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The Attitudes to Disability Scale (ADS)

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The Attitudes to Disability Scale (ADS): development and psychometric properties

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Abstract

Background This paper describes the development of an Attitudes to Disability Scale for use with adults with physical or intellectual disabilities (ID). The aim of the research was to design a scale that could be used to assess the personal attitudes of individuals with either physical or ID.
Method The measure was derived following standard WHOQOL methodology as part of an international trial. In the pilot phase of the study, 12 centres from around the world carried out focus groups with people with physical disabilities, people with ID, with their carers, and with relevant professionals in order to identify themes relevant for attitudes to disability. Items generated from the focus groups were then tested in a pilot study with 1400 respondents from 15 different centres worldwide, with items being tested and reduced using both classical and modern psychometric methods. A field trial study was then carried out with 3772 respondents, again with the use of both classical and modern psychometric methods.
Results The outcome of the second round of data collection and analysis is a 16-item scale that can be used for assessment of attitudes to disability in physically or intellectually disabled people and in healthy respondents.
Conclusions The Attitudes to Disability Scale is a new psychometrically sound scale that can be used

to assess attitudes in both physically and intellectually disabled groups. The scale is also available in both personal and general forms and in a number of different language versions.

Keywords disability, attitudes, scale, psychometrics

Introduction

An estimated 10% of the world's population experience some form of disability or impairment (WHO 2001). The number of people with disabilities is increasing due to population growth, ageing, the emergence of chronic diseases, and medical advances that preserve and prolong life. The first version of the International Classification of Impairments, Disabilities and Handicap defined disability as 'A restriction or lack of ability (resulting from an impairment) to perform an activity in the manner or within the range considered normal for a human being' (WHO 1980). Because of its excessively medicalised viewpoint, and using what has been criticised as stigmatising language (Bury 2000), the subsequent revised International Classification of Impairments, Disabilities and Handicap, known as the ICF, focuses on a more complex way of formulating health status (WHO 2001) and is a comprehensive classification system that takes a bio-psychosocial approach to understanding impairment, handicap and disability. The medical model and the social model are the two main approaches for classifying and measuring disability (WHO 2001). In the medical model, disability is viewed as a problem of the individual that is directly caused by disease, trauma or other health conditions, for which professional help is needed. From the perspective of the social model, disability is primarily attributable to characteristics of society that exclude participation by individuals affected by disease, injury, and so on. How disability is measured depends on the needs and world view of those doing the measuring. In the medical model, disability is measured primarily by health professionals and in terms of disorder, impairment and functional level, whereas in the social model it is measured primarily by self-report and in terms of the characteristics of the person's environment.

The common finding in research on attitudes towards people with disabilities is that people, to various degrees, harbour negative attitudes towards persons with disabilities (e.g. Akrami *et al.* 2000). Negative attitudes towards people with ID is one of the potential barriers to the delivery of health services to this group (Gill *et al.* 2002). Most research on attitudes has been done in relation to the medical model of care, on attitudes of students from different disciplines. Antonak & Livneh (2000) have provided an extensive review of the many direct and indirect methods that have been used to assess attitudes towards people with disabilities, while noting that many of the direct attitudinal methods have been used with healthy individuals in which certain biases such as social desirability may disguise true attitudes. Although the perspectives of experts are still dominant and most disability attitude scales have been derived only from the expert viewpoint, the trend of exploring and supporting the views of disabled people themselves in biomedicine and health care has found a recent resonance in medical ethics due to its empirical turn (Borry *et al.* 2005) and the participatory viewpoint in social studies of science (e.g. Nowotny *et al.* 2001). There is considerable need therefore for the development of measures that draw directly on the attitudes and experiences of people with intellectual and physical disabilities (PD) themselves, in addition to expert opinion. The views of people themselves with intellectual or PD were drawn on from different cultural groups in the present research programme.

The current paper aims to address this gap in knowledge through using the methodology for scale development collated by the World Health Organization Quality of Life Group (The WHOQOL Group 1998a,b), specifically in the context of the development of a disabilities adaptation of the WHOQOL measures (Power *et al.* 2010). The study asked the question of whether it is possible to have a single cross-cultural Attitudes to Disability Scale or whether each culture required its own culture-specific adaptation. Although it has been possible to generate a common generic adult version of the WHOQOL and an Attitudes to Ageing Questionnaire (Laidlaw *et al.* 2007), the possibility remained that diverse attitudes across cultures towards adults with disabilities might require the production of different adult modules, especially for people with ID. This possibility was tested in the form of whether or not people with ID differed from people

with PD in their attitudes. The feedback from focus groups and the data analyses also allowed the question of how well the existing WHOQOL items performed when used with people with disabilities. That is, one of the key objectives of the research was to test the question of whether the existing WHOQOL items only need to be supplemented with an additional module or whether these generic items also need to be altered in some way or another such as through simplification of item wording.

In summary, the overall aim of the present research was, in the context of the development of an adaptation of the generic version of the WHOQOL for use with adults with physical or ID, to develop a measure of attitudes to disability and then test its use in a series of cross-cultural field trials. This adaptation consisted of the development of both personal forms of the scale that can be used by people with disabilities, or general forms of the scale that can also be used by non-disabled people to rate their attitudes to disability. The end point of the work, however, was the production of an Attitudes to Disability Scale that can be used in a wide variety of studies including population epidemiology, service development and clinical intervention trials in which issues about attitudes such as in relation to stigma and discrimination are essential. The work has been presented to reflect the actual structure of the project with, first, the report of the pilot study in which items were generated and put to preliminary test, followed by a second phase or field trial in which a reduced set of items were tested further.

