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Original Article

The impact of self-efficacy, expectations, and readiness on hearing aid outcomes

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Abstract

Objective: To examine the impact of self-efficacy and expectations for hearing aids, and readiness to improve hearing, on hearing aid outcome measures in first-time adult hearing aid users *Design*: A prospective, single centre design. Predictor variables measured at the hearing assessment included measures of self-efficacy, expectations and readiness to improve hearing. Outcome measures obtained at six-week follow-up were the Glasgow Hearing Aid Benefit Profile and Satisfaction with Amplification in Daily Life. *Study sample*: A sample of 30 first-time adult hearing aid users were recruited through a public-sector funded audiology clinic. *Results*: When measured prior to hearing aid fitting, self-efficacy for hearing aids predicted satisfaction with hearing aids but was not related to other hearing aid outcomes. Expectations of hearing aids, in particular positive expectations, and readiness to improve hearing predicted outcomes for hearing aid satisfaction and benefit, although not hearing aid use. Hearing sensitivity was not correlated with hearing aid outcomes. *Conclusions*: These results suggest that assessment of expectations of hearing aids, and readiness to improve hearing, may be useful to help identify individuals attending audiology clinics who would most likely benefit from hearing aid provision.

Key Words: Hearing aids; self-efficacy; expectations; readiness; motivation; outcome measures; hearing aid satisfaction; hearing aid benefit; transtheoretical model

Hearing loss is associated with poorer quality of life in older people (Chia et al, 2007; Dalton et al, 2003; Davis et al, 2007) and can lead to emotional distress and reduced participation in everyday life (Gopinath et al, 2012). The most common intervention for adults with hearing loss is hearing aids (Laplante-Lévesque et al, 2010). Although hearing aids are reported to improve psychological, social, and emotional well-being (Chisolm et al, 2007), hearing aid uptake is often poor, with inconsistent daily use and long-term adherence among those who receive them (Barker et al, 2014; McCormack & Fortnum, 2013). There are a number of audiological factors that impact on hearing aid use, such as perceived hearing difficulty, age at onset of hearing loss, and hearing aid experience (Knudsen et al, 2010).

There is a growing awareness of the role that non-audiological factors, such as perceived self-efficacy, positive attitudes, and support from communication partners, play in the success of adult hearing aid users (Hickson et al, 2014; Meyer et al, 2014a; Singh et al, 2015; Ridgway et al, 2015). These and other psychosocial aspects of behaviours and attitudes relating to intervention uptake and adherence, can be explored using health behaviour models to gain a better understanding of behaviour change. The present study used the transtheoretical model (TM) of behaviour change that incorporates concepts of self-efficacy and readiness to change. This model has been used to gain insights into readiness for hearing rehabilitation by assessing the active participation of the audiologist as well as the patient (Ekberg et al, 2016; Ferguson et al, 2016a). Other health behaviour models have also been used or are recently emerging within the audiology literature (see Coulson et al, 2016). For example, the self-regulatory model to assess the psychosocial aspects of hearing loss and the role of engaged and disengaged coping (Heffernan et al, 2016), the health belief model (HBM) to explain the role of communication partners in hearing aid uptake (Saunders et al, 2013; Schulz et al, 2016), the HBM in combination with the TM to describe help-seeking behaviour (Saunders et al, 2016), and the COM-B model, a model that can be used to develop and evaluate interventions (Barker et al, 2016).

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Abbreviations

BEA	Better ear average
BSA	British Society of Audiology
ECHO	Expected Consequences of Hearing aid Ownership
GHABP	Glasgow Hearing Aid Benefit Profile
HBM	Health Belief Model
LQ1	The Line Question 1 (readiness)
LQ2	The Line Question 2 (self-efficacy)
MARS-HA	Measure of Audiologic Rehabilitation Self-efficacy for Hearing Aids
SADL	Satisfaction with Amplification in Daily Life
TM	Transtheoretical Model

