

The Use of the Modified Vestibular Activities of Daily Living Scale in the Examination of Older Adults

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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.¹ This costs the U.S. health care system \$20-30 billion per year.² Currently used older adult self-report measures demonstrate poor responsiveness³, 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 dysfunction⁴. 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.

•Assessing some basic psychometric properties of a modified version of the VADL (mVADL) to the examination of older adult balance is required before this tool can be used confidently in the clinic.

•In regards to statistical calculations for outcome measures, typically the mean is used to determine the average value to represent the participant scores, however, the mVADL is scored using the median. Using the median score reduces the amount of outliers from the normative data.

Purpose

The purpose of this study was to measure the test-retest reliability of the mVADL 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) when applied to older adults without vestibular dysfunction.

Methods

19 subjects were recruited from 2 years of data collection

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

Data Collection

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

Results

- 17 subjects were included in the results
 - Baseline characteristics reported in Table 1.
- Test-retest reliability of the m-VADL
 - $r = 0.85$
 - Figure 1 shows the two week test-retest reliability for the m-VADL and the line of agreement.
- Construct validity
 - The mVADL mean was used as opposed to the median as it gave a better representation of the subjects ability.
 - Figure 2 shows the two self report measures, the mVADL and the ABC, demonstrate strong correlation ($r = 0.94$).

Table 1. Subject Characteristics

Variable	Mean (±SD)
Age (years)	85 (± 7)
BMI	24 (± 5)
N	
Gender	13 female; 5 male
Number of falls within the past year	0 Falls = 11 subjects; 1 Fall = 3 subjects; 2 Falls = 3 subjects
Reported general health status	6 Excellent; 8 Good; 3 Fair
Reported health conditions	9 subjects report none; 1 subject reports paralysis due to brain aneurism; 1 reports dizziness during 10 meter walk; 1 reports hard of hearing

