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Backward walk test: a reliable and valid tool to assess gait and balance in older adults with dementia

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Background

- Older adults with dementia are more likely to have postural instability and gait impairment, resulting in an increased risk of falls in this population.
- Backward walking is a daily task that demands higher balance and gait control and more cognitive resources for older adults to perform.
- The backward walk test (BWT) has been developed to evaluate the backward walking performance in older adults. It is a reliable and valid measure to evaluate balance and gait performance and identify fallers in healthy older adults.
- The reliability and validity of the BWT in older adults with dementia has not been established.
- The ability of the BWT to identify older adults with dementia with balance deficit, gait impairment, and an increased risk of falls is yet to be determined.

This study aimed to investigate the clinimetric properties (test-retest and inter-rater reliability, construct and known-group validity) of the BWT in older adults with dementia.

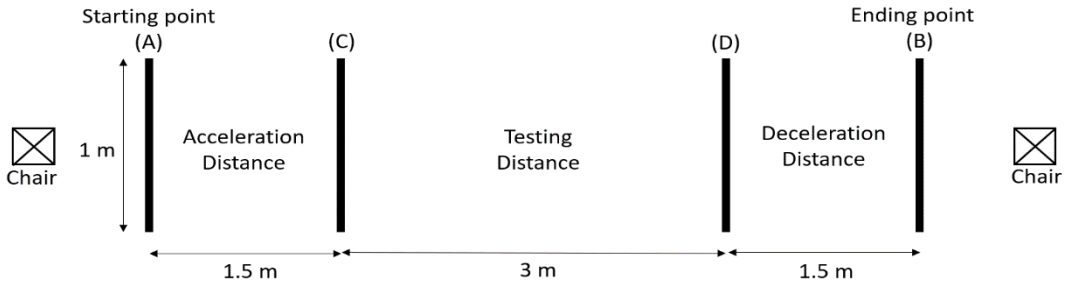
Method

- Participants: aged 65 or above, had a diagnosis of dementia, able to walk backward for 3 metres independently with or without walking aids.
- Settings: day care and residential care.
- Participants performed the BWT on 3 testing occasions within 2 weeks. The BWT was conducted by Rater A and B independently.
- Verbal and physical cues were used systematically to facilitate the participants to complete the BWT.

The cueing system

The BWT:

- Participants were told to “walk backward at your usual, comfortable speed” along a 6-metre straight, levelled, and indoor corridor.
- The time used to cover the middle 3 metres of the corridor was recorded.
- Three trials were conducted, and the average speed of 3 trials was calculated.



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Results

- The BWT had excellent test-retest and inter-rater reliability (intra-class correlation coefficient = 0.96 – 0.97).
- The BWT had moderate correlations with the Berg Balance Scale (ρ = 0.60) and strong correlation with the 10-metre walk test (Spearman's rho ρ = 0.84) and Timed Up and Go test (ρ = -0.82).
- The BWT could distinguish those who walked with walking aids and those who did not ($p < 0.001$).
- The BWT could not distinguish those who had fallen and those who did not fall in the past year ($p = 0.13$).

Table 1. Study participants

Age (years)	83.3 ± 7.8
Female, n (%)	21 (70.0)
BMI (kg/m^2)	23.3 ± 3.0
Number of chronic diseases	4.6 ± 2.0
MMSE (0–30)	15.3 ± 2.8
Walk unaided, n (%)	17 (56.7)
Fallers, n (%)	8 (26.7)
Berg Balance Scale	43.7 ± 10.4
10-metre walk test (m/s)	0.63 ± 0.3
Timed Up and Go test (s)	30.0 ± 17.9

Table 2. Participants' performance and correlations coefficients of the BWT

The BWT performance, mean ± SD (m/s)		Test-retest reliability	Inter-rater reliability
		$ICC_{3,2}$ (95% CI)	$ICC_{2,1}$ (95% CI)
Rater A	Rater B	Rater A only	Rater A and B
Occasion 1	Occasion 3	Occasion 1 and 2	Occasion 1 and Occasion 3
0.26 ± 0.17	0.25 ± 0.18	**0.96 (0.91 – 0.98)**	**0.97 (0.95 – 0.99)**
Occasion 2			Occasion 2 and Occasion 3
0.27 ± 0.18			**0.97 (0.94 – 0.99)**

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Conclusion

- The BWT is an easy-to-administer, feasible and safe assessment tool to evaluate balance and gait performances in older adults with dementia.
- The BWT has excellent test-retest and inter-rater reliability, and good to strong correlations with other functional tests in older adults with dementia.
- The BWT can distinguish older adults with dementia who have different ambulatory statuses based on the use of walking aids.
- Further studies are needed to investigate whether the BWT can identify those who have an increased risk of falls.

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