Manual of the Hearing Attitudes in Rehabilitation Questionnaire (HARQ) Revised, 2008.

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Acknowledgements: The collaboration and support of the late Denzil Brooks are warmly appreciated. Thanks also to Barbara Cadge and staff of the Audiological Rehabilitation Department of the Royal National Throat Nose and Ear Hospital Trust for their assistance in the early development of the questionnaire and in the collection of data.

The Manual of the Hearing Attitudes in Rehabilitation Questionnaire (HARQ)

1. Introduction to the Scale, Administration, and Norms

1. Psychosocial aspects of hearing impairment

Self-report measures have an important part to play in the assessment of disability and handicap associated with hearing impairment (Schow and Gatehouse, 1990). The severity of impaired hearing as measured by sensory threshold and speech discrimination tests does not fully account for the degree of subjectively experienced difficulty in hearing and listening situations (Gatehouse, 1991, Lutman, 1991, Noble, 1983, Salomon, Vesterager and Jagd, 1988). Consequently, attention has turned, both theoretically and practically, to psychosocial aspects of hearing. A number of scales have already been developed to assess a person's appraisal of their hearing difficulties and how emotionally distressed they feel when talking with and listening to others. Emotional reactions such as feeling irritable, 'left out', or depressed can themselves become an additional impediment to aural communication. These scales typically include the self-report of emotional distress and also behaviour such as avoidance of social situations.

Associated with these emotional reactions and avoidance behaviours are attitudes and beliefs concerning hearing impairment and its consequences. Some self-report scales include items to reflect this more cognitive aspect of disability/handicap but their coverage is often limited to just a few items (e.g. Noble and Atherley, 1970, Schow and Nerbonne, 1982). However, Demorest and Erdman (1987) in developing their145 item Communication Profile for the Hearing Impaired (CPHI), included 63 items of this type.

One of the aims in devising the Hearing Attitudes in Rehabilitation Questionnaire (HARQ) was to produce a measure of attitudes towards, and beliefs about, hearing impairment and its consequences which offered good coverage of this domain and avoided the weaknesses of existing scales. The items could be described as combining both cognitive and affective elements. The questions were framed bearing in mind that self-perceptions were requested and not self-reports of the *degree* of disability, handicap or emotional distress experienced. Moreover, the HARQ was not designed as a measure of strategies for coping with hearing loss. The purpose in constructing a questionnaire that assessed attitudes was derived from an assumption that this form of self-report was more likely than others to be useful in predicting a range of behaviours such as avoidance of social interaction and failure to make good use of a hearing aid. It is intended that the HARQ be used in audiological rehabilitation clinics where it is important to identify the need for counselling, to have a means of predicting the outcome of rehabilitation, and to assess change in attitude over time. The items were originally developed from questionnaires used by Brooks (1985, 1989) in a rehabilitation unit for older persons referred on account of acquired hearing loss (AHL). Phases in this development are described below.

Research that has already been conducted on attitudes to hearing impairment has produced a number of relevant findings. A factor analysis of the scale mentioned earlier, the CPHI, identified a main dimension of acceptance versus denial of impairment, in which emotional distress was associated with the acceptance pole. Another factor concerned perception of the negative reactions of others or, put differently, perception of stigma. Research conducted by Hetu and colleagues (1990) has investigated the nature of denial and/or minimisation of hearing impairment and these authors relate them to discursive strategies such as 'not talking about the problem' and 'normalising' any hearing difficulties that may exist. The attitudes of acceptance/denial of hearing impairment and also of stigma are likely to be implicated in the process and also the success of audiological rehabilitation.

A further reason for developing a new scale is the need for an assessment standardised on the population, mainly middle-aged and elderly who are likely to be referred for prescription of a hearing aid in British National Health Service clinics. The only published test designed specifically for older persons is the Hearing Handicap Inventory for the Elderly (HHIE, Ventry and Weinstein, 1982). This scale is a measure of handicap, including the emotional effects of hearing impairment on self and others, and the standardisation sample is a heterogeneous group of elderly Americans. The HARQ is intended to provide a broader coverage of attitudes and, of course, is standardised on a British sample.

Attitude and benefits from hearing aid use

It has been shown that one of the benefits of rehabilitation is a reduction in perceived disability (Weinstein, 1991, Eriksson-Mangold et al., 1992). However, not all potential hearing aid candidates seek rehabilitation and of those who do, a number give up using their aid or use it very little. Community surveys have shown that older persons who obtain a hearing aid do have, as might be expected, a greater degree of hearing impairment (Humphrey et al, 1981, Stephens et al, 1991, Salomon et al, 1988) but attitude is an important determinant of acquisition of an aid. In the group identified as likely to benefit from amplification, take up is related to awareness of impairment and perceiving that this involves a degree of handicap. According to the findings of Stephens and his colleagues, it is the emotional component of handicap rather than handicap *per se* that distinguishes the group seeking help. A simple affirmative response to a question concerning "wanting help with your hearing" was also related to actually obtaining an aid after assessment.

