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Construction of the descriptive system for the Assessment of Quality of Life AQoL-6D utility instrument

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ABSTRACT

Objectives: To describe the construction of the descriptive system for the Assessment of Quality of Life (AQoL)-6D, a Multi Attribute Utility (MAU) instrument for use in economic evaluation studies.

Methods: AQoL-4D and AQoL-6D introduced the use of psychometric methods in the context of health related Multi Attribute Utility (MAU) modelling for use in economic evaluation studies in which quality of life (QoL) is an important outcome. Both created a multi-level descriptive system in which latent dimension variables were constructed from individual items and which, in turn, created a latent QoL variable.

Results: The AQoL-6D consists of 20 items within 6 dimensions. Structural Equation Modelling (SEM) results reveal that all but one of the gamma weights between dimensions and the AQoL-6D latent variable are 0.73 or greater. Lambda weights between the observed item responses and the dimension latent variables are all above 0.5. The Comparative Fit Index of 0.97 and RMSEA of 0.054 is an exceptionally good result.

Conclusion: The AQoL-6D has excellent psychometric properties and is a suitable basis for generating utility values for the economic evaluation of a wide range of health programs.

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1 Introduction

Multi-Attribute Utility (MAU) instruments seek to measure the quality of life (QoL) of individuals in varying health states for use in economic evaluation studies and, in particular, Cost Utility Analyses (CUA). In principle, MAU instruments have an advantage over holistic health state valuations – one-off evaluations of single health states – as they describe a large number of health states and may be used with a relatively small research budget. In practice, because of the cost and complexity of constructing MAU instruments, only a limited number have been created to date. These include the AQoL-4D (Hawthorne, Richardson et al. 1997; Hawthorne, Richardson et al. 1999), EQ-5D (Dolan, Gudex et al. 1995; Kind 1996), SF-6D, 12D (Brazier, Harper et al. 1998; Brazier, Roberts et al. 2002), Health Utilities Index (HUI 1, 2, 3) (Furlong, Feeny et al. 2001; 2002), and the 15D (Sintonen and Pekurinen 1993).

This paper describes the construction of the descriptive system of the Assessment of Quality of Life (AQoL)-6D which is an extension of the earlier AQoL-4D instrument. It outlines the conceptualization and innovations of the two AQoL instruments, presents results from the AQoL-6D construction analysis, and reports the final AQoL-6D descriptive system[1].

The AQoL instruments: The objective of the initial AQoL instrument (renamed AQoL-4D) was the creation of an instrument using the psychometric principles for instrument construction and an instrument which addressed three challenges, namely, increased sensitivity, a descriptive system based upon handicap and structural independence between dimensions (Hawthorne, Richardson et al. 1999). Increased sensitivity was sought to overcome perceived limitations with existing instruments. It was hypothesized that individual preferences for health states are more closely related to the level of 'handicap' than to impairment or disability and, consequently, that more sensitive measurement will be achieved. With a handicap based than with a 'within the skin' descriptive system.

The third challenge is one of the most problematical in modelling QoL for economic evaluation. According to Decision Analytic theory, dimensions in the combination model should be 'orthogonal' (eg colour of car does not correlate with horsepower; or with location of factory, etc). This avoids double counting of elements – 'structural dependence' or 'non-orthogonality' (eg cost

[1] Utility scaling of the AQoL Mark 2 is described elsewhere (Richardson, Peacock et al. 2007).

of product correlates with cost of labour and size of car, etc). However dimensions of health generally overlap and increasing the number of items in an instrument to achieve content validity and sensitivity increases the likelihood of structural dependence. The 'double counting' of elements can distort estimated utilities and benefits in an economic evaluation (Von Winterfeldt and Edwards 1986).

To achieve sensitivity without double counting, the AQoL-4D adopted a hierarchical descriptive system in which items map into dimensions, and dimensions into an overall latent variable, QoL. Non-orthogonality was permitted within dimensions to increase sensitivity but orthogonality was sought between dimensions through the use of exploratory factor analysis, with varimax rotation. In principle, the effects of non-orthogonality would therefore be constrained within dimensions and minimized. The instrument was scaled – calibrated – using TTO methods and a two part model in which multiplicative modelling was used firstly to construct 4 dimension values and secondly, to combine these dimensions to obtain a single AQoL-4D utility score (Hawthorne, Richardson et al. 1997; Hawthorne, Richardson et al. 1999).