Self-efficacy can be defined as 'the beliefs, or domain-specific confidence, that individuals have in their abilities to perform a set of skills needed to achieve a certain behaviour, including health behaviours' (Bandura, 1986). Research into health behaviours amongst patients with long-term conditions, such as diabetes, has shown that low self-efficacy is a significant barrier to effective self-management (Glasgow et al, 2001). Clinicians have capitalized on this by using interventions that improve self-efficacy in order to increase adherence to treatment programmes and improve outcomes (Allen et al, 2008; Dutton et al, 2009; King et al, 2010). Diabetes, like hearing loss, is a chronic long-term condition that requires the individual to proactively manage an intervention on a day-to-day basis (Plack et al, 2010), and is associated with reduced quality of life (Norris, 2005) and emotional distress (Lustman et al, 2000; Anderson et al, 2002), and can affect relationships with significant others (Franks et al, 2010).

Although the concept of self-efficacy was developed more than four decades ago, with some early suggestions of its impact in hearing aid users (Carson & Pichora-Fuller, 1997; Kricos, 2000), there has been a resurgence of interest in this concept in aural rehabilitation. Audiological professionals have become increasingly aware of the impact that self-efficacy can have on health behaviour and patient outcomes (Hickson et al, 2014; Meyer et al, 2014a; Smith et al 2011; Smith & West, 2006; West & Smith, 2007). Recent research has shown that individuals with higher levels of self-efficacy are more likely to have obtained hearing aids and gone on to become successful users (Hickson et al, 2014; Meyer et al, 2014a). However, these studies were limited by their retrospective design. It is unclear whether the participants had high self-efficacy prior to obtaining hearing aids or if their high levels of self-efficacy resulted from their success with hearing aids (Meyer et al, 2014a).

The role of individuals' expectations for hearing aid use has also been investigated. It has been suggested that patients who do not expect to benefit from wearing hearing aids will not seek hearing aids or make optimum use of them. Conversely, patients with high expectations may be keen to try hearing aids but discontinue use when the hearing aids fail to deliver the anticipated level of satisfaction (Saunders et al, 2009). Since individuals who have not previously tried hearing aids tend to have higher expectations than those who have experience of hearing aids (Cox & Alexander, 2000), concerns have been raised that new hearing aid users have unrealistically high expectations of the potential benefit of hearing aids (Saunders et al, 2009). Several authors have found that expectations are not a strong predictor of hearing aid outcomes (Gatehouse, 1994; Wong et al, 2004), whereas others have found a positive correlation (Cox et al, 2007; Saunders et al, 2009; Saunders & Jutai, 2004). Furthermore, self-efficacy is not always congruent with expectations (Bandura, 1977). For example, an individual may expect that amplification will improve their ability to communicate but doubt their capability to use a hearing aid. By addressing such an incongruity the audiologist may be able to help maximize hearing aid success.

Readiness to take action to overcome hearing difficulties in terms of help-seeking, intervention adoption and maintenance, based on the transtheoretical model of health behaviour change (Prochaska & DiClemente, 2005), has also been investigated. The transtheoretical model comprises six stages of change to describe a person's readiness to adopt and maintain health behaviour (precontemplation, contemplation, preparation, action, maintenance, and relapse), and has been widely used in the health psychology literature. Laplante-Lévesque et al (2012) identified that a greater contemplation stage of change predicted uptake of an intervention (hearing aids or communication program), and lower pre-contemplation and greater action stages of change predicted the success of the interventions. A further study that applied the transtheoretical model to adults with hearing loss seeking help for the first time showed that those in the action stage were more likely to take-up an intervention for hearing loss and were more likely to report successful outcomes (Laplante-Lévesque et al, 2013). An investigation of the impact of motivation on hearing aid adoption considered two types of motivation (Ridgway et al, 2015). Autonomous or intrinsic motivation, reflects personal interests, values and beliefs, and has been correlated with the action stage of change (Ryan et al, 2011), whereas controlled or extrinsic motivation reflects external pressures as posited by the self-determination theory (Deci & Ryan, 2008). Ridgway et al (2015) found that, in addition to greater hearing disability, hearing aid adoption was predicted by autonomous, rather than controlled motivation.

