# Self-assessment of driving performance in patients with Mild Cognitive Impairment (MCI) and Alzheimer's disease (AD)

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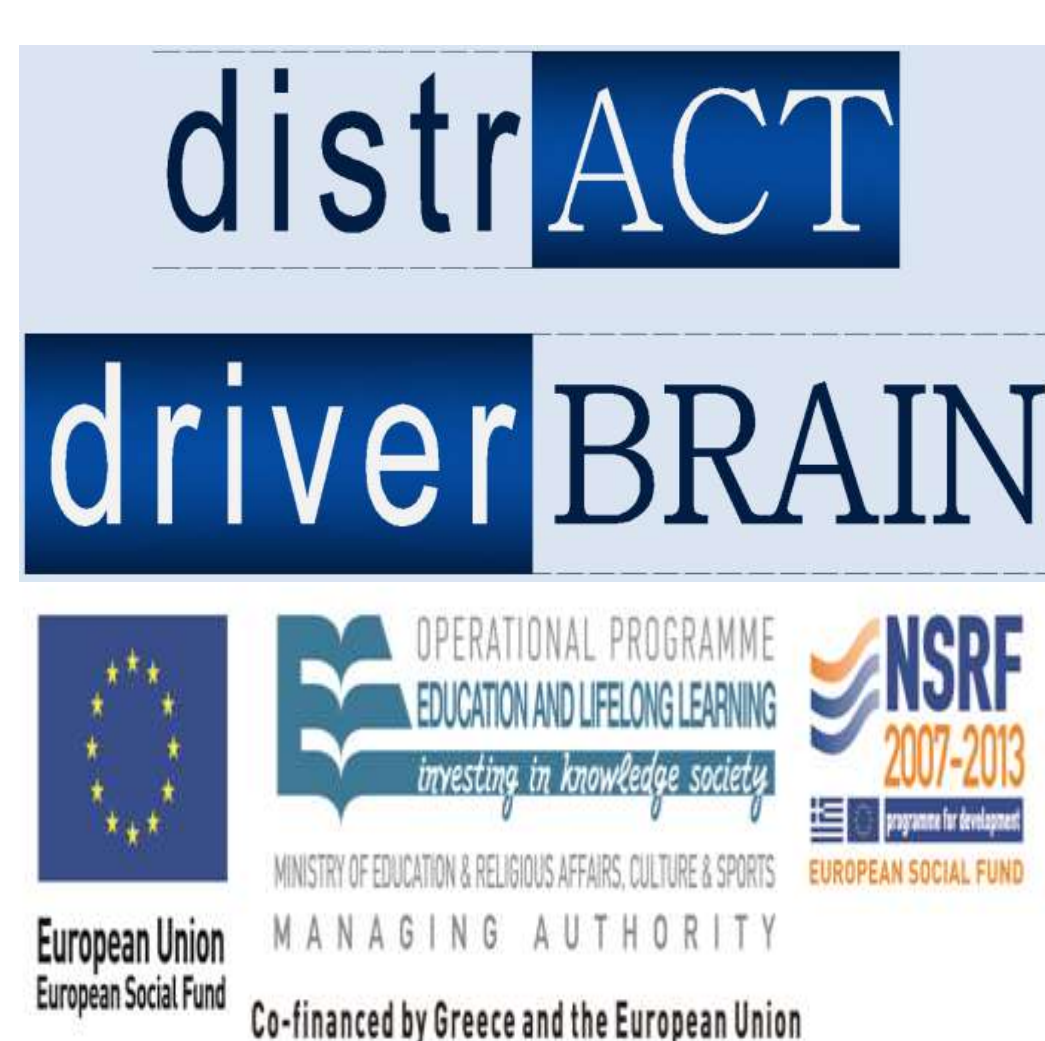
INTRODUCTION

- Maintaining mobility is of greatest importance for preserving autonomy and self-esteem in the elderly (Gardezi et al., 2006)
- Cognitive and functional impairments are recognized as a risk factor for accidents in the elderly population (Carr et al., 2010)
- Commonly, patients with mild or moderate cognitive impairments (MCI or mild Alzheimer's disease) voluntarily limit or cease driving (Man-Son-Hing et al., 2007), however not in all cases (Wong et al., 2012)
- Individuals with MCI and AD that continue driving tend to overestimate their driving abilities (Okonkwo et al., 2009; Brown et al., 2005).
- Drivers who lack insight of their driving difficulties are less likely to apply self-regulatory strategies in their driving behavior and increasing, thus, accident risk (Wong et al., 2012)
- Self-estimation of driving abilities in the MCI population has rarely been investigated. This is the first study to compare detailed driving parameters in terms of objective and subjective assessment of performance

