

# Reliability and Validity of the Modified Vestibular Disorders Activities of Daily Living Scale in Older Adult Balance Examination

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## Background

- 30-60% community dwelling older adults fall each year, which is the leading cause of injury, death, and traumatic hospital admissions in the elderly.<sup>1</sup> This costs the U.S. health care system \$20-30 billion per year.<sup>2</sup>
- Currently used older adult self-report measures demonstrate poor responsiveness<sup>3</sup>, thus failing to detect a decline in function early enough for preventative physical therapy intervention.
- The Vestibular Activities of Daily Living Scale (VADL) is a self-report measure developed to determine activity & participation restrictions in patients with vestibular dysfunction<sup>4</sup>. This scale clearly delineates important tasks and categories of independence, which would be applicable to the assessment of older adult fall risk and functional decline.
- The 10 independence rating categories of the VADL may enable physical therapists to detect functional changes on balance-related tasks and provide interventions to prevent falls and associated injuries in community-dwelling elders.
- Assessing some basic psychometric properties of a modified version of the VADL (m-VADL) to the examination of older adult balance is required before this tool can be used confidently in the clinic.

## Purpose

The purpose of this study was to measure the test –retest reliability of the m-VADL and its construct validity with the Functional Gait Assessment (FGA), 10-Meter Walk Test (10MWT), Single Limb Stance (SLS), and Activities-Specific Balance Confidence scale (ABC).

## Methods

### Subjects

- Inclusion criteria:
  - ≥65 years old
  - able to independently ambulate ≥14 meters
  - able to provide informed consent
  - lives independently within the community
  - able to follow 3 step commands
- Recruitment: from local retirement community

### Data Collection

- Subjects completed m-VADL, ABC, FGA, SLS, and 10MWT in a random order during a single data collection session.
- Subjects completed m-VADL for a second time 2 weeks later.

### Statistical Analysis

- SPSS software – using intraclass correlation coefficient (ICC) for reliability
- Known group analysis for validity

## Results

- 10 subjects completed testing
  - Baseline characteristics reported in Table 1.
- Test-retest reliability of the m-VADL
  - ICC = 0.92 (95% CI, 0.72-0.98)
  - Figure 1 shows the two week test-retest reliability for the m-VADL and the line of agreement.
- Construct validity
  - Within the subjects tested, 2 groups emerged based on the presence or absence of other health conditions.
  - m-VADL scores differentiated between the two groups, with balance and gait self report measures (ABC) and performance-based measures of 10 MWT comfortable walking speed (CWS), fast walking speed (FWS), FGA, single limb stance with eyes open (SLS-EO) and eyes closed (SLS-EC) consistently higher for the group reporting no major health conditions—see Table 2.

