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Deriving preference-based utility measures from existing measures

6th UK Rasch User Group Meeting

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Overview

- Introduction to health economics & quality adjusted life years (QALYs)
- Rasch Analysis in constructing preference-based measures
 - Multidimensional instruments
 - Unidimensional instruments



Economic evaluation

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 - At what cost?
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QALY



QALYs for economic evaluation

- QALY = Quality Adjusted Life Year
 - Combines both quantity and quality of life into a single measure of health outcome
 - Adjusts life years by a quality weight that reflects preferences on a 0-1 dead-full health scale
 - Can be used across all health care interventions for all patient groups
 - Provides a single index number
 - indicates which treatment is more effective
 - indicates how health changes over time



Health utility measurement

- Health utility measurement provides the quality adjustment weight; the 'Q', for the QALY
- Health utility values are measured on an interval scale
 - upper anchor at one for full health
 - lower anchor at zero (assuming it is equivalent to dead)
- Utility values generate a single score per health state based on preferences

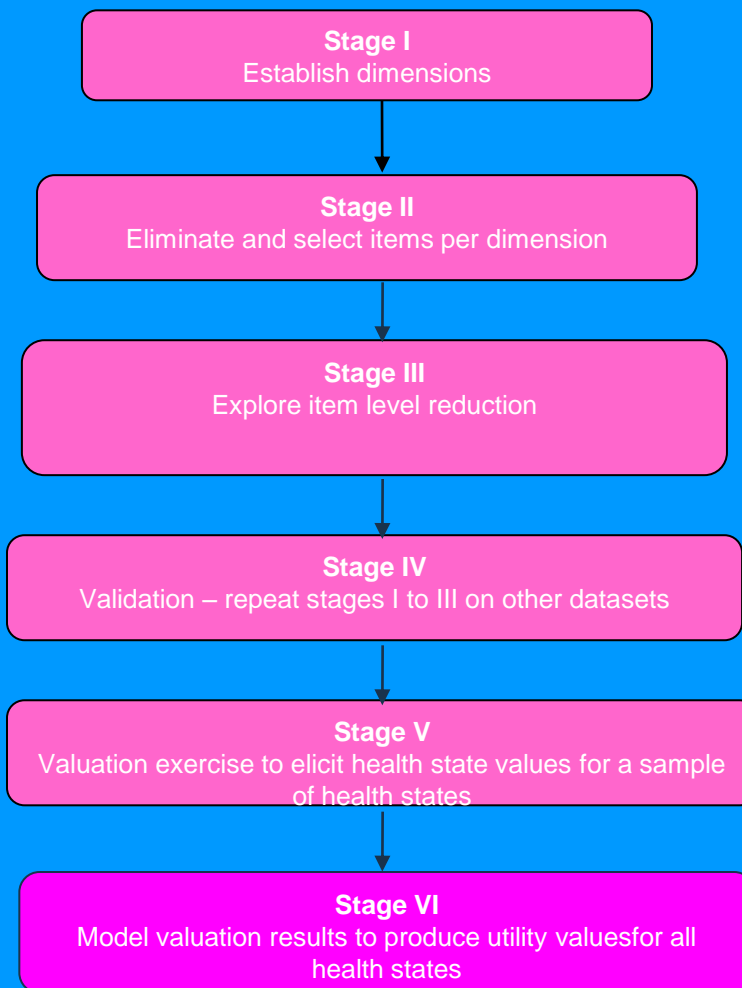


Health utility measurement

- Obtaining the 'Q' in the QALY has two components:
 - Health state description
 - Corresponding utility value
- Usually obtained using a preference-based measure
- PROMs can be used to generate the health state description
- But many PROMs are not preference-based so cannot be used directly



Introduction





Stage I: Establish dimensions

- It is advisable to check the original HRQL dimension structure using traditional methods such as Factor Analysis and Cluster Analysis
- OAB-q symptoms dimension – urge and desire



Stage II: Eliminating & Selecting Items

Eliminating items – item level ordering

- Unordered items highlight inability of responder to distinguish between item levels
- Wish to select items for our health state classification that respond to full range of severity
- Examine threshold probability curves OR category probability curves
- Exclude items for HSC that are unordered



