Evaluation of Diagnostic Concordance Between Algorithms for Parkinson's Disease Dementia

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Introduction

- Parkinson's disease (PD) may progress to Parkinson's Disease Dementia (PDD), with prevalence estimates ranging from 14–55% (Sousa et al., 2022).
- The 2007 MDS criteria define two diagnostic levels (Emre et al., 2007):
  - **Level I**: brief cognitive screening;
  - **Level II**: comprehensive neuropsychological testing.
- A recent study (Kulisevsky et al., 2024) suggests changes to Level I, including:
  - Replacing MMSE with MoCA;
  - Expanding functional (IADL) and language assessments;
  - Including anxiety screening and biomarkers.
- **Objective**: Compare diagnostic concordance among Level I algorithms and their agreement with Level II assessment.

Methods

- **Participants**:
  - 204 patients with PD (126 males; 62%) aged 58.96 years (SD = 8.35).
- **Assessments**:
  - **Level I**: MMSE, MoCA, sMoCA, and IADL measures (FAQ item 9 vs FAQ total score).
  - **Level II**: Full cognitive battery (five domains) and functional/neuropsychiatric evaluation.
- **Approach**:
  - 68 diagnostic algorithms tested (66 Level I, 2 Level II).
  - Assessed diagnostic concordance using Cohen's κ, accuracy, sensitivity, and specificity.

Results

- **PDD Rate Estimates**:
  - Ranging from **2%** to **16.75%.**
  - FAQ total score algorithms detected more cases than FAQ item 9.
- **Concordance**:
  - High within algorithms using the **same IADL operationalisation** ($\kappa_{FAQ\ total}$ = 0.75; $\kappa_{FAQ\ item\ 9}$ = 0.86).
  - Low agreement (κ = 0.41) when IADL definitions differed.
- **Best Predictors of Level II Diagnosis**:
  - MoCA + FAQ total + Clock Drawing (executive function assessment) (see Table 1)
  - sMoCA showed **high balanced accuracy (sensitivity 0.95, specificity 0.93)**.

Table 1

	Level II (1)[a]					Level II (2)[b]				
Predictor	κ	Accuracy	p	Sensitivity	Specificity	Predictor	κ	Accuracy	p	Sensitivity	Specificity
Top five											
MoCA (3)	0.64	0.94	.010	0.52	0.99	MoCA (12)	0.85	0.99	.028	0.86	0.99
MoCA (51)	0.70	0.94	.010	0.71	0.97	MoCA (16)	0.85	0.99	.028	0.86	0.99
MoCA (11)	0.63	0.94	.019	0.57	0.98	MoCA (2)	0.83	0.99	.028	0.71	1.00
MoCA (13)	0.68	0.94	.019	0.71	0.97	MoCA (20)	0.85	0.99	.028	0.86	0.99
MoCA (15)	0.63	0.94	.019	0.57	0.98	MoCA (4)	0.83	0.99	.028	0.71	1.00
Bottom five											
MMSE (1)	0.53	0.93	.061	0.43	0.99	MoCA (50)	0.70	0.98	.168	0.71	0.99
MoCA (25)	0.57	0.92	.098	0.57	0.97	MoCA (54)	0.70	0.98	.168	0.71	0.99
MoCA (35)	0.53	0.92	.098	0.48	0.98	MoCA (58)	0.70	0.98	.168	0.71	0.99
MMSE (3)	0.41	0.92	.143	0.30	0.99	MMSE (2)	0.66	0.98	.168	0.57	0.99
MoCA (39)	0.51	0.92	.148	0.48	0.97	MMSE (4)	0.53	0.97	.296	0.43	0.99

[a] IADL deficit was defined as FAQ (total score) > 7

[b] IADL deficit was defined as FAQ (item 9) > 1

κ: Cohen's κ; p: p-value associated with a one-sided Exact Binomial Test comparing the Accuracy to the No Information Rate; The table shows five most accurate (Top five) and five least accurate (Bottom five) Level I algrithms for Parkinson's Disease Dementia (PDD) in predicting Level II classficiation of PDD. The algorithms were grouped by their definition of the deficit in Instrumental Activities of Daily Living (IADLs). The items comprising each listed algorithm can be found in Table A1.

*For information on the MoCA numeric badge, visit the website linked by the QR code.

Conclusions

- ***PDD diagnosis varies*** substantially depending on the algorithm applied.
- Cognitive tool selection and especially IADL definitions strongly influence outcomes.
- **MoCA-based algorithms** show ***greater consistency*** with comprehensive Level II diagnoses.

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