The primary aim of this study was to investigate the impact of self-efficacy prior to hearing aid fitting on hearing aid outcomes measured at six-week follow-up, in a prospective sample of first-time adult hearing aid users. Secondary aims were to examine the effect of users' expectations of hearing aids, and their readiness to improve their hearing, on hearing aid outcome measures.

Materials and Methods

Participants

Participants were recruited prospectively from a random sample of first-time hearing aid users who attended the public-sector funded Nottingham Audiology Services. Inclusion criteria were (1) adults aged 18 years or over, (2) first-time hearing aid users, which included those who had not worn a hearing aid for at least two years, and (3) English spoken as a first language or a good understanding of English. The exclusion criteria were (1) lack of capacity to give informed consent, (2) requirement for alternative management strategies (e.g. tinnitus counselling), and (3) requirement for high-power hearing aids. Based on previous studies (e.g. Cox & Alexander, 2000) and allowing for 15% attrition rate, the study aimed to recruit 38 participants, to achieve a final sample of 32. A total of 100 patients were seen at the hearing assessment appointment, of which 61 met the study criteria and were seen at the hearing aid fitting by a clinical audiologist (AW). A total of 34 patients consented to participate, and 30 completed the study.

Study design and procedures

The study was a prospective, single centre design. Participants attended three appointments, (1) initial hearing assessment, (2) hearing aid prescription and fitting (time from initial hearing assessment to hearing aid fitting: M = 2.6 weeks, SD = 0.9, range =2.3– 3.3), and (3) follow-up for evaluation of outcomes (time from hearing aid fitting to follow-up for evaluation of outcomes: M = 6.9 weeks, SD = 2.0, range = 6.0–14.0). An expression of interest to participate was obtained at assessment, and written informed consent obtained at the hearing aid fitting. Ethical and sponsor approvals were provided by the East Midlands Research Ethics Committee and Nottingham University Hospitals NHS Trust Research and Innovation Department.

Clinical assessment and hearing aid fitting

Pure-tone audiometry air conduction thresholds were obtained at octave frequencies between 0.25–8 kHz, and bone-conduction thresholds obtained as required (0.5–4 kHz), following the British Society of Audiology recommended procedure (BSA, 2011). Otoscopy and tympanometry assessed outer and middle-ear function. Based on the findings of the assessment, patients were supported to make informed decisions on an appropriate management plan. All patients received Phonak Nathos Micro hearing aids programmed to NAL-NL1, and verified by real-ear measurement in accordance with national guidelines (BSA 2008). All patients were given a booklet with information on the fitting process and ongoing hearing aid use and management, in addition to informational counselling, as part of their standard clinical care.

Questionnaires

All questionnaires were completed by interview conducted by AW.

Predictors of hearing aid benefit

Self-efficacy was assessed using (1) the Measure of Audiologic Rehabilitation Self-efficacy for Hearing Aids (MARS-HA, West & Smith, 2007), and (2) the second question on the Ida Institute 'Line' tool (Clark, 2010). The MARS-HA is a 24-item questionnaire that comprises four subscales (basic handling, advanced handling, adjustment, and aided listening). Participants were asked how confident they felt about carrying out a described task (e.g. '*I can insert a battery into a hearing aid with ease*'). The response scale ranged from 0% (cannot do this at all) to 100% (certain I can do this). Average scores for each of the subscales and global score averaged across all items were obtained. The Line Question 2 (LQ2) asks participants to identify on an unmarked visual analogue scale from 0–10 '*How much do you believe in your ability to use hearing aids?*' MARS-HA was completed immediately prior to hearing aid fitting and LQ2 was administered at the initial hearing assessment. Completion of MARS-HA was delayed as unlike LQ2, it is not a standard clinical tool and was therefore completed after patients had consented.