Elimination – DIF

- Establish whether responders with different characteristics (e.g. male/female) consistently answer differently
- Items where it is necessary to adjust for DIF are of limited value for cross population comparisons



Elimination – Model Fit

- Need to achieve overall Rasch model goodness of fit
- If overall Rasch model has poor fit examine individual item goodness of fit statistics for non-unidimensionality
- Items that are poor fitting are excluded from the health state classification



Selecting Items

- Aim is to select items for the health state classification that span the full range of condition severity
- Combine results from Rasch with classical psychometric criteria
 - **Spread of item levels across latent space**
 - Item level goodness of fit (chi-squared)
 - Logit score – even spread



OABq: Item Selection – Symptom

		Rasch Criteria			
Item	dimension	Location	Residual	χ^2_5 (P-value)	Spread at logit 0
2	Symptoms	-0.17	-0.11	5.28 (0.382)	0.88
3	Symptoms	-0.21	-0.38	14.98 (0.010)	0.81
8	Symptoms	0.14	1.22	0.60 (0.988)	0.63
11	Coping	0.23	1.73	9.37 (0.095)	0.43
21	Coping	0.16	0.10	2.42 (0.788)	0.55
22	Coping	-0.51	-0.46	6.28 (0.280)	0.54
12	Sleep	-0.17	-0.47	18.51 (0.002)	0.78
31	Social	0.40	-1.86	6.46 (0.264)	0.63
28	Concern	1.18	-0.13	4.83 (0.437)	0.39



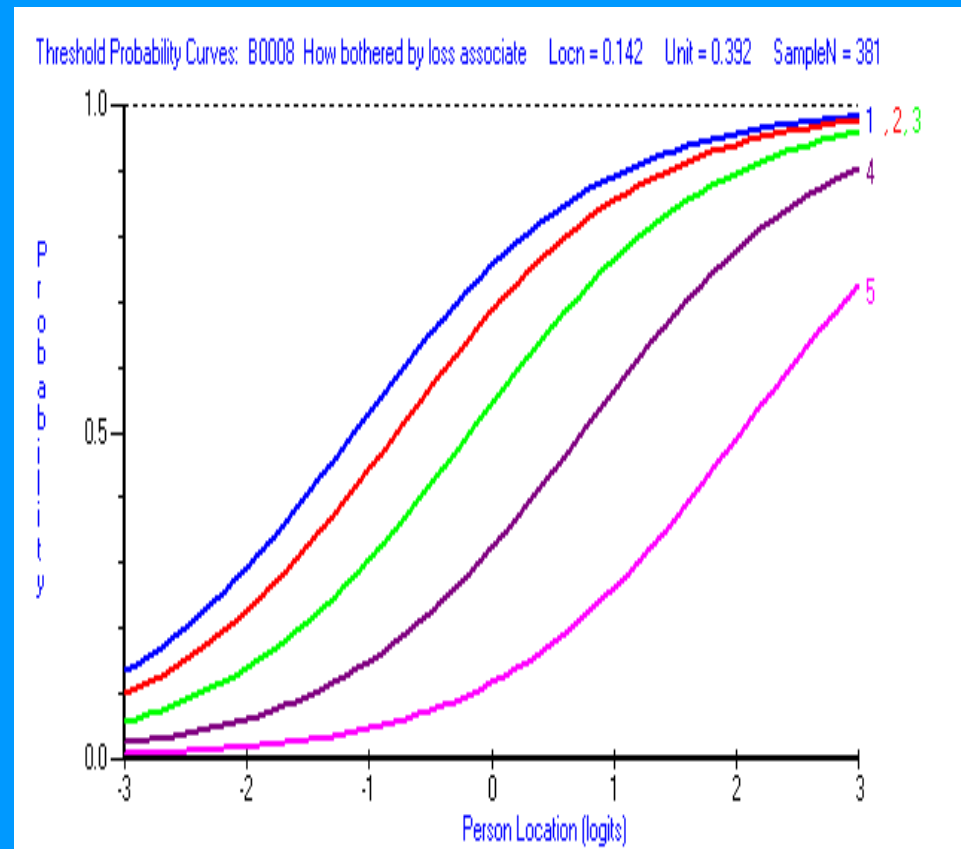
OAB-5D

- Symptom (urge): Item 2 – an uncomfortable urge to urinate
- Symptom (loss): Item 8 – urine loss associated with a strong desire to urinate
- Sleep: Item 12 – bladder symptoms interfered with your ability to get a good night's sleep
- Coping: Item 21 – bladder symptoms caused you to plan escape routes
- Concern: Item 28 – bladder symptoms caused you embarrassment



Stage III: Explore item level reduction

- Concern that participants in the valuation stage may have problems processing information from a large number of item levels.





