, 1994). Appointment non-attendees are more likely to be younger (Giunta et al., 2013), have a lower mean level of education (Humphreys et al., 2000), and have greater travel distances (Jackson, Booth, Mcguire & Salmon, 2006) than attendees. To our knowledge the reasons for HAR appointment attendance and non-attendance for hearing aid owners (both users and non-users) have not been investigated and reported. However, documented reasons for hearing aid non-use may contribute to appointment nonattendance, such as a lack of support from significant others, negative attitudes to hearing aids and poorer perceived benefit from hearing aids (Hickson, Meyer, Lovelock, Lampert & Khan; 2014). Accordingly, the purpose of this study was to investigate hearing aid owners' decisions to attend or not attend an annual HAR appointment and to investigate possible factors associated with appointment attendance, including age, gender, transportation, travel time, significant others attitudes toward hearing aids, hearing aid use, and self-reported hearing aid benefit.

METHODS

Ethical approval for this study was granted by the Human Research Ethics Office of The University of Western Australia. All participants provided consent to participate.

Materials

This study developed and administered two different survey sets (see Supplemental Material); one to a group of hearing aid owners who attended a HAR appointment, and another to a group of hearing aid owners who did not attend a HAR appointment. Each survey set included questions regarding the reasons why the participant did (or did not) attend a HAR appointment. Both survey sets included questions regarding the participants' beliefs about the HAR appointment, their travel to and from appointments, the attitudes of their support network towards hearing aids [eight items from the Attitude Towards Hearing Aids (ATHA) survey (van den Brink, 1995)], as well as demographic and hearing aid questions, including the International Outcomes Inventory - Hearing Aids (IOI-HA; Cox & Alexander, 2002).

The survey sets were developed by a team of three clinical audiologists and two audiology researchers. The initial draft of the survey sets were sent to five clinical audiologists, two audiology managers and two audiology administration staff members working for the organisation from which the participants were to be recruited. They provided input on: 1) additional possible reasons for appointment attendance or non-attendance; 2) other clinical questions that they may like to include to enrich the data collected; and 3) the language and terminology used to ensure that it is consistent with the language used by the clinic and appropriate for their "average" patient. The readability or reading grade level of the surveys were not formally assessed; they were only evaluated by asking the clinicians and hearing aid owners involved in pilot testing to comment on the language and terminology used in the survey. The final version was then pilot tested on five adult hearing aid owners to evaluate the ease of survey completion. No further changes were made to the survey.

The list of reasons for attending or not attending a HAR appointment included in the surveys (see Supplemental Material) was generated by 1) discussion between researchers, 2) perusing the HAR appointment case notes from 30 randomly selected client files who had recently attended a HAR appointment, and 3) through interviewing the five clinicians, two clinic managers and two administration staff mentioned above.

The section on beliefs about the HAR appointment was created to establish whether predetermined belief systems influenced attendance rates. Travel and transport

arrangements have been reported to influence appointment attendance in other health disciplines, and as such were included as a measure in this study to determine whether travel and transport arrangements impact on HAR appointment attendance rates.

The ATHA survey was created to investigate the perceived benefits or limitations of hearing aids by their owners (van den Brink, 1995). An eight-question subset of the ATHA survey asked respondents to indicate whether “those around them” (for example, family and friends) were more inclined to view hearing aids positively or negatively. This subset was used in a study by Meyer et al. (2014) to assess the role of significant others in encouraging hearing aid uptake in participants. The results showed lower ATHA subset scores, indicating negative attitudes towards hearing aids by participants’ significant others, correlated with poorer help-seeking behaviour in participants. This ATHA subset (eight items) was included in this study to identify whether the attitude of others towards hearing aids affected HAR appointment attendance. For example, one question was “People around me think that hearing aids have more disadvantages than benefits”. Questions were rated on a five point Likert scale of “Strongly Disagree”, “Disagree”, “Neither agree nor disagree”, “Agree”, and “Strongly Agree”. A higher score indicated greater perceived support from significant others.

Demographic data collected included age, gender and employment status. Hearing aid questions included fitting configuration (unilateral or bilateral), style of hearing aid (Behind-The-Ear: BTE or In-The-Ear: ITE), when they received their current hearing aid (year), and when they received their first ever hearing aid (year). Participants were also asked to indicate the source of funding for their audiological appointments (whether they were self-funded: Private, or whether they received financial support from the Australian Federal Government through the Office of Hearing Services: OHS). This section also included the IOI-HA, a seven-item survey developed to assess the effectiveness of hearing aids in improving hearing and general life enjoyment in real-life situations (Cox & Alexander, 2002). It was designed to be administered in conjunction with other related surveys in order to provide a common platform to facilitate comparison of results between different audiological studies. The IOI-HA was included in this survey set to enable investigation into whether hearing aid outcomes (IOI-HA total score), daily hours of hearing aid use (IOI-HA item 1) and hearing aid benefit (IOI-HA item 2) were associated with HAR appointment

attendance.

Participants

Potential participants were identified as adult (over 18 years) hearing aid owners due for an annual HAR appointment at the time of data collection. Potential participants were recruited from a single hearing clinic in Perth, Western Australia. Obtaining the sample population from a single clinic allowed us to control for several variables. All participants experienced the same physical environment (such as clinic proximity to parking, bus and train), administration and clinical staff, and clinical protocols (including number and duration of appointments offered, testing equipment, and range and prices of devices offered).

