Self-assessment of driving in relation to driving performance

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Objective

Background

Perception of change in driving ability with age and cognitive decline is important for the self-monitoring of driving and the realistic adaptation to challenging driving situations. Such situations are difficult to investigate during on-road driving.

Objective

The aim of the study is to examine self-assessment of driving in relation to objective driving measures derived from a driving simulation experiment in different neurology patients and controls.

Methodological steps

Participants

In these analyses, 157 drivers participated: 65 controls (>43 years, 61.62±8.55), 50 Mild Cognitive Impairment (MCI) patients (67.66±9.35 years), 23 mild Alzheimer's disease (AD) patients (72.61±6.46 years), and 19 Parkinson's disease (PD) patients (64.16±9.14 years). Different numbers of patients entered different analyses, depending on driving conditions completed.

Measures

Questionnaire measures

Selected questions from a driving behavior questionnaire asking the driver to rate his/her driving in a variety of driving environments and conditions in relation to five years prior.

Driving measures

Average speed (in km)

Lateral position variation (SD of distance of the vehicle from the right road border in m)

Headway average (distance from the vehicle ahead in m)

Number of speed limit violations

Number of crashes at unexpected incidents (2 unexpected incidents per trial)

Methodological steps

Procedure

Measures were derived from the U1 & U2 trials (**Urban** driving environment **moderate** and **high** traffic load, respectively), and the R1 & R2 trials (**Rural** driving environment **moderate** and **high** traffic load, respectively).

Average speed, lateral position variation and headway average were z-transformed based on the entire sample of 102 controls (range: 22-80 years, 48.42±16.33 years).

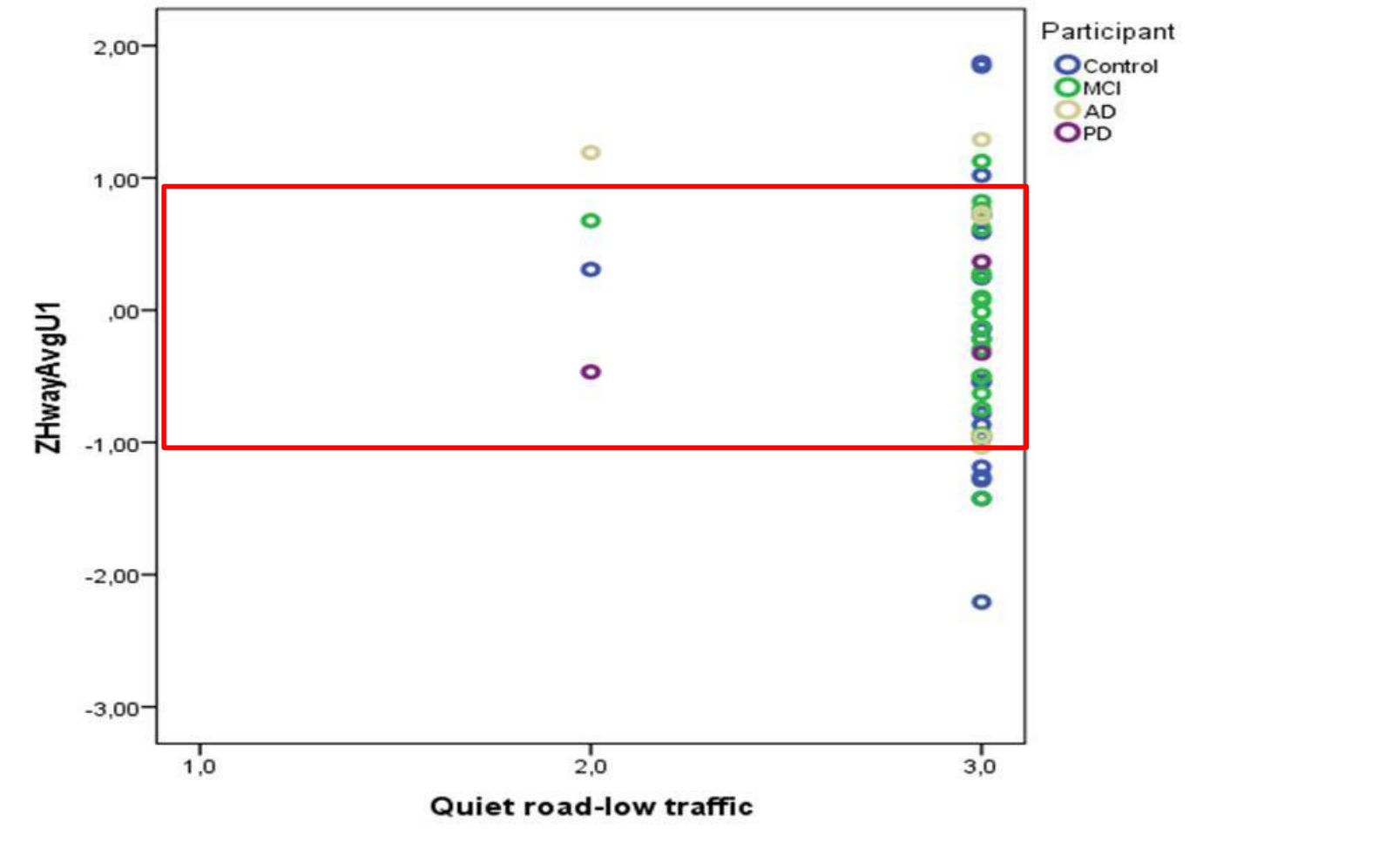
Methodological steps

Questionnaire

Compared to 5 years prior, how would you evaluate your driving in the following conditions?