Pilot study

Method

The WHOQOL-DIS Coordinating Field Centre in Edinburgh produced a draft protocol based on the previous WHOQOL Group experiences in conducting international collaborative research for the development of the WHOQOL-100 and WHOQOL-BREF (The WHOQOL Group 1998a,b). Following initial protocol development, it was circulated to each field centre for comment. In summary, the agreed steps for the development of the WHOQOL-DIS followed the published

WHOQOL methodology, which consisted of focus group work in collaborating centres, item generation, pilot testing, refinement and item reduction, and then field trial testing of the instrument, as outlined below. Prior to the focus group exercise the Group also summarised issues that might not be covered in the WHOQOL that might be relevant for attitudes towards disabilities, and any other issues about the use of measures with these populations.

Focus groups

The protocol for the conduct of focus groups established a common framework for the interpretation and assessment of the data reported by each centre. Once agreed, the protocol was used in each centre as the guide for planning and conducting focus groups for the purpose of eliciting themes in relation to attitudes to disabilities, and for reporting the data back to the Edinburgh Coordinating Centre.

The focus group discussions included four parts: a general unstructured discussion on attitudes to disability that were important for people with physical or ID; a commentary on and assessment of the facets and items from the WHOQOL-BREF instrument in order to consider different specific domains relevant to attitudes; feedback on additional facets and items that had been previously suggested by field centres during the initial discussions; and the gathering of ideas from participants for additional areas of attitudes or items that participants considered were not covered during discussion. Twelve centres completed focus groups with ID (a total number of 56), 10 centres ran focus groups of mixed PD ($n = 45$), 10 centres ran focus groups with adults with Parkinson's disease ($n = 49$), 5 centres ran focus groups with adults with sensory impairment ($n = 29$), one centre ran a focus group with adults with multiple sclerosis ($n = 5$), and all centres ran at least one focus group with carers and one group with health professionals working with people with disabilities (see Van Heck *et al.* in prep., for more details of the focus groups).

Suggestions for possible items were translated into English as the working language; equivalent items were identified across the suggestions from each centre; and each centre was given feedback about the proposed items. This process eventually led to the generation of a set of 38 pilot items that formed the pilot ADS.

Centre	ID	PD	Age ± SD	% Female	% 'not disabled'*
Edinburgh	26	48	61.2 (16.3)	65	3
Barcelona	51	49	49.7 (17.2)	54	38
Paris	17	21	40.3 (16.6)	58	14
Prague	46	60	44.7 (18.3)	51	6
Tromso	7	26	45.1 (11.9)	45	6
Izmir	52	57	32.7 (13.1)	56	23
Vilnius	13	62	48.1 (21.1)	51	1
Sicily	28	72	53.3 (21.3)	45	15
Hamburg	26	35	59.6 (18.2)	79	2
Tilburg	13	37	59.9 (16.2)	58	10
Guangzhou	53	249	45.9 (14.2)	64	7
Porto Alegre	57	88	39.8 (17.2)	48	20
Montevideo	45	51	39.9 (16.5)	51	17
Auckland	7	4	34.0 (8.8)	55	0
Budapest	50	50	40.9 (17.2)	48	12
Total	491	909	45.9 (18.3)	56	13

Table 1 General descriptions of the pilot study sample from each of the 15 centres

* Disabled or not-disabled as subjectively defined.
ID, intellectual disabilities; PD, physical disabilities.

Preliminary measure

There were a number of key points that arose from the focus groups and the expert review. First, it was decided for the pilot study to phrase items in a 'general' form (e.g. 'People with a disability should be valued by society') because at this stage the main focus was on item selection, and to consider a parallel form for the field trial that also included a 'personal' item format (e.g. 'Because of my disability, I feel I am a burden on my family') (cf. Laidlaw *et al.* 2007). Second, and following standard test-item generation recommendations, some items were written in a positive form (e.g. 'People with a disability should be respected') and others in a negative form (e.g. 'People with a disability are lonely and isolated'). Third, the consensus time frame was agreed as 'in general' and a 5-point Likert response format was chosen in order to parallel the WHOQOL-DIS response format, which was being developed at the same time (Power *et al.* 2010).

The results and feedback from the focus groups and from the expert review were collated and a preliminary pilot version of the ADS generated with 38 items in total. The items were grouped into a range of domains that included physical, psychological, social, economic and role status, but part of the purpose of the pilot phase of the study was to examine other possible factor structures for the measure. The items were then translated into the local language and back-translated into English by independent bilingual speakers. The back-translations were reviewed by the coordinating centre and any anomalies reviewed with the local centre.

Participants

The pilot testing was carried out in 15 different WHOQOL centres from around the world (see Table 1). Each centre was asked to test an opportunistic sample of a minimum of 50 people with intellectual or PD, although many centres collected data from more than the minimum numbers (see Table 1). A total of 1400 respondents were included, which consisted of 491 adults with ID and 909 adults with PD.

Statistical analysis

The approach for the statistical analysis was to combine the classical psychometric and modern psychometric approaches together (see Power *et al.* 2005). In this approach, descriptive data analysis is first used to examine item response frequency distributions, missing values analysis, item and sub-

scale correlations and internal reliability analyses, and exploratory and confirmatory factor analyses (CFA). The purpose of this first stage was therefore both item reduction and scale structure exploration. The second stage of analysis used an item response theory (IRT) approach, in particular, that of the Rasch model as implemented in the RUMM2020 programme (Andrich 2005) and in the Winmira programme (von Davier 2001). The IRT approach is especially suited to testing for item equivalence across disparate populations, for example, in order to identify items that function equivalently across different cultural, gender and age groups.