Procedure

As per the normal practice for the clinic from which participants were recruited, those hearing aid owners who were due for a HAR appointment were mailed a reminder letter prompting them to call the clinic to make a HAR appointment. The letter was not modified by the research team. Seven hundred and one reminder letters were sent in January and February 2017 (two separate batches, one in each month). This sample included hearing aid owners who had obtained their hearing aid exactly (to the month) one, two, three, four or five years prior to the month in which the reminder letter was sent.

Two months after sending the first letter (allowing time for potential participants to make and attend a HAR appointment), the clinic database was accessed to identify those who had attended or had not attended a HAR appointment. Two months was allocated to allow sufficient time for hearing aid owners to receive their invitation, make an appointment and attend an appointment, considering the fact that the clinic often has a waiting period between one to three weeks for appointments. They were all, as potential participants, invited to participate in the study and sent a survey set (specific to whether they had attended a HAR appointment or not), including a study information sheet, consent form, and a stamped addressed envelope to return the completed surveys. The invitation to participate in the study was sent by the research team on University letterhead, and

responses were not shared with the clinic staff (as was stated in the letter of invitation to participants).

Data analysis

All data was entered into Microsoft Excel in a de-identified format and analysed using SPSS version 25.0. Firstly, the reasons for attendance or non-attendance for participants were examined as proportions. Secondly, the associations between HAR attendance and numerous demographic, social, environmental and experiential variables were examined. For this we used Logistic regression to test the relative importance of the included factors (the Odds Ratio) for attending.

RESULTS

Of the 701 hearing aid owners invited to partake in the study, 283 (40%) attended a HAR appointment, and 418 (60%) did not. One hundred and twenty returned completed surveys (response rate 17.11%). Of those who returned completed surveys, 71 (59%) attended a HAR appointment, and 49 (41%) did not. There was a significant relationship between study participants and HAR appointment attendance [$\chi^2 (1) = 20.191; p < 0.001$]. That is, those who returned a completed survey were more likely to have attended an appointment than those who were invited to partake in the study but did not return a completed survey.

HAR Appointment attendees

Around half of the participants attended their appointment for reasons related to their hearing aids (Table 1). Eighty-four (70%) participants indicated that they attended, or likely would have attended, a HAR appointment irrespective of whether they had been prompted by the clinic. Eighty-eight (73%) participants indicated that their reason(s) for attending the HAR appointment were discussed during the appointment, and 84 (70%) indicated that their needs were met by the appointment.

Table 1: Reasons for annual hearing aid review appointment attendance; more than one response was allowed.

Reasons for HAR appointment attendance	Number (%) of participants who indicated this as a reason for attending a HAR appointment (n = 70)
Invited by clinic/clinician	58 (83%)
Review appointments important part of ongoing hearing program	53 (76%)
Felt hearing aids needed adjusting	39 (56%)
Not sure if hearing aids were working well	35 (50%)
Felt hearing had changed	25 (36%)
Hearing aid is faulty and needed repair	15 (21%)
Wanted to find out about new hearing aids	13 (19%)
Wanted additional information	10 (14%)
Recommended by family/friend	6 (9%)
Wanted to know about options other than hearing aids	5 (7%)
Health had changed	3 (4%)
Wanted assistance with particular situations	2 (3%)
Wanted additional training	1 (1%)
Was not using the hearing aid and wanted to give it another go	0 (0%)
Other	0 (0%)

HAR Appointment non-attendees

Commonly reported reasons for non-attendance included “not having made the appointment yet, but planning to” (22%), and “being away or not having received the letter to attend the appointment” (12%) (Table 2). For “Other” reasons (n = 25, 50%), participants stated health problems (n = 5), dissatisfaction with the hearing aid (n = 3), and issues with the OHS voucher system (n = 2) as reasons for non-attendance.

Table 2: Reasons for annual HAR appointment non-attendance; more than one response was allowed.

Reasons for HAR appointment non-attendance	Number (%) of participants who indicated this as a reason for attending a HAR appointment (n = 50)
Other	25 (50%)
Planned to make appointment, but had not yet	11 (22%)
Did not have problems with hearing aids	7 (14%)
Was away/did not receive letter	6 (12%)
Made appointment but had not yet attended	6 (12%)
Could not afford appointment	6 (12%)
Too busy/no time off work	4 (8%)
Last appointment a waste of time	3 (6%)
Understood review appointments were important, but had avoided making one	3 (6%)
Worried that new hearing aids would be recommended	3 (6%)
Was not using the hearing aid anymore	2 (4%)
Last appointment a waste of money	2 (4%)
Had switched hearing service providers	2 (4%)
Wanted to wait for test results from another specialist	1 (2%)
Didn't think appointment was important	1 (2%)

Participants were aware of the following clinical procedures as part of the HAR appointment: hearing assessment to detect changes in hearing (94%), modify the settings of the hearing aid (90%), perform a clean and check of the hearing aid (80%), perform hearing aid repairs (74%), discuss and recommend hearing aid accessories or assistive listening devices where indicated (76%), provide additional training on hearing aid use and maintenance (74%), provide information on new hearing aids available (76%). Thirty-six percent of participants indicated that they were now more likely to attend future HAR appointments, after gaining knowledge of the services included.