The AQoL-6D project was undertaken to increase the sensitivity of the AQoL-4D. This exacerbated the problem of structural dependence and a new, more powerful technique was introduced to overcome the problem. This was to introduce third stage utility modelling to adjust scores to offset bias from non-orthogonality. An econometric procedure was employed which used a range of multi attribute (holistic) health state utilities as dependent variables and initial multiplicative utility and dimension scores as explanatory variables. With this third stage following and the concern with orthogonality reduced, it was possible to focus more fully upon the sensitivity of the descriptive system in the AQoL-6D.

MAU Instrument Construction Theory: Psychometric procedures for instrument construction involve a combination of theory, data collection and analysis which follow the broad steps outlined in Table 1. Each step has alternative methodologies (and choices have been controversial). The first step is to establish the relevant concept for HRQoL and instrument content (elements). For example, an instrument may be based upon a 'within the skin' concept of health; that is, body impairment and disability of body functions. Alternatively, the instrument may seek to measure the effect of a health state upon handicap, the reduction in a person's ability to operate in their social context. This initial concept will determine the type of items that are subsequently included in the item bank.

Secondly, an item bank is constructed from the literature, from other instruments, from focus groups and directly from clinicians and the research team itself. The initial items in the item bank are 'filtered' to eliminate items which are poorly expressed, which contain ambiguous or multiple elements ('aspects' or 'concepts') or which are obviously repetitive. Final item selection is based upon an analysis of a construction survey – step 3. This is a stratified and representative group of respondents who complete all of the items. Item and statistical analysis in step 4 identify items with desirable properties and which cluster together. The analysis indicates the correspondence between these clusters and the hypothesized dimension structure. The final choice of items is based upon the interplay of empirical results, the selected theory and the coherence of the overall instrument.

The construction of utility weights, described in Part B of Table 1 is discussed in Richardson et al. (Richardson, Peacock et al. 2007). Step 5 involves a 'scaling survey' in which the scaling instrument (Standard Gamble, Time Trade-off, etc) is used to assign value weights to item responses, items and, in the case of AQoL-4D and 6D to the dimensions. These are combined

using an algebraic or econometric model – Step 6. Finally, in step 7 the instrument is tested for reliability, validity and sensitivity in a particular context (Cronbach and Meehl 1955).

Table 1 Steps in constructing an MAU instrument

A. Descriptive System	
1.	Select Theory of HRQoL Select Concept (handicap/disability/impairment) Hypothesise dimensions, elements
2.	Construct Item Bank Literature Focus groups Triage/Filter Linguistic, logical analysis
3.	Construction Survey Population experiencing elements
4.	Derivation of final instrument Psychometric properties of items Statistical analyses plus judgment
B. Utility weights/algorithm	
5.	Scaling Survey Population whose values are required
6.	Modelling utilities Interpolation; derivation of a scoring algorithm
7.	Validation/Testing

2 Methods

The methods used to construct AQoL-6D closely followed the steps described above.

Theory: The AQoL-6D is based upon the hypothesis that (dis)utility depends predominantly upon the effects of a health condition upon a person's capacity to achieve a productive and fulfilling life in their social environment; that is, it conceptualizes health primarily in terms of handicap. This is described by the WHO as "a disadvantage for a given individual, resulting from an impairment or disability... (which) limits or prevents the fulfillment of a role that is normal... for that individual" (1980 p29). Thus, for example, the loss of an eye (impairment) may result in disability (an inability to drive) which may result in social handicap (the person may become isolated in their community). Conversely a blind person who has adapted to their circumstances and, for example, used a taxi for communication and to maintain social contacts, may suffer relatively little loss of utility.

Item Bank: The scope and content of the descriptive system depends upon the scope and content of the items in the 'item bank'. For the AQoL-4D this was constructed from a review of published health related instruments, from focus groups and from expert analyses. The AQoL-6D built upon the AQoL-4D item bank and repeated the process but with a wider focus which emphasised items and elements describing positive health states and health states close to full health. Focus groups were conducted to obtain additional elements and dimensions to those already included in the item bank and to ensure terminology was appropriate for both patients and the general public. The groups included participants associated with health promotion activities sponsored by the Victorian Health Promotion Foundation and potential users of the final

instrument – clinicians, researchers, and decision-makers – from the fields of health promotion ageing, migrant and youth health.