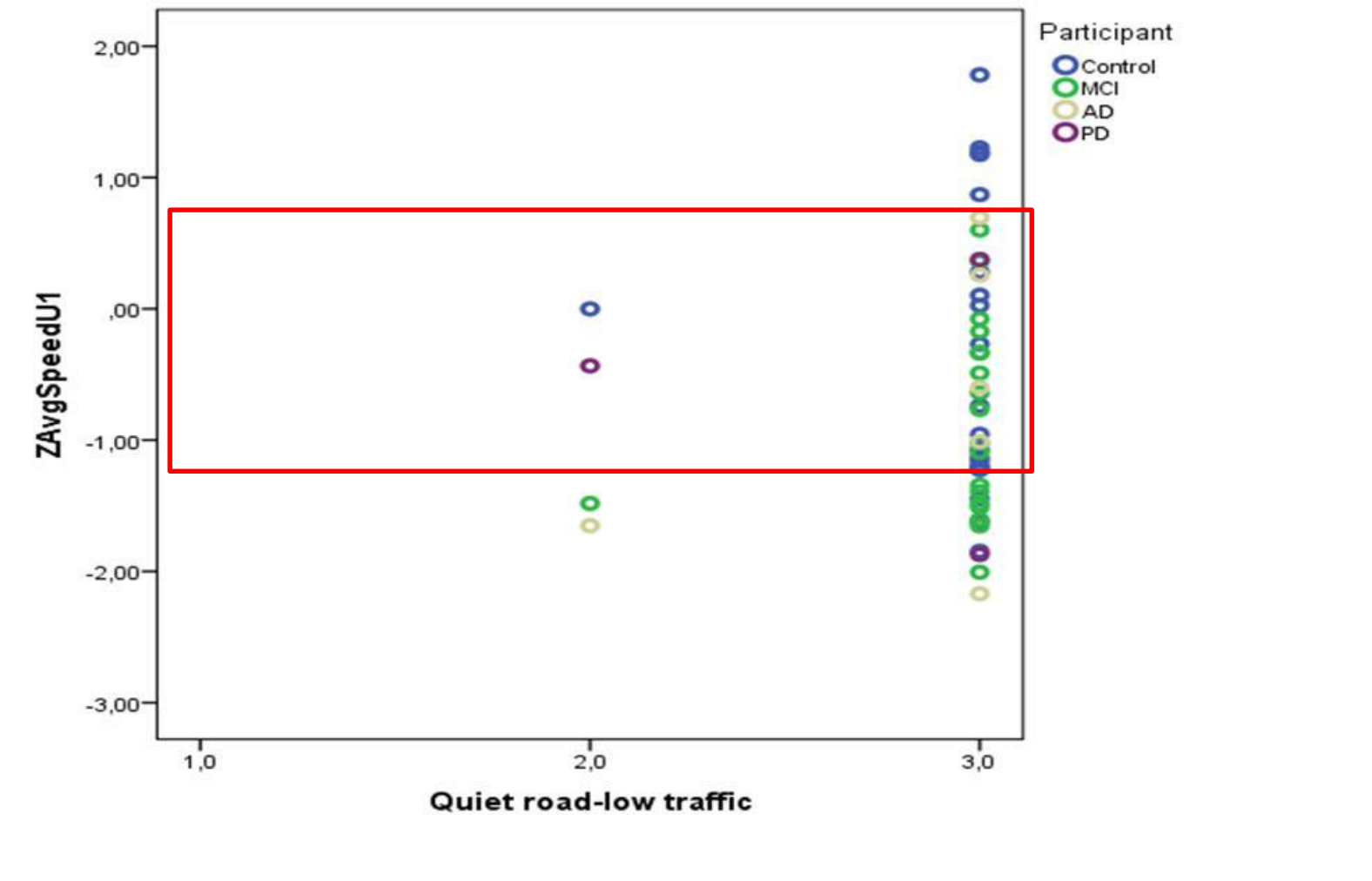
1=significantly worse 2 =slightly worse 3=no difference