Once engaged in the rehabilitation process, patients' attitudes have been observed to vary between strongly positive and strongly negative and Goldstein and Stephens (1981) described four attitude types on this basis. Positive attitudes have been shown to be related to greater use of an aid (Gatehouse, 1994, Hickson, Hamilton and Orange, 1986). To date there have been few attempts to construct self-report measures of attitudes to hearing aids whose psychometric properties have been investigated. Studies have generally related single questions to the benefits of rehabilitation. For example, Brooks' research (Brooks, 1989),which is discussed in more detail later, has demonstrated a relationship between response to attitude questions and use of the aid 4 months after fitting. Pre-fitting counselling was shown to be successful in changing unhelpful attitudes and beliefs and it resulted in greater use of the aid later on.

Approximately half of the items of the HARQ measure attitudes to provision and use of a hearing aid. An aim in developing the scale was to extend and confirm Brooks' findings.

Brief Description

The HARQ is a psychometrically constructed 40 item questionnaire which assesses 3 attitudes to hearing impairment and 4 attitudes to provision of a hearing aid. These attitudes are measured by 7 factorially derived subscales whose content can be summarised as follows: (1) Perceiving self as distressed/inadequate in situations of aural communication (2) Perceiving self as having reduced social status, and perceiving others as having negative attitudes, as a result of the hearing impairment (3) Minimising the importance of hearing impairment as a significant problem (4) Perceiving an aid as stigmatising (5) Perceiving self as not wanting/needing an aid or the aid as unhelpful (6) Perceiving external pressure to be assessed for an aid (7) Having an over-positive expectation that an aid will restore normal hearing quickly. The items of the HARQ are given in Table 1.

With the exception of a few low to moderate size correlations, the subscale scores are uncorrelated and can be regarded as tapping separate beliefs and attitudes. There is a moderate positive association between feeling distressed/inadequate and feeling stigmatised by hearing impairment and a negative association between these attitudes and minimisation of hearing problems. However, the semantic content of the subscale items is sufficiently distinct, to regard each of them as making a separate contribution to assessment.

Six of the 7 subscales have satisfactory internal consistency and test-retest reliability. In development work, the subscale concerning 'wanting/needing an aid' showed moderate internal consistency but poor retest reliability. However, given that retesting was performed just prior to assessment, attitudes may well have been changing at this point. This subscale has been retained although its psychometric properties are still under review.

The majority of older persons seeking rehabilitation hold favourable attitudes to being assessed for an aid. Consequently, subscale scores tend to be skewed such that the most frequent scores express a dominant opinion that the process of rehabilitation is helpful and non-problematic. Thus, older persons tend to want an aid, do not minimise their hearing problem, do not feel pressured into having an assessment, and do not feel stigmatised by their hearing impairment or by wearing an aid. This skewing of the distribution is taken into account in the interpretation of scores.

Table 1. Item frequencies and scoring for the HARQ

Note: After factor analysis only 40 items of the final (45 item) version of the HARQ were retained for the HARQ; the numbering for the 5 excluded items is omitted below. For the derived subscale scores, items were coded 1-3 where 3 represents the attitude most strongly. The following acronyms refer to the 7 subscales: PDI, Personal distress/inadequacy, HLS, Hearing loss stigma, MOL, Minimisation of loss, HAS, Hearing aid stigma, ANW, Aid not wanted, PTA, Pressure to be assessed, PE, Positive-expectation.

	True	Partly True	Not True
I think my hearing is normal for my age.	22	61	55
1. It sometimes depresses me when I cannot follow a conversation (3,2,1 PDI).	75	48	16
2. I feel I have been pressured into having my hearing assessed (3,2,1 PTA).	14	28	96
3. I would expect to get used to using a hearing aid in a matter of days (3,2,1 PE).	56	52	30
4. I think the behind-the-ear aids are really quite small and inconspicuous (1,2,3 HAS).	85	34	14
I think it's quite normal to have some difficulty hearing at my age.	70	44	26
5. If I wear an aid, people will probably think I'm a bit stupid (3,2,1 HAS).	5	11	123