Three broad questions were canvassed: (i) What is the current role of quality of life measurement in health promotion; (ii) How is quality of life conceptualized by practitioners and researchers working in health promotion; and, (iii) What broad changes and developments are likely to occur in Health Promotion that researchers should anticipate in revising a quality of life instrument?

Discussions were transcribed and examined to identify distinct statements which were then rewritten as items. The resulting item bank was subject to logical and grammatical analysis to eliminate obvious duplication and inferior items and to standardize and simplify expression.

Construction survey: The aim of the construction survey was to provide a set of completed items for statistical analysis to determine the final content and structure of the AQoL-6D. There were three main criteria for selecting items from the item bank for inclusion in the survey. These were, first, that the items should result in an instrument which was similar to, but an extension of, the AQoL-4D to allow for comparison and transformation of results; secondly, that the items should improve sensitivity as compared with AQoL-4D particularly in the domain of good health, and thirdly, that there should be multiple items describing each of the important elements hypothesised and supported by the empirical results to this point. Each item was accompanied by a rating scale to indicate item importance for a person's QoL.

The survey was administered to selected members of the Victorian adult population aged 18 and above and patients at a major Melbourne teaching hospital. Patient groups were included to increase the likelihood that responses would include the more severe health states described by the items.

The population sample was selected in two stages. In the first, telephone addresses were selected from a computerized directory stratified by postcode, population of postcode and the social economic (SEIFA) status of the postcode. A RSSI (random start sampling interval) procedure was used in the case of postcodes with populations too small otherwise to warrant inclusion in the sample.) All in-scope users of the telephone service were included and a single individual randomly selected. The number of in-scope persons using the service was recorded and used to weight the sample to offset bias which would otherwise result in over-representation of telephone services used by a smaller number of in-scope persons. In the second stage an introductory letter was sent to the listed telephone subscriber followed by a telephone call. The construction survey was mailed to consenting individuals. Up to two reminder letters or phone calls were made.

Inpatients were selected from four wards of a major Melbourne hospital. Patients were initially approached by cooperating clinical staff with a short letter, an explanatory statement and consent form requesting the patient's participation. Those agreeable were interviewed by members of the research team as were outpatients who were approached in the same way.

The questionnaire was separated into 8 sequences to offset order effects, and randomly allocated to participants. Data from the completed questionnaires were double entered using SPSS v11.5 (SPSS 2004), and inconsistencies checked and re-entered. Items were subject to logical checks of consistency.

Derivation of the instrument: Initially, frequency distributions and missing values for all items were checked to identify those that might lack sufficient variance or have no 'head room' or 'foot room' as such items are less likely to detect change. Items were also more likely to be discarded

when they were expected to discriminate between hospital and population respondents but failed to do so, and when the response level selected constantly conflicted with the importance rating given on the rating scale.

The search for instrument structure used two structural equation programs: for dimensions with fewer than 20 items, the EQS (Bentler and Wu 1995) program was used. For other dimensions, the LISREL (Jöreskog and Sörbom 1996; Jöreskog and Sörbom 1996) program was applied. In each case, polychoric correlations were used to reflect the ordinal nature of the data from the items. For purposes of validation, in the case of one dimension both programs were used and, due to differences in the algorithms, results were found to differ slightly.

The structural equation analysis was conducted in two stages: initially, analysis was conducted domain by domain: for example, all items associated with 'social relations' were examined, then items relating to 'Independent Living' and so forth. Initially the LISREL program was used to test whether items in a dimension measured the same underlying concept. Next, the internal structure of the dimensions was examined: modification indices provided by the LISREL program often suggested sub dimensions, and these were explored. Finally items were excluded which significantly cross loaded between dimensions. In a few instances items were found to measure a different domain from the initial expectation. Examples of the analysis are given in Day et al. (2010).

This process identified a few items that strongly supported a scale within each dimension. The next step was to combine each of these dimensions into an overall model and ensure that each dimension loaded onto an overall latent measure of health related quality of life.