Results

Descriptives

The data presented in Table 1 provide summary descriptions of the samples from each of the 15 centres in terms of age, gender and sample size. There were just under 500 people with an ID who participated and just over 900 people with a PD. The 'disability status' category in Table 1 refers to subjective assessment of disability state, irrespective of objective health-related conditions; the table shows that 13% of the total sample described themselves as 'not disabled' even though all of the sample were accessed through services through which they had been diagnosed with a PD or ID.

The data in Table 2 present a range of descriptive statistics for the combined sample. Missing values were all below 10% and the majority of items showed some degree of skew and kurtosis. An overall scale Cronbach alpha was 0.803, although a number of item-total-corrected *r*s were close to zero, which can suggest the possibility of sub-scales. Table 2 also shows that the first three items have very high mean values, with the highest values for skew and kurtosis, which flags them for possible elimination in item reduction. Subsequent factor analyses were run both with and without mean substitution for missing values, and with and without natural log transformation to control for distribution and outlier effects. These analyses were run for the total sample because some of the centre sample sizes were relatively small. However, a consistent pattern of results emerged across all of the analyses,

therefore the results presented here will focus on the non-transformed total dataset.

Exploratory factor analyses

In order to test for possible sub-scale structure, Exploratory Factor Analyses (EFA) were carried out. Initial Principal Components Analysis with Varimax rotation for the 38 items suggested possible four- or five-factor solutions for factors defined by eigenvalues >1 plus factors being formed by >3 items per factor. An initial solution suggested nine factors with eigenvalues >1, but three of these factors contained only two items, plus the scree slope suggested a maximum of a five-factor solution. However, the five-factor solution also included a factor with only two items loading at >0.4 (and the coefficients were only 0.421 and 0.402), so the PCA approach with Varimax rotation gave best support for the four-factor solution, which accounted for 38.4% of the variance.

A number of authors have argued for EFA that Principal Axis Factoring plus oblique rotation may be more appropriate for attitudinal data in which sub-scales are potentially correlated (e.g. Kline 2000). Principal Axis Factoring followed by oblique rotation analyses led to identical solutions as obtained with the PCA plus Varimax approach; thus, the four-factor solution for PAF was the best supported solution with item loadings on the four factors showing the identical structure to the PCA approach. The two EFA approaches provided therefore a convergence in support for a possible four-factor solution for the pilot version of the questionnaire.

CFA

Confirmatory factor analyses with the structural equation modelling program EQS Version 6.1 for Windows were also employed as a further check on possible sub-scale structure. Missing values were replaced with the appropriate median (in order to preserve the five category structure for the subsequent IRT analyses), and two cases were eliminated as outliers, which gave a sample size of 1398 for the analyses. The initial analyses were run using the Maximum Likelihood estimation model. The CFA showed that a one-factor model fell well below 0.9 on the Comparative Fit Index (CFI) (which ranges

Table 2 Descriptives for pilot version of ADS (max *n* = 1400)

Domain/facet	*n*	MV %	Mean	SD (±)	Skew	*P* (Skew)	Kurtosis	*P* (Kurtosis)	*r* (corrected)
1 Valued by society	1331	4.9	4.47	0.758	−1.897	<0.001	4.940	<0.001	0.249
2 Respected	1339	4.4	4.58	0.647	−1.899	<0.001	5.383	<0.001	0.234
3 Accepted	1320	5.7	4.53	0.702	−1.822	<0.001	4.388	<0.001	0.252
4 Good-looking	1325	5.4	4.08	1.025	−1.039	<0.001	0.325	<0.01	0.185
5 Easy to get on with	1325	5.4	4.02	1.013	−0.898	<0.001	0.104	NS	0.150
6 Hard to make friends	1324	5.4	3.45	1.142	−0.574	<0.001	−0.523	<0.001	0.266
7 Problems getting involved	1302	7.0	3.66	1.068	−0.829	<0.001	0.149	NS	0.302
8 Lonely and isolated	1316	6.0	2.96	1.145	0.052	NS	−0.940	<0.001	0.363
9 Negative ideas	1305	6.8	3.40	1.088	−0.371	<0.001	−0.620	<0.001	0.449
10 Making fun of disabilities	1334	4.7	3.20	1.209	−0.240	<0.001	−0.994	<0.001	0.377
11 Not treated fairly	1309	6.5	3.26	1.157	−0.272	<0.001	−0.850	<0.001	0.423
12 Easier to take advantage	1301	7.1	3.40	1.156	−0.386	<0.001	−0.806	<0.001	0.436
13 More vulnerable	1307	6.6	3.50	1.153	−0.598	<0.001	−0.537	<0.001	0.400
14 Burden on society	1311	6.4	2.72	1.273	0.265	<0.001	−1.085	<0.001	0.248
15 Burden on family	1310	6.4	2.95	1.280	−0.039	NS	−1.134	<0.001	0.189
16 Society more considerate	1314	6.1	4.32	0.759	−1.459	<0.001	3.485	<0.001	0.372
17 Not excluded	1307	6.6	4.23	0.839	−1.496	<0.001	3.022	<0.001	0.280
18 Treated the same as others	1319	5.8	4.30	0.815	−1.434	<0.001	2.631	<0.001	0.341
19 Make positive contribution	1296	7.4	4.20	0.808	−1.205	<0.001	2.163	<0.001	0.325
20 Not defined by disability	1277	8.8	4.18	0.839	−1.216	<0.001	1.850	<0.001	0.323
21 More contact with disabled people	1313	6.2	4.27	0.752	−1.139	<0.001	2.090	<0.001	0.327
22 Ignorant about disability	1297	7.4	3.67	1.058	−0.584	<0.001	−0.316	<0.05	0.385
23 Uncomfortable	1306	6.7	3.32	1.070	−0.322	<0.001	−0.641	<0.001	0.422
24 Frightening	1317	5.9	2.79	1.161	0.043	NS	−0.963	<0.001	0.254
25 Overprotective	1298	7.3	3.42	1.085	−0.344	<0.001	−0.674	<0.001	0.256
26 Impatient	1306	6.7	3.39	1.058	−0.362	<0.001	−0.610	<0.001	0.462
27 No feelings	1302	7.0	3.00	1.155	−0.010	NS	−0.934	<0.001	0.460
28 Sex not discussed	1302	7.0	2.28	1.113	0.735	<0.001	−0.121	NS	0.114
29 Expect too much	1277	8.8	2.68	1.135	0.134	<0.05	−1.022	<0.001	0.101
30 Optimistic about future	1286	8.1	2.34	1.165	0.659	<0.001	−0.481	<0.001	0.063
31 Less to look forward to	1303	6.9	2.68	1.261	0.215	<0.001	−1.155	<0.001	0.107
32 Extra talents	1284	8.3	3.78	0.911	−0.781	<0.001	0.686	<0.001	0.322
33 Stronger	1295	7.5	3.85	0.972	−0.872	<0.001	0.492	<0.001	0.237
34 Wiser	1292	7.7	3.62	0.988	−0.549	<0.001	−0.058	NS	0.234
35 Achieve more	1289	7.9	3.55	1.038	−0.525	<0.001	−0.233	<0.05	0.225
36 Determined	1288	8.0	3.75	0.935	−0.608	<0.001	0.157	NS	0.265
37 Do something special	1285	8.2	3.69	0.949	−0.536	<0.001	−0.018	NS	0.311
38 Satisfying lives	1300	7.1	3.78	1.048	−0.807	<0.001	0.157	NS	0.088
									0.803

