

INTRODUCTION

Health and vision-related quality of life in children with intellectual disability (ID) is an unexplored area. The relationship between visual function and quality of life (QoL) has not been investigated in the population of children with ID. Given the high prevalence of visual anomalies, the importance of timely, regular vision assessment in people with ID becomes more apparent.

AIM

To investigate the psychometric properties of instruments for the assessment of self-reported functional vision performance (FV) and health-related quality of life (HQoL) in children with ID.

METHODS

After a preliminary item-generation process, items were selected from three previously validated instruments in consultation with a focus group. The questionnaires were:

- AUQUEI (Manificat S, et.al,1997) – Self perceived HQoL;
- LVP-FVQ (Gothwal VK, et al.,2003) – Self perceived FV.

Two instruments (AUQUEI, LVP-FVQ) designed for the assessment of FV and HQoL were adapted and administered to 168 school children with ID aged 8 to 18 years. 53 subjects (31.5%) with IQ of 55 to 70 (mean=60.8, SD=4.1) were classified as having mild ID and 115 (68.5%) with ID of 40 to 54 (mean=44.5, SD=3.5) were classified as having moderate ID. Subjects with IQ less than 40 (severe or profound ID) and/or otherwise unable to respond to the questionnaires were not included in this study. The mean subject age was 14.3 years (standard deviation 3.0), and 57% of the respondents were male.

An ophthalmic examination was conducted on 107 subjects whose parents gave consent for this part of the study. This examination established whether subjects had visual abnormalities and provided an indication of the extent to which the LVP-FVQ, intended for children with low vision, would apply to these subjects. The screening procedure included monocular visual acuity testing, static retinoscopy, colour vision test, stereoacuity test, cover test and direct ophthalmoscopy. Subjects found to have significant visual abnormalities were referred for further assessment as appropriate.

Rasch analysis was employed to determine the appropriateness of the rating scales of the two instruments and to identify any redundant items. Construct validity of the instrument is specified by the data fit and the form of relationship between respondents and the items. Furthermore, construct validity is indicated by the order of items determined by Rasch analysis, i.e. whether the ranking of the items is consistent with the construct theory.

RESULTS

Redundant items were excluded by the results of descriptive statistics and Rasch analysis, leaving 16 of 22 items in the revised AUQUEI and 15 of 23 in the LVP-FVQ. The AUQUEI items showed disordered thresholds on the rating scale. A modified step calibration (collapsed from four categories to three categories) resulted in ordered response thresholds for all items. The adjusted instruments produced an overall fit to the model (item infit, 1.01-1.05 ± 0.11-0.23; outfit, 0.80-1.06 ± 0.31-0.01), indicating good construct validity. After Rasch analysis, AUQUEI showed good content validity (person separation 2.18; item reliability 0.99; Cronbach α 0.89), while LVP-FVQ couldn't show different subject groups well (person separation 1.35, item reliability 0.94; Cronbach α 0.84). Increased similarity of person and item means and standard deviations on the logit scale after modification would indicate that the instruments were more applicable to the target population in their modified form.

RESULTS

Table 1 Descriptive statistics for the excluded items in AUQUEI and LVP-FVQ, showing examples of those excluded. Asterisks indicate items not meeting criteria for skew, kurtosis or ceiling effect. In the AUQUEI, each item was asked in the form of "...I feel:" and in LVP-FVQ, it was "Can you...?" (except for item 15 "Is your handwriting neat?"). Values of skew, kurtosis, percentage of missing data and percentage ceiling effect (percentage of responses in the highest options) are shown. Ceiling/floor effect was cut off at a lenient level of 90% in the dichotomous scale (LVP-FVQ) and 50% in Likert scale (AUQUEI), to ensure that potentially valuable information was not lost.