Results – Urban low traffic-2



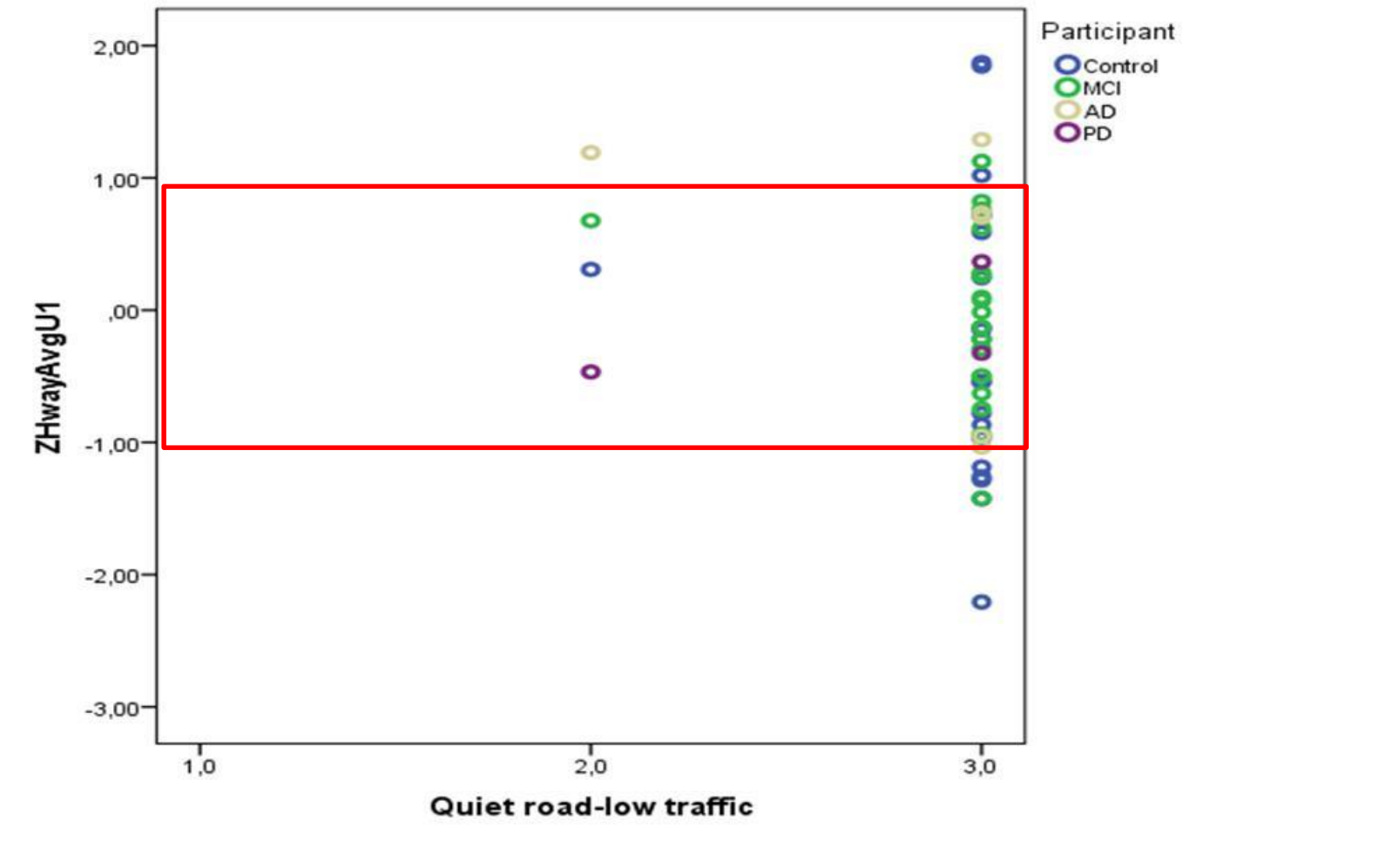
Ήπια κίνηση-ήσυχος δρόμος

Results – Urban low traffic-1



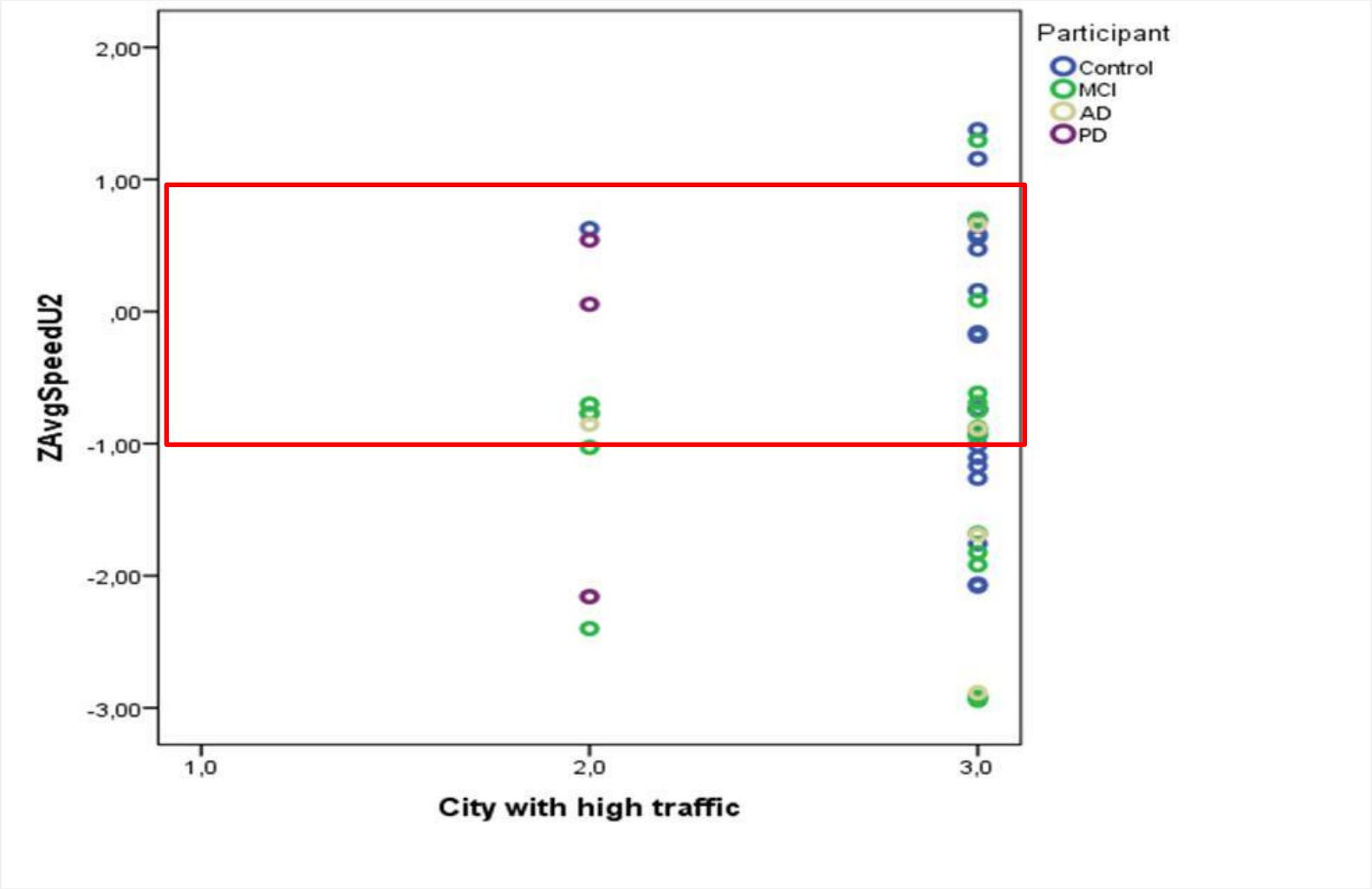
Ήπια κίνηση-ήσυχος δρόμος

Results – Urban low traffic-3