MV, missing values.

from 0 to 1, and for which a value of 0.9 or greater is considered as a good degree of 'fit' for the model in question) with the actual value of CFI = 0.333 being obtained. Other commonly used fit indices for CFA (e.g. RMSEA and χ^2) were equally poor. The CFI improved with a possible four-factor solution (CFI = 0.688) that showed further improvement when the four factors were allowed to correlate (CFI = 0.709). However, because the item analyses above had shown some non-normality of distribution, the CFAs were repeated using the EQS Maximum Likelihood Robust estimation model, which may be preferable with non-normal data (Bentler & Wu 2002). Using this approach, the four

factor-correlated model showed a further improvement in fit (CFI = 0.762, RMSEA = 0.053, Satorra-Bentler χ^2 = 3225.6, d.f. = 661, $P < 0.001$). Of course, it would be possible at this stage to improve the fit further through item-reduction, cross-loading of items, and so on, but it was considered preferable to use a more in-depth approach after the IRT item reduction and with the field trial data (presented later).

IRT analyses

RUMM2020 analyses were then conducted both on the overall set of 38 items as well as on each of the four possible sub-scales (see Table 3). Results indicated good fits for the four sub-scale analyses yet only moderate fit for the overall scale. The table gives an overview of results of the RUMM analyses for the sub-scale analyses. RUMM analyses identify a number of items as lacking Rasch properties. Furthermore, results for the overall analysis and the sub-scale-related analysis are inconsistent according to Residuals and Chi-squares, indicating good fits for the sub-scale analyses, however, only moderate fit for the overall scale. Proposals for item selection were therefore based only on the sub-scale-related analyses, and based on the following criteria: threshold-parameters, item characteristics, dispersion indices and differential item functioning (DIF). One of the key problems for the items was that separate analyses for ID and for PD participants showed that they were the main source of the high number of disordered thresholds shown in Table 3. Basically, the ID group were using the 5-point scale as if it were a 3-point scale such that when the items for the ID participants were re-scored to be 3-point scales, then thresholds became ordered and other Rasch properties of the sub-scales improved. A similar problem arose with the WHOQOL-DIS for which it was also decided to switch to a 3-point response format for the ID group (see Power *et al.* 2010, for details).

Proposals for item deletion were therefore drawn from the sub-scales. Several items were highlighted for possible deletion based on the criteria noted above.

Field trial

The field trial version of the ADS included 16 items retained from the pilot study. The

re-conceptualisation of the scale into the four major dimensions of inclusion, discrimination, gains and prospects led to a decision to choose 4-items per sub-scale similar to the WHOQOL measure development (The WHOQOL Group 1998a).

A number of changes were also made to item form and to response format. For the field trial it was decided to produce both a 'general' form of items (e.g. 'People with a disability are a burden on society') and a 'personal' form (e.g. 'Because of my disability, I feel I am a burden on society'), either of which could be used by the field trial centres according to their focus of interest. And the response format was changed for the ID version to three response categories rather than five, because the IRT analyses had indicated that the ID group had treated the scales as if they were 3-point scales. Smiley faces were still included because these had generally received positive feedback especially from the ID participants.

For the actual data collection with the ADS, each participating centre was again asked to include the ADS alongside their field trial testing of the WHOQOL-DIS; these field trials included a range of study types that included clinical trials, population surveys, opportunistic cross-sectional studies and tests of reliability and validity (see Power *et al.* 2010, for further details). The participating centres provided the Edinburgh coordinating centre with a minimum dataset that consisted of the 16-item field trial version of the ADS together with basic socio-demographic and health and disability status information about each respondent. The main purpose of the field trial was to refine the measure further and to provide psychometric data for the scale.