Expectations of hearing aids were assessed with the Expected Consequences of Hearing aid Ownership questionnaire (ECHO, Cox & Alexander, 2000). Participants were asked how much they agreed with statements relating to their expectations of hearing aids on a scale from A (not at all) to G (tremendously). This corresponds to scores of 1 (low expectations) to 7 (high expectations). Two questions were removed from the original 15-item questionnaire. Question 12 ('*The person who provides me with my hearing aids will be competent*') was omitted as the questionnaire was delivered by the audiologist (AW) who fitted the hearing aids, and so was considered inappropriate. Question 14, ('*The cost of my hearing aids will be reasonable*') was omitted as hearing aids were provided free of charge by the UK National Health Service. Thus, the Service and Costs scale focussed on Question 15 ('*My hearing aids will be dependable (need few repairs*'). The global score was the average of all the items. The ECHO was completed immediately prior to hearing aid fitting.

Readiness to address hearing difficulties was assessed using the Ida Institute 'Line' tool (LQ1). Using an unmarked visual analogue scale as for LQ2, the participant was asked '*How important is it for you to improve your hearing right now?*' This was completed at the initial hearing assessment.

Outcome measures

Satisfaction with hearing aids was assessed using the Satisfaction with Amplification in Daily Life (SADL) questionnaire (Cox & Alexander, 1999). This questionnaire was designed to align with the ECHO and uses the same response scale. The statements are rephrased as questions to elicit patients' opinions after experiencing hearing aids (e.g. ECHO: '*I will be content with the appearance of my hearing aids*', SADL: '*How content are you with the appearance of your hearing aids?*'). As with the ECHO, Questions 12 and 14 were also omitted, and the global score was the average of all the items. The SADL was completed at the six-week follow-up.

Activity limitations and *participation restrictions* were assessed using Part I of the Glasgow Hearing Aid Benefit Profile (GHABP, Gatehouse, 1999). The four predefined situations (e.g. having a conversation with several people in a group) were assessed using a 5-point scale (1 = no difficulty, to 5 = cannot manage at all). Part I was completed at initial assessment.

Hearing aid use, benefit, residual disability and satisfaction were assessed using GHABP Part II at the follow-up session. Overall mean scores for each domain were converted to a percentage. A global outcome score was derived from the mean of the Part II four scales (reversing residual disability) and converted to a percentage.

*Hearing aid use (*average hours/day) using datalogging information integral to the hearing aid was obtained for each participant for the period between the fitting and follow-up.

Statistical analysis

Data were represented graphically with histograms and scatterplots, allowing for visual inspection checks of normality. As some measures had skewed distributions, Spearman's rank correlations were used to assess associations between predictor and outcome measures. A linear regression analysis was performed with outcome measures of satisfaction (global SADL), hearing aid outcome (global GHABP), and hearing aid use (datalogging) as the dependent variables, and predictor measures of self-efficacy, (global MARS-HA and LQ2), expectations (global ECHO), and readiness (LQ1) as the independent variables. To minimize the risk of type II errors arising from using the subscales for the MARS-HA and ECHO as predictor variables, a stepwise linear regression was performed, with hearing aid outcome measures (global and subscales scores) as the dependent variables. The beta (β) values and variance (R^2) from the regression analysis are reported. The alpha value used was $p \leq 0.05$. Statistical analysis was carried out using SPSS 22.

Results

The mean participant age was 68.4 years (SD =9.1, range = 52–88) and mean better-ear average (BEA) threshold across octave frequencies 0.25–4 kHz was 31.8 dB HL (SD = 9.1, range = 13–47). Eighteen (60%) participants were male and twelve (40%) were female. Mean activity limitations ('hearing disability') was 43.8% (SD = 22.4, range = 6–100) and participation restriction ('hearing handicap') was 48.3% (SD =24.5, range 0–100). There were 27 (90%) bilateral hearing aid fits and three (10%) unilateral fits. This sample was similar to a first-time hearing aid user population from the same audiology clinic reported elsewhere (Ferguson et al, 2016b).

