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Original Article

Hearing aid use in the elderly as measured by datalogging and self-report

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Abstract

Objectives: The primary aim was to compare the objective and the subjective assessments of hearing aid use among elderly people at a 6-month follow-up after fitting. A secondary aim was to determine whether advanced knowledge of follow-up impacts hearing aid use. *Design*: Hearing aid use was assessed by datalogging (objective) and self-report (subjective) 6 months after initial fitting. Participants were also randomised to an intervention (informed of 6-month follow-up at fitting) or control group (informed just prior to follow-up). *Study sample*: A total of 181 hearing aid recipients ≥60 years (mean age = 79.2 years). *Results*: Daily hearing aid use based on datalogging (mean = 6.12 h, SD = 4.94) was significantly less than self-reports (mean = 8.39 h, SD = 5.07). More severe hearing impairment and prior hearing aid experience were associated with increased hearing aid use. Advanced knowledge of the follow-up had no significant impact on use, which did not differ between intervention ($n = 93$) and control ($n = 88$) groups. *Conclusions*: Elderly people typically use their hearing aids for a substantial part of the day in the 6 months after fitting, but tend to overestimate their usage. Datalogging is recommended to identify those who do not use or rarely use their aids so that appropriate rehabilitation and support can be provided.

Key Words: Hearing aids; datalog; self-report

Introduction

Hearing impairment has adverse effects on the physical, cognitive, emotional, behavioural and social functioning of elderly people (Tomita et al, 2001; Chia et al, 2007; Grue et al, 2008; Lopez-Torres et al, 2009; Solheim et al, 2011). To minimise problems associated with hearing impairment and to enhance communication in daily life settings, hearing aids are considered to be a useful remedy (Ivory et al, 2009; Meister et al, 2015; Niemensivu et al, 2015). However, a considerable number of hearing aids end up not being used (Lupsakko et al, 2005; Gimsing, 2008; Hartley et al, 2010; Kaplan-Neeman et al, 2012; Solheim et al, 2012) and this impacts the elderly hearing-impaired individual as well as his or her family members (Brooks et al, 2001; Scarinci et al, 2009; Scarinci et al, 2012).

In addition to the impact of non-use on individuals with hearing impairment and their families, non-use also represents a public health cost-benefit challenge. In Norway, where hearing aids are covered by the public health system and mainly allocated free of charge, hearing aid costs are estimated to be approximately USD 63 million annually (Ministry of Finance, 2015) and the amount is increasing. Norway has a population of approximately 5 million people, and every tenth citizen is 70 years or older. Population projections estimate that one in five will be within this age range in 2060 (Statistics Norway, 2014). As specified by Norwegian law, every hearing-impaired citizen has a legal right to two hearing aids every six years, including wireless accessories and repair costs (batteries are not covered).

Hearing aid use can be measured subjectively using self-report or, objectively, using data-logging in hearing aids, with the former being the most commonly used in research studies. Table 1 contains an overview of published studies on self-reported hearing aid use. The estimated proportion of hearing aids that are seldom or never used according to self-report studies varies widely from a low of 3% to a high of 25% (Wilson & Stephens, 2003; Stark & Hickson, 2004; Lupsakko et al, 2005; Vuorialho et al, 2006; Chia et al, 2007; Gimsing, 2008; Bertoli et al, 2009; Solheim et al, 2012). The reasons for this variance appears to be related to the different participant samples being studied, the time post fitting when data were collected and the different means of estimating hearing aid use.

In relation to the participants included in such studies, articles on hearing aid use published over the last 10 years show substantial

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Table 1. Overview of published studies on self-reported hearing aid use (2002–2012).