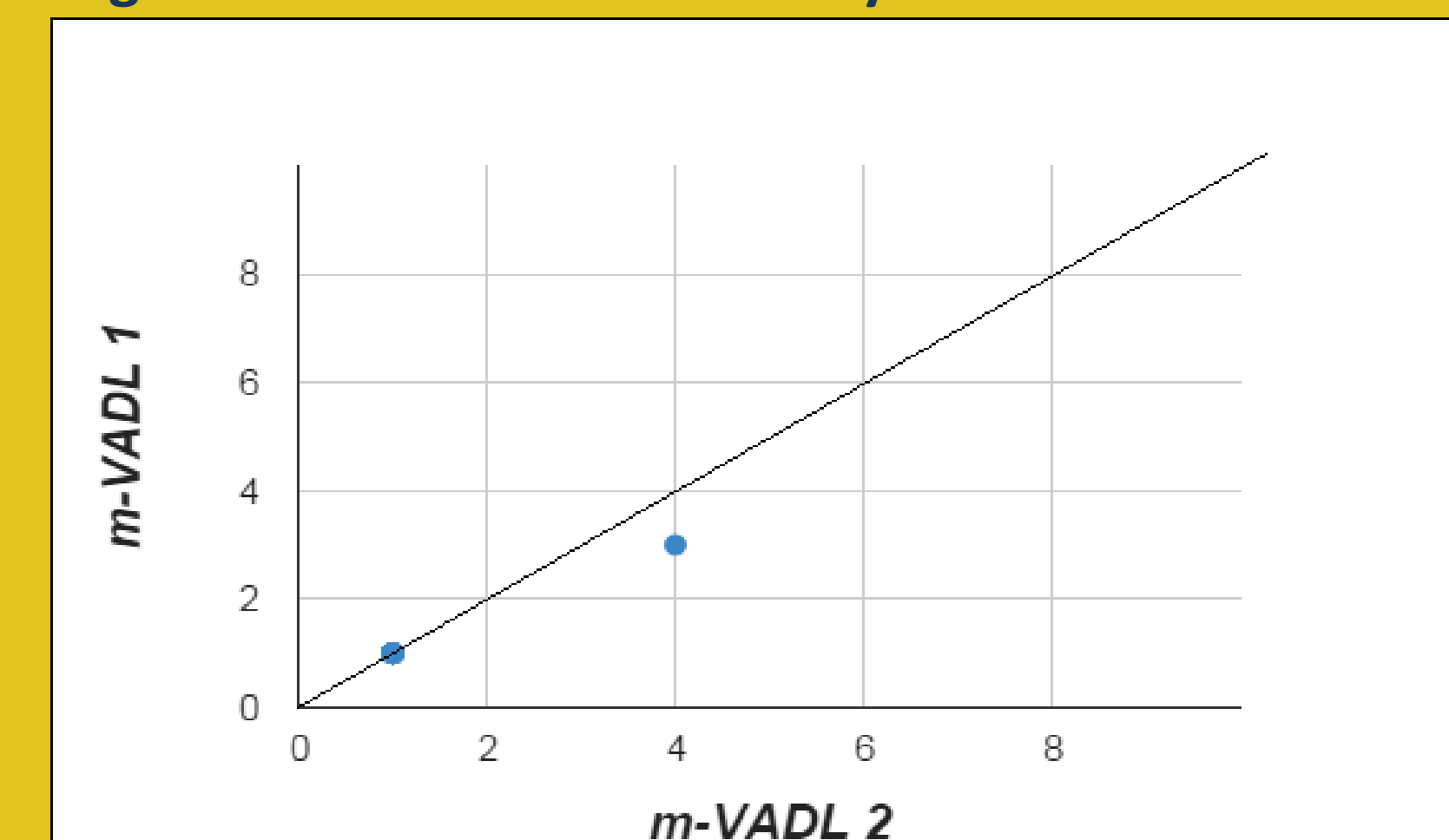
Table 1. Subject Characteristics

Variable	Mean (±SD)
Age (years)	81 (± 7)
BMI	22 (± 3)
	N
Gender	9 female; 1 male
# of falls within the past year	0 Falls = 7 subjects; 1 Fall = 2 subjects; 2 Falls = 1 subject
Reported general health status	5 Excellent; 5 Good
Reported health conditions	9 subjects report none; 1 subject reports paralysis due to brain aneurism
Frequency of community walking	Daily = 4 subjects; 3-4 days/wk = 3 subjects; 1-2 days/wk = 2 subjects; Never = 1 subject

Table 2. Construct Validity: Known Group Analysis

	Group 1 (n=9)	Group 2 (n=1)
Total m-VADL 1 score	1	3
FGA score	27	16
SLS-EO Left/Right (s)	10/9	0/0
SLS-EC Left/Right (s)	2/2	0/0
10MWT – CWS (m/s)	1.30	0.89
10MWT – FWS (m/s)	1.70	0.90
ABC (%)	92	53

Figure 1. Test-Retest Reliability of the m-VADL



## Discussion

- m-VADL demonstrated strong test-retest reliability for a high functioning population of community dwelling older adults (ICC = 0.92).
- Construct validity established using known group analysis
  - m-VADL scores distinguished expected group differences in balance and gait using self-report measures and performance-based measures.
  - m-VADL accurately identified independent community dwelling older adults.
- High level of independence displayed by subjects:
  - All subjects were regular participants in a group balance class, resulting in a homogeneous sample.
  - A normative score for the FGA is 20.8 among 80-89 year olds<sup>5</sup>. The subjects in this study had a combined average of 25.5.
  - Group 1 had an average CWS of 1.30 m/s, which is faster than the average for 80 year olds of 0.80 m/s for females and 0.88 m/s for males<sup>6</sup>.
- Strengths of this study
  - Tests were administered in a random order to reduce test order bias.
  - Self-report questionnaire follow-up was 100%.
- Limitations to this study
  - Homogenous sample, skewed to higher functioning older adults.
  - Small sample size.

## Conclusion

- Within the small sample size of this study, the test-retest reliability is strong.
- m-VADL distinguished expected group differences in balance and gait measures in community dwelling older adults.

## Further Research

- Extend validity assessment of the m-VADL with a larger sample size and recruitment of community-dwelling older adults representative of a wider range of functional levels.
- Assess responsiveness of the m-VADL to change in functional status.
- Assess the prospective predictive validity of the m-VADL with regards to future falls.

## References

1. Cleary, KK, & Skorniyakov, E. (2014). Reliability and Internal Consistency of the Activities-Specific Balance Confidence Scale. *Physical & Occupational Therapy in Geriatrics*, 32(1):58-67.
2. Rubenstein, LZ. (2006). Falls in older people: epidemiology, risk factors and strategies for prevention. *Age and ageing*, 35(suppl 2), ii37-ii41.
3. Shekelle, PG, Maglione, MA, Chang, JT, Mojica, W., Morton, SC, Booth, M., ... & Lapin, P. (2003). Falls prevention interventions in the Medicare population. Retrieved from <http://www.rand.org/pubs/reprints/RP1230.html>.
4. Cohen HS, Kimball, KT. (2000). Development of the vestibular disorders activities of daily living scale. *Arch Otolaryngol Head Neck Surg*, 126(7): 881-887.
5. Walker, ML, Austin, AG, Banke, GM, Fox, SR, Gaetano, L, Gardner, LA, ...Penn, L. (2007). Reference group data for the functional gait assessment. *Physical Therapy*, 87(11): 1468-1477.
6. Lusardi MM, Pellacchia, GL, Schulman, M. (2003). Functional performance in community living older adults. *Journal of Geriatric Phys Ther*. 26(3): 14-22.