3 Results

Focus groups and item bank: Four focus groups were conducted in addition to those conducted for AQoL-4D, two with health professionals and two with members of the public, with a total of 22 participants (64 percent female). In all groups, both intrinsic and mediating factors were identified as being important for HRQoL. Intrinsic factors are those concerning the self, such as independence, social well-being, emotional well-being, physical well-being, and coping or self-actualization. Mediating factors, such as planning, organization and strategic development facilitated the achievement of HRQoL but were not an intrinsic part of a state of well-being. Only items from the former group were selected for inclusion in the item bank.

The two focus groups which included practitioners sought to identify elements which would be of increasing importance for future HRQoL. Some anticipated the increased importance of less material elements in health, for example spirituality, sexual fulfillment, while others believed that there would be a movement away from individual level objectives towards the achievement of collective goals. Some additions were made to the item bank to accommodate the former comments. The latter comments illustrate the boundaries of an individual oriented QoL instrument.

After 'logical analysis' and triage 112 items were included in the survey, a ratio of approximately 5:1 with the targeted instrument size of 15-25. They included multiple items for each of the elements identified as important.

Table 2 AQoL-6D Construction Respondent Characteristics

	Male	Female	Total
Community	132	184	316
Hospital	156	148	304
Total	288	332	620

		Community			Hospital		
		Male	Female	Total	Male	Female	Total
Age	18-24 years	3	9	12	4	6	10
	25-34	12	33	45	12	14	26
	35-44	18	39	57	16	30	46
	45-54	30	39	69	12	24	36
	55-64	33	34	67	52	34	86
	64+	36	30	66	60	40	100
	Total	132	184	316	156	148	304
Education	primary	19	11	30	32	22	54
	high school	36	72	108	82	84	166
	trade	28	16	44	12	14	26
	university	43	73	116	22	24	46
	other	6	12	18	8	4	12
Occupation	full time	63	38	101	40	12	52
	part time	13	58	72	8	24	32
	unemployed	7	2	9	10	6	16
	home	2	33	34	2	36	38
	retired	43	48	91	72	50	122
	student	2	3	5	2	4	6
	other	1	3	4	20	18	38
	Total	131	185	316	154	150	304
Marital status	married/de facto	99	132	231	108	62	170
	single/never married	19.5	18	37	26	30	56
	single/widowed	4.5	16	21	4	16	20
	single/divorced	9	18	27	18	40	58
	Total	132	184	316	156	148	304
Income	Under $20,000	42	40	82	62	86	148
	20,001-30,000	22	22	45	32	16	48
	30,001-40,000	15	19	34	14	8	22
	40,001-50,000	10	22	33	2	6	8
	50,001-60,000	16	24	40	18	0	18
	60,001-80,000	15	10	25	2	10	12
	above 80,000	11	31	42	6	4	10
	Total	131	168	301	136	130	266
		missing=7	missing=8		missing=20	missing=18	

Construction survey: The construction survey was completed and returned by 316 members of the general public, a response rate of 31 percent of the sample initially targeted, 44 percent of the in-scope (possible) respondents and 78 percent of those sent a questionnaire. 206 outpatients[2] and 96 inpatients were approached. Interviewers reported no refusals to participate from either of these groups. This provided a total of 618 responses. These are classified in Table 2 by their age, gender, socio-economic characteristics and marital status. As shown, the survey succeeded in obtaining a broad spread of respondents across each of these attributes.

Missing information on individual items was well within acceptable boundaries, with the exception of three questions about intimate relationships. These items were subjected to Expectation Maximization Estimation using the SPSS Missing Values procedure (SPSS 2004) so that answers to all the questions in the social dimension were used to estimate values on intimacy questions for those who had not answered.

The final instrument is summarized in Box 1 and the results of the SEM analysis in Figure 1. The instrument consists of 6 dimensions and 20 items. Each of these has between 4 and 6 response levels. Commencing from the left side of Figure 1, the first column of numbers (in boxes) are the gamma coefficients between the dimensions and AQoL latent variables. These are equivalent to standardized correlation coefficients. With the exception of sensory perception where the gamma coefficient is 0.51, all of the coefficients are 0.73 or greater. Lambda weights between the observed item responses and the dimension latent variables – the middle column of Figure 1 – may also be interpreted as equivalent to correlation coefficients. None is below 0.58. Error terms on the individual items in the final, right hand column, are generally low for an analyses of individual level data.