URGE

- 1 **Not at all** bothered by an uncomfortable urge to urinate
- 2 Bothered by an uncomfortable urge to urinate **a little bit or somewhat**
- 3 Bothered by an uncomfortable urge to urinate **quite a bit**
- 4 Bothered by an uncomfortable urge to urinate **a great deal**
- 5 Bothered by an uncomfortable urge to urinate **a very great deal**



Stage IV: Validation

- Validation should be undertaken to strengthen the justification for items selected in the health state classification
 - A random sample from the original data set
 - Samples from other data sets



Stage V: Valuing health states

- Preferences usually obtained using representative sample of general population
 - as healthcare often publicly funded
- Classification systems define thousands of health states e.g. OAB-5D has 3125
- Too many to value – selection are chosen using statistical techniques
- E.g. OAB-5D: 98 health states valued by 308 members of UK general population using time trade-off



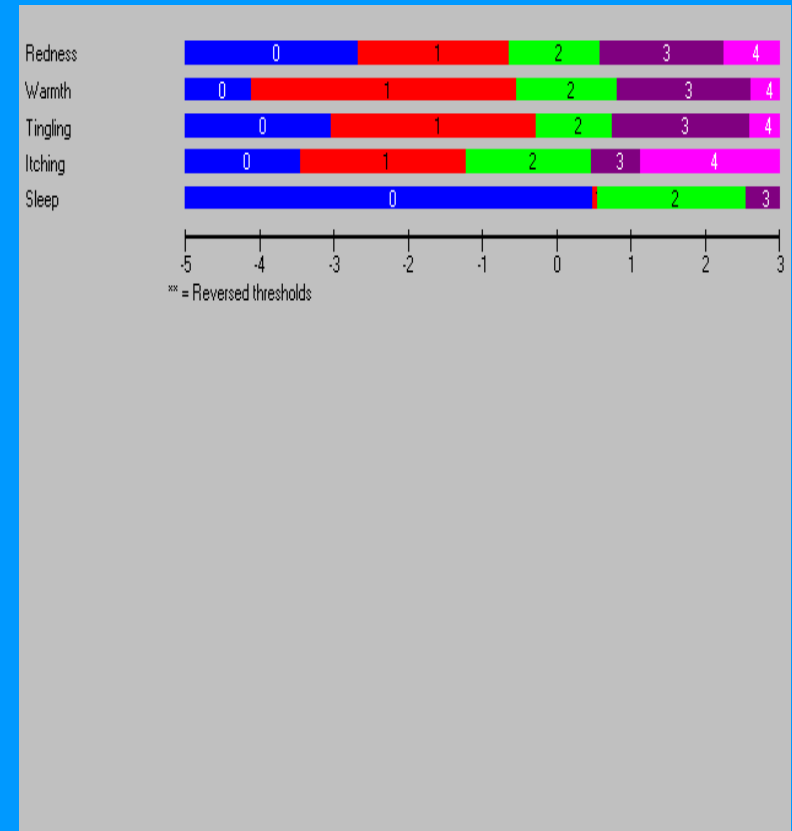
Stage VI: Estimating utility values for all states

- Stage V elicits utility values for a sample of health states
- Need utility values for every health state
- Regression analysis used to estimate a utility decrement from full health for every severity level of every dimension
- These results are used to estimate utility values for every health state described by classification system



The unidimensional instrument

- Stage V: selecting states for valuation using orthogonal arrays can lead to problems when valuing states as some combinations are implausible
 - e.g. feeling downhearted and low and happy most of the time





Conclusions

- The methods described here are not a definitive solution
- Still some level of subjectivity in item selection, important to have a team of experts involved in the selection process