

TOWARDS EFFICIENT AND CONCISE FUNCTIONAL ASSESSMENT IN ALZHEIMER'S DISEASE:

Using Item Response Theory to shorten the Amsterdam IADL Questionnaire

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Background

- Amsterdam Instrumental Activities of Daily Living Questionnaire (A-IADL-Q-30) was previously found to be a reliable and valid functional measure in memory clinic settings.^{1,2,3,4}
- A shorter, more efficient and concise version may improve feasibility in diverse clinical and research settings.

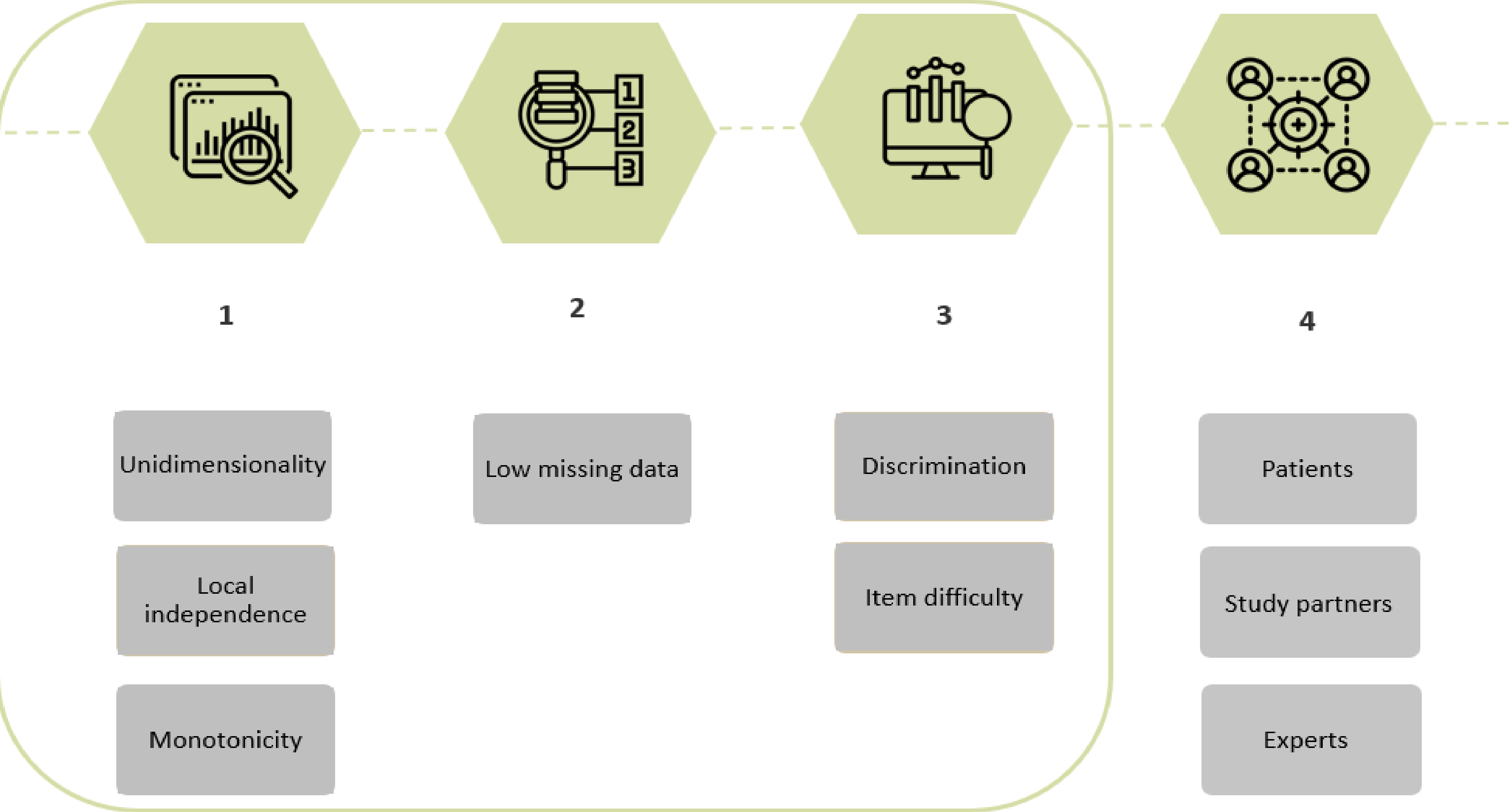
Aim

To select candidate items from the A-IADL-Q-30 based on psychometric analyse, as the first phase of short-form development

Methods

- Study design:** Cross-sectional design
- Sample:** 3,306 participants were included from 4 international cohorts (population-based $n=154$; primary care $n=478$ and memory clinic-based $n=2674$).
- Measurement:** The A-IADL-Q-30 consists of 30 items and takes approximately 10-15 minutes to administer. the A-IADL-Q-30 was completed by an informant for each participant.¹