AIMS

Aim of the present study was to compare self-perceived driving abilities and objective driving performance in healthy elderly and patients with MCI and AD

METHODS

Participants:
- 29 patients with amnestic MCI (Petersen et al., 2005)
- 16 patients with mild AD (McKhann et al., 2011)
- 24 healthy individuals

Inclusion & Exclusion Criteria:
- Valid driving license
- Regular drivers
- CDR: MCI ≤ 0.5 , AD ≤ 1
- Without any significant psychiatric history of psychosis
- Without any significant motor or visual disorder

Procedure
(a) All the participants underwent a complete neurological, neuropsychological and ophthalmological assessment.
- 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 occurred in each of the two sessions (sudden appearance of pedestrian or child on the road, sudden appearance of an animal on the rural road)
(b) After the driving simulator experiment, participants were asked **to self-evaluate their performance** in comparison to other people of their own age and educational level on the following driving indexes:
(1) average speed,
(2) lateral position,
(3) headway distance,
(4) reaction time and
(5) steer wheel variation

➤ **The self-evaluation was reported on a scale ranging from -100 to +100** (with 10-point intervals expressed as percentages) for each of the aforementioned driving variables (Figure 1). On the particular scale, the number zero (0) represented the average performance while the extreme values (**-100%** / **+100%**) of the scale represented opposite qualities: (1) driving **slower** / **faster** , (2) at the **leftmost** / **rightmost** edge of the road, (3) maintaining **shorter** / **longer** headway distances, (4) having **slower** / **faster** reaction times and (5) preserving a more **unstable** / **stable** hold of the wheel while driving

Figure 1. Example of the self-assessment scale administered to the participants after the driving simulator experiment
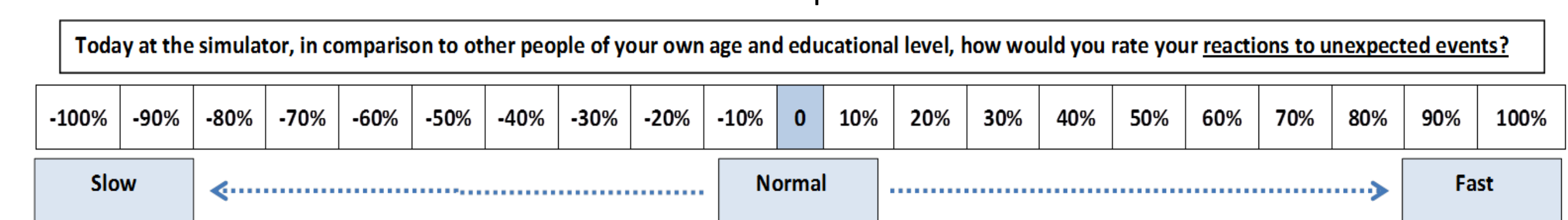
RESULTS

Table 1. Demographic characteristics of the control, MCI and AD group

	Controls ($m\pm SD$)	MCI ($m\pm SD$)	AD ($m\pm SD$)
Age	61.8±8.3	67.5±7.5	73.6±5.1
Driving Experience	34.1±8.1	40.7±5.4	45.8±6.9
MMSE (/30)	29.3±0.8	28.1±1.6	22.6±3.7

MMSE=Mini Mental State Examination, m=mean score, SD= standard deviation

Figure 2. Differences between objective and subjective performance in healthy elderly, MCI and AD patients