Authors	*Year*	*Nationality*	*N*	*Age (years)*	*Follow-up after HA fitting*	*Hearing aid use*
Kaplan-Neeman et al	2012	Israel	131	21–99 mean = 65	3 month to 3 years	≤1 h: 17% 1–4 h: 36% 4–8 h: 18% 8–16 h: 29%
Solheim et al	2011	Norway	90	≥65 median = 80	3–5 years	≤1 h: 22% 1–2 h: 10% 2–4 h: 11% 4–6 h: 9% 6–8 h: 20% >8 h: 28%
Hartley et al	2010	Australia	2956	49–99 mean = 67	<1 year to >10 years	Never: 24% <1 h/wk: 7% <1 h/day: 7% 1–4 h/day:23% 4–8 h/day: 13% >8 h/day: 24% Unsure: 1%
Bertoli et al	2009	Switzerland	8707	>18 median = 74	1–5 years	No answer: 2% <1 h: 3% 1–4 h: 20% 4–8 h: 26% >8 h: 49%
Gimsing	2008	Denmark	1003	19–105 median = 75	1–28 years (median = 5 years)	Never: 13% Not every day: 5% 3–4 h (both HA): 11% All day (one HA): 4% All day (both HA): 67%
Chia et al	2007	Australia	707[a]	≥49 mean = 67	≥5 years	77% usually used their HA
Vuorialho et al	2006	Finland	76	mean = 65	6 months	Non-users: 5% Occasional users: 37% Regular users: 57% Missing: 1%
Stark & Hickson	2004	Australia	131	49–90 mean = 71	3 months	Never: 4% Seldom (<1h/wk): 8% Occasionally (>1 h/wk but <1 h/d): 15% 1–4 h: 31% 4–8 h: 28% >8 h: 14%
Wilson & Stephens	2003	UK	140	mean ≥75	3 months	Never: 6% Occasionally: 17% Regular: 77%
Gianopoulos et al	2002	UK	116	–	8–16 years	Used HA: 43% Did not use HA: 57%
Smeeth et al	2002	UK	3846[a]	≥75	–	Not regularly: 40% Regular: 60%

HA: hearing aid.
[a]Part of a larger study.

variability in terms of age distribution. For example, Gimsing (2008) included people aged 19–105 years (median 75) (Gimsing, 2008), Chia et al's participants were over 48 years (mean 67) (Chia et al, 2007) and Solheim et al (2012) included those over 65 years (median 80 years). The time at which follow-up data about hearing aid use was collected also varies, from 3 months (Wilson & Stephens, 2003; Stark & Hickson, 2004) to 6 years (Takahashi et al, 2007) up to 28 years in one study (Gimsing, 2008). Finally, although all studies used self-report measures, there is variation in the measures used and response alternatives to items about the extent of hearing aid use (Table 1). In light of these variations in participant samples and means of measurement, comparisons across self-report studies are difficult.

A number of research studies have been conducted that compare self-report measures to objective data. Humes et al (1996) examined hearing aid use 90 days post fitting for 20 elderly people and found a strong tendency for participants to overestimate hearing aid use by an average of 4 h/day (Humes et al, 1996). Taubman et al (1999)

compared hearing aid use 1 week after fitting in an experimental group (informed that the amount of time they reported wearing their hearing aids would be confirmed by computer analysis) and a control group (unaware of the comparison of self-reported hearing aid use time with computer analysis) (Taubman et al, 1999). Twenty-four experienced hearing aid users participated in the study, 12 in each group. The experimental group had datalogged hours of use of 11.71 h/day and the control group had 9.28 h/day. On average, both groups self-reported more hours of use than were evident with datalogging: 1.1 h for the experimental group and 3.7 h for the control group. Similar findings about self-reported use being higher than datalogged use have been reported by Mäki-Torkko et al (2001) for 84 participants and by Laplante-Levesque et al (2014) for 166 hearing aid users. The timing of the measurements varied across studies from one week (Taubman et al, 1999) to 90 days (Humes et al, 1996) post fitting. These timeframes are relatively short and may not reflect long-term hearing aid use patterns.

Thus, the primary aim of this study was to assess subjective and objective hearing aid use at a follow-up appointment 6 months after hearing aids have been fitted. The focus was on people over the age of 60 years, regardless of the degree of hearing loss, prior hearing aid experience or type of hearing aids being fitted. The rationale for this was to reflect typical elderly hearing aid users attending hospital departments in Norway for hearing aid fitting.