6. I dread meeting new people since becoming hearing impaired (3,2,1 PDI).	33	41	64
7. I think I already overcome any hearing difficulties I might have through my own efforts (3,2,1 MOL).	16	42	82
8. From what I know, hearing aids don't help a great deal (3,2,1 HAS).	10	23	105
9. My poor hearing sometimes makes me feel really inadequate (3,2,1 PDI).	49	57	34
10.Difficulty in hearing is not of major concern to me at the moment (3,2,1 MOL).	14	49	76
11.I expect to hear as easily with a hearing aid as I did before (3,2,1 PE).	80	47	10
12.It would embarrass me to have to wear a hearing aid (3,2,1 HAS).	12	23	102
13.I have come here about my hearing in order to please someone else (3,2,1 PTA).	18	20	102
14.I don't really want a hearing aid (3,2,1 ANW).	12	25	102
I can hear well enough when I really concentrate.	9	48	82
15.I don't consider it important to be assessed for a hearing aid (3,2,1 ANW).	7	12	118
16.I find myself avoiding company because conversation is too much effort (3,2,1 PDI).	35	47	58
It is my opinion that hearing aids make everything louder so an aid would not help me in a group situation.	21	44	69
17.I think people react differently to you when you are wearing a hearing aid (3,2,1 HAS).	17	39	83
18.When you have hearing difficulties, other people ignore you (3,2,1 HLS).	16	47	77
19.In a conversational group I keep quiet for fear of saying the wrong thing (3,2,1 PDI).	52	44	42
20.I would stand out in a crowd wearing a hearing aid (3,2,1 HAS).	7	19	113
21.As I see it, I am less of a person because of my hearing difficulty			

(3,2,1 HLS).	15	25	118
22.I've come to regard whatever hearing difficulties I may have as a problem not worth bothering about (3,2,1 MOL).	7	20	110
23.Many people don't know how to react to you when you have a hearing aid (3,2,1 HAS).	11	53	71
24.I am sure that some people think I am stupid just because I have a hearing loss (3,2,1 HLS).	14	24	102
25.When several people are chatting, it bothers me that I often lose the thread of the conversation (3,2,1 PDI).	93	32	14
26.It is due to pressure from my family or friends that I am having my hearing assessed (3,2,1 PTA).	30	30	80
27.I get the feeling that other people find it a strain to talk to me (3,2,1 HLS).	35	48	56
28.Hearing is not a serious problem for me (3,2,1 MOL).	17	49	69
29.I think that wearing a hearing aid would help me when meeting strangers (1,2,3 ANW).	104	28	5
30.I think that if you wear a hearing aid people tend to ignore you (3,2,1 HAS).	5	15	116
I suppose the trouble with a hearing aid is that you hear every unwanted noise.	37	62	28
31.It really upsets me when I realise I've got 'the wrong end of the stick' in a conversation (3,2,1 PDI).	68	51	21
32.I am willing to try a hearing aid but I don't think an aid will be of much help to me (3,2,1 ANW).	7	16	113
33.I suppose it would take some weeks or months to get used to using a hearing aid (1,2,3 PE).	45	53	39
34.Some people avoid me because of my hearing difficulty (3,2,1 HLS).	11	20	109
35.My hearing problems are really quite minor (3,2,1 MOL).	26	52	59
36.By and large, I am able to hear without difficulty (3,2,1 MOL).	16	51	72
37.My hearing is not so bad that I need			

a hearing aid (3,2,1 ANW).	10	38	88
38.My hearing loss makes me feel isolated from other people (3,2,1 PDI).	45	48	46
39.It would make me feel old to wear a hearing aid (3,2,1 HAS).	7	13	119
40.I have to admit that deep down I feel restricted by my hearing loss (3,2,1 PDI).	88	40	12

Administration

The HARQ is relatively short having only 40 items and is therefore quick and easy to administer. However, older respondents may take more time for completion and are likely to need some encouragement. As with any self-report test, rapport should be established and the purpose of the test briefly explained. Cooperation is essential and so queries of any kind should be answered; the instructions are pointed out and the person asked to read them. These state:

> *"The purpose of this questionnaire is to find out what you think of your ability to hear well and, assuming you have a hearing loss, how this affects your attitudes. We are also interested in what you think about hearing aids, these being the tools most often used to help those with hearing impairment. Your answers to these questions will help us to plan the best service for you."*
>
> *"Please circle the answer (TRUE, PARTLY TRUE, or NOT TRUE) that best applies to you."*

It is advisable to check that the person is able to read and has glasses available if needed. A calm and quiet environment for test completion should be provided. It is helpful to have somebody on hand to help with any queries and to check the form for omitted items when completed. Omissions should be pointed out, and unless there are genuine difficulties in responding, the person should be encouraged to give an answer. Any help offered during completion of the questionnaire itself should be limited to simple explanation and non-leading prompts. All items should have been completed in order to score the shorter subscales (5items or less). For the longer subscales, one omitted item maybe scored by assigning 2 to the missing item.

