



UNDERSTANDING THE NEED FOR ASSISTANCE WHEN COMPLETING MEASURES OF PATIENT-REPORTED OUTCOMES IN HUNTINGTON DISEASE

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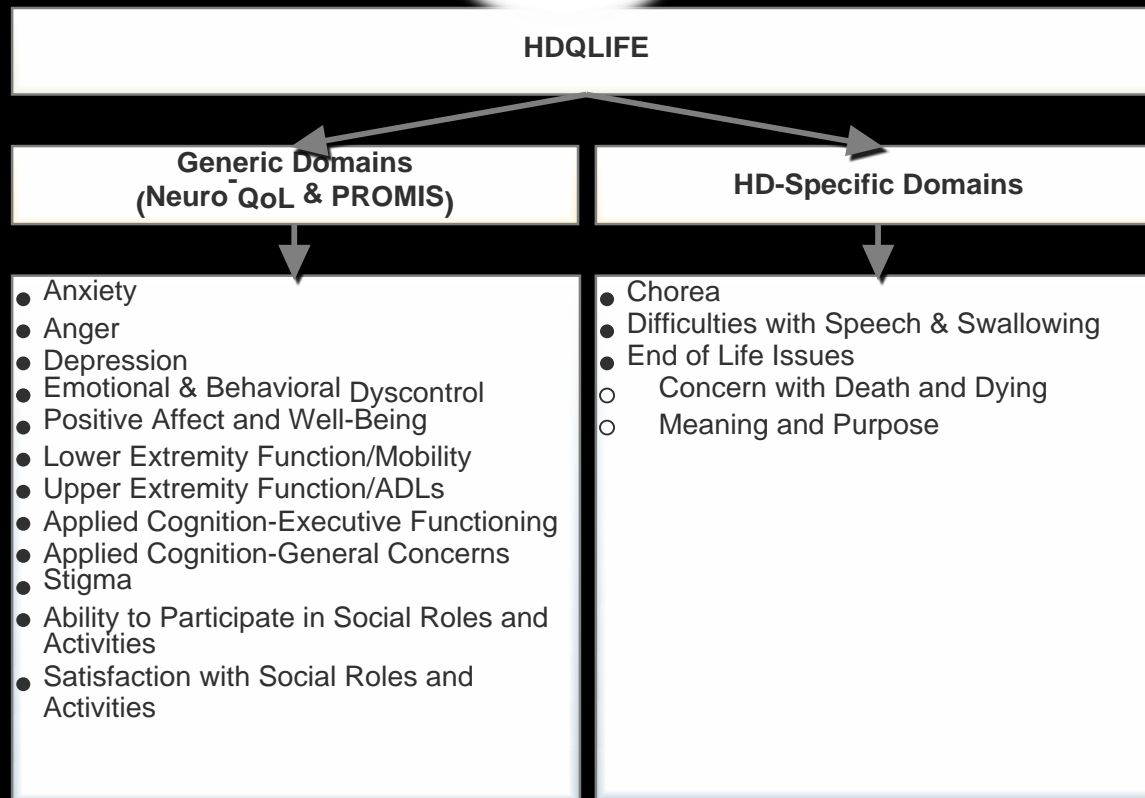
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HUNTINGTON DISEASE (HD)

- <https://youtu.be/JzAPh2v-SCQ>

A PRO MEASUREMENT SYSTEM THAT IS SPECIFIC TO HD



Carlozzi, N.E., et al. (2016):

- HDQLIFE: Development and assessment of health-related quality of life in Huntington disease (HD). *Quality of Life Research*, 25(10), 2441-2455.
- New measures to capture end of life concerns in Huntington disease: Meaning and Purpose and Concern with Death and Dying from HDQLIFE (a patient reported outcomes measurement system). *Quality of Life Research*, 25(10), 2403-2415.
- The development of a new computer adaptive test to evaluate chorea in Huntington Disease: HDQLIFE Chorea. *Quality of Life Research*, 25(10), 2429-2439.
- HDQLIFE: The development of two new computer adaptive tests for use in Huntington disease, Speech Difficulties and Swallowing Difficulties. *Quality of Life Research*, 25(10), 2417-2427.