A second aim of this study was to determine whether hearing aid users who were informed in advance of a follow-up appointment 6 months after fitting had a different pattern of hearing aid use than control group participants who were not pre-informed of the follow-up appointment. The rationale for this was related to evidence about the importance of motivation for the adoption of hearing aids and evidence that follow-up support is associated with increased hearing aid use (Solheim et al, 2012). We were interested to know if awareness of a follow-up appointment would influence hearing aid use post-fitting and envisaged that findings from this study would provide evidence for clinicians and policy makers about how best to plan hearing rehabilitation services.

Material and methods

Participants

The study was conducted from April 2014 to May 2015 at Lovisenberg Diakonale Hospital, a community hospital in Oslo, Norway. During the study period, all people referred to the hospital's Department of Otolaryngology for hearing aid fitting by an Ear, Nose and Throat (ENT) specialist were asked to participate. The study received approval from the National Committee for Research Ethics and the Norwegian Social Science Data Services. In Norway, more than 81,000 hearing aids were fitted in 2014. Approximately 364 models are on the list for available hearing aids covered by the Public Health system. The distribution of hearing aids is carried out at hospitals (48%) or by audiologists employed at private ENT specialist centres (52%) (Birkeland, 2014). The number of private hearing aid dispensers is quite small, but is expected to rise within the next few years because of a new reimbursement system for hearing aid fitting.

Inclusion criteria were that participants needed to be $\geq$60 years of age and able to communicate in Norwegian. All participants were being fitted for a hearing aid, but both first-time and experienced hearing aids users were included. Participants were not excluded based on having other diseases or health conditions. All participants provided written informed consent.

Procedure

All participants received the same treatment with respect to procedures for hearing aid fitting, a process that takes 3 months on average. At the first appointment at the hospital, the participants were examined by an ENT specialist, and then an audiologist performed hearing and speech discrimination testing, provided information on hearing aids and took impressions for earmolds, if needed. All participants were fitted with digital hearing aids with telecoils and a minimum of two listening programmes. The Noah software system was used for hearing tests, speech discrimination testing and for programming the hearing aids, as well for verification of modifications, corrections and readjustments during the fitting process and at the follow-up appointment. Real ear insertion gain measurements are not commonly used in Norway, and were not performed for this study. At the second appointment (after one month), the chosen hearing aids were fitted with requested programmes, and individuals were trained in the management of hearing aids. After a one-month trial of hearing aid use at home, participants were seen again in the clinic by the audiologist who assessed the participant's experiences with hearing aids, made adjustments if necessary, and suggested solutions to any problem issues. Specific data about listening programme or telecoil usage were not collected. At this point, the participants made a decision about whether or not to accept the hearing aids. If they were not comfortable with the fitted hearing aids, or wanted to compare with other models before making a final decision, the process was extended.

At their initial visit to the hospital's Department of Otolaryngology, participants were randomised into an intervention group or a control group. Once they made a final decision about hearing aid ownership, participants assigned to the intervention group were given an appointment time for a 6-month follow-up. Participants assigned to the control group were not informed of the 6-month follow-up. All participants were advised that they could contact the audiologist if needed at any time in the future.

Six months after the final appointment of the hearing aid fitting process, all participants were invited to a follow-up appointment. Participants were told that their hearing aid use would be recorded at the follow-up, but the procedure for this was not specified. They were also told they would receive assistance for any problems or obstacles they had encountered.

Measures

At the 6-month follow-up, hearing aid use was assessed objectively, using the datalog in the participant's hearing aid, and subjectively, based on the participant's self-report of their hearing aid use. The datalog records hearing aid use continuously and included all data from the time the hearing aid was received by the participant until the data were downloaded at the 6-month follow-up appointment. Datalogged hearing aid use was recorded in terms of average number of hours/day. Datalogging information was rounded to the nearest hour for each aid (e.g. $<0.5 = 0$ h, $\geq 0.5 = 1$ h). Thus, a value 2.5 h/day would be rounded to 3 h/day. Consequently, participants were classified as non-users if datalogging showed they used their hearing aids on average less than 30 min/day. If the datalogs differed between a participant's two hearing aids, the higher

average value was used in the analyses. For the self-report measure of hearing aid use, participants were asked: *What would you estimate your average hearing aid use in hours a day for the last 6 months to be?*