Mean, standard deviation (median and interquartile range where distribution is skewed) and range for the predictor and outcome measures are shown in Table 1. The MARS-HA, LQ1, and LQ2 scores were positively skewed, and the proportion greater or equal to 80% (MARS-HA; suggested level for successful hearing aid use, West and Smith, 2007) and 8 (LQ1, LQ2) was 70%, 73% and 80% respectively. Expectations were also high, but normally distributed at the upper end of the scale, where 97% of patients scored at least 3.5 (the midpoint of the scale) or more on the global ECHO score and 53% scored at least 5. The two measures of self-efficacy (MARS-HA and LQ2) were not correlated with the exception of the Adjustment scale which remained significant after Bonferroni correction (Aided listening: $r_s = 0.281$, $p = 0.133$; Basic handling: $r_s = 0.190$, $p = 0.315$; Adjustment: $r_s = 0.484$, $p = 0.007$; Advanced handling: $r_s = 0.261$, $p = 0.163$; Global: $r_s = 0.305$, $p = 0.102$).

The correlational analysis between the predictor and outcome measures is shown in the supplementary tables available in the online version of the journal. Please find this material with the direct link to the article at http://www.tandfonline.com/10.1080/14992027.2016.1177214. Whereas there were significant correlations for self-efficacy, expectations and readiness measures with outcome measures, it was notable that hearing sensitivity (BEA) was not correlated with outcomes. Table 2 shows the significant results from the regression analysis, described below.

Self-efficacy. Self-efficacy measured by the MARS-HA predicted satisfaction with the dependability of the hearing aids; whereas self-efficacy measured by LQ2 predicted the global measure of satisfaction (SADL). Self-efficacy measured by either method did not predict global or subscale scores measured by the GHABP or hearing aid use measured by datalogging. This suggests that self-efficacy predicts individuals' satisfaction overall, in addition to satisfaction with the dependability of their hearing aids, but not the hearing aid outcomes more generally.

Table 1. Mean, standard deviation (or median and interquartile range for skewed distributions), and range for the predictor and outcome measures.

Variable	*Mean (or *median)*	*Standard deviation (or *interquartile range)*	*Range*
Predictor measures			
Self-efficacy (MARS-HA: 0–100%)			
Aided listening	90.0*	76.1–98.1*	52–100
Basic handling	91.4*	77.1–91.4*	50–100
Adjustment	88.3*	70.0–88.3*	50–100
Advanced handling	87.0*	71.5–96.0*	10–100
Global score	89.6*	75.0–95.4*	52–100
Self-efficacy (LQ2: 0–10)	9.5*	8.0–10*	2–10
Expectations (ECHO: 1–7)			
Positive effects	5.3	1.0	3.0–6.8
Service & costs	5.0	1.3	2.0–7.0
Negative features	4.1	1.1	1.7–6.0
Personal image	5.3	1.3	2.0–7.0
Global score	5.0	0.8	3.0–6.5
Readiness (LQ1: 0–10)	9.0*	6.8–10*	3–10
Outcome measures			
Hearing aid benefit (GHABP: 0–100%)			
Use	93.8*	77.3–95.3*	6–100
Benefit	75.0*	73.4–93.4*	0–100
Residual disability	0.0 *	0.0–9.4*	0–88
Satisfaction	81.3*	75.0–100.0*	6–100
Global score	85.7*	77.3–95.3*	10–100
Satisfaction (SADL: 1–7)			
Positive effects	5.4	1.1	3.0–7.0
Service & costs	5.8	1.1	3.0–7.0
Negative features	5.1	1.1	3.0–6.7
Personal image	6.4	0.7	4.0–7.0
Global score	5.6	0.7	4.0–6.9
Hearing aid use (datalogging: hours)	5.9	4.2	0–14

MARS-HA = Measure of Audiologic Rehabilitation Self-efficacy for Hearing Aids, LQ = Line Question, ECHO = Expected Consequences of Hearing aid Ownership, SADL = Satisfaction with Amplification in Daily Life, GHABP = Glasgow Hearing Aid Benefit Profile.