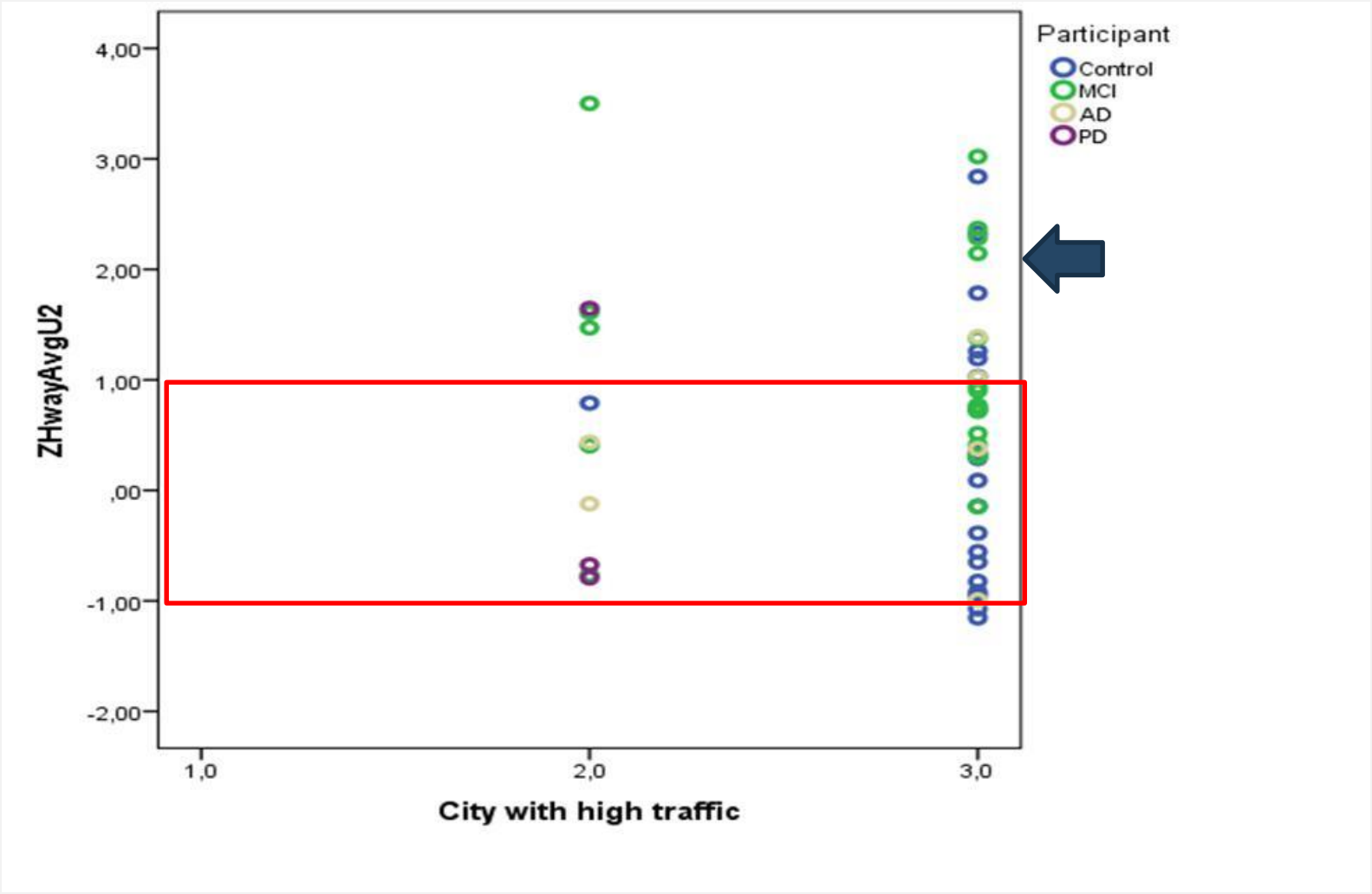
Ήπια κίνηση-ήσυχος δρόμος

Results – Urban high traffic-1



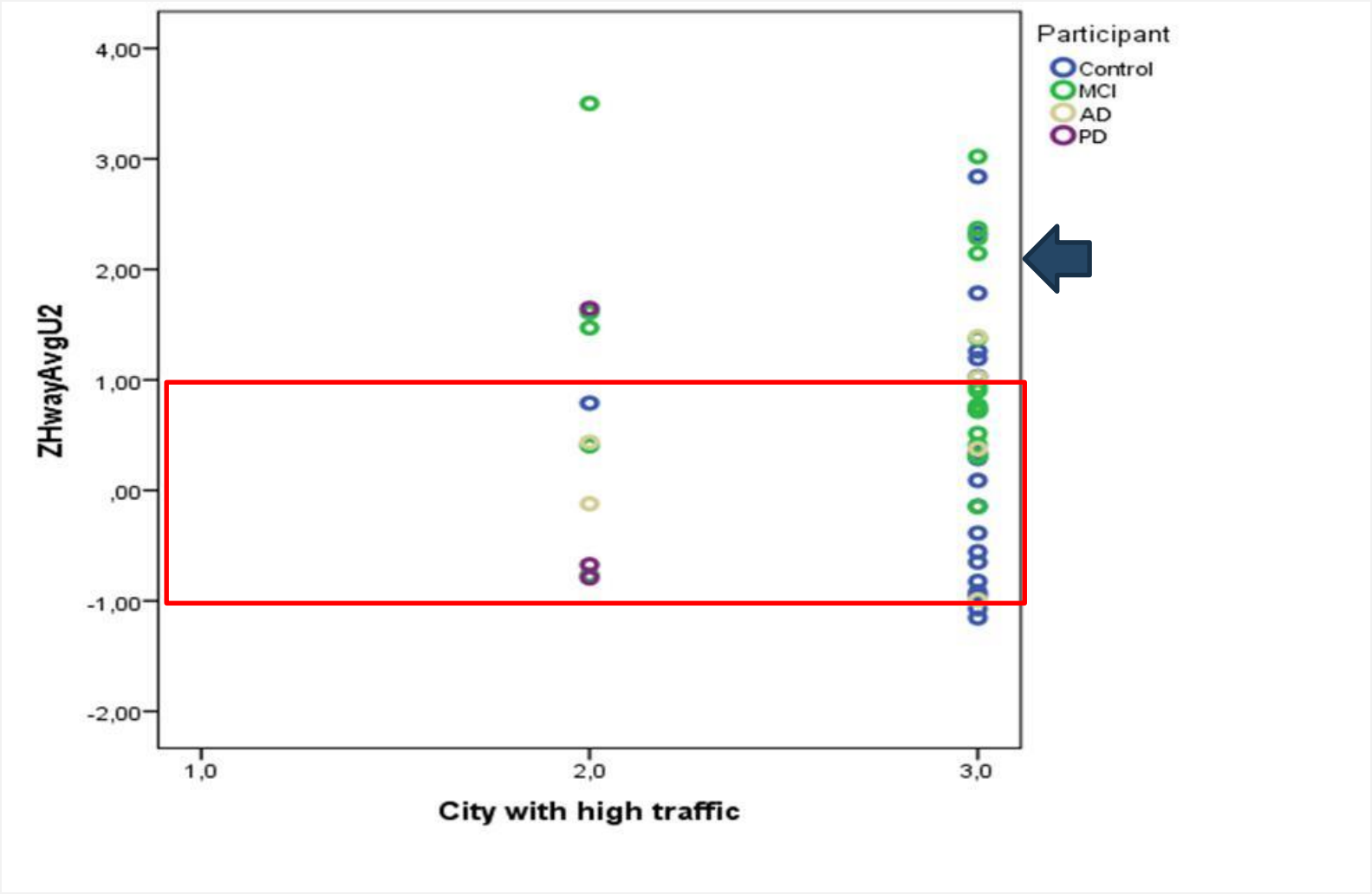
Πόλη με μεγάλη κυκλοφορία

Results – Urban high traffic-2



Πόλη με μεγάλη κυκλοφορία