Method

Participants

The field study analyses were conducted on a sample of $n = 3772$ with data coming from 14 national centres (Auckland, Bangalore and Melbourne were unfortunately unable to participate in the field trial). The sample size recruited in each centre varied between $n = 19$ (Paris) and $n = 1000$ (Guangzhou) (see Table 4). The gender rates varied with particularly higher rates of women in the Vilnius centre, but overall there was a good distri-

Table 3 IRT analyses for a possible 4-Domain structure for ADS

PSI	Alpha	Item / Facet	Fit Residual	χ^2	Disordered Threshold	DIF A/B	Gender	Country	Disability
Domain 1									
0.865	0.81	1 Valued by society	2.50	55.26	✓	–	–	✓	–
		2 Respected	−2.12	61.90	✓	–	–	✓	–
		3 Accepted	−4.18	59.71	✓	–	–	–	–
		4 Good-looking	4.30	38.09	✓	✓	–	✓	–
		5 Easy to get on with	6.16	59.28	✓	–	–	–	–
		16 Society more considerate	−1.51	16.95	✓	✓	–	✓	✓
		17 Not excluded	1.50	27.23	✓	–	–	–	–
		18 Treated the same as others	−2.55	34.57	✓	–	–	–	–
		19 Make positive contribution	−0.76	14.34	✓	–	–	–	–
		20 Not defined by disability	−0.10	31.91	✓	–	–	–	–
		21 More contact with disabled people	−1.56	18.38	✓	–	–	–	–
Domain 2									
0.858	0.82	6 Hard to make friends	6.08	50.44	✓	–	–	–	–
		7 Problems getting involved	1.71	18.91	✓	✓	–	–	✓
		8 Lonely and isolated	1.30	7.57	–	–	–	–	–
		9 Negative ideas	−1.27	34.89	–	–	–	–	–
		10 Making fun of disabilities	−0.24	11.72	✓	–	–	–	–
		11 Not treated fairly	−1.44	26.20	–	–	–	✓	–
		12 Easier to take advantage	−2.20	38.16	✓	✓	–	–	–
		13 More vulnerable	−1.58	19.92	✓	–	–	–	–
		22 Ignorant about disability	2.84	20.90	–	–	–	–	✓
		23 Uncomfortable	0.08	16.20	–	–	–	✓	–
		24 Frightening	5.43	27.65	–	–	–	–	–
		25 Overprotective	7.17	77.48	✓	–	–	–	–
		26 Impatient	−1.69	32.29	✓	–	–	–	–
		27 No feelings	−0.08	19.83	–	–	–	–	–
Domain 3									
0.785	0.72	14 Burden on society	2.81	10.63	✓	–	–	–	–
		15 Burden on family	1.78	12.72	–	–	–	–	–
		28 Sex not discussed	0.94	19.65	✓	–	–	–	–
		29 Expect too much	1.98	15.00	–	–	–	–	–
		30 Optimistic about future	−0.85	22.29	✓	–	–	–	–
		31 Less to look forward to	−0.86	40.74	✓	✓	–	✓	–
Domain 4									
0.818	0.77	32 Extra talents	2.06	30.13	✓	–	–	–	–
		33 Stronger	−2.06	18.22	✓	✓	–	–	✓
		34 Wiser	2.21	24.73	–	–	–	✓	–
		35 Achieve more	1.47	4.69	–	–	–	–	–
		36 Determined	−2.09	12.29	–	–	–	–	–
		37 Do something special	−1.64	14.95	–	–	–	✓	–
		38 Satisfying lives	2.03	20.58	–	✓	–	✓	✓

DIF, differential item functioning; IRT, item response theory.

bution with 52.6% of respondents being male and 47.4% being female. Table 4 also shows that most centres found it easier to collect more data from people with PD (69.3%) than from people with ID (30.7%), which, in part, reflected the fact all of the ID participants had to be sufficiently able to give direct self-report, because we did not use any proxy information in the main field trial study.

Table 4 Field trial data

Centre	PD			ID			Total		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Edinburgh	66	61	127	51	53	104	117	114	231
Barcelona	74	75	149	59	40	99	133	115	248
Paris	9	9	18	0	1	1	9	10	19
Prague	171	70	241	25	17	42	196	87	283
Tromso	10	20	30	0	0	0	10	20	30
Izmir	86	71	157	93	57	150	179	128	307
Vilnius	74	168	242	25	35	60	99	203	302
Sicily	159	163	322	13	6	19	172	169	341
Hamburg	31	20	51	45	45	90	76	65	141
Tilburg	61	48	109	0	0	0	61	48	109
Guangzhou	468	339	807	103	90	193	571	429	1000
Porto Alegre	64	98	162	102	55	157	166	153	319
Montevideo	26	22	48	25	52	77	51	74	125
Budapest	66	85	151	78	88	166	144	173	317
Totals	1365	1249	2614	619	539	1158	1984	1788	3772

Statistical analysis

The approach used for the statistical analysis was similar to that of the pilot study and was designed to combine the classical psychometric and modern psychometric approaches together. Again, descriptive data analysis was first used to examine item response frequency distributions, missing values analysis, item and sub-scale correlations and internal reliability analyses, and exploratory and confirmatory factor analyses. The purpose of this first stage was therefore primarily scale structure exploration in order to test unidimensionality of scales for the subsequent IRT analyses. Similarly, the second stage of analysis used the IRT approach, in particular, that of the Rasch model as implemented in the RUMM2020 program (Andrich 2005).

Results

Descriptives

Summary descriptive statistics for item analyses are presented in Table 5 for PD respondents and in Table 6 for ID respondents, although for both the 'general' and the 'personal' forms combined. As a reminder, the means and standard deviations for the ID group are smaller than for the PD group

because of the use of the 3-point rather than 5-point response scales for the ID Group.