If administration exceeds 15 minutes it is likely that the person is having some intellectual, reading, or perceptual difficulties.

Scoring and Interpretation

For each item, the respondent must circle one of the options, namely, True, Partly True, or Not True. The response categories were kept simple given the age of some of the people for whom the scale was devised. The responses are scored 3, 2, 1 with a higher score indicating the specified attitude more strongly. For the most part, a True response is scored 3. Although there might be a natural tendency to agree with statements, it should be noted that apart from items of the scale assessing an expectation of rapid benefit, the modal response is to disagree with attitudes that might suggest a negative response to rehabilitation. If anything, an acquiescence response bias will produce a tendency to detect the atypical response which in this case is the response of interest.

As noted above, the distribution of responses is noticeably skewed except for two subscales. The distribution of scores is more likely to approximate a normal distribution in samples of people who have not yet put themselves forward for rehabilitation. However, in the assessment context of patients already referred, the subscale scores of interest, apart from 'distress/inadequacy' and 'over-positive expectation' subscales, lie at only one end of the continuum. These subscales are best regarded as ordinal rather than interval and the raw scores have been transformed accordingly. For these subscales, the raw scores are transformed into 'average' (0 - approximately 60th percentile) 'above average' (approximately 60 – 90th percentile) and 'high' (approximately 90th percentile and above). For the 'distress/inadequacy' and 'over-positive expectation' subscales, treated here as interval scales, equivalent 'low average' and 'low' transformed scores are used in addition (see Table 2).

Table 2. Transformation of scores for interpretative purposes

Subscale	Range of raw scores (and % frequency)	Interpretation
Distress/Inadequacy	9-12 (10%) 13-16 (11-30%) 17-22 (31-67%) 23-25 (68-88%) 26-27 (89-100%)	Low Low average Average High average High
Hearing loss stigma	5-8 (74%) 9-11 (75-91%) 12-15 (92-100%)	Low Average High
Minimisation	6-10 (65%) 11-13 (66-91%) 14-18 (92-100%)	Low Average High
Hearing aid stigma	9-12 (71%) 13-15 (72-90%) 16-27 (91-100%)	Low Average High
Don't want/need aid	5-6 (67%) 7-9 (68-92%) 10-15 (93-100%)	Low Average High
Pressure to be assessed	3-4 (61%) 5-7 (62-90%) 8-9 (90-100%)	Low Average High
Positive expectation	3-4 (13%) 5 (14-25%) 6-7 (26-67%) 8 (68-84%) 9 (85-100%	Low Low average Average High average High

Standardisation

The HARQ has been developed on samples of middle-aged and older persons referred to audiological rehabilitation clinics. The standardisation sample was selected on the basis of (a) first time referral for hearing assessment and (b) a consecutive series of patients attending the clinic. The sample, which is from the Regional Audiology Centre in Manchester, is assumed to be representative of people referred to urban British National Health Service clinics on account of acquired hearing loss and probable suitability for provision of an aid. This health district is fairly typical of urban settings in terms of social class and ethnic composition. The sample of 140 people is composed of 62 men and 77 women (1 missing datum) of mean age 74.2 years (range 36 - 96) and standard deviation of 10.38 years. Ninety two percent of the sample are aged 60 years or over.

Norms

The distribution of subscale scores is displayed in histogram form in Figure 1. Means and standard deviations are also provided although the raw item frequencies (see Table I) may be more useful for non-parametric statistical comparisons. The HARQ has not yet been administered to any other samples with which comparison could be made. As noted above, a general population sample of middle aged to older persons is likely to differ in important respects from the standardisation sample of referred NHS patients.

Age and Sex Differences

None of the subscale scores shows a significant correlation with age or sex (see Table 6). Given that the correlations are all so close to zero, age and sex differences can be safely ignored when interpreting the scores.

2. Psychometric properties of the HARQ

Development of the HARQ

The HARQ was developed in four stages (see Hallam and Brooks, 1996). Interest in producing a new questionnaire arose out of research by Brooks on benefits derived from hearing aids and factors affecting their daily use (Brooks and Johnson, 1981, Brooks, 1985, 1989). Stage 1 consisted of analyses of Brooks' self-report scale. Data from several large samples were factor analysed in order to investigate the dimensions of meaning underlying responses to this scale. The analyses also revealed gaps in the range of items contained in the scale. In Stage 2, a greatly expanded prototype questionnaire was produced (HARQ-P); experts were asked to examine the items, to modify them if necessary, and to suggest additional ones if they noted any obvious omissions. A 67 item HARQ-P was piloted and administered to 141 patients attending rehabilitation clinics in Manchester and London. After examination of the responses to individual items and factor analyses, a revised 50 item questionnaire was produced (HARQ-R). This questionnaire consisted of two sets of intermingled items, one set relating to attitudes to hearing impairment, the other to attitudes to hearing aids.