Results – Urban high traffic-3



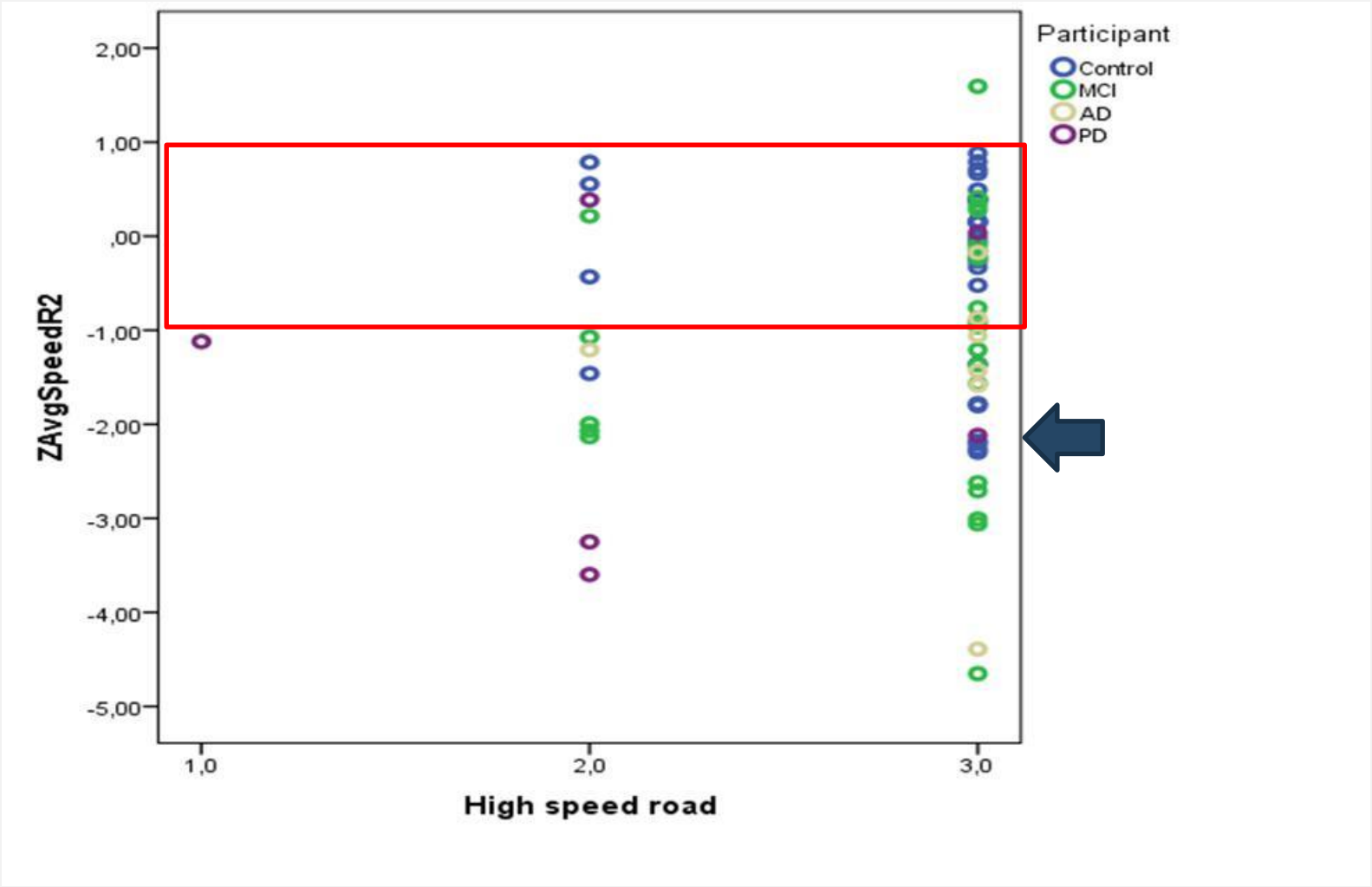
Πόλη με μεγάλη κυκλοφορία

Results-Urban

No relationship between self-assessment and objective performance using questions that correspond to the driving conditions.