The six AQoL-6D dimensions all load on the one HRQoL factor, while the results of the SEM indicate that they are measuring different aspects of HRQoL. Hence, it is likely these items form a uni-dimensional parsimonious measure but without extensive double-counting within the descriptive system. Dimensions, items and response categories are also summarised in Box 1 and reproduced fully on the AQoL website (http://www.aqol.com.au). The overall Comparative Fit Index (CFI) of 0.97 is considerably higher than the commonly accepted criterion of 0.95 for a satisfactory fit. The RMSEA of 0.054 is well below 0.08, the generally accepted maximum value for a satisfactory fit.

In sum, the results summarized in Figure 1 indicate an exceptionally good result and represent strong evidence of the validity of the model as a representation of the data from our construction sample (Brown and Cudeck 1993; Yu 2002)[3].

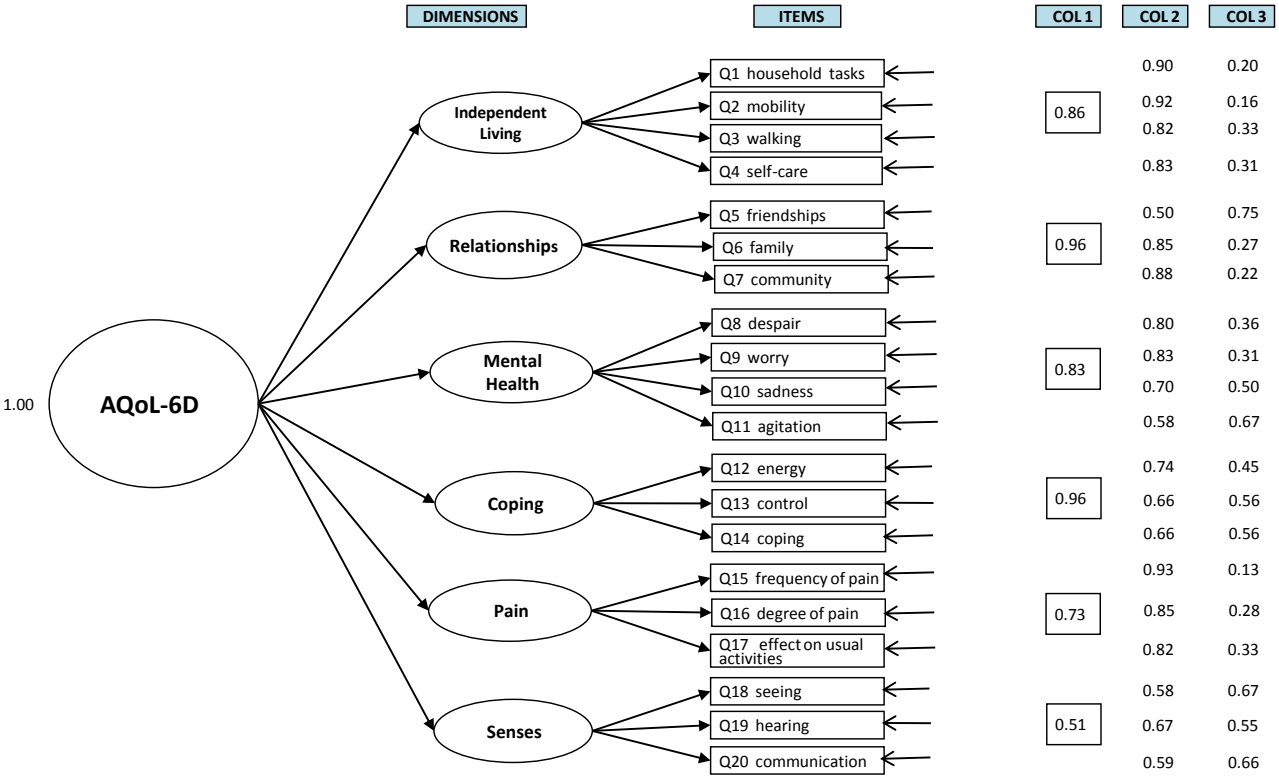
[2] The response rate from the outpatients was indeterminate due to the method of administration.