BACKGROUND

- PROs should be both reliable (i.e., repeatable) and valid (i.e., measure what was intended).
- Symptom progression in HD often includes cognitive decline, especially in the later stages.
- Can we determine when cognitive impairment may preclude PRO responding (i.e., large error variance and low reliability)?

HYPOTHESES

- Items on PROs should not exhibit item bias.
- PROs should demonstrate moderate relationships with observer reports of similar constructs.
- The variability and reliability for PROs should meet minimally acceptable standards.

SAMPLE CHARACTERISTICS

- N = 506 participants
 - 38.8% prodromal
 - 39.0% early-stage HD
 - 22.5% late-stage HD
- Average age 49.0 (SD = 13.2)
- 58.5% female
- 95.3% Caucasian

MEASURES

HDQLIFE PROs:

Chorea (34 items)

Speech Difficulties (27 items)

Swallowing Difficulties (16 items)

UHDRS clinician-rated assessments:

Total Functional Capacity

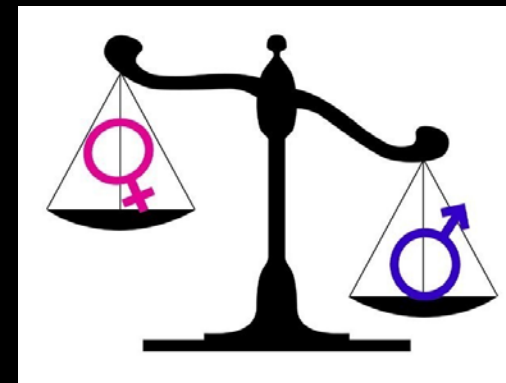
Total Motor Score

Stroop (Color Naming, Word Reading, and Interference)

Symbol Digit Modalities Test

ITEM BIAS

- Item bias was assessed using differential item functioning (DIF) both across HD stage and relative to cognitive performance.
- In general, items should not exhibit DIF. Some degree of DIF is considered acceptable. Some types of DIF are more problematic than others.



ITEM BIAS RESULTS

- Most items were free from DIF
 - Chorea: no items consistently exhibited DIF; when DIF was present it was minimal
 - Speech: 5 items exhibited DIF across cognitive tests and staging; no items consistently demonstrated non-uniform DIF
 - Swallowing: 4 items consistently exhibited DIF across cognitive tests and staging; no items consistently exhibited non-uniform DIF
- Overall DIF was minimal



RELATIONSHIPS BETWEEN PROS AND CLINICIAN-RATED SYMPTOMS

- Pearson correlations between self-report and associated clinician ratings were examined.
- We expect moderate agreement between respondents (r 's between 0.40 and 0.60).

RELATIONSHIPS BETWEEN SELF-REPORT AND CLINICIAN RATINGS

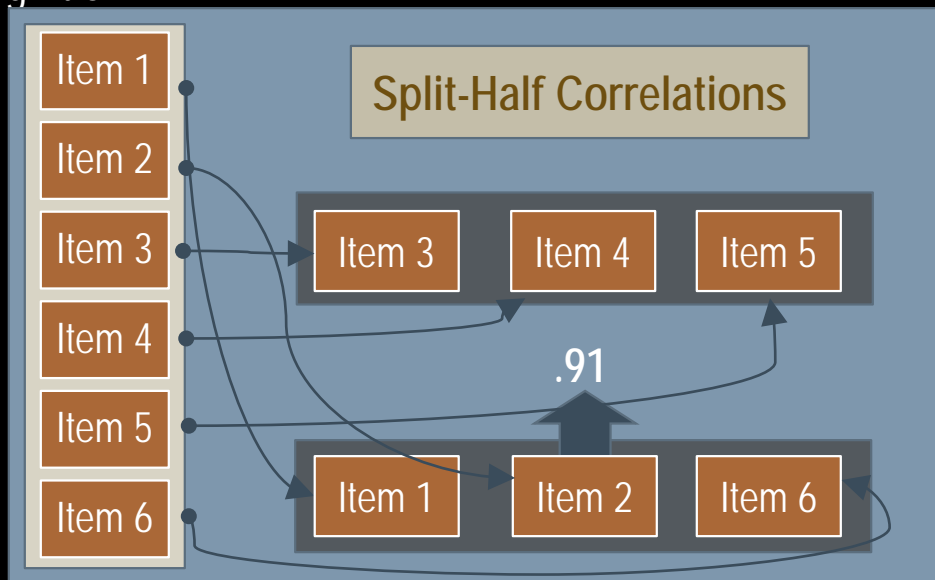
	PRO Measures											
	Prodromal			Early-HD			Late-HD			Combined		
Composite Scores	Chorea	Speech	Swallowing	Chorea	Speech	Swallowing	Chorea	Speech	Swallowing	Chorea	Speech	Swallowing
Clinician-rated Total Motor Score	.40	.22	.31	.31	.21	.27	.22	.28	.07	.66	.54	.50

