

When do Greek older adults with mental disorders stop driving?

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Abstract

Introduction: The purpose of this postdoctoral study is to determine the driving cessation time-point of Greek older adults with mental disorders in relation to their mental stage. **Methodology:** Enrichment of the existing database which formed part of the basic doctoral dissertation work. The study participants were 639 drivers examined according to their sex, age, marital, professional or retirement status, and their level of education. Out of the 639 participants, 307 were assessed on an extensive driving questionnaire, 285 on a short driving questionnaire, and 47 caregivers on a short caregiver driving questionnaire. Also, 79 participants-patients performed a

driving simulation. The Extensive Driving Questionnaire was administered to 307 drivers as well as to a group of Alzheimer's Disease (AD) patients aged over 65 years, which led to the creation of a 15-item Short Driving Questionnaire. The short questionnaire was answered by 285 participants, 183 men (64.2%) and 102 women (35.8%). The distribution of the population according to the diagnosis was: 88 healthy (30.9%); 100 Mild Cognitive Impairment (MCI) (35.1%); 69 AD (24.2%); 28 other dementias (9.8%) with no mobility problems. The AD patients were diagnosed according to the NINCDS-ARDR criteria, the MCI ones according to the Petersen and Winblad criteria, while the other dementias according to the DSM-IV criteria. It is proposed to construct and administer a new questionnaire to the participants of the sample. It will include questions such as: "Have you stopped driving? If so, when and why?" "Have you been treated by a doctor?" "Have you been re-evaluated at a Daycare Unit?" The percentage of older adults who stopped driving will be correlated with the stage of dementia.

Discussion and Conclusion: Driving cessation time point may be related to the quality of life of Greek older adults with mental disorders.

Keywords: Mental Disorders, Dementia, Alzheimer's Disease, Older, Adult Driving.

JEL Classifications: I12, I13, R41

Introduction

While elderly people strive for independent transportation, age-related changes in their functionality affect their driving ability and, consequently, their safety. The evaluation of the ability of people with cognitive disorders to keep up driving is becoming an increasingly common clinical problem (Katsouri & Tsolaki, 2012).

Aging is closely related to many other common medical conditions (such as hypertension, cardiac rhythm abnormalities, heart failure, coronary artery disease, diabetes mellitus) and medications (even the proper use of drugs can lead to adverse effects) that may also impair driving. co-morbidity is markedly high in older ages.

The abolition of the sense of independence and autonomy afforded to the elderly that are still capable of driving may have detrimental effects on both the individual's mood and his or her ability to accept and adapt to the new way of living that is being imposed by their medical and cognitive condition (Katsouri & Tsolaki, 2013).

The existing evaluation system for the ability of driving in Greece is based on an individualized medical examination every 3 years over the age of 65 years (pathologist, ophthalmologist) and every year or two years after the age of 80 years (pathologist, ophthalmologist, ENT, neurologist) [Katsouri, Athanasiadis, Bekiaris, & Tsolaki 2015b; Katsouri, 2018].

Our main goal is to construct and administer a psychometrical tool, or standardize one in a Greek sample, that will have the psychometric properties needed to accurately discriminate the elderly people that should give up driving from those that are capable of maintaining this ability.

Legal framework on driving licenses about mental disorders

The issue of driving ability, as certified by the renewal of a driving license in relation to mental disorders, is already a matter of concern in most countries all over the world.

Directive 2006/126/EC of the European Parliament and of the Council of 20 December 2006 on driving licenses about mental disorders:

Driving licenses shall not be issued to, or renewed for, applicants or drivers who suffer from:

- severe mental disturbance, whether congenital or due to disease, trauma or neurosurgical operations,
- severe mental retardation,
- severe behavioral problems due to ageing (drivers over 75 years old, according to European Commission, Transport, Road Safety, European Road Safety Observatory ERSO); or personality defects leading to seriously impaired judgment, behavior or adaptability, unless their application is supported by authorized medical opinion and, if necessary, subject to regular medical check-ups.

(https://ec.europa.eu/transport/road_safety/specialist/erso_en)

To be mentioned, drivers are classified in two groups: Group 1 (drivers of vehicles of categories A, A1, A2, AM, B, B1 and BE) and Group 2 (drivers of vehicles of categories C, CE, C1, C1E, D, DE, D1 and D1E). The above Directive concerns to Group 1.

