



Introduction

- Over one million older adults will be living with dementia by 2030 resulting in reduced independence and quality of life as well as increased burden on the health care system.¹
- Clinically useful assessment tools for the early detection of cognitive decline is required to provide early interventions to mitigate these associated negative health outcomes.²
- Commonly used neurocognitive assessment tools include:
 - Global cognition: Montreal Cognitive Assessment (MoCA) and Repeatable Battery for the Assessment of Neuropsychological Status (RBANS).^{3,4}
 - Executive functioning (EF): Trail Making Test (TMT).⁵
- More recent EF cognitive assessments include Single Task (ST) subtraction by 7's & Dual-Task(DT) walking-subtraction by 7's.⁶

Research Questions:

- Determine the association in cognitive assessment scores across the neurocognitive tests;
- Determine the clinical benefit of DT (walking-cognitive) paradigms compared to single cognitive task to detect cognitive decline in older adults.

Methods

Participants:

- 53 community dwelling older adults >60 yrs (73± 6.4, M =12 F=41)

Protocol:

- MoCA was conducted to evaluate the cognitive status.
- Participants performed 30 seconds of seated subtractions by 7's from a randomly generated 3-digit number.
- Participants performed DT walking-subtraction by 7's from randomly generated 3-digit number for 7 trials (14 passes) on GaitRite mat.
- RBANS and TMT were conducted following the DT test.

Measures:

- MoCA total score was used as a measure of baseline cognitive status.
- Percent of accurate response was used as a measure of single task cognitive performance.
- Average percent of accurate response was used as a measure of DT cognitive performance.
- RBANS total scale was used as a measure of global cognitive status.
- Trail B-A time was used as a measure of the TMT performance.

Statistical Procedure: Pearson correlations were conducted across the cognitive tests using Jasp software version 0.19.

Results

* Only the significant correlations have been reported with P(value) ≤0.05.

Table 1: Correlation between MoCA and RBANS.

	Pearson (r), P(value)
MoCA Total score-RBANS Total scale	0.577, (<.001)
MoCA Visuospatial/Executive-RBANS Visuospatial/Constructional	0.410, (0.002)
MoCA Language-RBANS Language	0.338, (0.013)
MoCA Attention-RBANS Attention	0.357, (0.009)
MoCA Delayed recall-RBANS Delayed memory	0.5, (<.001)

Table 2: Correlation between MoCA, TMT, DT and ST.

MoCA	TMT	DT 7s	ST 7s
	Pearson (r), P(value)	Pearson (r), P(value)	Pearson (r), P(value)
Total score	-0.552, (<.001)	0.358, (0.009)	0.370, (0.006)
Attention	-0.470, (<.001)	0.322, (0.019)	
Visuospatial			0.293, (0.033)
Language		0.409, (0.002)	0.365, (0.007)
Delayed recall	-0.362, (0.008)		
Abstraction	-0.752, (<.001)		

Table 3: Correlation between RBANS, TMT, DT and ST.

RBANS	TMT	DT 7s	ST 7s
	Pearson (r), P(value)	Pearson (r), P(value)	Pearson (r), P(value)
Total scale	-0.486, (<.001)	0.272, (0.049)	0.407, (0.003)
Attention	-0.382, (0.005)		0.328, (0.017)
Visuospatial	-0.343, (0.012)		0.440, (<.001)
Language	-0.271, (0.049)		
Delayed memory	-0.416, (0.002)	0.328, (0.016)	0.391, (0.004)
Immediate Memory	-0.475, (<.001)		

Table 4: Correlation between TMT, DT and ST.

	Pearson (r), P(value)
DT-TMT	-0.249, (0.072)
DT-ST	0.665, (<.001)
TMT-ST	-0.310, (0.024)

Funding Sources:



Discussion

- As expected, total score for the MoCA and RBANS as well as their comparable subdomains (Visuospatial/Executive-Visuospatial/Constructional, Language, Attention, and Delayed Recall-Delayed memory) are highly correlated suggesting no difference in their capacity to detect cognitive impairment in community dwelling older adults (Table 1).
- For both TMT and ST, significant associations were seen with MoCA total score and RBANS total scale and TMT is correlated with some subdomains such as MoCA abstraction and attention and RBANS delayed and immediate memory. TMT and ST are also correlated. Therefore, ST represents a reasonable test of cognitive status (Table 1, Table 2).
- Further ST can be performed during gait making it ideal for a DT walking paradigm in contrast to MoCA, RBANS and TMT. In addition, ST and DT were correlated on cognitive performance (Table 4).
- Interestingly, correlations between DT and RBANS, MoCA or TMT were not significant. This is likely due to two factors:
 - First, the addition of the walking motor task (i.e. a Dual task paradigm) concurrently tests multiple capacities of the nervous system while MoCA, RBANS and TMT are single tasks that only evaluate the cognitive component of executive function.
 - Second, the cognitive demand of counting backwards by serial 7's from a 3-digit number is greater than some of the cognitive tests in the MOCA and RBANS.

Conclusion

- The current results demonstrate that overall, cognitive assessments do not test the integrity of nervous system in the same fashion as DT (cognitive-walking) paradigms.
- Functional decline in older adults is most evident in ADLs which often involve concurrent motor and cognitive performance.⁷ Fall incidence is higher in cognitively impaired older adults. Therefore, utilizing DT paradigms may have a higher diagnostic value to help clinicians with earlier detection of cognitive decline and fall risk.
- This suggests that DT (cognitive-walking) paradigm test is critical to include in geriatric assessments to challenge multiple facets of executive functioning that include both motor and cognitive domains to detect limitations in functional capacity.

References

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