Data analysis

Analyses were performed using SPSS 22.0 for Windows (IBM Corp., Armonk, NY). Descriptive statistics (means, standard deviations, and frequencies) were used to summarise sample characteristics. Chi-square tests were used to compare groups on categorical variables. Paired *t*-tests were used to compare objective and subjective measures of hearing aid use, and Pearson's correlations were used to evaluate their degree of association. Independent *t*-tests were used to compare hearing aid use between groups (e.g. between the experimental and control groups or between men and women). Linear regression was used to examine possible relationships between participant characteristics (gender, age, hearing impairment, prior hearing aid experience, and number and type of hearing aids) and hearing aid use measured by datalogging and by self-report, while controlling for other relevant factors. A significance level of $p < 0.05$ was applied for all analyses.

Results

Sample

Figure 1 shows the flow of participants through the study, reasons for attrition, and the final sample of 181 participants (73% of those who were originally recruited). Table 2 summarises the sample characteristics. The mean age of the sample was 79.2 years (SD = 9.7, range 60–100 years), and slightly more than half of the participants (54.1%) were women. Average hearing loss in the participant's better ear (0.125–8000 kHz) was 49.4 dB (SD = 12.2, range 23–92 dB). The vast majority (86.2%) were fitted bilaterally. Behind-the-ear hearing aids were fitted for 85.6% of the participants, and 14.4% had in-the-ear, in-the-canal or completely-in-canal hearing aids. Nearly half of the participants were first-time hearing aid users (44.8%), while the remainder were experienced users (55.2%). Experienced users had used a hearing aid for an average of