As for Group 2 the Directive refers vaguely that "The competent medical authority shall give due consideration to the additional risks and dangers involved in the driving of vehicles covered by the definition of this group". (<https://eur-lex.europa.eu/legal-content/en/ALL/?uri=CELEX%3A32006L0126>)

In the Greek State the status of issuing a driving license is regulated by the presidential decree PD51/2012 «Adaptation of Greek legislation to Directive 2006/126/EC of the European Parliament and of the Council of 20 December 2006»

The above presidential decree (PD) provides an obligation of the holder of a driving license to undergo a medical examination, in case of reduction of physical or mental capacity for driving (art. 11 par. 3 PD51 /2012). Additionally, the driving license is recalled by the Competent Service and the holder is referred to a medical examination to verify the fulfillment of the minimum required specifications. However the conditions for the revocation of the driving license are not defined in the PD (in fact, omitting this crucial procedure at random).

The object of the study is, therefore, the utilization of the research results for the "de lege ferenda" modification of this problematic decree regarding the procedures for the issuance or removal of driving licenses for people with mental disorders. The target is to find the stage of cognitive or mental decline when people cannot drive.

In order to enrich the study findings and reclaim the proposal to amend the relevant legal framework, in addition to European legislation, elements of the relevant legislation of other countries will be taken into account by a comparative law study, which will be prepared during the implementation of the study. Indicatively, in

the United Kingdom there are more detailed procedures (in the legislation "Driving and Vehicle Licensing Agency") than in force in Greece - the same applies in Germany ("Driving License Ordinance").

Driving cessation in older adult population with cognitive impairment

There is an important concern in the US as older adult population is projected to considerably increase in the future and continued driving mobility is important for health and wellness aspects in populations with fewer transportation alternatives (Crowe, Kanoth, Andrews, Strogatz, Li, DiGiuseppi, Hill, Eby, Molnar & Mielenz, 2020).

Driving cessation decision is not easily made as driving is associated with social participation, independence and well-being. Some people cease driving abruptly, while others cease driving gradually (Piersma et al, 2018a).

Driving is a cognitively challenging activity that requires fast and precise processing of new information and decision-making. Several studies have shown the relation between working memory and driving. Increased working memory load while driving impairs the driving ability, for example lane changing performance and response latency in braking reactions. Driving by the elderly with cognitive impairment is a major public health problem. Little is known about the cessation indicators of driving in people with mild cognitive impairment (MCI). People with dementia are at risk of accidents due to their gradually impaired cognition. In this regard, it is critical to know the factors that predict driving cessation in people with cognitive impairment (Pyun et al, 2018).

It is difficult to define when a patient with dementia is no longer fit to drive because of large individual differences in the patterns of dysfunctions, related to the different etiologies of dementia. Therefore, the most appropriate moment to cease driving needs to be assessed on a case-by-case basis (Piersma et al, 2018b).

There is limited available information about how to evaluate fitness-to-drive, and no practical interventions for people with dementia. There are currently no theory-driven, empirically tested interventions to facilitate driving cessation for people with dementia in routine clinical practice within Australia (Scott, Liddle, Mitchell, Beattie & Pachana, 2019). A standardized approach to medical assessment of driving for patients with dementia remains an issue across many countries (Scott, Liddle, Pachana, Beattie & Mitchell, 2020).

The American Academy of Neurology proposed clinical guidelines with multiple tools to assess fitness to drive in elderly subjects and in patients with cognitive decline (Crivelli et al, 2019). As far as driving ability in AD patients is concerned, the main aim of the previous stated assessment seems to be the identification of the remaining skills, taking into account both environmental influences and individual's interests, while the decision to cease driving seems to be influenced by older age as well as by gender, with this phenomenon being more pronounced among women (Pyun et al, 2018; Tzonichaki, 2019).

Different means are available to assess fitness-to-drive: off-road tests, simulator-based assessments, and on-road assessments (Katsouri, Athanasiadis, Bekiaris & Tsolaki, 2019; Bellagamba, Vionnet, Margot-Cattin & Vaucher, 2020). The On-Road-Driving-Test (ORDT) was the only evaluation that, when used alone, proved able to determine aptitude to drive (Crivelli et al, 2019). Driving assessment consisted of psychometric tests and a driving simulator evaluation, the later consisting of two different subtests: a traffic signal reaction task and a brake reaction task. The analysis of the results revealed mild dementia patients had a poorer performance compared to controls.

A recent study by Anstay KJ et al. 2020 aimed to prospectively validate 8 brief measures used clinically or in research settings to identify drivers who would be classified as unsafe using an on-road driving assessment. Of the individual tests evaluated, the "multivariate model comprising the Multi-D", "Useful Field of View" and "Hazard Perception Test" performed well. Analysis of all measures in the single sample allows their relative predictive accuracy to be evaluated. Combinations of these 3 measures provided reliable off-road information for clinicians and were applicable in subgroups of participants with cognitive and visual impairment.