*$p=.05$, **$p<.001$
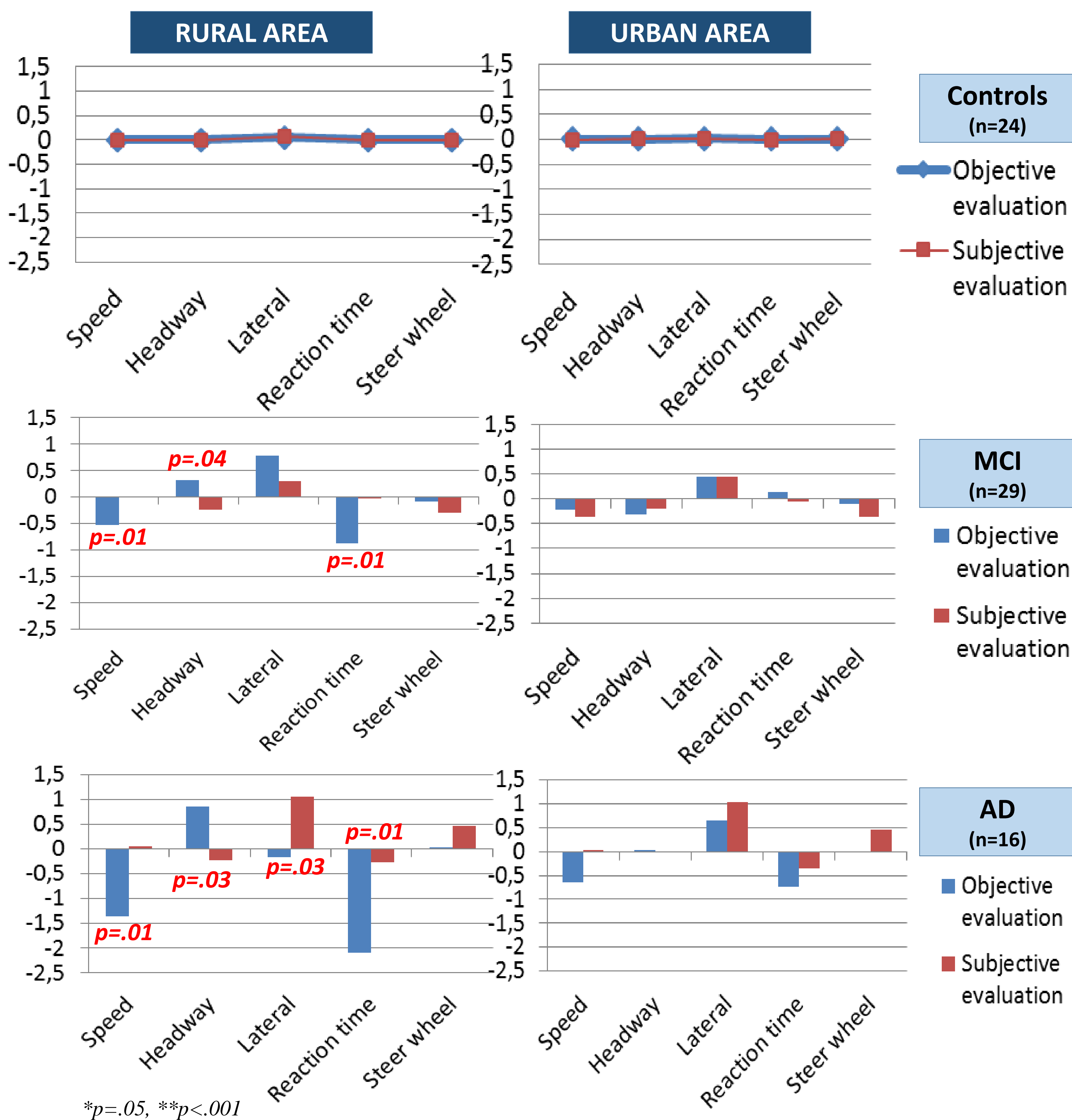
CONCLUSION

- In the specific analysis, we focused on evaluating the discrepancy that exists between objective and subjective performance in the various groups of the study. Moreover, it should be noted that positive or negative z-scores in the various driving indexes are not necessarily representative of a better/worse driving performance but rather signify the amount of difference that exists from the average driving behavior.
- Based on this perspective, the current findings suggest that patients with MCI and AD do present specific difficulties when assessing their driving performance. Notably, the ability to accurately evaluate driving capabilities seems to follow a comparable decline along with the level of cognitive impairment.
- Driving in urban areas seems to improve the capacity of the drivers to evaluate accurately their driving performance. Factors that may contribute in this direction could be the more organized driving environment and the greater amount of cues that are provided for monitoring driving behavior in the urban area

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