Expectations. The ECHO global score predicted the SADL global and the SADL positive effects and negative features subscale scores, explaining just under 30% of the variance (Table 2). This was driven primarily by the ECHO positive effects subscale, which predicted the SADL global, and positive effects and negative features subscales, and explained 43, 50, and 23% of the variance in the SADL scores respectively. The ECHO positive effects subscale also predicted the GHABP global, benefit, residual disability and satisfaction scores, explaining approximately 25% of the variance. Similar results were seen for the global ECHO score and GHABP scores, but just missed significance ($p < 0.068$). This suggests that expectations, in particular positive effects, predict hearing aid outcomes.

Readiness. LQ1 (readiness to improve hearing) predicted SADL global, and the positive effects and service and costs subscale scores, explaining around 40% of the variance for the global and positive effects scores. LQ1 predicted the GHABP benefit scores, to a lesser extent, explaining 14% of the variance, with GHABP use and satisfaction missing significance ($p < 0.065$). This suggests that readiness to improve hearing predicts some hearing aid outcomes.

Comparison of the ECHO and SADL scores showed the majority of participants (86.7%) were significantly more satisfied with their hearing aids (SADL global; mean =5.6) than they had expected to be (ECHO global; 5.0, $t(29) = 4.56$, $p < 0.001$).

Discussion

The main aim of this prospective study was to investigate the impact of self-efficacy with hearing aid outcome measures obtained six-weeks post-hearing aid fitting. Self-efficacy, as measured by the MARS-HA and the Line (LQ2), predicted the dependability of hearing aids and overall hearing aid satisfaction as measured by the SADL. However both self-efficacy measures were poor predictors of hearing aid outcomes more generally (i.e. GHABP and datalogging), which has also been reported by Saunders et al (2016). There are several explanations why this might be the case.

First, the self-efficacy measures may be poor predictors of the specific hearing aid outcomes used in this study. Previous studies have shown that perceived self-efficacy as measured by the MARS-HA was a significant factor in hearing aid use (Meyer et al, 2014a,b). However, given their retrospective design it was not possible to ascertain the causality of the association (i.e. did high self-efficacy result in high hearing aid use, or did high hearing aid use result in high self-efficacy?).

Second, the self-efficacy measures used in the present study may not be appropriate or sufficiently sensitive to identify individual differences for self-efficacy or hearing aid outcome measures. This is an issue often reported in the auditory rehabilitation research literature (Saunders et al, 2005; Ferguson & Henshaw, 2015; Ferguson et al, 2016b). For example, the MARS-HA asks very specific questions about hearing aids and hearing aid use. Due to the

Table 2. The results of the linear regression analysis with MARS-HA, ECHO and LQ1 and LQ2 as predictors, and SADL and GHABP as outcome measures.

	Satisfaction (SADL)					Hearing aid benefit (GHABP)				
	Global	*Positive effects*	*Service & costs*	*Negative features*	*Personal image*	*Global*	*Use*	*Benefit*	*Residual disability*	*Satisfaction*
MARS-HA global score										
R^2	–	–	0.17	–	–	–	–	–	–	–
β			0.41							
p			0.026							
Line LQ2 self-efficacy										
R^2	0.15	–	–	–	–	–	–	–	–	–
β	0.39									
p	0.033									
ECHO global										
R^2	0.30	0.20	–	0.27	–	–	–	–	–	–
β	0.55	0.44		0.52						
p	0.002	0.014		0.003						
ECHO positive effects										
R^2	0.43	0.50	–	0.23	–	0.24	–	0.27	0.19	0.22
β	0.66	0.71		0.48		0.52		0.52	−0.43	0.47
p	<0.001	<0.001		0.049		0.004		0.004	0.016	0.009
ECHO service and costs										
R^2	–	–	0.13	–	–	–	–	–	–	–
β			0.39							
p			0.032							
ECHO positive image										
R^2	–	–	–	–	0.19	–	–	–	–	–
β					0.43					
p					0.017					
Line LQ1 readiness										
R^2	0.37	0.40	0.19	–	–	–	–	0.14	–	–
β	0.61	0.63	0.43					0.38		
p	<0.001	<0.001	0.016					0.040		