Factors associated with HAR appointment attendance

Participants who attended a HAR appointment were more likely to have reported a greater perceived importance, benefit and satisfaction of HAR appointments than those who had not attended a HAR appointment (Table 3).

Although there appears to be a greater proportion of HAR appointment attendees travelling less of a distance, logistic regression found no association between travel time and HAR appointment attendance (Table 3). Mode of Transport and Parking were not able to be analysed due to insufficient responses in one or more categories.

Table 3. Factors associated with annual HAR appointment attendance included in a binomial logistic regression (Appointment attendees: n = 70; Appointment non-attendees: n = 50)

Variable	Appointment attendees N(%)	Appointment non-attendees N(%)	OR	95CI	p
Age	75.7 (11.4)	72.7 (11.2)	1.022	0.988-1.058	0.204
Gender			0.792	0.360-1.741	0.561
Female	27 (38.6)	15 (30.0)			
Male	41 (58.6)	29 (58.0)			
Missing	2 (2.9)	6 (12.0)			
BTE/ITE/Both			Not enough data		
BTE	58 (82.9)	40 (80.0)			
ITE	5 (7.2)	4 (8.0)			
Both	2 (2.9)	0			
Missing	5 (7.2)	6 (12.0)			
First Ever HA			1.008	0.967-1.052	0.698
<1990	3 (4.3)	2 (4.0)			
1990-1995	3 (4.3)	1 (2.0)			
1996-2000	5 (7.1)	6 (12.0)			
2001-2005	8 (11.4)	6 (12.0)			
2006-2010	13 (18.6)	9 (18.0)			
2011-2015	26 (37.1)	15 (30.0)			
2016>	8 (11.4)	5 (10.0)			
Missing	4 (5.7)	6 (12.0)			
Monaural/binaural fitting			0.972	0.314-3.006	0.960
Binaural	59 (84.3)	6 (12.0)			
Monaural	8 (11.4)	38 (76.0)			
Missing	3 (4.3)	6 (12.0)			
OHS/private			2.945	1.340-60.474	0.007
Private	22 (31.4)	25 (50.0)			
OHS	46 (65.7)	17 (34.0)			
Missing	2 (2.9)	8 (16.0)			

Hearing Aid Benefit					
Not at all	0	1 (2.0)			
Slightly	2 (2.9)	5 (10.0)	0.237	0.041-1.368	0.107
Moderate	16 (22.9)	11 (22.0)	0.790	0.299-2.086	0.634
A Lot	22 (31.4)	11 (22.0)	1.048	0.418-2.629	0.920
Very Much	28 (40.0)	15 (30.0)			
Missing	2 (2.9)	7 (14.0)			
Hearing Aid Use					
Never	0	2 (4.0)			
Less than 1 hour per day	0	0			
1 to 3 hours per day	8 (11.4)	8 (16.0)			
4 to 8 hours per day	21 (30.0)	6 (12.0)	0.649	0.222-1.898	0.429
More than 8 hours per day	37 (52.9)	26 (52.0)	2.189	0.814-5.885	0.120
Missing	4 (5.7)	8 (16.0)			
Childcare					
Yes	0	0			
No	67 (95.7)	44 (88.0)	All attended		
Missing	3 (4.3)	6 (12.0)			
Working					
Full time	5 (7.1)	4 (8.0)	1.600	0.104-24.703	0.736
Part time	9 (12.9)	3 (6.0)	6.000	0.390-92.277	0.199
Retired	53 (75.7)	36 (72.0)	2.700	0.237-30.824	0.424
None	1 (1.4)	2 (4.0)			
Missing	2 (2.9)	5 (10.0)			
Time off Work					
Yes	4 (5.7)	5 (10.0)	0.550	0.140-2.164	0.392
No	63 (90.0)	39 (78.0)			
Missing	3 (4.3)	6 (12.0)			
Transport Method					
Drive Myself	54 (77.1)	37 (74.0)		Not enough data	
Taxi/Private	1 (1.4)	0			
Bus/Train	3 (4.3)	1 (2.0)			
Walk	1 (1.4)	1 (2.0)			
Rely On Others	8 (11.4)	3 (6.0)			
Other	0	2 (4.0)			
Missing	3 (4.3)	6 (12.0)			
Is Parking Difficult					
Yes	8 (11.4)	4 (8.0)		Not enough data	
No	57 (81.4)	36 (72.0)			
Unsure	0	2 (4.0)			
Missing	5 (7.1)	8 (16.0)			
Travel Time (minutes)					
<15	15 (21.4)	3 (6.0)	3.750	0.537-26.188	0.183
15-29	28 (40.0)	13 (26.0)	1.867	0.335-10.412	0.477
30-44	14 (20.0)	16 (32.0)	0.937	0.163-5.387	0.942
45-60	5 (7.1)	5 (10.0)	0.833	0.114-6.111	0.858
61-90	2 (2.9)	4 (8.0)	0.400	0.040-3.955	0.433
>90 (ref)	3 (4.3)	3 (6.0)			
Missing	3 (4.3)	6 (12.0)			