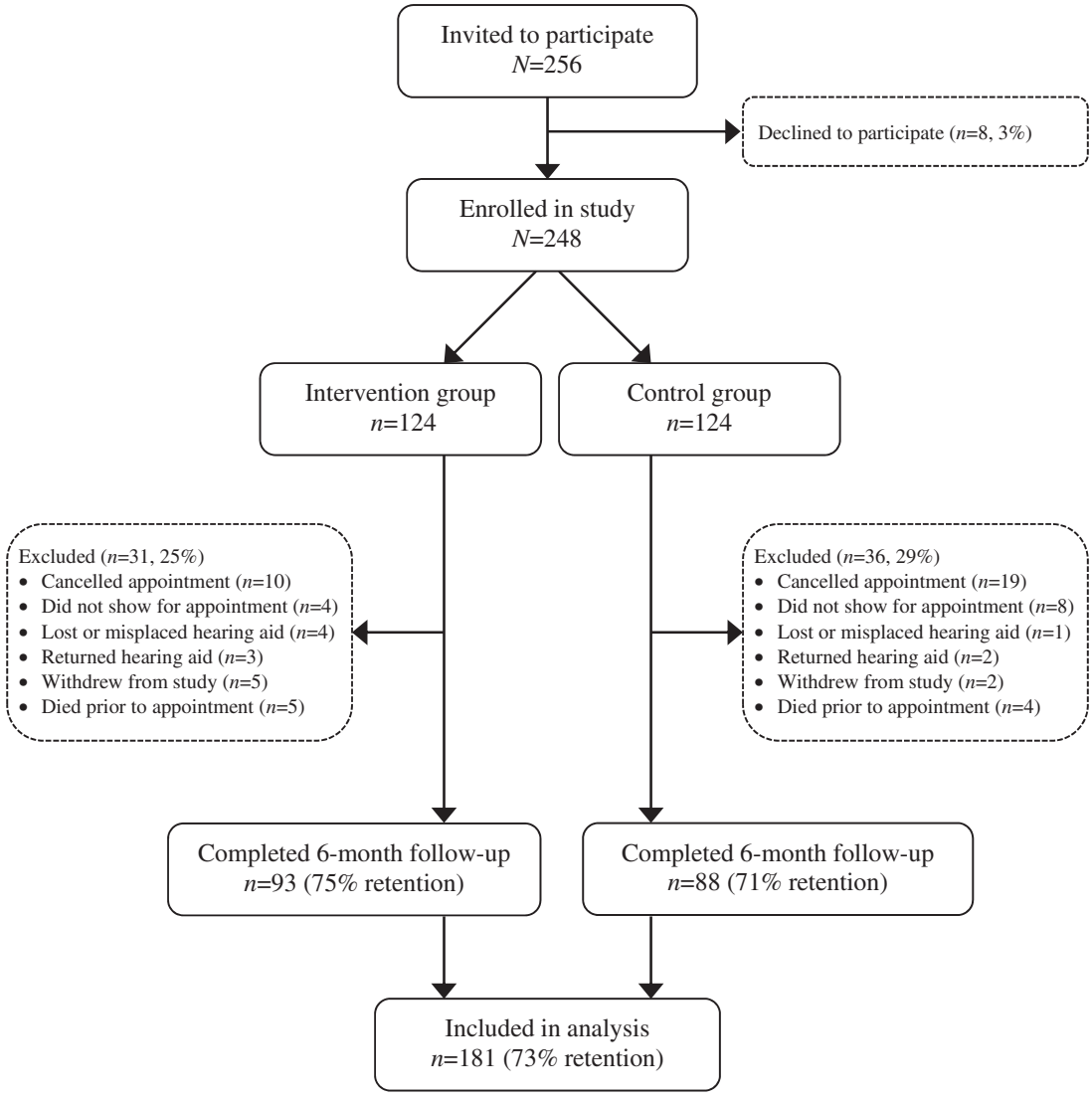

Figure 1. Flow chart of study sample.

Table 2. Sample characteristics and their unadjusted relationships to objective and subjective measures of hearing aid use ($N = 181$).

		Daily hours of hearing aid use	
Characteristics	*Mean (SD) or % (n)*	*Datalogged mean (SD)*	*Self-report mean (SD)*
Age (years)	79.2 (9.7)		
<80	48.1% (87)	5.30 (5.09)*	7.74 (5.30)
≥80	51.9% (94)	6.87 (4.71)*	9.00 (4.80)
Gender			
Female	54.1% (98)	5.79 (4.68)	7.77 (4.71)
Male	45.9% (83)	6.51 (5.24)	9.13 (5.40)
Hearing loss (dB)	49.4 (12.2)		
<50 dB	53.0% (96)	4.76 (4.88)***	7.55 (5.31)*
≥50 dB	47.0% (85)	7.65 (4.58)***	9.34 (4.65)*
Prior hearing aid experience			
No (new user)	44.8% (81)	4.47 (4.50)***	7.09 (4.79)**
Yes (experienced user)	55.2% (100)	7.45 (4.90)***	9.45 (5.07)**
Years of experience	7.2 (3.9)		
Number of hearing aids			
One	13.8% (25)	5.80 (5.03)	8.08 (4.59)
Two	86.2% (156)	6.17 (4.95)	8.44 (5.16)
Type of hearing aid			
BTE	85.6% (155)	6.14 (4.99)	8.47 (5.15)
Other (ITE, ITC, CIC)	14.4% (26)	5.96 (4.73)	7.92 (4.62)
Randomisation group			
Intervention	51.4% (93)	5.66 (4.82)	8.30 (4.81)
Control	48.6% (88)	6.60 (5.05)	8.49 (5.37)

The intervention group was informed of the 6-month follow-up appointment at the time of the hearing aid fitting, while the control group was informed just prior to the 6-month follow-up appointment.

BTE: behind-the-ear; ITE: in-the-ear; ITC: in-the-canal; CIC: completely-in-canal.

*groups differed $p < 0.05$; **groups differed $p < 0.01$; ***groups differed $p < 0.001$.

7.2 years (SD = 3.9). An attrition analysis indicated that the 67 participants who did not attend the 6-month follow-up were slightly older (mean age = 82.3 years, SD = 10.5) than the 181 included participants ($p = 0.029$), but did not differ with respect to gender (62.7% women).