In Stage 3, HARQ-R was administered to 130 attenders at rehabilitation clinics who had never before been fitted with an aid. Factor analysis was used in a confirmatory manner to extract the expected number of factors, based on earlier analyses, from each of the two item subsets. Items that frequently received a Not Applicable response or did not discriminate well were examined. Some items were reworded and others,

such as low loading items, were dropped. A 'final' version of HARQ with 45 items (HARQ-F) was produced.

In Stage 4, HARQ-F was administered to 164 Manchester clinic attenders. The two sets of items (hearing impairment, hearing aid) were factor analysed separately and the expected factor structure was, in the main, replicated. As a check on the conceptual separation of the item subsets, an unconstrained factor analysis was performed on all items together. This confirmed that the two types of items clustered into factors relating either to hearing impairment or to hearing aids. The 45 item HARQ-F was then reduced to the 40 item HARQ by dropping two of the smaller factors and also some items with low factor loadings. The 7 factorially derived sets of items were rescored to produce 7 'attitude subscales'. Internal consistency values were calculated and a small test-retest reliability analysis was carried out. Inter-correlations between subscales and correlations with age and sex were also computed.

HARQ-F: Sample characteristics and details of analyses.

The composition of the sample was described earlier under Standardisation. For this administration, the Not Applicable (NA) response option, originally included as an aid in identifying unsatisfactory items, was removed. The instructions and response categories were otherwise as given earlier. All patients were being referred for the first time for potential fitting of a hearing aid. Twenty-four questionnaires with more than 5 missing responses were excluded from the analysis, leaving an N of 140.

Analysis of responses to individual items showed that only one yielded a missing data rate of greater than 5%. This item referred to concern about the technical performance of an aid (9%missing). In 9 items, the distribution was skewed towards either True or Not True categories (<10 or >130). As in earlier analyses, the frequency analysis indicated that the majority of patients did not deny that they had a hearing impairment or that an aid was needed and generally they did not see the aid as stigmatising.

The items relating to hearing impairment (n=23) and hearing aids (n=22) were factor analysed separately using varimax rotation of principal components. Loadings above 0.40 were considered for inclusion in a scale but in practice some of the lower loading items were excluded.

A four-factor solution was sought from the hearing impairment items in line with the expected factor structure (see Table 3). The first 3 factors accounting for 52.5% of the variance were clearly recognisable as distress/inadequacy, hearing loss stigma, and minimisation of impairment, although the order of extraction differed from that found in earlier versions of the HARQ. The fourth factor, which had only 2 large loading items, related to the perception of hearing being 'normal for age'. In previous analyses these items had associated with clusters interpreted as 'denial/minimisation'. Subsequent analysis revealed that both items were significantly correlated with age (r = -0.31, -0.64). These items were therefore regarded as unsuitable and only three separate subscales for hearing impairment were adopted.

Table 3. Factor analysis of the HARQ-F

Factor loadings > 0.40 of HARQ items (hearing impairment only) on first four factors.
(Item numbers as in the HARQ are shown in brackets; items without numbering were not included in HARQ subscales).

No	Item content	Factor 1	Factor 2	Factor 3	Factor 4
		Personal distress/ inadequacy	Hearing loss stigma	Minimisat. of hearing impairment	Normal hearing
	% variance	37.1	9.5	5.9	4.5
38	My hearing loss makes me feel isolated from other people	0.74			
9	My poor hearing sometimes makes me feel really inadequate	0.73			
16	I find myself avoiding company because conversation is too much effort	0.71			
31	It really upsets me when I realise I've got the 'wrong end of the stick' in a conversation	0.70			
25	When several people are chatting, it bothers me that I often lose the thread of the conversation	0.67			
19	In a conversational group I keep quiet for fear of saying the wrong thing	0.67			
40	I have to admit that deep down I feel restricted by my hearing loss	0.67			
6	I dread meeting new people since becoming hearing impaired	0.59			
1	It sometimes depresses me when I cannot follow a conversation	0.57			
	By and large I am able to hear without difficulty	- 0.51			
	I can hear well enough when I really concentrate	- 0.50			
24	I am sure that some people think I am stupid just because I have a hearing loss		0.73		
34	Some people avoid me because of my hearing difficulty		0.72		
21	As I see it, I am less of a person because of my hearing difficulty		0.62		
18	When you have hearing difficulties, other people ignore you		0.55		
27	I get the feeling that other people find it a strain to talk to me		0.54		
22	I've come to regard whatever hearing difficulties I may have as a problem not worth bothering about			0.76	
28	Hearing is not a serious problem for me			0.52	
7	I think I already overcome any hearing difficulties I might have through my own efforts			0.49	
10	Difficulty in hearing is not of major concern to me at the moment			0.46	
36	By and large I am able to hear without difficulty			0.44	
	I think my hearing is normal for my age				0.77
	I think it's quite normal to have some difficulty hearing at my age				0.77
	My hearing problems are really quite minor				0.42