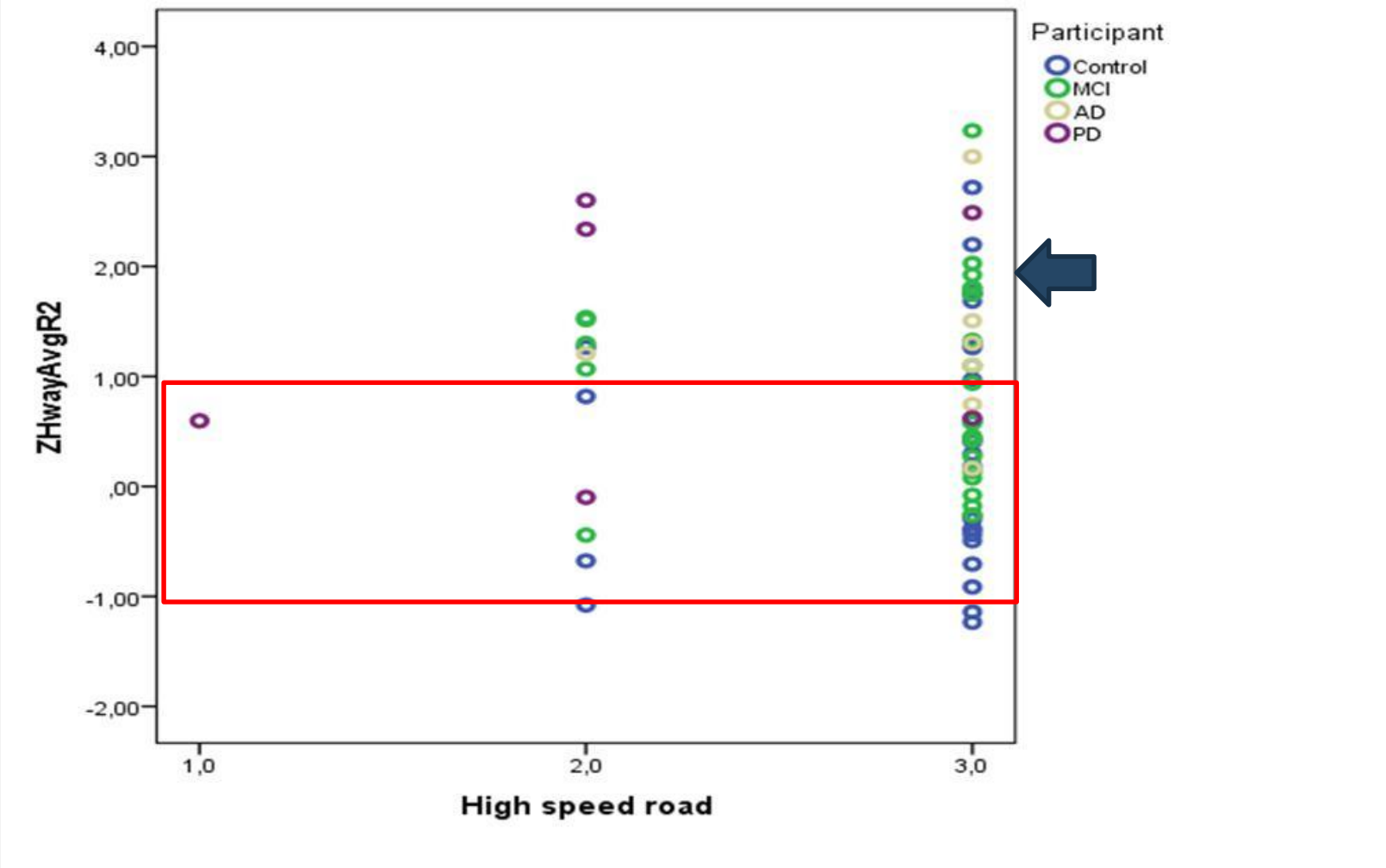
No significant differences in the 3 **Urban** driving measures among the groups, controlling for age.