Item	Description	Skew	Kurtosis	Missing Data [%]	Ceiling Effect [%]
AUQUEI					
6	On my birthday	-2.3 *	5.9 *	1.2	77.4 *
12	When I am with my grandparents	-1.7	1.8	1.2	66.7 *
15	When I am eating	-1.4	2.8 *	1.8	56.0 *
17	When I am not sick	-1.4	2.5 *	1.8	52.4 *
LVP-FVQ					
1	Can you climb up and down stairs?	-7.3 *	52.3 *	0.6	98.2 *
5	Can you find food on your plate when eating?	-4.6 *	19.2 *	1.8	95.8 *
6	Can you find your favorite toy at play time?	-4.6 *	18.9 *	3.0	95.7 *
10	Can you see the TV clearly?	-4.0 *	14.0 *	1.2	94.6 *
13	Can you see the pictures in your books clearly?	-3.7 *	11.7 *	3.6	93.8 *
17	Can you write the numbers from 1 to 10?	-2.9 *	6.3 *	2.4	90.9 *

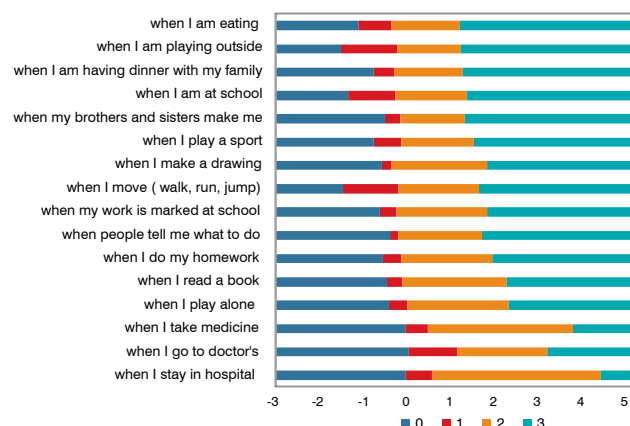


Figure 1 Threshold map of AUQUEI, showing ordered thresholds after item rescaling. The numbers in the bar represent the threshold levels. The scale below the bar indicates the category difficulty.

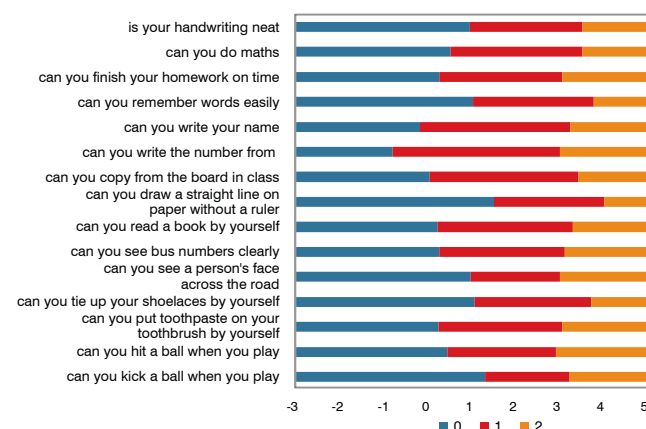


Figure 2 Threshold map of LVP-FVQ, showing ordered thresholds after item rescaling. The numbers in the bar represent the threshold levels. The scale below the bar indicates the category difficulty.

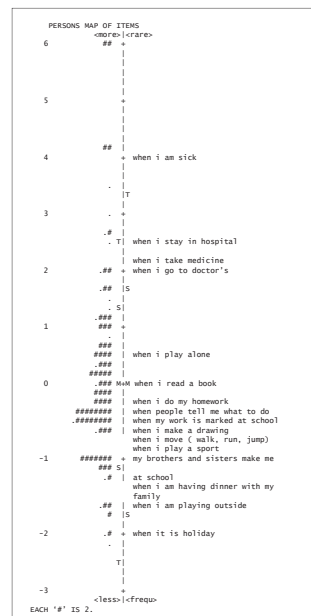


Figure 3 Person-item map of the Rasch-scaled AUQUEI, showing the distribution of the Rasch calibrated respondents scores (right) and item locations (left). Each '#' represents 2 children. More able children and more difficult items are near the top.