Importance of Reviews						
Not At All	0	1 (2.0)	0			
Little Importance	0	2 (4.0)	0			
Neutral	2 (2.9)	14 (28.0)	0.059	0.012-0.289		<0.001
Some What Important	23 (32.8)	11 (22.0)	0.711	0.298-1.694		0.441
Very Important	41 (58.6)	16 (32.0)				
	4 (5.7)	6 (12.0)				
Benefit of appointment						
Not at All	0	1 (2.0)	0			
Of Little Benefit	0	1 (2.0)	0			
Neutral	0	7 (14.0)	0			
Somewhat Beneficial	21 (30.0)	19 (38.0)	0.405	0.178-0.918		0.030
Very beneficial	44 (62.9)	16 (32.0)				
Missing	5 (7.1)	6 (12.0)				
Importance Of Ongoing Support						
Not at all	0	0				
Little importance	0	0				
Neutral	1 (1.4)	7 (14.0)	0.065	0.008	0.558	0.013
Somewhat important	7 (10.0)	13 (26.0)	0.229	0.083	0.631	0.004
Very important	58 (82.9)	24 (48.0)				
Missing	4 (5.7)	6 (12.0)				
Satisfaction with services						
Very Dissatisfied	1 (1.4)	1 (2.0)	0.417	0.025	6,994	0.543
Dissatisfied	0	2 (4.0)	<0.001	<0.001	<0.001	0.999
Neutral	1 (1.4)	5 (10.0)	0.069	0.008	0.615	0.017
Satisfied	16 (22.9)	19 (38.0)	0.373	0.161	0.861	0.021
Very Satisfied	48 (68.6)	17 (34.0)				
Missing	4 (5.7)	6 (12.0)				

Note. BTE: Behind-The-Ear; ITE: In-The-Ear; HA: Hearing Aid; IOI-HA: International Outcomes Inventory for Hearing Aids; OHS: Office of Hearing Services; OR: Odds Ratio; CI: Confidence Interval; *p*: significance (*p*-value)

There were no significant differences in demographic factors (age, gender and employment status) or hearing aid configuration (monaural/binaural and BTE/ITE) related to HAR appointment attendance (Table 3). There was a significantly higher proportion of OHS clients in the group of participants who attended the HAR appointment (68.1%) than in those who did not attend (43.2%), [OR = 3.945, 95CI = 1.340-60.474]. The wide confidence interval is likely due to the skewness of the data to shorter travel distances, and the relatively low number of participants travelling longer distances. There was no significant difference in mean ATHA scores for HAR appointment attendees (M = 2.9, SD = 0.7, range = 0-4.4) and non-attendees (M = 3.1, SD = 0.5, range = 0-3.8), [OR = 0.594, 95CI = 0.281-1.253, *p* = 0.171].

There were no significant differences in self-reported rates of hearing aid benefit (IOI-HA item 2) or hours of hearing aid use (IOI-HA item 1) between those who attended and did not attend a HAR appointment. The mean IOI-HA score for HAR appointment attendees ($M = 4.1$, $SD = 0.5$, range = 2.7-5.0) was significantly higher than for non-attendees ($M = 3.6$, $SD = 0.9$, range = 1.0-5.0), [OR = 2.570, 95CI = 1.388-4.759, $p = 0.003$], suggesting that hearing aid owners who attend HAR appointments also experience better hearing aid outcomes.

DISCUSSION

The importance of follow up support after hearing aid acquisition is evidenced in its relationship with greater hours of hearing aid use (Brooks, 1979; Hickson & Worrall, 2003; Solheim, Kvarner, Sandvik, & Falkenberg, 2012). The HAR appointment is one such instance wherein the clinician can provide follow up support. While previous research indicated the low attendance rates at HAR appointments as an area worthy of attention (Linssen, Joore, Minten, van Leeuwen, & Anteunis, 2013), this is the first study to quantify rates and investigate factors contributing to HAR appointment attendance and non-attendance.

While ongoing support in the form of HAR appointments were offered to all participants in the present study (attendees and non-attendees), those who attended the appointment indicated a greater belief in the importance and benefit of the HAR appointment. Similar findings were obtained in a study conducted with clients undergoing long-term asthma treatment, in which higher appointment attendance was measured in participants who reported awareness of the importance of long-term treatment compliance (Jones, Jones, & Katz, 1987). The same study highlighted the pivotal role that clinicians play in ensuring that clients are well-informed about treatment outcomes and compliance. Simply offering HAR appointments does not appear sufficient to convince hearing aid owners to attend follow-up sessions. Clinicians need to explain and demonstrate to hearing aid owners the importance and benefit of these appointments, or make other options available such as telephone or internet based reviews. Additionally, 36% of participants indicated that the knowledge gained by completing the survey regarding what occurs during a HAR appointment would encourage them to attend future HAR appointments. Clinicians

may find it beneficial to spend more time discussing the importance of HARs with their clients in the early stages of hearing aid rehabilitation, in order to shape a more positive attitude towards those appointments, and potentially improve attendance rates. This could be achieved using a variety of methods, including sharing stories of previous clients' experiences or client testimonials, or discussing the individual clients' perceived barriers and/or facilitators to attending future HAR appointments. Additionally, clinicians could describe the types of hearing aid related problems that can occur (see Bennett, Laplante-Lévesque, Meyer, & Eikelboom, 2018a) and explain how the HAR appointment enables the clinician to address them.