Results – Rural high traffic-1



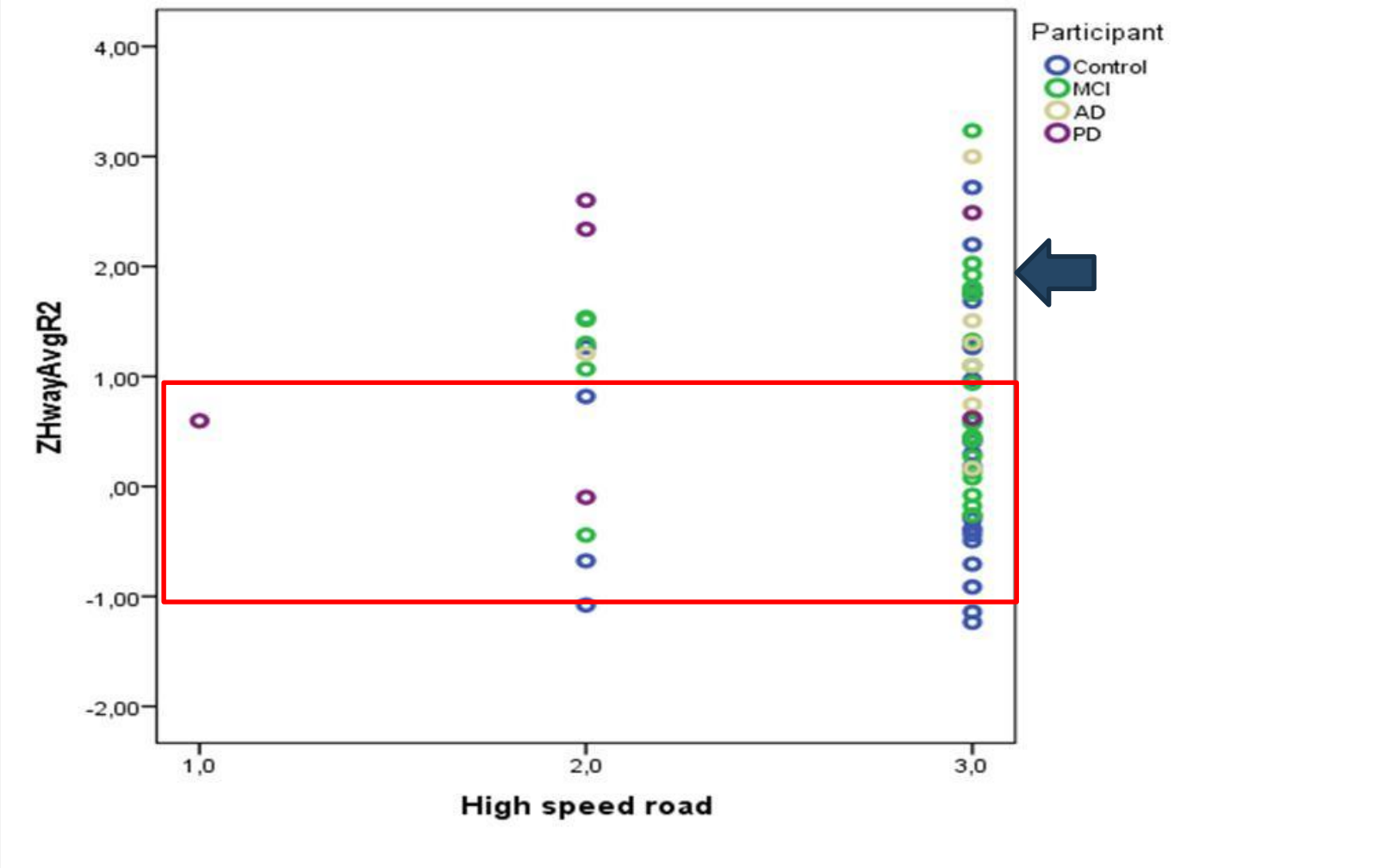
Δρόμος ταχείας κυκλοφορίας

Results – Rural high traffic-2



Δρόμος ταχείας κυκλοφορίας

Results – Rural high traffic-3



Δρόμος ταχείας κυκλοφορίας

Results-Rural

No relationship between self-assessment and objective performance using questions that correspond to the driving conditions.

Rural, Moderate Traffic: PD <Controls in Average Speed, $p<.05$, PD >Controls in Headway Average, $p<.01$, controlling for age.

Rural, High Traffic: PD & AD <Controls in Average Speed, $p<.01$, PD & AD >Controls in Headway Average, $p<.01$, controlling for age.

Unexpected incidents, speed limit violations

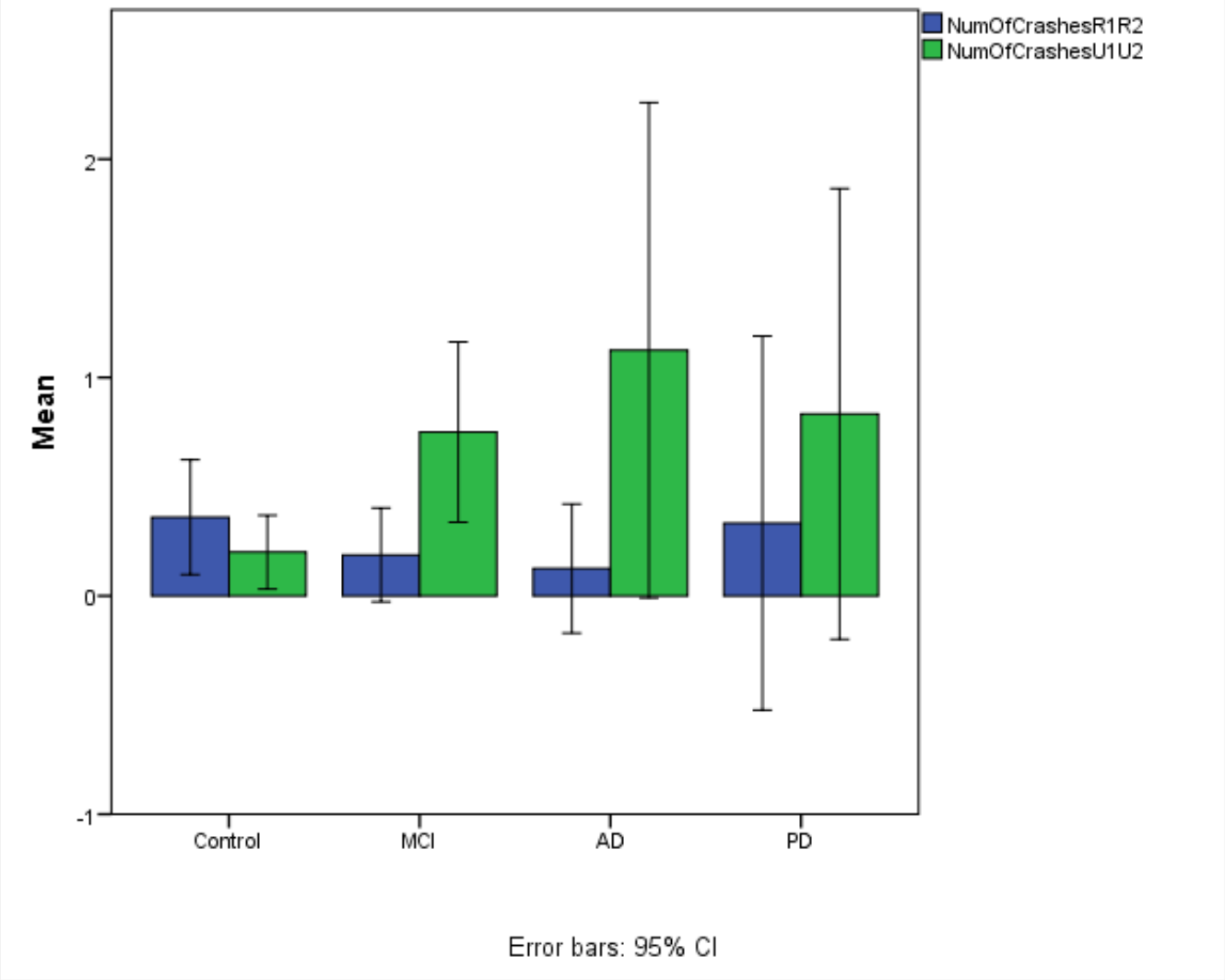
Q1. *Delay of reaction in event of sudden break*