Table 4. Factor analysis of the HARQ-F hearing aid items

Loadings > 0.40

No	Item content	Factor 1	Factor 2	Factor 3	Factor 4
		Hearing aid stigma	Aid not wanted	Pressure to be assessed	Positive Expectat.
	% variance	24.9	10.8	9.7	6.8
30	I think that if you wear a hearing aid people tend to ignore you	0.72			
20	I would stand out in a crowd wearing a hearing aid	0.67			
23	Many people don't know how to react to you when you have a hearing aid	0.66			
39	It would make me feel old to wear a hearing aid	0.65			
05	If I wear an aid, people will probably think I'm a bit stupid	0.63			
12	It would embarrass me to have to wear a hearing aid	0.61			
17	I think people react differently to you when you are wearing a hearing aid	0.60			
8	From what I know, hearing aids don't help a great deal	0.52			
4	I think the behind-the-ear hearing aids are really quite small and inconspicuous	-0.53			
14	I don't really want a hearing aid		0.74		
15	I don't consider it important to be assessed for a hearing aid		0.72		
37	My hearing is not so bad that I need a hearing aid		0.72		
29	I think that wearing a hearing aid would help me when meeting strangers		-0.71		
32	I am willing to try a hearing aid but I don't think an aid would be of much help to me		0.56		
26	It is due to pressure from my family or friends that I am having my hearing assessed			0.86	
13	I have come about my hearing in order to please someone else			0.85	
2	I feel I have been pressured into having my hearing assessed			0.79	
3	I would expect to get used to using a hearing aid in a matter of days				-0.82
33	I suppose it would take some weeks or months to get used to using a hearing aid				0.74
11	I expect to hear as easily with a hearing aid as I did before				-0.58

Table 5. Internal consistency (alpha) and test-retest (rank order correlation) analyses
(N refers to retest sample)

subscale	alpha	retest	N
Personal distress/inadequacy (9 items)	0.90	0.76	18
Hearing loss stigma (5 items)	0.76	0.85	20
Minimisation of hearing loss (6 items)	0.79	0.81	18
Hearing aid stigma (9 items)	0.84	0.72	19
Aid not wanted (5 items)	0.77	0.44	20
Pressure to be assessed (3 items)	0.82	0.88	20
Positive expectation of aid (3 items)	0.62	0.63	20

Table 6. Rank order correlations between subscale scores and with age and sex.
(N=92, *p=<.001)

	PD/I	HLS	MOL	HAS	ANW	PTA	PE	AGE	SEX
PD/I	1.0								
HLS	0.71*	1.0							
MOL	-0.72*	-0.46*	1.0						
HAS	0.15	0.32	-0.06	1.0					
ANW	-0.48*	-0.36*	0.55*	0.12	1.0				
PTA	0.01	-0.03	0.09	0.04	0.04	1.0			
PE	0.00	-0.11	0.03	-0.37*	-0.11	-0.08	1.0		
AGE	0.02	0.04	0.13	0.04	-0.03	-0.01	-0.03	1.0	
SEX	0.02	0.08	0.03	0.11	-0.13	-0.07	-0.06	0.14	1.0

A five factor solution was sought from the 'hearing aid' set of items and the results were entirely consistent with earlier analyses. The factors, in order of extraction, were labelled as 'hearing aid stigma', 'aid not wanted', 'external pressure', 'poor technical performance' and 'over-positive expectation'. The 'poor technical performance' factor comprised three items with moderate loadings. In view of a previously identified tendency for patients to give NA answers to this type of item, its rather specific focus and the small number of items, it was decided not to use this factor as the basis of a subscale. A four-factor solution was used instead to derive subscale items (see Table 4); items relating to the technical performance of an aid did not load any of these factors.