Comparisons of objective and subjective measures of hearing aid use

Overall, average use of hearing aids as measured by datalogging (6.12 h/day, SD 4.94, range 0–16 h) was significantly lower than when assessed by self report (8.39 h/day, SD 5.07, range 0–18 h; paired $t(180) = 11.4$, $p < 0.001$). Participants overestimated their hearing aid use by ~2 h/day, and this overestimation was consistent across all participant characteristics listed in Table 2. Despite this difference, the objective and subjective measures were highly correlated ($r = 0.86$), indicating that participants who reported relatively high use also had relatively high use according to their datalog.

Based on datalogging, 28 participants (15.5%) used their hearing aids <30 minutes/day according to their datalog and were thus considered non-users. Yet, these participants self-reported an average use of 1.9 h/day (SD = 2.08). The proportion of non-users did not differ significantly between the intervention (14.0%) and control (17.0%) groups. For the 153 participants (84.5%) whose datalogging results indicated that they used their hearing aids an average of at least 30 minutes/day, their datalogged use averaged 7.24 h/day (SD = 4.55, range 1–16 h). The subjective estimations for these same participants averaged 9.58 h/day (SD = 4.52, range 1–18 h). Again, this difference between objective and subjective hours/day was significant (paired $t(152) = 10.5$, $p < 0.001$).

Predictors of hearing aid use

Several factors in Table 2 were associated with hearing aid use in bivariate analyses. More severe hearing loss was associated with increased hearing aid use, based on both datalogs ($r = 0.33$, $p < 0.001$) and self-report ($r = 0.23$, $p = 0.002$). In fact, as shown in Table 2, participants with at least 50 dB of hearing loss used their hearing aids nearly 3 h more per day than participants with less hearing loss, according to the datalogs ($t(179) = 4.22$, $p < 0.001$). Prior hearing aid experience was also associated more hearing aid use, as measured both by datalogging ($t(179) = 4.09$, $p < 0.001$) and self-report ($t(179) = 2.40$, $p = 0.017$). Participants ≥80 years of age used their hearing aids more than younger participants according to the datalogs ($p = 0.032$), but this age difference was not significant for self-reported hearing aid use ($p = 0.094$). As shown in Table 2, the participant's gender, and the number and type of hearing aids were unrelated to datalogged and self-reported hearing aid use.

Linear regression analyses were conducted to determine whether the factors associated with hearing aid use in Table 2 remained significant when controlling for other relevant factors. As shown in Table 3, datalogged hearing aid use remained significantly associated with both the degree of hearing impairment ($p = 0.001$)

Table 3. Linear regression for predictors of hearing aid use in the 6 months after initial fitting.

	Dependent variables: Hearing aid use (adjusted coefficient with 95% confidence interval)	
Predictors	*Datalogged use*	*Self-reported use*
Gender (0 = female, 1 = male)	0.46 (−0.95 to 1.87)	1.12 (−0.37 to 2.62)
Age (years)	−0.05 (−0.13 to 0.04)	−0.04 (−0.13 to 0.04)
Hearing loss (dB)	**0.12 (0.05 to 0.19)**	**0.09 (0.01 to 0.16)**
Prior HA experience (0 = no, 1 = yes)	**1.92 (0.41 to 3.43)**	1.56 (−0.04 to 3.16)
Number of HA (1 or 2)	−0.32 (−2.42 to 1.77)	−0.36 (−2.58 to 1.86)
Type of HA (0 = BTE, 1 = other)	−0.17 (−2.18 to 1.84)	−0.45 (−2.58 to 1.69)

HA: hearing aid; BTE: behind-the-ear.
Bold coefficients were significant $p < 0.05$.

and previous hearing aid experience ($p = 0.013$). Those with greater degrees of hearing impairment, or who had previously worn hearing aids, used their hearing aids more. Self-reported hearing aid use was also significantly related to hearing loss ($p = 0.020$), but its relationship to previous hearing aid experience did not reach significance ($p = 0.056$) when controlling for other factors. Gender, age, numbers of hearings aids, and type of hearing aid were not associated with either datalogged or self-reported hearing aid use. Thus, the regression analyses indicated that the degree of hearing loss was the strongest predictor of hearing aid use, regardless of whether hearing aid use was measured by datalogging or self-report.