Q2. *Difficulty in perceiving vehicles and pedestrians that approach suddenly in front of you from a lateral position*

Q3. *Difficulty focusing on traffic signs in an environment where there are other signs*

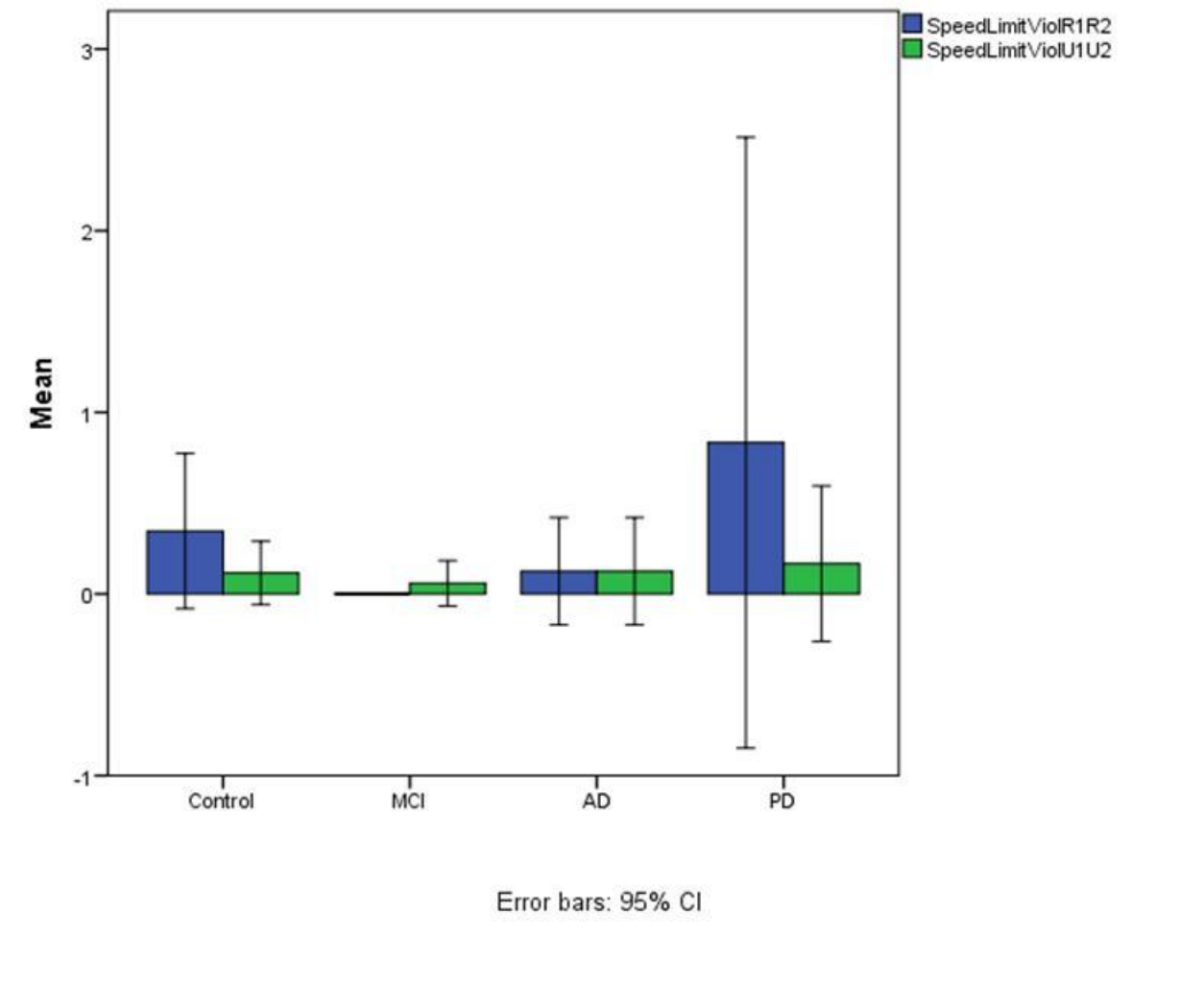
1=never 2=rarely 3=sometimes 4=often 5=always

Results-Unexpected incidents



Max=4

Results-Speed limit violations



Results-Incidents & violations

No associations were found between Q1, Q2 & no. of crashes, Q3 & speed limit violations in **Rural** and **Urban** conditions (in moderate & high traffic).

Rural condition: No. of crashes correlated with speed limit violations ($p<.05$).

Conclusions

- The driving simulator measures employed are poorly associated with self-assessment of driving performance.
- Outliers (>±1SD) were more evident in the Rural condition, most likely due to higher speed demands. Slower speed and the correlated measure of larger headway distance in the AD and PD patients may reflect an adaptation to decline in abilities and therefore may not be perceived as a decline in self-assessment.
- Self-assessment of readiness to sudden events is not associated with unexpected event crashes in the simulator. Crashes are rare events in real life and one's readiness to them may be difficult to self-assess.
- All patients crashed more often in the Urban condition, with AD patients crashing more than 1 out of 4 times. PD patients made more speed limit violations in the Rural condition but showed the greatest variability.

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