In addition, another study attempted to determine time to driving cessation as a function of dementia severity and cerebrospinal fluid (CSF) biomarker levels in a group of actively-driving, cognitively normal and mildly impaired older adults. They found that participants with very mild dementia stopped driving at approximately three and a half times the rate per year as control group at baseline. For those with mild dementia, cessation was over five times the rate per year compared to control group. Additionally, they found that those with abnormal CSF biomarkers levels stopped driving at approximately twice the rate per year compared to those with normal CSF levels (Stout et al, 2018).

The consensus across many driving simulator studies is that patients with heart failure have poorer performance on simulated driving. Taken together, these findings suggest that heart failure, vascular dementia and white matter hyperintensities (WMH) negatively impact driving performance and contribute to driving cessation among older adults (Babulal, Kolady, Stout & Roe, 2020).

Cognitive domains may mediate the association between dementia diagnosis and driving cessation. Tests for praxis within the "Cambridge Cognition Examination" (CAMCOG) highlighted visuospatial functions to be more impaired in patients with dementia, and were also the most significant mediator for driving cessation (Velayudhan et al, 2018).

Another study aimed to examine the reliability and validity of the English and Malay versions of the "Driving and Riding Questionnaire", tools measuring driving behaviors amongst older drivers and riders. The findings of this study demonstrated both the English and Malay versions of the Driving and Riding Questionnaires to be valid and reliable (Ang et al, 2017).

There are several tools that measure stress while driving. Three of them are: "Driving Cognition Questioners" (DCQ) which relates stress to mental functions, "Driving Situation Questionnaire" (DSQ) which focuses on stress as opposed to fear and is a self-report tool for the severity of driving stress, and the "Driving Behavior Survey" (DBS) which includes subcategories for stress-based executive

deficits, excessive safety and attention behaviors, and aggressive behavior (Taylor, Stephens & Sullman, 2021).

Another study highlighted an evaluation strategy that included clinical interviews, neuropsychological tests, and driving simulator rides. These three types proved to provide very important information regarding the prognosis of driving ability in people with dementia (Piersma et al, 2018a).

Based on the literature, there is a general need for validated assessment of driving ability and the development of assessment strategies for people with dementia. When we consider public safety related to car accidents caused by older adult driving, we should also consider the individual mobility of older adults because driving is a primary form of transportation for this population. There is no evidence showing advanced age as the common reason to stop driving (Moon & Park, 2020).

Studies' findings suggest that fitness-to-drive assessments should be complete, comprehensive, comprising several types of tasks and sources of information, and that guidance for patients with dementia in interpreting a recommendation about driving is essential (Piersma et al, 2018b). Given the safety and public health implications of driving cessation among older adults, there is an urgent need to better understand the link between driving cessation and the factors that predict it (Stout et al, 2018).

Screening and Assessment of Functional Abilities for Driving

The tools that clinicians use to approach driving are divided in two categories, the screening and the assessment tools. The screening tools are used to detect possible functional deficits of an older driver, which are considered to be «at risk» points. As a result, they cannot give a comprehensive profile of the client. Examples of such tools are the following: Testing Driver Safety, AAA's Drivers 65 Plus, The Driving Decisions Workbook, Fitness-to-Drive Screening Measure and The SAFER Driving Survey (Eby, Molnar, Shope & Dellinger, 2007). Based on the results of the screening tools, clinicians may advice their clients to visit other specialists for more detailed examinations (ophthalmologist, occupational or physical therapist). At this point, the assessment tools health professionals mostly use are the following:

- **General:** Information regarding the general history, the medication and the functionality of the older person in driving and in the Instrumental Activities of Daily Life (The Driving Habits Questionnaire, IADLs questionnaire) (Owsley, Stalvey, Wells & Sloane, 1999)
- **Vision:** Assessment of visual acuity (Snellen chart), field of view and contrast sensitivity (Pelli-Robson contrast sensitivity chart) (American Geriatrics Society & Pomidor, 2019)
- **Cognitive:** Delineation of the cognitive skills, using the Montreal Cognitive Assessment (MoCA), Trails A & B, Clock - Drawing Test and Maze Test. These tools focus on long - term and short - term memory, selective attention, visual perception and visuo-spatial skills (Kwok, Gélinea, Benoit & Chilingaryan, 2015; Freund, Gravenstein & Ferris, 2002)

- **Motor and Somatosensory:** Tools like Rapid Pace Test and Get Up and Go test are used to determine the range of motion, endurance and balance of the older driver (Mathias, Nayak, & Isaacs, 1986). There are also two (2) computer-based assessment tools available, the Useful Field of View and the Drive ABLE test. Unfortunately, they cannot be used in clinical practice yet, because more studies are needed to delineate their reliability and validity, as assessment tools of functional abilities for driving (Classen et al, 2009).