There were generally low rates of missing values across the items (range 2.1–6.3%), so for the purposes of subsequent factor and IRT analyses missing values were replaced with median scores because the median retains the category structure for item responses whereas other missing value replacement approaches do not and therefore create an additional small category in the IRT analyses. Values for skew and kurtosis show some degree of skew and kurtosis that are typical for value-laden attitudinal statements (cf. Laidlaw *et al.* 2007). Overall scale Cronbach alphas are good for both PD (alpha = 0.795) and ID respondents (alpha = 0.764) but an examination of the item-total-corrected *r*-values in Tables 5 and 6 show that Items 7, 8, 9 and 10 stand out as low values because they form a clear separate sub-scale.

Factor analyses

The data were analysed using CFA in the EQS Version 6.1 program (Bentler & Wu 2002). A number of models were compared that included 1-factor, 3-factor, 3-factor correlated, 4-factor, and 4-factor correlated for the overall dataset, for sepa-

Table 5 Descriptives and reliability analysis (PD – Max *n* = 2614)

	Item	*n*	MV %	Mean	SD (±)	Skew	P (Skew)	Kurtosis	P (Kurtosis)	r (corrected)
1	Relationships	2493	4.6	3.00	1.205	−0.105	<0.05	−1.097	<0.001	0.553
2	Inclusion	2491	4.7	3.23	1.162	−0.394	<0.001	−0.894	<0.001	0.534
3	Ridicule	2480	5.1	2.75	1.212	0.077	NS	−1.101	<0.001	0.405
4	Exploitation	2483	5.0	2.88	1.224	−0.028	NS	−1.136	<0.001	0.458
5	Burden society	2490	4.7	2.80	1.218	0.045	NS	−1.118	<0.001	0.529
6	Burden family	2484	5.0	2.95	1.234	−0.133	<0.01	−1.117	<0.001	0.507
7	Emotional strength	2486	4.9	3.24	1.090	−0.372	<0.001	−0.629	<0.001	0.179
8	Maturity	2491	4.7	3.23	1.043	−0.291	<0.001	−0.515	<0.001	0.197
9	Achievement	2491	4.7	2.84	1.046	−0.005	NS	−0.598	<0.001	0.046
10	Determination	2485	4.9	3.25	1.023	−0.314	<0.001	−0.379	<0.001	0.119
11	Irritation	2483	5.0	2.96	1.106	−0.083	<0.05	−0.956	<0.001	0.480
12	Ignorance	2486	4.9	2.62	1.066	0.337	<0.001	−0.706	<0.001	0.480
13	Sexuality	2450	6.3	2.34	1.008	0.462	<0.001	−0.278	<0.005	0.426
14	Underestimation	2480	5.1	2.60	1.063	0.287	<0.001	−0.780	<0.001	0.476
15	Optimism	2481	5.1	2.39	1.097	0.480	<0.001	−0.580	<0.001	0.412
16	Future prospects	2480	5.1	2.65	1.146	0.209	<0.001	−0.912	<0.001	0.440
										0.795

MV, missing values.

Table 6 Descriptives and reliability analysis (ID – Max *n* = 1158)

	Item	*n*	MV %	Mean	SD (±)	Skew	P (Skew)	Kurtosis	P (Kurtosis)	r (corrected)
1	Relationships	1134	2.1	2.07	0.885	−0.145	<0.05	−1.710	<0.005	0.458
2	Inclusion	1129	2.5	2.09	0.873	−0.174	<0.01	−1.667	<0.005	0.472
3	Ridicule	1126	2.8	2.01	0.882	−0.024	NS	−1.716	<0.005	0.437
4	Exploitation	1119	3.4	1.98	0.871	0.036	NS	−1.683	<0.005	0.489
5	Burden society	1101	4.9	1.82	0.859	0.358	<0.005	−1.553	<0.005	0.506
6	Burden family	1098	5.2	1.81	0.865	0.377	<0.005	−1.561	<0.005	0.421
7	Emotional strength	1124	2.9	2.19	0.825	−0.362	<0.005	−1.439	<0.005	0.121
8	Maturity	1123	3.0	2.13	0.824	−0.247	<0.005	−1.485	<0.005	0.156
9	Achievement	1119	3.4	2.06	0.829	−0.117	NS	−1.534	<0.005	0.058
10	Determination	1118	3.5	2.23	0.809	−0.442	<0.005	−1.339	<0.005	0.048
11	Irritation	1125	2.8	2.11	0.823	−0.210	<0.005	−1.495	<0.005	0.433
12	Ignorance	1122	3.1	1.90	0.849	0.197	<0.005	−1.584	<0.005	0.445
13	Sexuality	1106	4.5	1.78	0.794	0.420	<0.005	−1.294	<0.005	0.363
14	Underestimation	1113	3.9	1.86	0.809	0.266	<0.001	−1.426	<0.005	0.423
15	Optimism	1114	3.8	1.75	0.800	0.485	<0.005	−1.276	<0.005	0.398
16	Future prospects	1120	3.3	1.82	0.819	0.336	<0.005	−1.432	<0.005	0.488
										0.764

MV, missing values.

rate analyses for PD and ID respondents, and then separate analyses within PD and ID groups for 'general' and 'personal' forms of the scale. These different analyses were compared in order to check whether or not similar conclusions would be reached for the different versions of the ADS about scale structure. Only the overall analyses for ID plus PD, and for general plus personal combined

will be presented here for the sake of brevity. The CFA analyses for the overall combined data using a Maximum Likelihood estimation model showed that the 1-factor solution did not fit the data well (CFI = 0.618, NFI = 0.617, χ^2 = 11 740.9, d.f. = 104, P < 0.001, RMSEA = 0.175). The 3-factor (CFI = 0.799, NFI = 0.796, χ^2 = 6239.1, d.f. = 104, P < 0.001, RMSEA = 0.127) and 4-factor (CFI = 0.741, NFI = 0.738, χ^2 = 8012.7, d.f. = 104, P < 0.001, RMSEA = 0.144) solutions both show significant improved fit in comparison with the 1-factor solution, but the addition of a higher-order factor in the CFA model on which all lower-order factors load improves both the 3-factor model (CFI = 0.868, NFI = 0.866, χ^2 = 4115.8, d.f. = 101, P < 0.001, RMSEA = 0.104) and the 4-factor model (CFI = 0.882, NFI = 0.879, χ^2 = 3709.6, d.f. = 99, RMSEA = 0.099). However, the improvement in fit for the 4-factor-correlated model in comparison with the 3-factor-correlated model is highly significant (χ^2 = 406.2, d.f. = 2, P < 0.001) and consistent across other levels of analysis and therefore the 4-factor-correlated model provides the preferred structure for the ADS. A further comparison of note, however, was that the personal version of the ADS showed better fit for both the PD respondents and the ID respondents than did the general version.