Interpretation of factors

Personal distress/inadequacy (9 items used in subscale): The items of this scale imply that the person recognises the existence of difficulties in communication and that these are having a significant impact on personal well-being. The person is liable to feel isolated from others and expresses a sense of inadequacy. Failures of communication lead to emotional upset and occasionally to depressed mood. The person attempts to cope by either avoiding social situations, especially if they involve meeting new people, or by keeping quiet in conversation. Low-scorers on this scale do not regard impaired hearing as having these adverse effects on them.

Hearing loss stigma (5 items used in subscale). This scale focuses on how the person perceives that others are influenced, especially negatively, by their hearing impairment. For example, above-average scorers are concerned that they will be regarded as 'stupid' or 'too much of a strain' to be worth talking to. Other people are perceived as being likely to ignore or avoid them as a result of their hearing impairment.

Minimisation of hearing impairment (6 items used in subscale). The person who scores above average on this scale acknowledges some hearing impairment but does not regard any ensuing difficulty as a problem that seriously concerns them. The difficulty is minimised or simply overcome through effort.

Hearing aid stigma (9 items used in subscale). High scorers on this scale are particularly concerned with how they are perceived by others when they are seen to be wearing a hearing aid. Wearing an aid embarrasses them and they feel that it makes them socially conspicuous and look older. They fear that others will ignore them or be at a loss to know how to react to them.

Don't want/need aid (5 items used in subscale). The person who scores highly on this scale reports little interest in having their hearing assessed for a hearing aid fitting, possibly because they do not regard their hearing as sufficiently poor or because they do not think that wearing an aid would help them to communicate better.

Pressure to be assessed (3 items used in subscale). A high score indicates that the person feels pressured by others into having their hearing assessed or is attending just to please others.

Over-positive expectation of aid (3 items). An above-average score indicates that the person believes that a hearing aid will quickly restore normal hearing in a matter of days; a below-average score indicates that it will take weeks or months to get used to using a hearing aid.

Reliability of the subscales

Internal consistency: The items were recoded on a 1-3 scale so that all scale items are unidirectional with a higher score representing the attitude denoted by the scale label (see Table 1 for re-codings). Almost all item-total correlations for each scale were above +0.40 with a range of +0.32 to +0.74. Cronbach'salpha was satisfactory for all but the 'over-positive expectation' scale (alpha = 0.62) which has only three items. Remaining alphas range between 0.76 and 0.90 (see Table 5).

Test-retest reliability: A sample of patients was sent a second questionnaire to complete after an interval of two weeks. They were informed that the earlier form had been mislaid and they were kindly asked to complete another. Twenty-one retests were obtained in this manner. Test-retest rank correlations for each subscale are displayed in Table 5. As can be seen, the values of the test-retest correlation coefficients were comparable to internal consistency values for most scales. However, for 'Aid not wanted', the test-retest correlation coefficient was only +0.44. The discrepancy between this value and the other retest coefficient values might suggest that patients' attitudes to having an aid fitted were actually unstable at this time when the prospect of aid fitting was immanent.

As would be expected, the subscales with a greater number of items have higher values for internal consistency. However, it is hoped that the shorter subscales will prove satisfactory as a means for detecting the small minority of patients whose attitudes might affect their response to rehabilitation.

Intercorrelations between subscales

Table 6 shows the rank order correlations between subscales. The correlations between attitude scores for hearing impairment and hearing aid subscales are generally low or negligible. In fact, if the HARQ is regarded as composed of two scales (i.e. hearing impairment and hearing aid items separately grouped together) there is no association between them (r = +.04). Nevertheless, patients who are distressed by hearing impairment tend to want an aid ('Aid-not-wanted', r= -0.48) and stigma associated with hearing impairment is slightly associated with hearing-aid stigma (r = +0.32).

Within the hearing impairment subscales, 'distress/inadequacy', 'minimisation', and 'hearing loss stigma', are moderately inter-correlated either positively or negatively. This means that a person who is distressed or feels inadequate because of hearing difficulty is also likely to perceive others as having negative reactions and is unlikely to minimise the degree of hearing impairment. However, the correlations are moderate rather than high and the subscales appear to be conceptually distinct.

Theoretical considerations in using the HARQ

Development of the HARQ has been guided by an attempt to sample personal opinion rather than factual or normative judgements, coping behaviour, or severity of handicap. In focusing on the perception of attributes of self/other relating to impairment, the HARQ is more truly a measure of attitude rather than communication ability or severity of handicap. It is hoped that these attitudes will prove to be a relevant focus for counselling as suggested in work by Brooks and colleagues. The vast majority of people in the standardisation sample was aged 60 or over and in retirement. Although none of the subscale scores was correlated with age (or gender) it is possible that the psychometric properties of the HARQ may differ in a younger or mainly working-age sample.

