Mini Mental State Examination and Montreal Cognitive Assessment: which is the best predictor of Driving Ability?

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INTRODUCTION

Mini Mental State Examination (MMSE) and Montreal Cognitive Assessment (MoCA) are the most commonly used screening tests for the evaluation of general cognitive ability. Previous research suggests that MMSE and MoCA could be used as predictors of driving ability.

In regards to MMSE, previous studies which have investigated performance on the MMSE in relation to driving abilities have revealed contradictory results. Although the inconsistency of the MMSE as a predictor of driving ability is shown in a number of studies (Adler et al., 2003; Lesikar et al., 2002; Paccalin et al., 2005; Uc et al., 2005), some studies suggest a consistent relationship between the two (Lesikar et al., 2002; Uc et al., 2005).

Hollis et al. (2005) examined the comparison between MMSE and MoCA in order to predict driving performance. The study's findings suggested that the MoCA was a useful screening test for identifying individuals with cognitive impairment who are at driving risk.

AIM

The present study compared the capacity MMSE and MoCA to predict specific driving indexes in patients with aMCI, mild AD and healthy individuals.

METHODS

Participants:
- 44 patients with aMCI
- 23 patients with mild AD
- 44 healthy individuals

The diagnosis of aMCI was made by the Petersen et al. (2005) criteria
The diagnosis of mild AD was made by the McKhann et al. (2011) criteria

Inclusion & Exclusion Criteria:
- have a valid driving license
- regular drivers
- CDR: MCI ≤ 0.5 , AD ≤ 1
- not have significant psychiatric history of psychosis
- not have any significant motor disorder
- not have any significant visual disorder

Procedure
(a) All the participants underwent a complete neurological, neuropsychological and othalmological assessment. General cognitive ability was measured by the administration of MMSE & MoCA

(b) The participants went through a driving simulator experiment:

- Phase 1: Practice session (5-10 min.)
- Phase 2: Two driving sessions (about 20 min. each) on **urban streets** with multiple lanes, and on a two-lane **rural road**. An unexpected incident occurs in each of the two sessions (sudden appearance of pedestrian or child on the road, sudden appearance of an animal on the rural road)
- Driving was assessed with **a Foerst FPF driving simulator**, in different conditions

Driving Indexes:
- Average speed
- Lateral position
- Head way distance
- Reaction time
- Accident probability
- Speed limit violations

RESULTS

Table 1. Correlations between MMSE, MoCA and Driving Indexes in aMCI patients

Driving Indexes	Rural Area				Urban Area			
	MMSE		MoCA		MMSE		MoCA	
	r	p-value	r	p-value	r	p-value	r	p-value
Average speed	.01	.94	-.05	.77	-.01	.96	.09	.61
Lateral position	-.10	.55	-.33	.055	.22	.22	.18	.32
Head way distance	.02	.91	.04	.83	-.16	.38	.01	.94
Reaction time	**-.33**	**.045***	**-.42**	**-.01***	**-.78**	**.000****	**-.47**	**.02***
Accident probability	**-.34**	**.041***	**-.046**	**.006***	**-.56**	**.003***	**-.47**	**.02**
Speed limit violations	-.23	.18	**-.39**	**.02***	.20	.27	.34	.059

Table 2. Correlations between MMSE, MoCA and Driving Indexes in mild AD patients

Driving Indexes	Rural Area				Urban Area			
	MMSE		MoCA		MMSE		MoCA	
	r	p-value	r	p-value	r	p-value	r	p-value
Average speed	.41	.09	**.48**	**.044***	.29	.26	.34	.21
Lateral position	.22	.37	.06	.79	.21	.43	-.04	.88
Head way distance	**-.53**	**.024***	**-.57**	**.014***	-.28	.29	-.26	.32
Reaction time	.07	.77	-.09	.69	-.16	.59	.13	.68
Accident probability	.21	.39	.13	.61	**-.54**	**.03***	**-.53**	**.037***
Speed limit violations[a]	-	-	-	-	-	-	-	-