Figure 1 Test-Retest Reliability of the m-VADL

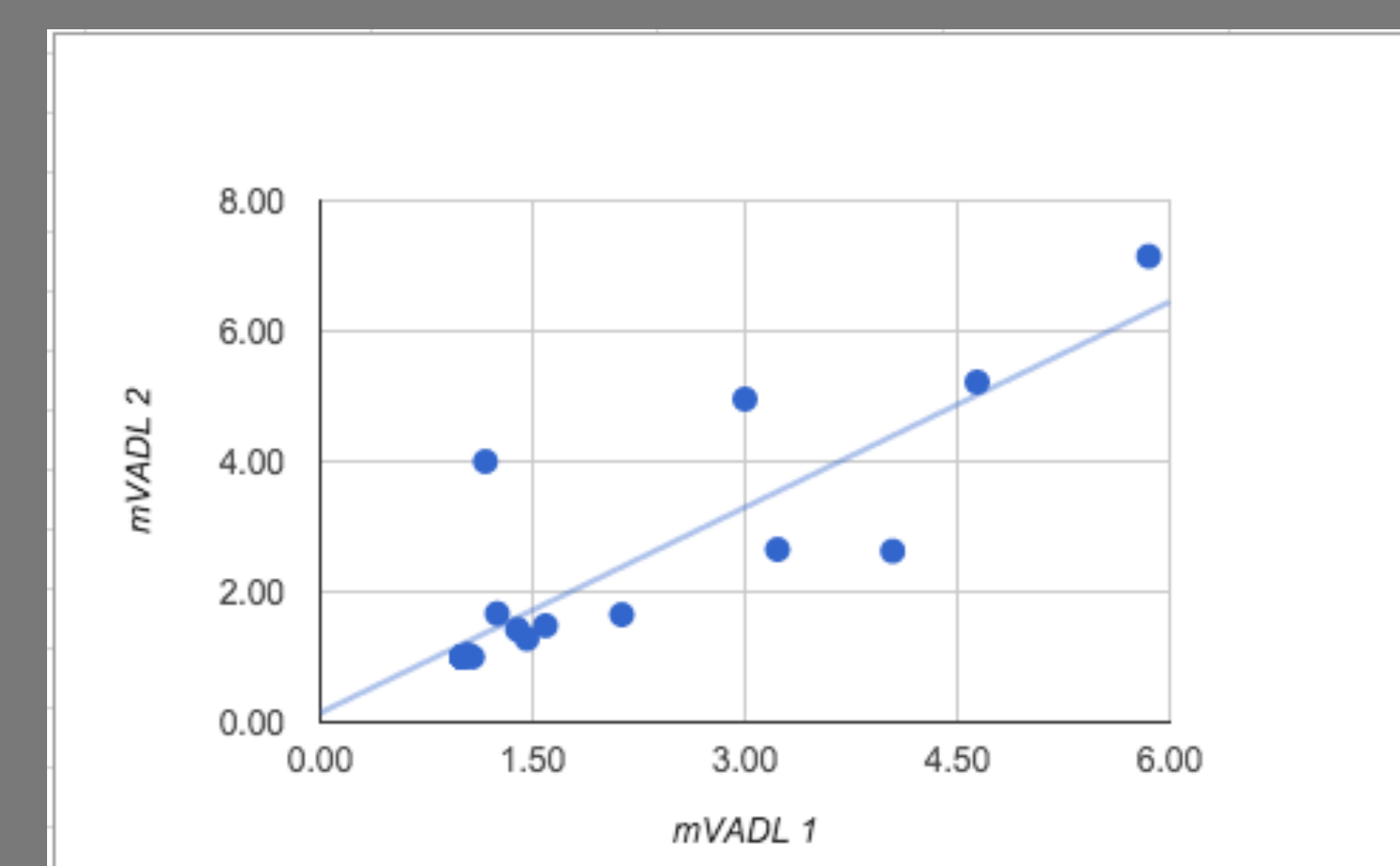


Figure 2. Correlation between the ABC and m-VADL

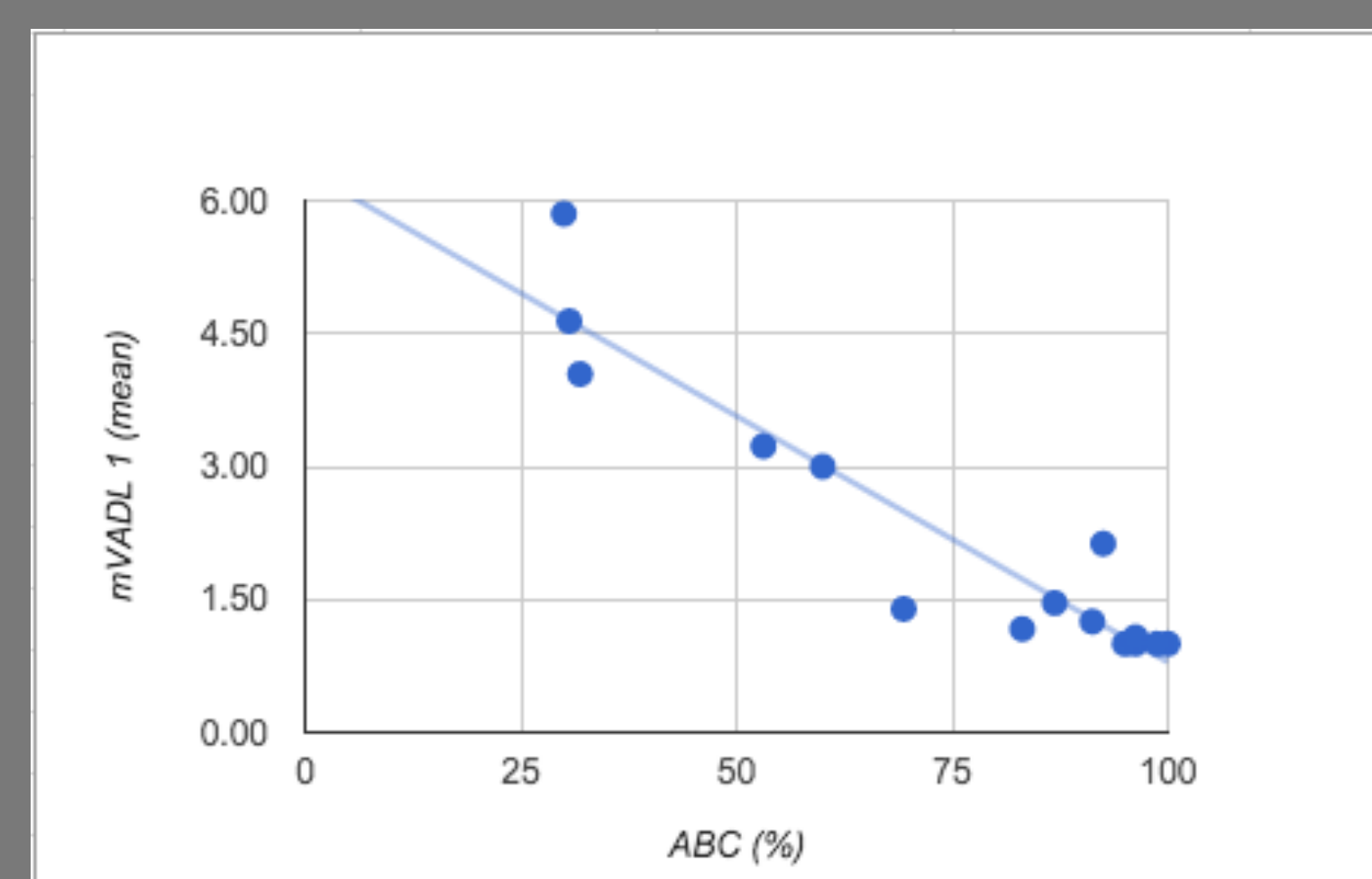


Table 2. Outcome Measure Data

Measure	(n=17)
Total m-VADL 1 score (mean)	2.11
Total m-VADL 2 score (mean)	2.36
FGA score	21.7
SLS-EO Left/Right (s)	6/6
SLS-EC Left/Right (s)	2/2
10MWT – CWS (m/s)	1.23
10MWT – FWS (m/s)	1.63
ABC (%)	76



Discussion

- The mean mVADL demonstrated strong test-retest reliability for community dwelling older adults ($r = 0.85$).
- The mVADL has been validated to use the median when calculating scores. Although, with data analysis the mean produced a more accurate representation of each individual's perceived ability. The mean also minimized outliers by reducing a ceiling effect that was caused by the median.

- Construct validity established using known group analysis
 - mVADL demonstrated high correlation with the ABC scale, $r = 0.94$, see Figure 2.
 - mVADL was not strongly correlated with the performance based outcome measures, the FGA, 10 Meter Walk Test and the single leg balance.
 - mVADL accurately identified independent community dwelling older adults.

- Strengths of this study
 - Tests were administered in a random order to reduce test order bias.
 - Self-report questionnaire follow-up was 94%.

- Limitations to this study
 - Homogenous sample.
 - Small sample size.

Conclusion

- Within the small sample size of this study, the test-retest reliability is stronger using the mean versus the median.
- mVADL strongly correlates with the ABC scale which is a well vetted outcome measure for measuring patient confidence. It is recommended that if using the mVADL with a geriatric population the mean be used as opposed to the median.

Further Research

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

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