Although travel time, mode of transport and parking were not found to be significant factors affecting appointment attendance in this instance; these factors would be highly dependent on the individual clinic being attended, its access by public transport and the availability of parking in its vicinity. Transportation barriers such as difficulty accessing public transport, limited parking and traffic congestion have been associated with appointment non-attendance in general practice (Halpern, Lopez, Grimes, & Gallo, 2011) and breast cancer management clinics (Ersin & Bahar, 2011). Travel distance has been reported to affect appointment attendance in other health-related fields including to an alcohol rehabilitation centre (Jackson et al., 2006) and a hospital outpatient clinic (Dove & Schneider, 1981). The possible clinical implications of transportation issues require further consideration. To assist hearing aid owners to overcome the barrier of distance, clinicians could consider the utilisation of satellite sites (opening smaller clinics across a wider area), mobile services (such as home visits), self-help tools (Ferguson, Brandreth, Brassington, Leighton, & Wharrad, 2015) or teleaudiology services (Swanepoel et al., 2010). Teleaudiology is defined as the use of technology to deliver hearing health care, in order to overcome distance and time barriers. Various aspects of teleaudiology have been investigated, including hearing screening (Yousuf Hussein et al., 2016), diagnostic audiometry (Krumm, Ribera, & Klich, 2007), and hearing aid fitting (Campos & Ferrari, 2012). Although there are still significant gaps in evidence required to implement teleaudiology services for hearing aids, there are some reports of its implementation in audiology practice (Tao et al., 2018). Further developments are likely to provide hearing aid users with alternative options to access services integral to optimal hearing aid use.

Participants receiving services under the OHS system were more likely to have attended a HAR appointment than privately paying clients. One of the key differences between OHS and private clients is the source of funding for hearing aids and services. That is, OHS clients receive financial support from the government to cover the cost of the base model hearing aid and all appointments, including the HAR appointment. In contrast, private clients pay in full for their hearing aids and appointments, although some may receive small rebates from private health insurance claims. Where the cost of hearing aids have been described as a barrier to hearing aid uptake (Fischer et al., 2011; Laplante-Lévesque et al., 2012), the cost of the appointment may be a barrier to HAR appointment attendance. The cost of the appointment has been found to influence appointment attendance rates in other health related studies (Go & Becker, 1979; Rice & Lutzker, 1984). Although only a small proportion of the participants in the present study indicated their reason for appointment nonattendance was due to the cost. In addition, there may be other factors associated with OHS eligibility acting in combination with the subsidised cost of the appointment to contribute to the higher HAR appointment attendance rates. These may include OHS eligibility lending itself to older aged people who are more compliant to professional advice, have fewer obligations related to employment, and lower education levels leading to lower ability to self-help. To address the low attendance rates at a clinical level, clinicians may want to consider lowering the cost of HAR appointments for private clients or offering more cost effective review methods, such as telephone reviews or self-administered screening tools (such as the Hearing Aid Skills and Knowledge Inventory; Bennett, Meyer, Eikelboom, & Atlas, 2018b) to identify if a face-to-face appointment is required.

Higher rates of hearing aid success (IOI-HA scores) were reported by those participants who attended their HAR appointment than those who did not attend a HAR appointment. However, at this stage it is unclear whether HAR appointments contribute to hearing aid success, or whether successful hearing aid users are more inclined to attend HAR appointments. It is possible that a bidirectional relationship exists and that improving both long term client care and success with hearing aids will result in better client outcomes. Although studies have indicated the importance of ongoing clinical support beyond the initial fitting of hearing aids (Bennett et al., 2018c; Linssen et al., 2013; Jorunn Solheim, Kværner, Sandvik, & Falkenberg, 2012), further research is required to quantify the

benefits of the HAR appointment. Nonetheless, there is now growing evidence supporting the benefit of follow-up support for those acquiring hearing aids (Perez & Edmonds, 2012; Goggins & Day, 2009; Bennett et al. 2018a), and clinicians should look to incorporate structured approaches to the provision of follow-up support to optimise client outcomes (Valente et al., 2006).

Limitations and future directions

One limitation of this study was the difference in attendance rates identified between participants of the study and those who were invited to participate but declined to, suggesting that participants' decisions to attend or not attend the HAR appointment may have also influenced their decision to be involved in the study. The response rate of 17% was lower than those reported in similar studies using self-report survey in clinical cohorts of hearing aid owners: 21-56% (Bennett et al., 2018d; Bertoli et al., 2009; Hickson, Clutterbuck, & Khan, 2010; Williams, Johnson, & Danhauer, 2009). Thus, the sample may not have been representative and findings must therefore be interpreted with a level of caution. Data collection occurred during January and February, which coincides with the summer holiday period in Australia, so it is possible that participant availability or willingness is lower during this period. Results also showed that being away or not receiving the letter of invitation accounted for one quarter of participants not attending their hearing aid review. Investigation into the effects of timing (month of the year) on participants' likelihood to receive and respond to correspondence could inform clinics as to the most appropriate time periods for correspondence. Where reminder and memory aids, staff training to improve communication of appointments and their importance, and organisational procedures (such as responses to missed appointments) have been shown to improve appointment attendance rates in other health related clinics (Mitchell & Selmes, 2007), future research could investigate their potential applications in audiology practice.

