

# Latent Constructs Across Motor Assessments: A Proof-of-Concept Study

Ila Hales, Biomedical Engineering  
Mentor: Dr. Sydney Schaefer, Associate Professor  
School of Biological and Health Systems Engineering



## Research Question

Comparing motor behaviors for clinical applications in different dementia subtypes to identify early biomarkers of neurodegenerative disease.

## Background

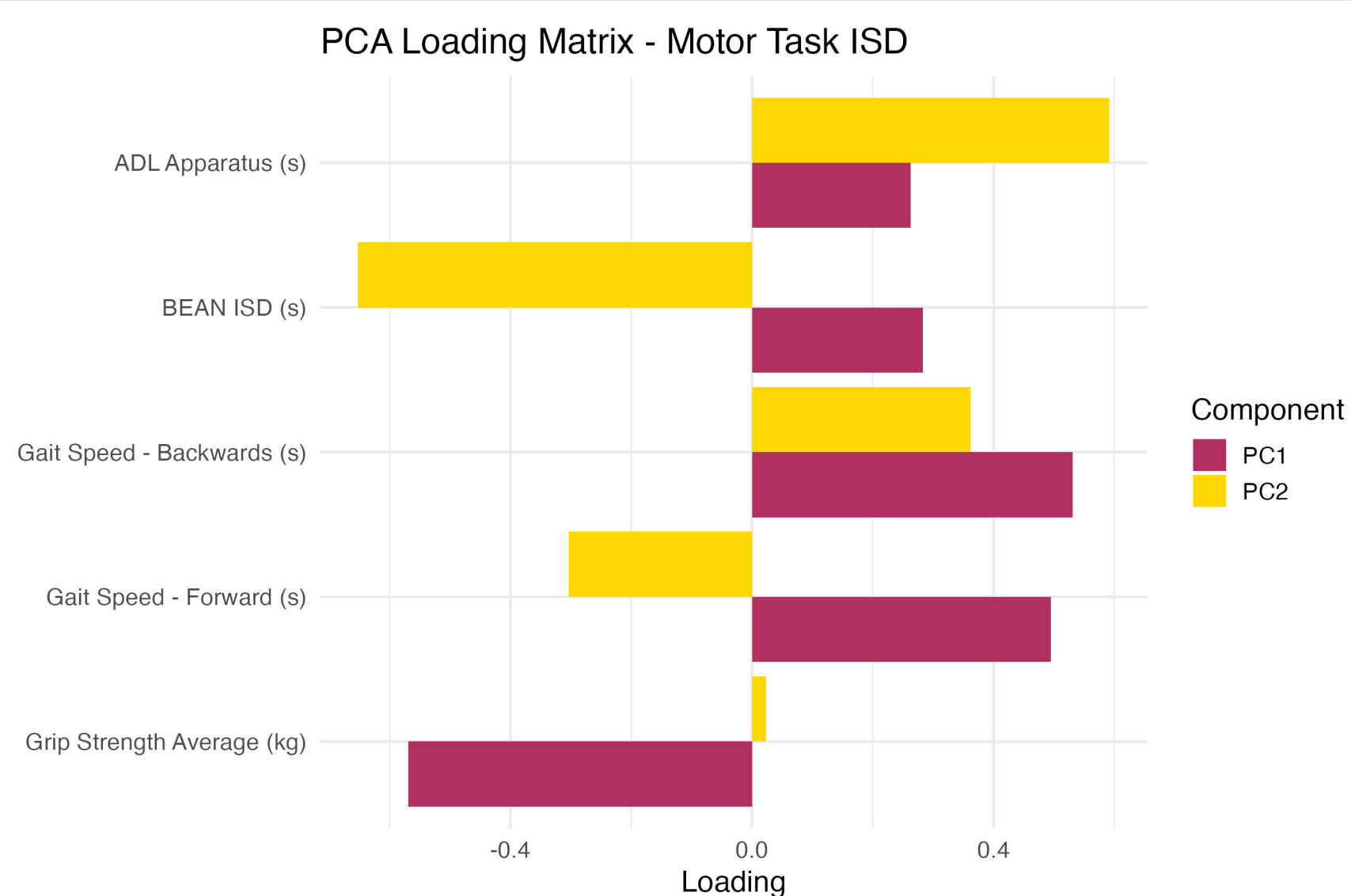
Motor-based assessments can be easily and objectively administered by clinicians, including in primary care. New research shows that motor-based assessments can detect early signs and risk of dementia. However, it is unclear which commonly-administered assessments involving gait, balance, strength, and fine motor skills evaluate different or shared constructs, which might be impaired early in those at risk of developing dementia. This proof-of-concept study tested whether there is overlap between common motor-based assessments to inform the development of a battery of tests that can be used in primary care for dementia risk screening and monitoring.

## Materials & Methods



**Figure 1.** Nine healthy adults with no self-reported neurological conditions and no motor impairment (based on the QuickDASH) performed five motor-based assessments: (A,B) Forwards and backwards 4-meter walking test (C) Grip strength using a Jamar dynamometer (D) the Brief Evaluation of Daily Functioning (BEAn) and (E) the Swedish ADL apparatus.

## Results



**Figure 2.** Principal Component Analysis depicting visual patterns in the results of motor-based assessments.

### PCA Loading Matrix

Variable	PC1	PC2
Gait Speed - Forward (Normal)	0.495	-0.303
Gait Speed - Backwards (Normal)	0.531	0.362
Grip Strength (Avg)	-0.569	0.023
ADL Apparatus	0.262	0.592
BEAN ISD	0.283	-0.653

**Figure 3.** Principal Component Analysis depicting numerical patterns in the results of motor-based assessments.

## Discussion

PC1 represents a broad measure of motor function, capturing gait, balance, and strength.

PC2 represents functional fine motor skill, involved in instrumental activities of daily living.

The strong loadings of the ADL Apparatus and BEAn (measured as intrasubject standard deviation, or ISD) on PC2 suggests that these tasks capture different constructs than gait or grip.

This study maps the fundamental relationships between five distinct motor assessments to determine how gait, balance, strength, and functional fine motor skill do vs. do not overlap in unimpaired individuals.

**This pilot data involving adults with no neurological or physical diagnoses will help optimize a data-driven battery of assessments that could be used in clinical settings to ensure breadth of evaluation with minimal evaluation time.**

**Next steps include expanding these assessments to clinical populations with motor and cognitive impairments.**

## Acknowledgments

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