[3] Yu (2002) investigates goodness of fit indices where data deviate substantially from normality and recommends CFI > .95 and RMSEA around .5 top .6 as providing acceptable Type 1 (5) and Type II errors.

Box 1 Summary of the AQoL-6D content

Item		Response category	Response
Dimension 1 Independent living			
1	help with household tasks	5	no help, efficient … all tasks
2	mobility outside house	6	easy, enjoyable … need help
3	walking	6	running easy … bed ridden
4	self care	5	very easy … need help
Dimension 2 Relationships			
5	intimate relationships	5	very happy … very unhappy
6	health and family role	4	no affect … incapacity
7	health and community role	4	no effect … incapacity
Dimension 3 Mental health			
8	despair	5	never … all the time
9	worry	5	never … all the time
16	Sadness	5	never … all the time
11	calm, agitation	5	always calm… always agitated
Dimension 4 Coping			
12	Energy	5	always energetic … always tired
13	control of life	5	always … never
14	coping with problems	5	completely … not at all
Dimension 5 Pain			
15	frequency	4	rarely … most of the time
16	discomfort	4	none … unbearable
17	interference with activities	5	never … always
Dimension 6 Senses			
18	vision	6	excellent … blind
19	hearing	6	excellent … deaf
20	communication	4	no trouble … cannot communicate

Figure 1 Structure of AQoL-6D descriptive system



Notes

1. Chi square = 460.73, df = 164; P-value = 0.0000; RMSEA = 0.054; CFI = 0.99
2. Column 1 represents gamma coefficients (between the AQol and dimension latent variables), column 2 represents lambda coefficients (between dimension and items), column 3 represents error terms on each of the items.

4 Discussion

The development of methods for the construction of the earlier AQoL-4D instrument was motivated by two significant problems with existing MAU instruments; the ad hoc construction of descriptive systems and their lack of breadth and sensitivity particularly in the good to best health range of the scale. This does not imply that they are 'invalid' in all contexts, but that their valid applicability is limited.

The AQoL projects also sought to contribute to MAU instrument design and construction methodology. Their use of psychometric methods and a multi level structure for an MAU instrument are innovative. Items have been commonly selected for instrument construction on the basis of logical and content analysis alone (Bowling 2001; Bowling 2005). However, in use, responses often reflect idiosyncrasies of language and secondary connotations of words which may not be correctly identified in logical analysis. Similarly, the implication of content overlap with other items or combinations of items may be opaque. Techniques used in psychometric theory are specifically designed to take account of these factors.

Results for the AQoL-6D descriptive system strongly suggest that the structure of preferences for health states does not lend itself to simple modelling. This arises, fundamentally, from the complexity of the underlying construct and the unavoidability of structural dependency in large instruments. The AQoL-4D relied primarily upon principal components and exploratory factor analysis to ensure that at least the dimensions were orthogonal in the psychometric sense; that is, that all of the common variance between the dimensions was explained by the latent variable and that the error variances were uncorrelated. The AQoL-6D relied primarily upon SEM to select the best fitting items and dimensions with the 'backup' of an econometric correction in the scaling, to eliminate residual redundancy.

At all stages of the analysis, the structure of the model was reviewed from a substantive as well as a statistical view point. In choosing items to include, and deciding upon the desirable structure, SEM was used to establish a range of variant models. Decisions between the models or about variations within them were informed by consideration of the substantive coverage of what is generally regarded as HRQoL. As an example, a review of the model shows loadings between items and dimensions (lambdas) are generally high, indicating a close relationship between the variance of each item and the dimension it represents. The exceptions are in the sensory perception dimension, where the lowest loading (0.58) is for Q18 about vision. This suggests that vision is less closely related to HRQoL than other items in the model. This is readily interpretable: people can suffer poor vision without it necessarily being related to other deficiencies in HRQoL. Similarly the loading from the AQoL-6D to the sensory perception domain (gamma coefficient) is lowest in this region of the model: 0.51. This suggests that sensory perception is less closely related to the other constructs represented by the general AQoL HRQoL measure. However, to exclude vision or sensory perception from a generic instrument would violate the usual understandings of HRQoL, and, consequently, they were included in the model. Despite the low loadings they do not compromise the overall fit of the model to the data.