One possible limitation was the two month time limit given to potential participants to book a HAR appointment after receiving their reminder letter. Outside of a research setting clients at hearing aid clinics would not normally be given a timeframe in which they have to book and attend their appointment. This was reflected in results from the study,

which showed that around one quarter of participants who did not attend planned to make an appointment, but had not yet done so. If a longer time limit had been set, more participants may have attended, which may have produced different results. To ensure clients do not forget to make their HAR appointment, clinics may want to consider sending reminder letters or using phone or text reminders to follow-up on clients who have not made contact to book a HAR appointment. Studies performed in other areas of allied health have reported on the effectiveness of phone and text reminders in improving attendance rates at appointments (Booth & Bennett, 2004; Hogan, Mc Cormack, Traynor, & Winter, 2008; Roberts, Meade, & Partridge, 2007).

The study sample was recruited from a single clinic allowing us to control for many variables. Participants would have all been tested using the same equipment and testing protocols, all provided hearing aids within the same business model, hearing aids programmed and delivered using the same formulae and clinical processes, and all given the same flexibility for number of appointments and payment schedules. Although convenience sampling, such as this, provides access to a group of identifiable and somewhat homogenous population, the inherent limitations include generalisability of the results, and thus applicability of this study's findings should be considered in light of the recruitment method selected.

Additionally, although the Bonferroni correction is frequently used to adjust probability values when making multiple statistical tests, many concerns have been raised regarding the notion that the probability of a type I error cannot be decreased without increasing that of a type II error, such that real differences may not be detected (Armstrong, 2014). Given that the present study is explorative in nature, looking to identify possible factors associated with appointment attendance, the authors chose not to miss a possible effect, i.e., to avoid a type II error and therefore not to use a Bonferroni correction.

CONCLUSION

Significant group differences between participants who attended and did not attend a HAR appointment were found to be associated with perceived HAR importance, source of appointment funding, and hearing aid outcomes. Overall, the results suggest changes in

clinical practice may help improve HAR appointment attendance, including providing better education about the content and purpose of the HAR appointment. It appears that those hearing aid owners who do not attend HAR appointments are those who are most in need of the assistance provided in these appointments to improve hearing aid outcomes.

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References

- American Speech-Language-Hearing Association. (2015). Hearing aids for adults. 2016, from <http://www.asha.org/PRPSpecificTopic.aspx?folderid=8589935381§ion=Overview>
- Armstrong, R. A. (2014). When to use the Bonferroni correction. *Ophthalmic and Physiological Optics*, 34(5), 502-508.
- Audiology Australia. (2013). Audiology Australia Professional Practice Standards - Part B Clinical Standards. 2014, from <http://www.audiology.asn.au/standards-downloads/Clinical%20Standards%20-%20whole%20document%20July13%201.pdf>
- Australian Government Department of Health. (2013). Schedule of Service Items. Retrieved 02/07/2018, from http://www.hearingservices.gov.au/wps/portal/hso/site/about/legislation/contracts/schedule_service_items
- Bacala, T. (2017). Phonak and VA Collaborate to Develop Hearing Aid Distance Fitting for Veterans. *The Hearing Journal*.
- Barron WM. Failed appointments: who misses them, why they are missed, and what can be done. *Primary Care* 1980;7:563-73.
- Bennett, R. J., Laplante-Lévesque, A., & Eikelboom, R. H. (2018c). How Do Hearing Aid Owners Respond to Hearing Aid Problems? *Ear and Hearing*. 40(1), 77-87.
- Bennett, R. J., Laplante-Lévesque, A., Meyer, C. J., & Eikelboom, R. H. (2018a). Exploring hearing aid problems: Perspectives of hearing aid owners and clinicians. *Ear and Hearing*, 39(1), 172-187.
- Bennett, R. J., Meyer, C., & Eikelboom, R. H. (2016). Does clinician continuity influence hearing aid outcomes? *International Journal of Audiology*, 55(10), 556-563.
- Bennett, R. J., Meyer, C. J., Eikelboom, R. H., Atlas, J. D., & Atlas, M. D. (2018d). Factors associated with self-reported hearing aid management skills and knowledge. *American Journal of Audiology - accepted July 2018*.