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PSYCHOMETRIC RELIABILITY OF PROS

- Three separate sets of regression models were examined to determine the psychometric reliability of the PROs
 1. A simple linear regression model: split half reliabilities were compared
 2. A heterogeneous variance model for HD stage: model was fit with different variances for each HD stage
 3. A heterogeneous variance model for cognition: model was fit for variance in total cognition.



- Reliability standards:
 - < 0.70 = unacceptable
 - $0.70 - 0.79$ = acceptable
 - $0.80 - 0.89$ = good
 - ≥ 0.90 = excellent

Table 4: Estimated PRO Reliabilities by HD Stage

Measure	Prodromal	Early	Late
HDQLIFE Chorea	0.98	0.86	0.72
HDQLIFE Speech	0.98	0.85	0.69
HDQLIFE Swallowing	0.95	0.79	0.71

SIMPLE REGRESSION MODELS

PRO Measure	beta	R ²	<i>t</i>
Chorea	0.97	0.94	83.22
Speech	0.92	0.92	70.93
Swallowing	1.24	0.84	49.18

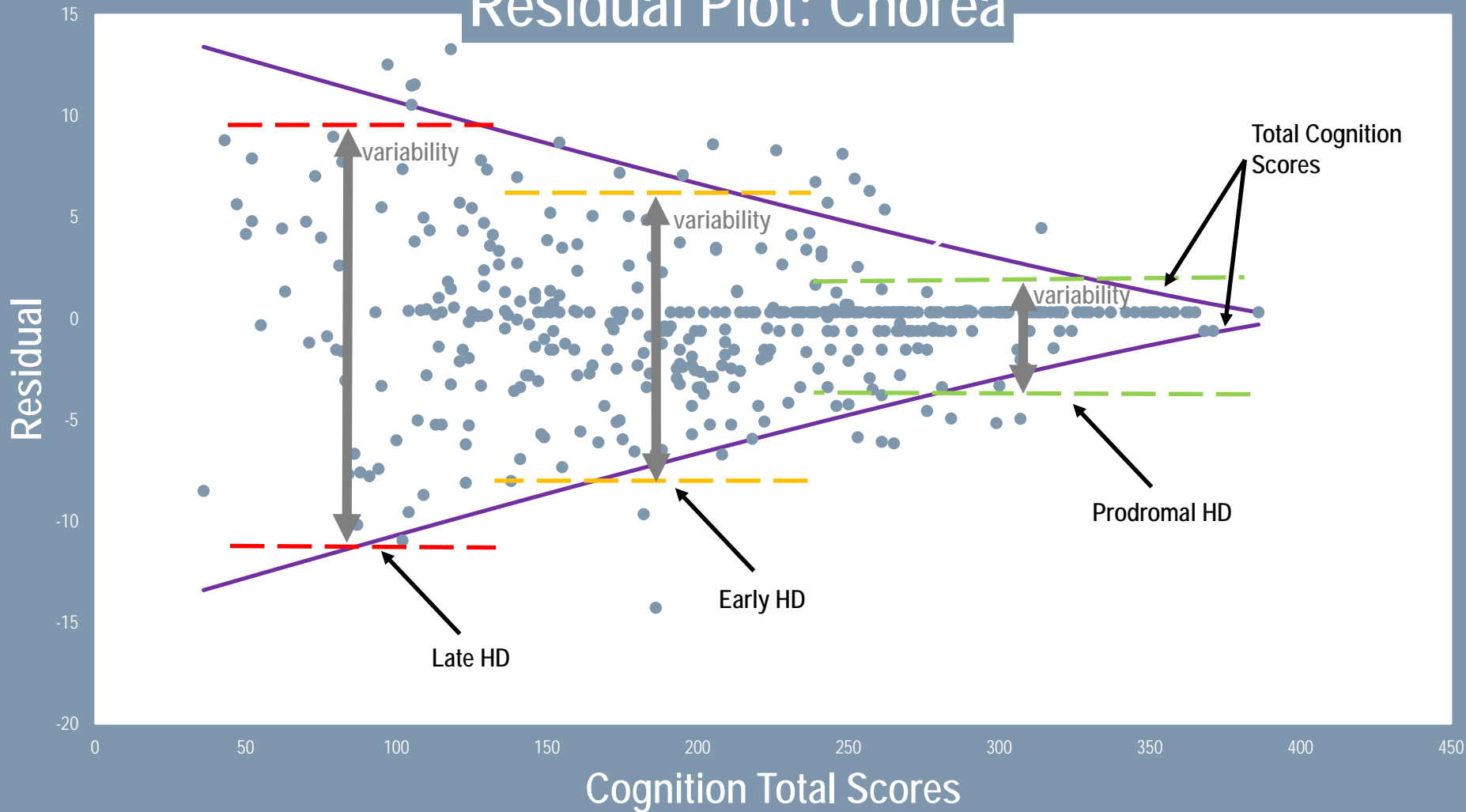
Note. all $p < .0001$

MODEL FIT RESULTS FOR PRO MEASURES

Model	DF	AIC	BIC	Chi-Square
HDQLIFE Chorea				
Simple Regression	3	2291.75	2303.90	
Heterogeneous - Cognition	4	2112.89 ↓	2129.09 ↓	180.86*
Heterogeneous - HD Stage	5	2096.93 ↓	2117.18 ↓	198.81*
HDQLIFE Speech Difficulties				
Simple Regression	3	2330.83	2343.12	
Heterogeneous -Cognition	4	2239.79 ↓	2256.19 ↓	93.03*