The final AQoL-6D descriptive system defines 6.58×10^{13} health states. The majority of these are irrelevant as they consist of combinations of health states which may not exist. Nevertheless the number indicates that the instrument achieves an unprecedented level of detail with respect to the dimensions of health which it encompasses.

Table 3 describes the relationship between the AQoL-4D and the AQoL-6D. The newer instrument overlaps and extends AQoL-4D both in terms of the range of elements embodied in the items and in the sensitivity of the responses. In particular, AQoL-6D gives additional items relating to coping and pain. It does not include items relating to illness as did the initial AQoL-4D instrument but which were subsequently removed during the validation process. As noted above, differences between the instruments do not indicate that one is right and one is wrong. The shorter AQoL-4D may represent a sufficient description in one context but AQoL-6D may be superior in another. Comparability between final utility scores is outside the scope of this paper, but other research indicates that each provides an unbiased estimate of the other (http://www.aqol.com.au).

Table 3 Comparison of AQoL-6D and AQoL-4D

Dimension	AQoL-4D[1]		AQoL-6D	
	Items (levels)	Combinations	Items (levels)	Combinations
Independent living	3 (444)	64	4 (5665)	900
Social relationships	3 (444)	64	3 (544)	80
Physical senses	3 (444)	64	3 (664)	144
Psychological wellbeing	3 (444)	60	4 (5555)	625
Pain	-		3 (445)	80
Coping	-		3 (555)	125

Note

1. Following a number of validating studies the illness dimension was removed from the final AQoL-4D scoring algorithm

5 Conclusion

The AQoL-6D is a more complex instrument than others reported in the literature. This was justified by the need to increase the sensitivity of available instruments and particularly for interventions where the benefits are associated with the change in the level of handicap and where 'within the skin' description is less likely to provide an indication of utility. The greater complexity of the instrument brought its own problems in the construction methods. In particular, it is difficult to envisage a descriptive system of this complexity which achieves construct validity without the use of the appropriate psychometric construction methods. With more elements potentially subtracting from utility, structural and preference dependence become of greater concern. Whilst administration of the AQoL-6D instrument is relatively simple – typically taking 2 to 3 minutes – calculation of utilities is more complex (see Richardson et al. (2007). However, the AQoL-6D utility algorithm is available for general use free of charge (http://www.aqol.com.au).

In sum, the instrument has excellent psychometric properties and is a suitable basis for generating utility scores for the economic evaluation of a wide range of health programs. Alternatively, it may be used as an unweighted ‘psychometric instrument’ to provide values for each of the 6 dimensions in addition to a single global score.

Appendix 1 AQoL-6D Questionnaire

Dimension 1: Independent Living

Q1 How much help do I need with household tasks (e.g. preparing food, cleaning the house or gardening):

- ❑ I can do all these tasks very quickly and efficiently without any help
- ❑ I can do these tasks relatively easily without help
- ❑ I can do these tasks only very slowly without help
- ❑ I cannot do most of these tasks unless I have help
- ❑ I can do none of these tasks by myself.

Q2 Thinking about how easy or difficult it is for me to get around by myself outside my house (eg shopping, visiting):

- ❑ getting around is enjoyable and easy
- ❑ I have no difficulty getting around outside my house
- ❑ a little difficulty
- ❑ moderate difficulty
- ❑ a lot of difficulty
- ❑ I cannot get around unless somebody is there to help me.

Q3 Thinking about how well I can walk:

- ❑ I find walking or running very easy
- ❑ I have no real difficulty with walking or running
- ❑ I find walking or running slightly difficult. I cannot run to catch a tram or train, I find walking uphill difficult
- ❑ walking is difficult for me. I walk short distances only, I have difficulty walking up stairs
- ❑ I have great difficulty walking. I cannot walk without a walking stick or frame, or someone to help me
- ❑ I am bedridden.

Q4 Thinking about washing myself, toileting, dressing, eating or looking after my appearance:

- ❑ these tasks are very easy for me
- ❑ I have no real difficulty in carrying out these tasks
- ❑ I find some of these tasks difficult, but I manage to do them on my own
- ❑ many of these tasks are difficult, and I need help to do them
- ❑ I cannot do these tasks by myself at all.