Abbreviations as Table 1. – = not significant.

use of the MARS-HA as a predictor, the questionnaire was completed prior to hearing aid fitting. However, knowledge of hearing aids and how to use them amongst first-time hearing aid users six-weeks post-fitting is far from ideal (Ferguson et al, 2015), and even in experienced hearing aid users, knowledge of how to use hearing aids is highly variable (Desjardins & Doherty 2009). As such, knowledge is almost certainly poorer prior to the hearing aid fitting. Thus, a lack of hearing aid-specific knowledge may be problematic in the completion of the MARS-HA when administered early in the patient journey. Indeed Meyer et al (2014a) used a shortened version the MARS-HA, omitting the aided listening and advanced handling subscales for participants without any experience of hearing aids. Whilst all participants in the present study were able to complete the full questionnaire, some reported that it was more difficult for them to make judgements on their abilities without experience of hearing aid use. Despite this, MARS-HA scores for participants in this study were generally similar to those for participants from other studies in terms of the distribution and range of results (Ferguson et al, 2016a; Meyer at al, 2014a,b; West & Smith, 2007). There were no reported problems answering Line Q2 (self-efficacy), which may be an easier question for patients to understand in terms of their assessment of their self-efficacy. Finally, the high levels and restricted range of reported self-efficacy amongst participants may also have resulted in insufficient variability to show any other significant effects on outcome measures.

The present study revealed some effects of self-efficacy related to satisfaction in hearing aid users. However, the two measures had different effects and were themselves not correlated, with the exception of LQ2 and the adjustment subscale of the MARS-HA (e.g. '*I could get used to the sound quality of my hearing aids'*). Furthermore, a recent study by Saunders et al (2016) reported that self-efficacy increased after hearing aid use. Qualitative methodologies using semi-structured interviews or focus groups with hearing aid users would provide insights into these aspects of self-efficacy in order to gain further understanding of how self-efficacy impacts on hearing aid users in their everyday lives.

A secondary aim was to assess the impact of expectations on hearing aid outcome. Expectations (ECHO) predicted hearing aid satisfaction (SADL). This relationship has been shown previously (Cox & Alexander, 2000; Saunders et al, 2009) and is perhaps not surprising as the two questionnaires ask about parallel statements and questions (e.g. ECHO: '*Getting hearing aids is in my best interests*' and SADL: '*Are you convinced that obtaining your hearing aids was in your best interests?*'). In contrast to the results of these previous studies but consistent with Saunders & Jutai (2004), the majority of participants in the present study were significantly more satisfied with their hearing aids than they had expected to be. This could reflect a difference in service provision between the studies or a desire amongst the participants to please the audiologist (AW) who fitted the hearing aids and completed the outcome measures with the patients. Ideally, the predictor and outcome measures would have been obtained by a different person to the one who fitted the hearing aids.

The significant relationship between the ECHO and the SADL was driven primarily by the positive effects subscale, also reported by Cox and Alexander (2000). This suggests that a positive outlook on the benefits of hearing aids outweighed the more negative aspects of hearing aid use. An example of this can be seen with the perceived stigma associated with hearing aid use. Wallhagen (2010) conducted qualitative interviews with individuals with hearing loss who were not current hearing aid users and their communication partners. Stigma was linked with three related concepts of 'alterations in self-perception', 'ageism', and 'vanity'. Many participants also discussed their feelings of hearing aids drawing attention to a disability, which made them feel old or unattractive. However, a theme emerged from that study whereby the appearance of the hearing aid was inconsequential if it enabled the participants to hear better. This was also seen in the present study where satisfaction with positive effects and personal image was higher than the satisfaction with negative features. Furthermore, comparison of the ECHO and SADL personal image subscales, showed that all but two participants were as satisfied or more satisfied than they had expected to be prior to hearing aid fitting. This suggests that hearing aids had less of an impact on the participants' personal image than they had thought it would prior to fitting. The clinical implication of this is that there may be value in audiologists incorporating these findings in their discussion with patients who are concerned around issues, such as the cosmetic appearance of hearing aids. Finally, expectations measured by the ECHO positive effects subscale predicted hearing aid outcomes measured by the GHABP subscales, with the exception of hearing aid use. Thus, positive expectations predicted perceived benefit and satisfaction from hearing aids and reduced residual disability.