Heterogeneous - HD Stage	5	2206.81 ↓	2227.30 ↓	128.02*
HDQLIFE Swallowing Difficulties				
Simple Regression	3	2136.32	2148.63	
Heterogeneous -Cognition	4	1993.47 ↓	2009.88 ↓	144.85*
Heterogeneous - HD Stage	5	2038.47 ↓	2058.94 ↓	101.85*
<i>Note.</i> * $p < .0001$				

The heterogeneous models provide a better fit than the simple regression model

Residual Plot: Chorea



CUTOFF SCORES FOR RELIABILITY

	Total Cognition Scores (SDMT + Stroop)	
PRO	Reliability > 0.7 "adequate"	Reliability > 0.8 "good"
Chorea	<77	< 136
Speech	N/A	<109
Swallowing	<134	<179

Note. M = 144.56 (SD = 77.31) for Total Cognition Scores for the combined sample

SUMMARY & CONCLUSIONS

- As HD progresses and cognition declines, high error variance and low reliability can negatively affected the psychometric properties of PRO measures.
- Although minimal standards for reliability on PRO measures was met for all HD groups, clinical cutoffs on cognitive tests can be used to maximize PRO reliability.
- In cases where cognitive scores do not meet critical cutoffs, PRO measures should only be considered in conjunction with other assessments.
- Recommended clinical cutoffs differed for different measures. This suggests that cognitive complexity may vary across PRO measures.

QUESTIONS?

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