The CFA analyses were extended in two further ways. Two key issues that arise with such a complex attitudinal dataset are that the distributions of the data are non-normal, and the data are nested within centre. EQS offers a Maximum Likelihood Robust estimation model that corrects for non-normal data distribution. Using this estimation model improved the fit of the 4-factor-correlated model (CFI = 0.901, NFI = 0.898, RMSEA = 0.084, Satorra-Bentler χ^2 = 2696.2, d.f. = 100, P < 0.001). Allowing Item 13 ('Sex should not be discussed with people with disabilities') to cross-load onto Factor 2 further improved the fit of this model (CFI = 0.907, NFI = 0.904, RMSEA = 0.082, Satorra-Bentler χ^2 = 2535.9, d.f. = 99, P < 0.001) and additional cross-loadings further improved the fit of the model.

The second issue for the dataset was that the data were nested within centre. An examination of the intraclass correlation coefficients for items within centre showed these coefficients to be mostly very small, with values mostly in the 0.0 to 0.1 range, although Item 9 ('Some people achieve more because of their disability') showed the largest value of 0.236. A multi-level CFA was therefore run within EQS in order to examine the impact of the clustering of data by centre. Again, just to report the values for the best-fitting model, the 4-factor correlated, there was an improvement in fit for the multi-level model (CFI = 0.905, NFI = 0.899, RMSEA = 0.063, χ^2 = 3080.9, d.f. = 200, P < 0.001). This model was further improved by allowing Item 13 to cross-load onto Factor 2 (CFI = 0.914, NFI = 0.908, RMSEA = 0.060, χ^2 = 2817.0, d.f. = 198, P < 0.001) and further improvements in fit were obtainable by allowing additional cross-loadings.

IRT analyses

The four-scale analyses using the RUMM2020 software package are shown in Table 7 for PD participants and in Table 8 for ID participants. The aim of these IRT-based analyses was further item-testing through taking account of DIF, item reverse thresholds and examination of scale fit for items according to the Rasch model. Tables 7 and 8 show the RUMM analyses; DIF analyses were carried out with dichotomised variables for gender, for version (personal vs. general version of the ADS), and for centre (European vs. non-European centres). It should be noted that in relation to centre, although there are other possible centre groupings other than European versus non-European, including analyses on a centre-by-centre basis, the sample sizes that would be involved certainly at centre-level comparisons would be small and unreliable by IRT sample size requirements. Moreover, the use of small opportunistic rather than large representative samples from centres means that the centre DIF analyses need to be treated with considerable caution in comparison with the version and gender DIF analyses. Nevertheless, the centre DIF analyses will be included despite the caution that must be expressed about their interpretation.

The results in Table 7 show that for the PD participants the overall scale PSI values (the IRT equivalent of Cronbach alpha) were good for the general form of the scale (PSI = 0.809) and the personal form was also good (PSI = 0.841). The four

Table 7 IRT analyses (PD 'general' version)

PSI	Alpha	Item/facet	Fit residual	χ^2	Disordered threshold	DIF Gender	DIF Centre
F1							
0.717	0.714	1 Relationships	1.29	11.40	✓	–	✓
		2 Inclusion	−0.75	19.97	✓	–	✓
		5 Burden society	0.31	13.66	–	–	–
		6 Burden family	−1.59	26.64	–	–	–
F2							
0.758	0.754	3 Ridicule	0.47	12.63	–	–	–
		4 Exploitation	−0.14	19.16	–	–	–
		11 Irritation	0.49	22.76	–	–	–
		12 Ignorance	−0.29	20.47	–	–	✓
F3							
0.764	0.760	7 Emotional strength	−2.70	40.47	–	–	✓
		8 Maturity	−0.31	12.36	–	–	✓
		9 Achievement	4.18	47.41	–	–	–
		10 Determination	−1.19	6.24	–	–	✓
F4							
0.811	0.790	13 Sexuality	3.06	23.36	–	–	✓
		14 Underestimation	1.93	32.62	–	–	✓
		15 Optimism	−4.05	50.73	–	–	–
		16 Future prospects	0.58	11.42	–	–	–

sub-scale factors range from PSI 0.758 to 0.811 for the general form (see Table 7) and from 0.780 to 0.850 for the personal form. Table 7 further shows that the sub-scales show good Rasch properties, with generally good item fit, very few disordered thresholds, no gender DIF, though some centre DIF.

The results in Table 8 show the equivalent results for the ID participants with a good range of PSI values across the factors for both general (0.702 to 0.784) and personal (0.686 to 0.827) forms, good item fit, no disordered thresholds, no gender DIF and very little centre DIF, with a similar picture emerging for the personal form of the scale.