Comparisons of intervention and control groups

As shown in Table 2, advanced knowledge of the 6-month follow-up had no impact on datalogged or self-reported hearing aid use, as these measures did not differ significantly between the intervention ($n = 93$) and control groups ($n = 88$). Nor did the intervention and control groups differ with respect to the proportion of participants who used their hearing aid <30 minutes/day (14.0% and 17.0%, respectively). In addition, attendance rates at the follow-up appointment did not differ between the intervention (75.0%) and control (71.0%) groups, and the groups had similar numbers of participants who cancelled or did not show for their appointment, withdrew from the study, or lost/misplaced or returned their hearing aids.

Discussion

The aims of this study were to compare subjective and objective hearing aid use at a follow-up appointment 6 months after hearing aid fitting and determine if advanced notice of a follow-up appointment would influence hearing aid use. We found that subjective reports of hearing aid use were significantly higher than objective measures for both the intervention and control groups of participants and there was no group difference in hearing aid use measured by either datalogging or self-report.

Average hearing aid use in the study sample was 6.12 h/day according to the datalog and 8.39 h/day by self-report. This finding that subjective reports overstate the use of hearing aids is consistent with other studies on this topic (Humes et al, 1996; Maki-Torkko et al, 2001). However, the datalogged hours of use reported in this study are considerably less than in a more recent study. Laplante-Levesque et al found that typical hearing aid users wore their hearing aids for 10.5 h/day, estimated by datalogging (Laplante-Levesque et al, 2014). The difference is most likely due to the different participant characteristics in the two studies. First, participants examined by Laplante-Levesque et al (2014) had an average of more than 6 years of hearing aid experience, while we included both new and experienced hearing aid users. Second, we only included adults aged 60 or over whereas Laplante-Levesque et al (2014) included all adults 18 years or older. Finally, hearing aid provision is quite different in Denmark and the Netherlands where the Laplante-Levesque et al (2014) study was conducted, compared to Norway. In Denmark and the Netherlands, people can choose whether they would prefer to receive free hearing aids – selected and fitted by the public hearing health clinic – or a voucher from the government to cover the cost of a hearing aid with basic features from a private dispenser. Private dispensers are uncommon in Norway, and most of the hearing aids are provided free of charge regardless of cost. In the Laplante-Levesque et al (2014) study, most participants had contributed financially to the cost of their hearing aids, while the participants in our study did not. It is possible that individuals who contributed financially to their hearing aids were more motivated to use them compared to individuals who received them for free, which could explain some of the differences in hearing aid use across studies.

Our finding that 15.5% of the participants did not use their hearing aids at all according to their datalog, deviated from self-reported non-use rates in other studies (Table 1). With two exceptions (Gianopoulos et al, 2002a; Hartley et al, 2010), we found the proportion of non-users in our study to be higher than in studies that included the category *never* when estimating hearing aid use (Wilson & Stephens, 2003; Stark & Hickson, 2004; Vuorialho et al, 2006; Gimsing, 2008). A common feature among the studies with lower rates of non-use is that the subjective estimations of hearing aid use are made in a period of 3–6 months after hearing aid fitting. It is possible that the proportion of non-use increases when assessed over longer periods. That is likely the case in the two prior studies with higher rates of non-use. Wilson & Stephens (2003) found that 57% of participants reported non-use of hearing aids 8–16 years after fitting, and Hartley et al (2010) found that 24% of their participants reported *never* using their hearing aids 1–10 years after fitting. Interestingly, in the former study, 71% of the non-users accepted an offer of a new hearing aid. This suggests that a need for hearing amplification is present, and while they may be dissatisfied with their current hearing aids, they still believe that hearing aids are a potentially viable remedy.

Approximately 3 out of the 4 participants chose to attend the follow-up appointment after 6 months, regardless of whether they were informed of the appointment when they received their hearing aids or just prior to the scheduled time. This indicates that most persons in our sample are motivated to attend the follow-up appointment, and find an advantage to making use of the offered appointment. We did not find any difference between the intervention and control groups according to attendance, cancellations and not showing up to the appointment. Had we found lower attendance among the persons in the control group (who did not know about the follow-up appointment in advance), we might question whether this could be related to lower hearing aid use in this group. However, we did not find evidence supporting this hypothesis. Hearing aid users and non-users seem to attend follow-up appointments because they believe they might be beneficial in some way. Our findings underline the importance of implementing follow-up appointments as a standard part of the hearing aid fitting process.