*p=.05. **p<.001*

[a] In the AD group, no speed limit violations were recorded

➤ **In the healthy individuals the MMSE and the MoCa were not associated with any of the driving indexes**
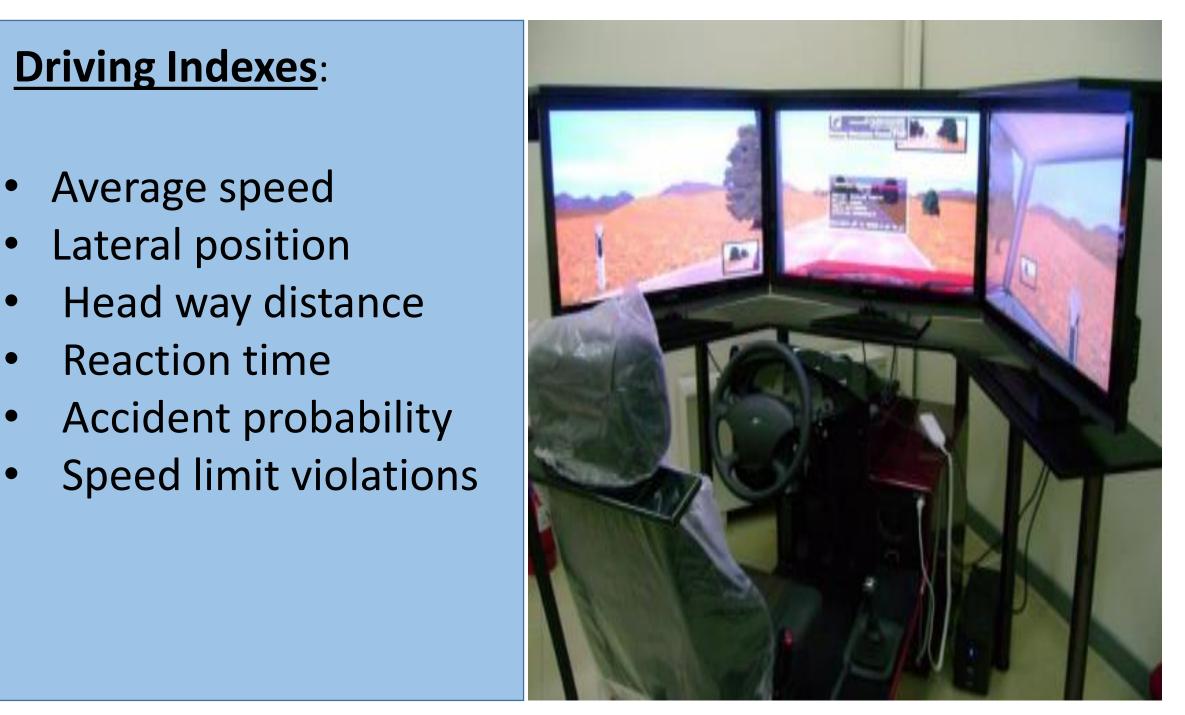
CONCLUSION

- Our findings indicated that both MMSE and MoCA associated with various driving indexes could be useful screening measures in order to assess driving fitness briefly.

- Both routine cognitive screening tests were correlated with the critical driving indexes of reaction time and accident probability in the groups of driver with MCI and AD

- In the mild AD group, both the MMSE and the MoCA achieved similar levels of predicted capacity in terms of driving behavior. Thus, the aforementioned screening tools could be alternatively utilized in order to obtain an indication of the driving fitness in patients with mild AD.

- However, in the case of aMCI, MoCA was correlated with more driving variables than the MMSE.

- Thus, MoCA seems to be a more useful source of information for facilitating decisions about driving ability. This finding could be linked to the fact that MoCA has proved to be a better screening test in detection of patients with MCI (Dong, et al., 2012).

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