Readiness to improve hearing predicted both satisfaction and hearing aid benefit. This supports the results of previous studies (Ferguson et al, 2016a; Laplante-Levesque et al, 2013; Ridgway et al, 2015). Ridgway et al (2015) found that autonomous (intrinsic), rather than controlled (extrinsic), motivation was associated with hearing aid adoption. Ryan and Deci (2008) argue that developing autonomous motivation and readiness for change is a key role of the therapist (or in this case the audiologist). Further research, based on health behaviour change models, could help identify clinically acceptable interventions to aid this process, for example, motivational engagement, interviewing techniques and behavioural planning (Ferguson et al, 2016a; Ekberg et al, 2016; Barker et al, 2016). Furthermore, the non-use of hearing aids is a commonly cited problem (for review, see McCormack & Fortnum, 2013), and there is some value in having clinical tools to identify individuals who are likely to be successful (or unsuccessful) hearing aid users. A tool such as the readiness line question that is easy to implement, administer, and interpret, and has some predictive value for hearing aid outcome, would be a significant advantage in a busy clinic. It should be noted that in contrast to the nonaudiological factors of expectations and readiness, the audiological measure of hearing sensitivity was not correlated with any of the outcome measures. From a clinical perspective, more research into how assessment of an individual's readiness to take action can be used to identify successful hearing aid users is warranted.

There were four limitations of this study. First, the number of participants was relatively small ($n = 30$) and failed to reach the required 32 initially planned, which might have affected the power to reach statistical significance and the validity and reliability of the conclusions. Second, factors that may affect hearing aid self-efficacy were not controlled for in this study. Meyer et al (2014b) found that self-reported visual function and having a supportive friend or family member had a significant impact on the basic handling subscale of the MARS-HA, and duration of hearing loss and level of anxiety about wearing hearing aids had a significant impact on adjustment. Future studies should include these factors. As discussed previously, there are also difficulties assessing self-efficacy for hearing aids in those who have little knowledge of hearing

aids. It was notable that the scores for all predictor measures were generally at the higher end of the scales, and all except the expectation scores were positively skewed. Although this suggests a generally optimistic view of hearing aids in those who chose to take-up hearing aids, the third limitation is that of the 100 adults who attended the hearing assessment, only a third ($n = 34$) participated in the study. It is possible that our sample were more motivated and more positive about taking action. Finally, although hearing loss is a chronic condition requiring ongoing management, there is a paucity of research looking at the impact of interventions after more than a year (Barker et al, 2014). Theories in counselling and psychotherapy suggest that autonomy for change has a continued role in the longer term as people are required to sustain an initial behaviour change in the face of new challenges (Ryan et al, 2011). In this study, participants were seen for follow-up shortly after hearing aid fitting, at around six weeks. This was a pragmatic approach to reduce the risk of participants dropping out of the study over time whilst allowing time for some acclimatization to their hearing aids (Glista et al, 2010), within the time constraints of study completion. Positive relationships were shown between expectations and readiness for hearing aids and hearing aid benefit and satisfaction in the short term. These short-term outcome assessments could be expanded to assess individuals' longer-term approach to change.

Conclusion

Self-efficacy for hearing aids does not appear to be a robust predictor of successful hearing aid outcomes using the measures in the present study. Furthermore, the MARS-HA questionnaire may not be the most appropriate tool to measure self-efficacy for hearing aids in the early stages of the fitting process. However, positive aspects of expectations for hearing aids as well as readiness to improve hearing did predict hearing aid outcomes in terms of satisfaction and benefit from hearing aids. Hearing sensitivity was not associated with hearing aid outcomes. Further research is needed to establish how clinical assessment of nonaudiological factors, such as expectations and readiness may best be implemented into clinical practice to assess who would benefit from hearing aids.

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