Dimension 2: Relationships

Q5 My close and intimate relationships (including any sexual relationships) make me:
- ❑ very happy
- ❑ generally happy
- ❑ neither happy nor unhappy
- ❑ generally unhappy
- ❑ very unhappy

Q6 Thinking about my health and my relationship with my family:
- ❑ my role in the family is unaffected by my health
- ❑ there are some parts of my family role I cannot carry out
- ❑ there are many parts of my family role I cannot carry out
- ❑ I cannot carry out any part of my family role.

Q7 Thinking about my health and my role in my community (that is to say neighbourhood, sporting, work, church or cultural groups):
- ❑ my role in the community is unaffected by my health
- ❑ there are some parts of my community role I cannot carry out
- ❑ there are many parts of my community role I cannot carry out
- ❑ I cannot carry out any part of my community role.

Dimension 3: Mental Health

Q8 How often did I feel in despair over the last seven days?
- ❑ never
- ❑ occasionally
- ❑ sometimes
- ❑ often
- ❑ all the time.

Q9 And still thinking about the last seven days: how often did I feel worried:
- ❑ never
- ❑ occasionally
- ❑ sometimes
- ❑ often
- ❑ all the time.

Q10 How often do I feel sad?
- ❑ never
- ❑ rarely
- ❑ some of the time
- ❑ usually
- ❑ nearly all the time.

Q11 When I think about whether I am calm and tranquil or agitated:

- ❑ always calm and tranquil
- ❑ usually calm and tranquil
- ❑ sometimes calm and tranquil, sometimes agitated
- ❑ usually agitated
- ❑ always agitated.

Dimension 4: Coping

Q12 Thinking about how much energy I have to do the things I want to do, I am:

- ❑ always full of energy
- ❑ usually full of energy
- ❑ occasionally energetic
- ❑ usually tired and lacking energy
- ❑ always tired and lacking energy.

Q13 How often do I feel in control of my life?

- ❑ always
- ❑ mostly
- ❑ sometimes
- ❑ only occasionally
- ❑ never.

Q14 How much do I feel I can cope with life's problems?

- ❑ completely
- ❑ mostly
- ❑ partly
- ❑ very little
- ❑ not at all.

Dimension 5: Pain

Q15 Thinking about how often I experience serious pain. I experience it:

- ❑ very rarely
- ❑ less than once a week
- ❑ three to four times a week
- ❑ most of the time.

Q16 How much pain or discomfort do I experience:

- ❑none at all
- ❑I have moderate pain
- ❑I suffer from severe pain
- ❑I suffer unbearable pain.

Q17 How often does pain interfere with my usual activities?

- ❑ never
- ❑ rarely
- ❑ sometimes
- ❑ often
- ❑ always

Dimension 6: Senses

Q18 Thinking about my vision (using my glasses or contact lenses if needed):

- ❑ I have excellent sight
- ❑ I see normally
- ❑ I have some difficulty focusing on things, or I do not see them sharply. E.g. small print, a newspaper or seeing objects in the distance.
- ❑ I have a lot of difficulty seeing things. My vision is blurred. I can see just enough to get by with.
- ❑ I only see general shapes. I need a guide to move around
- ❑ I am completely blind.

Q19 Thinking about my hearing (using my hearing aid if needed):

- ❑ I have excellent hearing
- ❑ I hear normally
- ❑ I have some difficulty hearing or I do not hear clearly. I have trouble hearing softly-spoken people or when there is background noise.
- ❑ I have difficulty hearing things clearly. Often I do not understand what is said. I usually do not take part in conversations because I cannot hear what is said.
- ❑ I hear very little indeed. I cannot fully understand loud voices speaking directly to me.
- ❑ I am completely deaf.

Q20 When I communicate with others, e.g. by talking, listening, writing or signing:

- ❑ I have no trouble speaking to them or understanding what they are saying
- ❑ I have some difficulty being understood by people who do not know me. I have no trouble understanding what others are saying to me.
- ❑ I am understood only by people who know me well. I have great trouble understanding what others are saying to me.
- ❑ I cannot adequately communicate with others.

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