This point may apply also to a general population sample of middle aged to elderly persons who have not sought help for hearing difficulties despite some awareness of hearing loss. It is clear that in the standardisation sample, for most of the attitudes, the subscales assess degree of deviance in one direction only from a majority view which realistically appraises the hearing impairment and is favourably disposed to the prospect of hearing aid use. This degree of skewing is unlikely to be found in a non-referred general population sample.

Comparison with Previous Studies

Several authors have reported factor analyses of comparable self-assessment scales and it is worth noting some similarities and differences between their findings and analysis of the HARQ. In a factor analysis of a Swedish version of the Hearing Measurement Scale (Noble and Atherley, 1970) Eriksson-Mangold and colleagues (1991, 1992) extracted two factors which related to (1) perception of auditory difficulties and (2) self-report of emotional reactions to the consequences of hearing difficulties and associated restrictions. The latter appears to refer to a number of aspects of the perception of impaired hearing which are differentiated in the HARQ.

Demorest and Erdman (1989) factor analysed the 23 subscale scores (rather than the individual items) of the CPHI and interpreted the first 5 factors. The largest factor was labelled "Adjustment", one pole of which was characterised by acceptance of impairment, negative emotional responses and maladaptive strategies and the other pole by lack of problem awareness or denial. This factor appears to be partially equivalent to 2 of the 3 correlated subscales of the HARQ, namely personal distress/inadequacy and minimisation. A fourth factor in the analysis concerned perception of the negative reactions of others and the use of maladaptive strategies of communication. This factor resembles the 'hearing loss stigma' factor of the

HARQ. The association found in this study between maladaptive strategies of communication and perception of negative reactions of others may suggest that perception of 'stigma' is as much a consequence of maladaptive behaviour as a cause of it.

The phenomenon of denial of hearing impairment should be captured by the minimisation subscale of the HARQ. On the basis of qualitative interviews with hearing impaired workers, Hetu and colleagues (1990) have pointed out the complexity of the phenomenon and described denial as a set of mutually supporting discourses. In their terminology, 'denial' is a categorical assertion that difficulty in hearing is a problem of no consequence. 'Minimisation' implies acknowledgement of some hearing impairment but this is viewed more as a problem for others and, in any case, a problem that can be overcome. Discursive strategies of 'not talking about the problem' and 'normalising' any difficulty are also associated with denial/minimisation. The authors note that examples of complete denial may exist although it is difficult to see how an individual who cannot communicate adequately would not receive feedback on this difficulty. The data that Hetu and colleagues present is consistent with denial/minimisation lying on a continuum although this need not be viewed as a unitary attitude or personality trait. The HARQ minimisation subscale seems to cover most of the aspects of the phenomenon mentioned above.

Prediction of Satisfaction with Hearing Aids

Brooks (1989) found that the following factors, identified before hearing-aid fitting, were related to increased use of the aid 4months after fitting: admitting that enjoyment of life was diminished by poor hearing, avoiding people because of hearing difficulty, admitting that others had difficulty in conversing, reporting that family and friends were impatient because of the hearing difficulty. It was also found that in non-counselled individuals who regarded themselves as having normal hearing and attributed their difficulties to external factors, and who also viewed an aid as conspicuous, there was less use of the prescribed aid. However, pre-fitting counselling was able to change these attitudes and increase later use of the aid. Differences between counselled and non-counselled groups were still in evidence 4 years later (Brooks, 1989).

In a study of factors predicting the outcome of audiological rehabilitation (Hallam and Brooks, 1998) three of the HARQ subscales were significantly associated with the amount of hearing aid use 3 - 9 months after fitting. The study used the sample of patients who were administerd the HARQ-F. Of these 140 patients, 128 patients had been appropriately fitted with an aid and could be followed up. Eighty nine per cent of this group completed follow-up questionnaires. It was found that of patients who minimised their hearing impairment, only 43% were using the aid more than 4 hours per day in contrast to 82% of patients who did not minimise. A similar pattern was revealed in the distress/inadequacy subscale scores where only 44% of patients with below-average scores were using the aid for more than 4 hours compared with 76% of the patients who were more distressed by their hearing impairment. The HARQ subscale of 'not wanting or needing an aid' was also associated with hearing aid use; 77%of patients with no reservations (average scorers) were using the aid for more than 4 hours compared with 49% who did have reservations.

Stigma associated with hearing loss and wearing a hearing aid was not related to hours of use although patients with high scores on the hearing aid stigma subscale were less likely to describe it as helpful and easy to use.

These data demonstrate that the HARQ has predictive validity. The pattern of results also encourages the view that attention given to psychological factors in pre-fitting counselling is likely to impact on later utilisation of a hearing aid as Brooks has shown (Brooks, 1989).

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