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Self-assessment of older drivers with brain pathologies: reported habits and self-regulation of driving



Dimosthenis Pavlou ^{a,*}, Panagiotis Papantoniou ^{a,1}, Eleonora Papadimitriou ^{a,1},
Sophia Vardaki ^{a,1}, Alexandra Economou ^b, George Yannis ^{a,1},
Sokratis G. Papageorgiou ^c

^a National Technical University of Athens, Department of Transportation Planning and Engineering, 5 Heroon Polytechniou str. GR-15773 Athens

^b National and Kapodistrian University of Athens, Department of Psychology, Athens, Greece

^c Behavioral Neurology and Neuropsychology Unit, 2nd Department of Neurology, University of Athens, "Attikon" University Hospital, 1 Rimini Str, 12462 Haidari, Athens, Greece

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ABSTRACT

The objective of this paper is to analyze the self-reported driving behaviour of older drivers with and without brain pathologies affecting cognition, in order to explore possible differences in self-perception of driving behaviour, through an extensive questionnaire assessment. The diagnostic categories examined include Alzheimer's disease, Parkinson's disease, and Mild Cognitive Impairment. The questionnaire was answered by 137 drivers with similar demographic characteristics, out of which 44 were healthy individuals and 93 had a brain pathology. It included questions about their driving routines, possible avoidance of driving, and their emotions and behaviours while driving. The participants were also asked about their opinion about in-vehicle driver distraction and how they deal with it. A comparison of the two groups with Kruskal-Wallis and One-Way ANOVAs, produced several statistically significant results. Patients tended to report that they were more likely to avoid using their vehicle because they were afraid of their driving abilities than healthy drivers. Regarding distraction, patients considered it too dangerous to converse with a passenger and even more so, to use the mobile phone and for that reason they reported avoiding to do so. Patients with brain pathologies reported being quite calm while driving. Overall, drivers with brain pathologies were aware of deterioration in their driving performance, and reported trying to compensate for their driving difficulties either by conservative driving or by driving avoidance.

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1. Theoretical background

1.1. Brain pathologies and driving performance

Driving requires possessing sufficient cognitive, visual and motor skills, adequate motor strength, speed and

* Corresponding author. Tel.: +302107721376.

E-mail address: dpavlou@central.ntua.gr (D. Pavlou).

¹ Fax: +302107721454.

coordination. More importantly, drivers must possess higher cognitive skills: concentration, attention, adequate visual and perceptual skills, insight, judgement and memory. Important skills for driving include strategic and risk taking behavioural skills, including the ability to process multiple simultaneous environmental cues in order to make rapid, accurate and safe decisions. The task of driving requires the ability to receive sensory information, process the information, and to make proper, timely judgments and responses (Waller, 1980; Freund et al., 2005).

Due to the complexity of skills required for driving, the ability to drive can be affected by various motor, visual, cognitive and perceptual deficits, which are either age-related or are caused by neurological disorders. Drivers suffering from brain pathologies may have difficulties in carrying out their usual activities, which include driving (Hunt et al., 1993), and drivers with dementia are one of the groups considered at greatest risk for unsafe driving performance (Langford et al., 2007). Although the greater the dementia severity, the greater the likelihood of poor driving ability, there is disagreement concerning the extent to which Mild Cognitive Impairment (MCI) or preclinical dementia can affect driving behaviour and driving safety. Road crashes, while infrequent, are also of concern for drivers with dementia, whose crash risk is two to five times that of unimpaired older drivers (Charlton et al., 2003).

Driving skills predictably worsen as dementia progresses (Adler et al., 1999) and will ultimately result in discontinuation of driving (Adler et al., 2005). Due to the variability in driving performance of persons with dementia, driving decisions need to be made not on the basis of diagnosis but on an assessment of the dementia's progress and the disease's effects on functional abilities (Duchek et al., 2003; Eby et al., 2009a, 2009b).

1.2. Self-regulation of driving and driving habits of older patients with brain pathologies

Self-regulation of driving is associated with lower levels of driving confidence of older adults (Baldock et al., 2006). Awareness of functional difficulties may be another critical factor for determining self-regulation among older drivers (Charlton et al., 2006). However, many older drivers do not regulate their driving to meet their functional decline, as shown by lack of differences in reported driving habits of older drivers when faced with challenging driving situations (Baldock et al., 2008). Ackerman et al. (2010) found that self-rated driving ability failed to predict older drivers' functional performance on measures of cognitive, visual and physical abilities, consistent with the above finding.

Drivers with cerebral diseases tend to limit their driving as part of a gradual progress of driving cessation (Croston et al., 2009). However, some continue to drive when it is no longer safe, and exercise poor judgment about their abilities (Brown et al., 2005). Research findings suggest that complex driving situations could pose safety concerns for patients with MCI. However, it is not clear if individuals with clinically-defined MCI report that they reduce their driving in order to compensate for declines of their abilities (Weston et al., 2011; Farias et al., 2005; Frittelli et al. 2009).

Moreover, according to Meng and Siren (2012), driving-related discomfort critically affects the self-regulation of driving in older adults, indicating a link between driving-related stress, driving self-regulation and driving cessation. What is more, discomfort as an outcome of complex driving situations may also act as a type of indirect self-monitoring of driving ability and motivate acts of self-regulation of driving.

It is therefore of critical significance to examine the self-regulation patterns that older drivers with brain pathologies report that they use in their everyday driving life in different conditions of driver distraction, which constitutes an important human factor related to road accident causation.

1.3. Assessing driving behaviour through self-report questionnaires

Self-reports include a variety of different methodologies, including questionnaires and inventories, focus groups, interviews (Basch et al., 1989; Kua et al., 2007) and driving diaries (Joshi et al., 2001). Self-reports and especially questionnaires present several advantages. They are less expensive than studies using an instrumented vehicle or a driving simulator, they provide quite more detailed information than observations, and they can reach a quite large number of people in short time. Representativeness of the sample is easy to establish and can be measured with direct statistical comparisons to driver population. Moreover, due to large samples, detailed and complicated statistical analyses can be conducted (Lajunen and Ozkan, 2011).

2. Objectives

The objective of this paper is to examine the self-reported driving behaviour of older drivers with brain pathologies and to compare it with that of healthy older drivers through an extensive questionnaire assessment. Patients with the following brain pathologies were examined: Alzheimer's disease (AD), Mild Cognitive Impairment (MCI), and Parkinson's disease. The group of patients with brain pathologies, as a whole, was compared to a healthy control group of similar demographics. The questionnaire that was developed and used included 24 questions about the participants': a) usual driving routines (driving and alcohol use, seat belt use etc.), b) self-assessment of driving frequency and driving performance, c) possible avoidance of driving, d) opinion about in-vehicle distraction (conversation with passenger or mobile phone use), e) dealing with in-vehicle distraction, and f) emotions while driving. It was predicted that there would be several significant differences between the two examined groups in the above domains.

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