We found that the participants in our study tended to overestimate their hearing aid use, and even non-users reported some use rather than no use. All of the participants were aware at the time of the follow-up visit that hearing aid use data was going to be collected, but were not informed about the accuracy of datalogging, which may have influenced their self-report. Participants with low levels of hearing aid use, particularly non-users, likely recognised that they did not use their hearing aids as intended, and may have overestimated their use in order to please the audiologist (clinician), as suggested by Taubman et al (1999). On the other hand, when participants used their hearing aid less than 30 min a day according to their datalog, their use was rounded down to 0 h a day, which may have resulted in an underestimation of their actual use. In addition, participants with variable use patterns (e.g. certain days of the week, in specific situations) may have difficulty estimating their use in terms of hours/day. Given the tendency to want to please the clinician, when in doubt, they may tend to overestimate rather than underestimate their usage. Moreover, 6 months is a long time during which to estimate daily usage, particularly if one is not intentionally monitoring use. Periods of non-use due to illness or hearing aid malfunction would be included in the datalogs, but may not have been taken into account in self-reports. Finally, many participants have other kinds of hearing devices as a supplement or alternative to their hearing aids. Assistive listening devices are mainly used when listening to radio and watching TV, and to many elderly, this is an interest and amusement that may be applicable for several hours a day. Therefore, to some participants, it could be hard to distinguish when they use one device or the other – the essence being that they consider themselves to be aided.

The high attendance at the 6-month follow-up appointment highlights the potential benefits of such a follow-up and others have argued that follow-up support is crucial for subsequent hearing aid use (Gianopoulos et al, 2002a; Hickson & Worrall, 2003; Takahashi et al, 2007; Solheim et al, 2012). It seems to be particularly important for support to be provided to new hearing aid users with mild hearing loss (Solheim, 2011). Additionally, the need for a follow-up appointment is reflected by our findings that 2% of participants chose to return their hearing aids after 6 months. Even if hearing aid users are encouraged to contact their clinician when or if problems arise, an invitation letter would likely improve accessibility to audiology professionals.

The reasons that 16.5% of participants did not attend or cancelled their follow-up appointment are unclear. It may be that they were not experiencing any problems and were fully satisfied with the new hearing aids, or it may be that they were no longer using the aids and did not want to take any further action. A considerable percentage (55.2%) of participants had previous hearing aid experience and it is likely that they were satisfied with their aids. Finally, it has to be acknowledged that many participants in this study were quite old, and we did not exclude participants due to health factors. The finding that participants who cancelled or did not attend were older than those who did attend may indicate that decreased health or other health conditions does influence attendance at follow-up appointments. Home-visits would clearly be a better option for these participants.

Study limitations

With a response rate of 73%, selection bias cannot be completely ruled out. This might be related to the inclusion criteria of people 60 years of age or older. We found that people who did not attend the follow-up appointment (cancelled or did not show up) were older than those attending. Participants were not excluded based on having other disease or health conditions. The decline in sensory abilities with age, reduced capacity and health issues, may affect the willingness and ability to handle hearing aids. Accordingly, it cannot be ruled out that health factors and mobility are reflected in the sample.

Conclusions

Evidence from datalogging software in hearing aids indicates that elderly people with hearing impairment use their aids for an average of more than 7 h/day 6 months after fitting. If asked about their hearing aid use, elderly people tend to overestimate how much they wear the device and even those who do not use their aids (according to datalogging) report some regular use. Those who have previous experience with hearing aids wore them more than those receiving a hearing aid for the first time, as do those with greater degrees of hearing impairment. Whether they knew about the follow-up appointment in advance or not did not seem to affect the extent of usage. Datalogging is recommended to identify those who are not using, or only minimally using their aids, so that appropriate rehabilitation and support can be provided.

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