

# Contribution of cognition and motor symptoms on Virtual Reality Functional Capacity Assessment Tool (VRFCAT-SL) performance in Parkinson’s disease.

Travis H. Turner, PhD Department of Neurology, Medical University of South Carolina

**Background:** Cognitive impairment is common in Parkinson’s disease (PD) and highly associated with loss of independence and assisted living placement. Reliable measures of functional capacity are thus needed in clinical and research settings. The Virtual Reality Functional Capacity Assessment Tool (VRFCAT-SL) is a tablet-based instrument that assesses proficiency for performing real world tasks in a highly realistic environment. Examinees locate items for a recipe in a kitchen, use a bus schedule, shop in a supermarket, and make exact change. Performance outcomes include:

- Completion time (all stages and tasks)
- Errors (e.g., checking locations twice, wrong change, etc.)
- Forced progressions (auto advance due to excessive errors or time)

**Objective:** Examines contributions of motor symptoms and cognition on VRFCAT-SL performance in Parkinson’s disease (PD).

**Method:** The VRFCAT-SL was administered to a sample of **29 consecutive PD patients (12 women)** during clinical neuropsychological evaluation.

**Cognitive status** was based on relevant history and neuropsychological testing according to MDS Task Force criteria. **PD normal=14, PD-MCI=15.** No patients were diagnosed with dementia.

**VRFCAT-SL** was administered at the end of the visit, interpreted qualitatively, and not considered with respect to cognitive status.

### Sample – Demographic and Clinical Characteristics

	Min	Max	Mean (SD)
Age	54	79	66.62 (7.64)
Education	11	20	15.66 (2.38)
Dur. Illness	2	20	8.66 (4.79)
HY Stage	1.0	3.0	2.38 (4.79)
LEDD	0	2180	980 (471)
MDS-UPDRS	9	49	29.5 (11.4)

### Analysis:

- Standardized neuropsychological test performances were converted to demographically-corrected T-scores according to test manuals
- VRFCAT-SL performance outcomes were corrected for age, gender, and education using normative database from the test developer.
- *Only 4 participants had forced progressions, and all were diagnosed with PD-MCI*
- Non-parametric correlations were examined.

### Results : Correlations between VRFCAT-SL and Clin /Motor Function

VRFCAT-SL	Dur. Illness	HY Stage	LEDD	MDS-UPDRS
Time	.054	-.254	-.122	-.024
Errors	.053	-.137	-.125	-.166
Forced Prog.	.032	.121	-.113	-.131

### Correlations between VRFCAT-SL and Cognitive Measures

	VRFCAT Time	VRFCAT Errors	VRFCAT Forced Prog.
BVMT Total Learning	0.345	0.152	-0.095
BVMT Delayed Recall	.444*	0.135	-0.105
HVLT-R Total Learning	0.26	0.258	0.143
HVLT-R Delayed Recall	0.206	0.195	-0.115
NAB Digits Fwd	0.192	0.266	0.047
NAB Digits Bkwd	0.237	-0.169	0.178
NAB Num & Let A Time	.457*	-0.001	0.264
NAB Num & Let A Errors	0.279	0.151	0.013
NAB Naming	-0.06	0.201	.499*
NAB Figure Copy	-0.224	0.115	-0.019
FAS	0.245	-0.133	0.218
Animals	0.224	0.321	0.072
Trails A	0.325	-0.26	0.09
Trails B	.472*	-0.23	0.063
Hayling Inhibition Errors	-0.096	.561**	0.09

**Conclusions:** The VRFCAT-SL appears to provide a useful measure of cognitive functional capacity that is not confounded by PD motor symptoms. Completion time is associated with visual memory, sustained attention and set-switching. Errors appear driven by disinhibition. Future studies will examine utility in PD dementia.

## EXAMPLE SCREENSHOTS OF VRFCAT-SL



### Kitchen

Search the kitchen for items on recipe



### Bus Stop

Use a bus schedule and get on the correct bus



### Grocery Store

Find and purchase items from a grocery store