Fig. 1 Overview of the item evaluation process and selection criteria

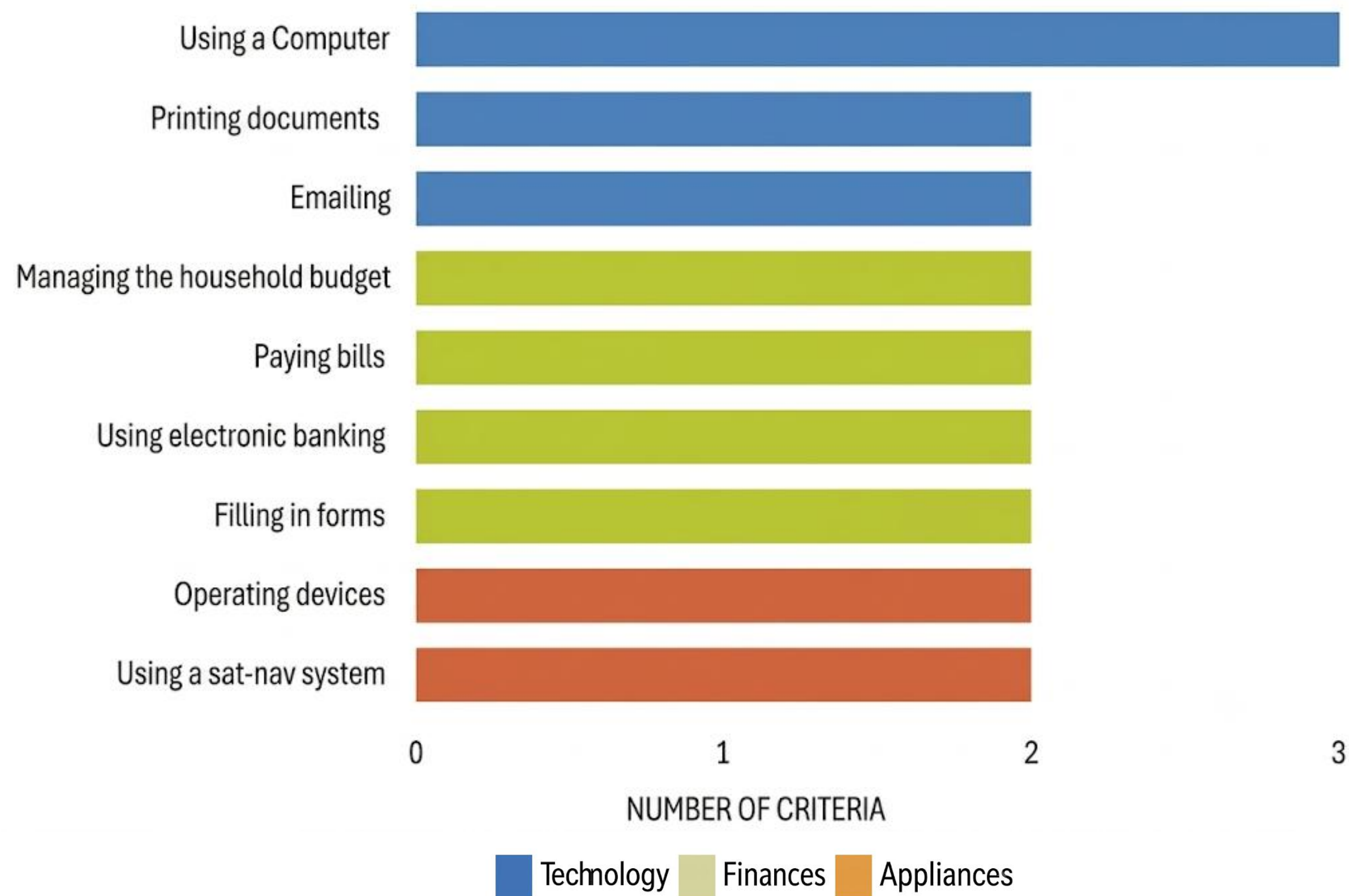


- Statistical analyses:** stepwise item-level psychometric evaluation (Figure 1)⁵ including assessment of Item Response Theory (IRT) assumptions (unidimensionality, local independence, monotonicity). Item selection was based on missing data, item discrimination, and item difficulty. We also considered local dependency, the need for balancing content and reducing redundancy.
- Ten items per criterion were selected based on low missing data, high discrimination, and high mean difficulty levels.

Table 1. Overview of Amsterdam IADL Questionnaire Items based on three Criteria

Frequency of responses	Estimation of Item Response theory parameters	
	Missing (%) Ranking low to high	Discrimination (α) Ranking high to low
Using a mobile phone (5.2)	Working (4.29)	Working
Operating the remote control (5.3)	Managing the household budget (4.20)	Managing the household budget
Operating domestic appliances (9.4)	Paying bills (3.94)	Making minor repairs to the house
Preparing sandwich meals (12.3)	Using electronic banking (3.80)	Filling in forms
Using a pin code (12.7)	Printing documents (3.74)	Paying bills
Operating the coffee maker (14.1)	Obtaining money from a cash machine (3.65)	Using electronic banking
Doing the shopping (15.6)	Using a computer (3.46)	Using a computer
Making appointments (16.9)	Operating devices (3.44)	Using a sat-nav system
Using a computer (18.9)	Filling in forms (3.38)	Emailing
Operating devices (20.1)	Using a sat-nav system (3.37)	Printing documents

Fig. 2. Overview Item Selection Criteria and Categories



Results

- All IRT assumptions were met, across all three settings.
- Mean **missing data** was 30.8% (range: 5.2% 'Using a mobile phone'- 60.7% 'Playing card and board games') (Table 1)
- Mean **item discrimination** was $\alpha=2.96$ (range: 1.99-4.29). With highest values for 'Emailing' (4.29) and lowest for: 'Being responsible for one's medication' (1.99).
- Item difficulty** (mean) varied across activities: with 'Working' being the most difficult and 'Operating the coffee maker' the least difficult.
- 9/10 items** ranked highly on more than one criterium. These items mainly reflect technology use, finances and appliances use (e.g. 'Using a computer', 'Managing the household budget' and 'Operating devices' (Figure 2).

Conclusion

These findings support the use of IRT for item selection. Several items showed strong psychometric properties, providing a basis for further co-creation with patients, caregivers, and clinicians toward a shortened, user-friendly version.