Mapping and Linking between the EQ-5D-5L and the PROPr in the United States Xiaodan Tang¹, Ron D. Hays², David Cella¹, Sarah Acaster³, Benjamin David Schalet⁴, Asia Sikora Kessler⁵, Montserrat Vera Llonch⁵, Janel Hanmer⁶

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Background

Two commonly-used preference-based measures which summarize multiple domains of health-related quality of life into a single score anchored at 0 (dead) and 1 (full health):

EQ-5D



- EQ-5D-5L:
 - 5 domains each assessed with 1 item and 5 response options (see Table for specific domains)
- Patient-Reported Outcomes Measurement Information System (PROMIS[®]) preference score (PROPr)
 - Derived from PROMIS domains
 - 7 domains scored using Item Response Theory (see Table for specific domains)
 - Ceiling effects are less common

Similar content allows for mapping or linking scores between the EQ-5D-5L and the PROPr. ¹⁻²

Research Objectives

- Evaluate content domain coverage between the two preference-based measures when PROPr is collected using the PROMIS 29+2
- Align scores of the EQ-5D-5L and PROPr using **US value sets**
- **Compare mapping and linking** approaches in prediction accuracy

Methods

- 983 adults recruited from the US general population completed an online survey (detailed demographic information in Hanmer et al.)
- Regression-based mapping
 - Indirect mapping: Logistic regression mapped EQ-5D-5L item responses onto PROMIS domain scores
 - Weighted kappa: agreement between predicted and observed EQ-5D-5L item responses
 - **Direct mapping**: Ordinary least-squares regression mapped EQ-5D-5L preference scores onto PROMIS domains and PROPr preference scores
 - Intraclass correlations (ICCs) and root-mean-squared deviations (**RMSD**s): agreement between predicted and observed EQ-5D-5L preference scores
- **IRT-based linking**: bidirectional crosswalks between EQ-5D-5L item responses and corresponding PROMIS domain scores.
 - Fixed parameter calibration
 - ICCs and RMSDs: agreement between predicted and observed PROMIS domain T scores

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Table. Mapping and Linking Matrix

		EQ-5D-5L Domains					EQ-5D-5L Preference Score
		Mobility	Self-care	Usual activities	Pain/ Discomfort	Anxiety/ Depression	
PROMIS Domains	Anxiety					Μ	
	Cognitive Function						
	Depression					M, L	Μ
	Fatigue	Μ				Μ	
	Pain Interference	Μ	Μ	Μ	M, L		Μ
	Physical Function	M, L	M, L	M, L	Μ		Μ
	Sleep Disturbance				Μ		Μ
	Ability to Participate in Social Roles and Activities	Μ		Μ			Μ

Note. **M** denotes a **mapping** relationship was **significant**; **L** denotes a **linking** relationship was modeled. **NO mapping or linking** was significant for **cognitive** function.

Figure. Mapping vs Linking



Predicted EQ-5D-5L Preference Scores

Note. Scatterplots of predicted and observed EQ-5D-5L preference scores based on the direct mapping approach using PROMIS domains and IRT-based linking approaches. IRT = Item Response Theory.

Results

- domain (see Table)
- linking methods

Conclusions

- scores to estimate EQ-5D-5L scores
- measures in **clinical studies**

References

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• When mapping is used, **5** PROMIS domains significantly predicted EQ-5D-5L preference scores, 7 PROMIS domains significantly predicted EQ-5D-5L **item responses** (see Table)

• When linking is used, **3** PROMIS domains are needed to generate scores from EQ-5D-5L item responses, or **vice versa** (see Table)

Cognitive Function was a **NOT** significant predictor for any EQ-5D-5L

Small differences (<10% EQ-5D-5L score range) and moderate to **high agreement** (>0.6 ICC for direct mapping, >0.6 kappa for both indirect mapping and linking except for Self-care) were found between observed and predicted scores for both mapping and

• Mapping exhibited better precision in estimating scores (see Fig)

• Linking demonstrated a broader range of score prediction (see Fig)

EQ-5D-5L item scores and preference scores can be estimated accurately from PROMIS health domains and PROPr

• Mapping equation is recommended for using PROMIS domains

• Linking crosswalks cover a broader range of low preference scores between EQ-5D-5L and PROPr/PROMIS health domains

• The mapping and linking results promote the use of PROMIS