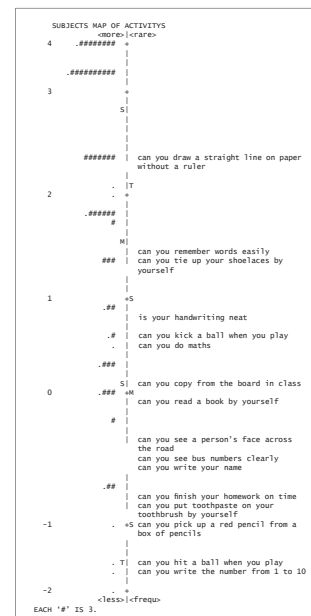


Figure 4 Person-item map of the Rasch-scaled LVP-FVQ, showing the distribution of the Rasch calibrated respondents scores (right) and item locations (left). Each '#' represents 3 children. More life satisfied children and less favorable activities are near top.

Table 2a Person separation, Targeting of items to subjects, Person and item reliability and Residual variance explained by measures for original AUQUEI and revised versions

	23 Item AUQUEI [4 Categories]	23 Item AUQUEI [3 Categories]	19 Item AUQUEI [3 Categories]	17 Item AUQUEI [3 Categories]
Person separation	2.08	2.41	2.27	2.18
Difference between item and subject means (subject SEM)	1.30 (0.08)	0.50 (0.10)	0.21 (0.10)	0.03 (0.10)
Cronbach Alpha [KR-20] person reliability	0.88	0.91	0.89	0.89
Item reliability	0.99	0.99	0.99	0.99
Residual Variance explained by measures [Unexplained variance in 1st contrast] [%]	70.7 (3.4)	84.0 (1.7)	83.2 (1.9)	85.1 (1.9)

Table 2b Person separation, Targeting of items to subjects, Person and item reliability and Residual Variance explained by measures for original and item-reduced LVP-FVQ

	22 Item LVP-FVQ	16 Item LVP-FVQ
Person separation	1.39	1.35
Difference between item and subject means (subject SEM)	2.70 (0.11)	1.40 (0.12)
Cronbach Alpha [KR-20] person reliability	0.85	0.84
Item reliability	0.95	0.94
Residual Variance explained by measures [Unexplained variance in 1st contrast] [%]	68.3 (3.2)	56.5 (5.2)

Table 3 Excluded items in AUQUEI and LVP-FVQ by Rasch analysis. The reasons for the exclusion of the items are as listed. The targeting of items to subjects was improved after the exclusion of items not well matched to subjects. Identification of the item which did not comply with Rasch revised content of the LVP-FVQ helped to improve content validity.

Item Description	Reason for exclusion
AUQUEI	
2. When I go to bed at night	Item misfit Rasch model with infit >1.5 and disordered categories
11. When I watch television	
LVP-FVQ	
2. Do you bump into things?	Item did not comply with the Rasch revised content
7. Can you pick up a red pencil from a box of pencils?	Item with mean further from subject mean

DISCUSSION

Rasch analysis identified misalignments between some items and subjects' lifestyles and capabilities which suggested that the removal of these items would result in better applicability of the instruments to this population. Following consideration of the context and meaning of the items, some of these were excluded to improve application validity in this population.

Category modification reduced the AUQUEI from a four-point to two-point scale. This instrument could be further improved for this population, by modification of the two categories.

The LVP-FVQ items described activities that our respondents generally found easy, so this questionnaire could be further improved for this population by modification of the items. This finding is perhaps not surprising, since the original was designed for children with low vision.

CONCLUSION

Rasch analysis indicates that questionnaires of the kind described here may be used in the assessment of HQoL in children with at least mild to moderate intellectual disability. With further refinement, the adapted questionnaires may be valid for use in this population.

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