Discussion

The two studies presented here summarise the development of a set of measures of attitudes to disability for use with individuals with PD and ID (the 'personal' forms of the scale) and for use with the general population about attitudes to disability in others (the 'general' form of the scale). The

studies demonstrate the development of the module following the WHOQOL methodology (The WHOQOL Group 1998a,b) in which a simultaneous approach to instrument development is employed (Bullinger *et al.* 1996). That is, the starting point for the WHOQOL methodology is an intense qualitative phase of cross-cultural focus groups, which for the ADS were run initially in 12 centres throughout the world. The summary output from these focus groups was used in particular to identify common themes and issues either absent from or poorly covered in existing measures related to attitudes to disability; these themes and issues were used to feed into a review by all of the participating centres, and then to generate a set of pilot items for testing with adults with disabilities.

In terms of psychometric performance, the items selected for the ADS demonstrate good performance both on classical and modern psychometric grounds. The approach taken here shows that both classical and modern methods can be combined appropriately for scale development. Although modern psychometric methods as evidenced by the

Table 8 IRT analyses (ID 'general' version)

PSI	Alpha	Item/Facet	Fit residual	χ^2	Disordered threshold	DIF	
						Gender	Centre
F1							
0.702	0.669	1 Relationships	2.46	10.07	–	–	–
		2 Inclusion	0.96	12.32	–	–	–
		5 Burden society	1.02	11.94	–	–	–
		6 Burden family	1.33	9.07	–	–	–
F2							
0.741	0.737	3 Ridicule	0.74	5.29	–	–	–
		4 Exploitation	1.15	3.17	–	–	–
		11 Irritation	0.95	10.35	–	–	–
		12 Ignorance	1.08	6.02	–	–	–
F3							
0.784	0.789	7 Emotional strength	0.55	3.55	–	–	–
		8 Maturity	0.50	8.19	–	–	–
		9 Achievement	−0.32	10.74	–	–	–
		10 Determination	0.85	9.51	–	–	–
F4							
0.712	0.720	13 Sexuality	3.32	11.48	–	–	✓
		14 Underestimation	0.03	8.48	–	–	✓
		15 Optimism	−0.32	14.46	–	–	–
		16 Future prospects	−0.07	9.81	–	–	–

Rasch modelling approach taken here were primarily developed previously to be used with unidimensional ability scales, their careful use with attitude scales provides a powerful methodology for the development of valid comparable measures across key populations, especially from different cultures. Once the dimensionality has been well identified (both conceptually and empirically) of an attitude scale, then IRT methods such as the Rasch approach can be used (Power *et al.* 2005).

The final version of the ADS developed focused primarily on four different aspects of disability. The first sub-scale focuses on issues of inclusion and exclusion and burden on families and on society as a whole (see Table 9). Sub-scale 2 focuses on a number of specific issues that relate to the general topic of discrimination, which is of especial relevance to people with ID. The third sub-scale has an explicitly positive focus and reflects both positive gains in relation to self and to others that may have been a surprise about disability. The fourth sub-scale focuses primarily on current and future hopes and prospects and whether or not disability impacts

on these hopes. The final version of the scale contained four sub-scales of four items each with the recommended scoring of the scale consisting of a profile set of four sub-scale scores, or, as supported by the existence of a higher-order factor in the CFA, there can be a single total score based on a summation of all 16 items in the scale.

The strengths of the study are that the items and format of the instrument were developed from an extensive search of the literature and consultation with a wide range of people and professionals in the disability field, including people with intellectual and PD themselves and their families. The people with disabilities who participated had a range of comorbid problems and were recruited from a wide range of settings, although only users with mild to moderate ID were included. Only a few scales related to attitudes or to some of the components such as stigma, have included adults with ID (Ali *et al.* 2008). Another strength is that compared with existing scales on attitudes, the ADS comprises more aspects, such as gains and prospects, whereas previous scales have focused mainly on inclusion

Table 9 Attitudes to Disability Scale –summary of retained items for 16-item general scale

Scale 1: Inclusion
  People with a disability find it harder than others to make new friends
  People with a disability have problems getting involved in society
  People with a disability are a burden on society
  People with a disability are a burden on their family
Scale 2: Discrimination
  People often make fun of disabilities
  People with a disability are easier to take advantage of (exploit or treat badly) compared with other people
  People tend to become impatient with those with a disability
  People tend to treat those with a disability as if they have no feelings
Scale 3: Gains
  Having a disability can make someone a stronger person
  Having a disability can make someone a wiser person
  Some people achieve more because of their disability (e.g. they are more successful)
  People with a disability are more determined than others to reach their goals
Scale 4: Prospects
  Sex should not be discussed with people with disabilities
  People should not expect too much from those with a disability
  People with a disability should not be optimistic (hopeful) about their future
  People with a disability have less to look forward to than others

and discrimination aspects (e.g. Thornicroft *et al.* 2007; Ali *et al.* 2008). This scale is the first to have been developed simultaneously cross-culturally and therefore to have cross-cultural validity in addition to drawing directly on the attitudes and experiences of people with disability themselves.

The ADS will permit the assessment of the impact of service provision and of different health and social care structures on personal attitudes, especially in the identification of the possible consequences of policies on QOL of people with disability and a clearer understanding of investment areas to achieve best gains in QOL (cf. Ellis 2005). A related issue is the estimation of the impact of physical, psychological and social interventions in a range of physical and psychological conditions related to disability. Cross-sectional studies between different services or treatments and longitudinal

studies of interventions can be assessed with the ADS in particular in conjunction with the WHOQOL-DIS. The unique cross-cultural approach to the development of the measure means that comparisons can be made between different cultures (cf. Power *et al.* 1999). The exacting standards of instrument development used for the ADS mean that such comparisons run less risk of cultural bias; the WHOQOL methodology provides a unique approach to instrument development that provides for cross-cultural validity for the assessment of attitudes to disability and quality of life across the adult lifespan.

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