- Bennett, R. J., Meyer, C. J., Eikelboom, R. H. & Atlas, M. D. (2018b). Evaluating hearing aid management: Development and validation of the Hearing Aid Skills and Knowledge Inventory (HASKI). *American Journal of Audiology*, 27(3), 333-348.
- Bertoli, S., Staehelin, K., Zemp, E., Schindler, C., Bodmer, D., & Probst, R. (2009). Survey on hearing aid use and satisfaction in Switzerland and their determinants. *International Journal of Audiology*, 48(4), 183-195.
- Blankson ML, Goldenberg RL, Keith B. (1994). Noncompliance of high-risk pregnant women in keeping appointments at an obstetric complications clinic. *Southern Medicine Journal*, 87, 634-8.
- Booth, P. G., & Bennett, H. E. (2004). Factors associated with attendance for first appointments at an alcohol clinic and the effects of telephone prompting. *Journal of Substance Use*, 9(6), 269-279.
- Brooks, D. N. (1979). Counselling and its effect on hearing aid use. *Scandinavian Audiology*, 8(1), 101-107.
- Campos, P. D., & Ferrari, D. V. (2012). Teleaudiology: evaluation of teleconsultation efficacy for hearing aid fitting. *Jornal da Sociedade Brasileira de Fonoaudiologia*, 24(4), 301-308.
- Cox, R. M., & Alexander, G. C. (2002). The International Outcome Inventory for Hearing Aids (IOI-HA): psychometric properties of the English version. *International Journal of Audiology*, 41(1), 30-35.
- Crosby, L. E., Modi, A. C., Lemanek, K. L., Guilfoyle, S. M., Kalinyak, K. A., & Mitchell, M. J. (2009). Perceived barriers to clinic appointments for adolescents with sickle cell disease. *Journal of Pediatric Hematology/oncology*, 31(8), 571.
- Dove, H. G., & Schneider, K. C. (1981). The usefulness of patients' individual characteristics in predicting no-shows in outpatient clinics. *Medical Care*, 19(7), 734-740.
- Duijvestijn, J., Anteunis, L. J., Hoek, C., Van Den Brink, R. H., Chenault, M. N., & Manni, J. J. (2003). Help-seeking behaviour of hearing-impaired persons aged ≥ 55 years; effect of complaints, significant others and hearing aid image. *Acta Oto-Laryngologica*, 123(7), 846-850.
- Ekberg, K., Grenness, C., & Hickson, L. (2014). Addressing patients' psychosocial concerns regarding hearing aids within audiology appointments for older adults. *American Journal of Audiology*, 23(3), 337-350.
- Ersin, F., & Bahar, Z. (2011). Inhibiting and facilitating factors concerning breast cancer early diagnosis behavior in Turkish women: a qualitative study according to the health belief and health development models. *Asian Pac J Cancer Prev*, 12(7), 1849-1854.
- Ferguson, M., Brandreth, M., Brassington, W., Leighton, P., & Wharrad, H. (2015). A Randomized Controlled Trial to Evaluate the Benefits of a Multimedia Educational Program for First-Time Hearing Aid Users. *Ear and Hearing*, 37(2), 123.
- Fischer, M. E., Cruickshanks, K. J., Wiley, T. L., Klein, B. E., Klein, R., & Tweed, T. S. (2011). Determinants of hearing aid acquisition in older adults. *American Journal of Public Health*, 101(8), 1449-1455.
- Giunta, D., Briatore, A., Baum, A., Luna, D., Waisman, G., & de Quiros, F. G. B. (2013). Factors associated with nonattendance at clinical medicine scheduled outpatient appointments in a university general hospital. *Patient Preference and Adherence*, 7, 1163.
- Go, H. T., & Becker, A. (1979). Reducing broken appointments in a primary care clinic. *The Journal of ambulatory care management*, 2(2), 23-30.
- Goggins, S., & Day, J. (2009). Pilot study: Efficacy of recalling adult hearing-aid users for reassessment after three years within a publicly-funded audiology service. *International Journal of Audiology*, 48(4), 204-210. doi: 10.1080/14992020802575687
- Grenness, C., Hickson, L., Laplante-Levesque, A., & Davidson, B. (2014). Patient-centred audiological rehabilitation: perspectives of older adults who own hearing aids. *International Journal of Audiology*, 53 Suppl 1, S68-75. doi: 10.3109/14992027.2013.866280

- Halpern, V., Lopez, L. M., Grimes, D. A., & Gallo, M. F. (2011). Strategies to improve adherence and acceptability of hormonal methods of contraception. *Cochrane Database of Systematic Reviews* (10).
- Hickson, L., Clutterbuck, S., & Khan, A. (2010). Factors associated with hearing aid fitting outcomes on the IOI-HA. *International Journal of Audiology*, 49(8), 586-595.
- Hickson, L., Meyer, C., Lovelock, K., Lampert, M., & Khan, A. (2014). Factors associated with success with hearing aids in older adults. *International Journal of Audiology*, 53 Suppl 1, S18-27.
- Hickson, L., & Worrall, L. (2003). Beyond hearing aid fitting: improving communication for older adults. *international Journal of Audiology*, 42(2), 84-91.
- Hogan, A., Mc Cormack, O., Traynor, O., & Winter, D. (2008). Potential impact of text message reminders on non-attendance at outpatient clinics. *Irish Journal of Medical Science*, 177(4), 355-358.
- Humphreys, L., Hunter, A., Zimak, A., O'BRIEN, A., Korneluk, Y., & Cappelli, M. (2000). Why patients do not attend for their appointments at a genetics clinic. *Journal of Medical Genetics*, 37(10), 810-815.
- Jackson, K. R., Booth, P. G., McGuire, J., & Salmon, P. (2006). Predictors of starting and remaining in treatment at a specialist alcohol clinic. *Journal of Substance Use*, 11(2), 89-100.
- Jacobson, A. M., Adler, A. G., Derby, L., Anderson, B. J., & Wolfsdorf, J. I. (1991). Clinic attendance and glycemic control: study of contrasting groups of patients with IDDM. *Diabetes Care*, 14(7), 599-601.
- Jones, P. K., Jones, S. L., & Katz, J. (1987). Improving compliance for asthmatic patients visiting the emergency department using a health belief model intervention. *Journal of Asthma*, 24(4), 199-206.
- Knudsen, L. V., Oberg, M., Nielsen, C., Naylor, G. & Kramer, S. E. (2010). Factors influencing help seeking, hearing aid uptake, hearing aid use and satisfaction with hearing aids: a review of the literature. *Trends in Amplification*, 14(3), 127-154.
- Kochkin S., Beck D., Christensen L., Compton-Conley C., Fligor B. et al. 2012. MarkeTrak VIII: The impact of the hearing healthcare professional on hearing aid user success. *Hear Rev*, 17, 12–32.
- Krumm, M., Ribera, J., & Klich, R. (2007). Providing basic hearing tests using remote computing technology. *Journal of Telemedicine and Telecare*, 13(8), 406-410.
- Lacy, N. L., Paulman, A., Reuter, M. D., & Lovejoy, B. (2004). Why we don't come: patient perceptions on no-shows. *The Annals of Family Medicine*, 2(6), 541-545.
- Laplante-Lévesque, A., Jensen, L. D., Dawes, P., & Nielsen, C. (2012). Optimal Hearing Aid Use: Focus Groups With Hearing Aid Clients and Audiologists. *Ear and Hearing*, 34(2), 193-202.
- Linssen, A. M., Joore, M. A., Minten, R. K., van Leeuwen, Y. D., & Anteunis, L. J. (2013). Qualitative interviews on the beliefs and feelings of adults towards their ownership, but non-use of hearing aids. *International Journal of Audiology*, 52(10), 670-677.
- Meyer, C., Hickson, L., Lovelock, K., Lampert, M., & Khan, A. (2014). An investigation of factors that influence help-seeking for hearing impairment in older adults. *International Journal of Audiology*, 53(sup1), S3-S17.
- Mitchell, A. J., & Selmes, T. (2007). Why don't patients attend their appointments? Maintaining engagement with psychiatric services. *Advances in Psychiatric Treatment*, 13(6), 423-434.
- Osborne, J. W., & Overbay, A. (2004). The power of outliers (and why researchers should always check for them). *Practical Assessment, Research & Evaluation*, 9(6), 1-12.
- Perez, E. & Edmonds, B. A. (2012). A systematic review of studies measuring and reporting hearing aid usage in older adults since 1999: a descriptive summary of measurement tools. *PLoS One*, 7(3), e31831.
- Poost-Foroosh, L., Jennings, M. B., Shaw, L., Meston, C. N., & Cheesman, M. F. (2011). Factors in client-clinician interaction that influence hearing aid adoption. *Trends in Amplification*, 15(3), 127-139. doi: 10.1177/1084713811430217

- Rice, J. M., & Lutzker, J. R. (1984). Reducing noncompliance to follow-up appointment keeping at a family practice center. *Journal of Applied Behavior Analysis, 17*(3), 303-311.
- Roberts, N., Meade, K., & Partridge, M. (2007). The effect of telephone reminders on attendance in respiratory outpatient clinics. *Journal of Health Services Research & Policy, 12*(2), 69-72.
- Schechter, C. B., & Walker, E. A. (2002). Improving adherence to diabetes self-management recommendations. *Diabetes Spectrum, 15*(3), 170-175.
- Solheim, J., Kværner, K. J., Sandvik, L., & Falkenberg, E.-S. (2012). Factors affecting older adults' hearing-aid use. *Scandinavian Journal of Disability Research, 14*(4), 300-312.
- Solheim, J., Kvarner, K. J., Sandvik, L., & Falkenberg, E. S. (2012). Factors affecting older adults hearing aid use. *Scandinavian Journal of Disability Research, 14*(4), 300-312.
- Stark, P., & Hickson, L. (2004). Outcomes of hearing aid fitting for older people with hearing impairment and their significant others. *International Journal of Audiology, 43*(7), 390-398.
- Swanepoel, D. W., Clark, J. L., Koekemoer, D., Hall III, J. W., Krumm, M., Ferrari, D. V., . . . Russo, I. (2010). Telehealth in audiology: The need and potential to reach underserved communities. *International Journal of Audiology, 49*(3), 195-202.
- Tao, K. F., Brennan-Jones, C. G., Capobianco-Fava, D. M., Jayakody, D. M., Friedland, P. L., & Eikelboom, R. H. (2018). Teleaudiology Services for Rehabilitation With Hearing Aids in Adults: A Systematic Review. *Journal of Speech, Language, and Hearing Research, 61*(7), 1831-1849.
- Valente, M., Abrams, H., Benson, D., Chisolm, T., Citron, D., Hampton, D., & Sweetow, R. (2006). Guidelines for the audiologic management of adult hearing impairment. *Audiology Today, 18*(5), 32-37.
- Van Baar, J., Joosten, H., Car, J., Freeman, G., Partridge, M., Van Weel, C., & Sheikh, A. (2006). Understanding reasons for asthma outpatient (non)-attendance and exploring the role of telephone and e-consulting in facilitating access to care: exploratory qualitative study. *BMJ Quality & Safety, 15*(3), 191-195.
- van den Brink, R., Wit, H., Kempen, G., & Van Heuvelen, M. (1996). Attitude and help-seeking for hearing impairment. *British Journal of Audiology, 30*(5), 313-324.
- van den Brink, R. H. S. (1995). *Attitude and illness behaviour in hearing impaired elderly*: Rijksuniversiteit Groningen.
- Williams, V. A., Johnson, C. E., & Danhauer, J. L. (2009). Hearing aid outcomes: effects of gender and experience on patients' use and satisfaction. *Journal of the American Academy of Audiology, 20*(7), 422-432; quiz 459-460.
- Yousuf Hussein, S., Wet Swanepoel, D., Biagio de Jager, L., Myburgh, H. C., Eikelboom, R. H., & Hugo, J. (2016). Smartphone hearing screening in mHealth assisted community-based primary care. *Journal of Telemedicine and Telecare, 22*(7), 405-412