A main aim of this study is (a) to use assessment tools that are known for their sensitivity and specificity in order to accurately evaluate the driving condition of the patient and, (b) to standardize in Greek population a psychometrical tool that will give insight to patients' driving experience, filling the gap between what they think that they are capable of and what they actually can do, as far as driving is concerned. As we already know driving cessation poses a challenge to the patient, considering all the drawbacks that may arise because of giving up driving, and, consequently, patients may try to avoid the above-mentioned decision. Considering both subjective and objective measurements will form a more detailed approach, where person needs will meet the restrictions being made by their medical condition.

For the above-mentioned purposes, we will try to evaluate the psychometric properties of two relative questionnaires: (a) the Driver Behavior Questionnaire (Reason et al., 1990), which evaluate the frequency of abnormal driving behaviors, and (b) the Driver Skill Inventory (Lajunen and Sumala, 1995), which evaluate the subjective perception as far as motor abilities and safety is concerned.

Driving activity of older adults with physical illness

It is self-evident that everyone tries to treat the underlying medical condition to improve the impairment, regardless the need to drive herself. Former and current public or commercial drivers are more susceptible to driving cessation than drivers of private vehicles.

Vision loss (macular degeneration, glaucoma, cataracts, monocular vision), musculoskeletal and respiratory disorders, and cerebrovascular and many neurological disorders (except for cognitive impairment) affect every day activities leaving driving in second place. Presbyopia and poor night vision do not affect vehicle handling. Hearing impairment alone usually does not influence the driving action (Falkenstein, Karthaus, & Brüne-Cohrs, 2020).

However, many other medical conditions could be responsible for car accidents since they may be the origin of an acute and unexpected episode: cardiovascular disorders, metabolic disorders, and the use of drugs. Very often people are unaware of these consequences:

1. **Cardiovascular disorders:** Coronary artery disease (can cause unstable angina and myocardial infarction), cardiac rhythm abnormalities with or without pacemaker or/and defibrillator insertion (rapid or slow rhythm can equally cause sudden loss of consciousness), heart failure, cardiomyopathy, severe valvular disease (all of them can cause arrest or pulmonary edema). As for driving after heart disease intervention it can resume 1 week after percutaneous transluminal coronary angioplasty and 2 months after open surgery (Babulal et al, 2020).

2. Metabolic disorders: Diabetes mellitus (either insulin dependent diabetes mellitus, or oral medicament /non-insulin dependent diabetes mellitus can cause severe hypoglycemia leading even to unconsciousness), hypothyroidism (can cause cognitive impairment, drowsiness, fatigue), hyperthyroidism (can cause anxiety, tachycardia, palpitations) (International Diabetes Federation. IDF Diabetes Atlas, 9th ed., <https://www.diabetesatlas.org>)

3. Medication: Not only medications can have an effect to safe driving, but medication's adverse effects can influence the driving ability temporarily as well. For example, the tight control of diabetes mellitus is inevitably connected with repeated events of hypoglycemia. Neurological and psychotropic drugs (anticholinergics, antidepressants, antiparkinsonian, benzodiazepines, hypnotics, narcotic analgesics) certainly are a contraindication for vehicle driving. Anti-hypertensives can cause low blood pressure while anti-arrhythmic may be responsible for low pulse rate and loss of consciousness. A combined intake of many drugs often exists (Vivoda, Cao, Koumoutzis, Harmon & Babulal, 2021).

A detailed medical history will be obtained from all the elderly participating the survey. Additionally they will be asked separately about any of the above mentioned medical disturbances and the potential of having experienced any vehicle accident or discomfort because of these disturbances.

Conclusion

Considering the previous findings, is established that further research is needed to accurately define driving cessation in the above-mentioned population. The main aim of this study is to fill-in the gap between the variables involved in driving cessation and the exact time that this decision is being made by older drivers facing mental disorders and possible other co-morbidities. The formation of a psychometrical tool, having the sensitivity and specificity needed, we assume that will help us make more accurate predictions on driving cessation in older patients with cognitive decline and possible other co-morbidities.

References

- American Geriatrics Society & A. Pomidor, Ed. (2019). *Clinician's guide to assessing and counseling older drivers*, 4rd edition. New York: The American Geriatrics Society.
- Ang, B H et al. (2018) "Reliability and validity of the English and Malay versions of the Driving and Riding Questionnaire: a pilot study amongst older car drivers and motorcycle riders." *Publichealth* vol. 155: 8-16.
- Anstey, K. J., Eramudugolla, R., Huque, H., Horswill, M., Kiely, K., Black, A., & Wood, J. (2020). Validation of Brief Screening Tools to Identify Impaired Driving Among Older Adults in Australia. *JAMA Network Open*, 3(6), e208263.
- Babulal, G. M., Kolady, R., Stout, S. H., & Roe, C. M. (2020). A Systematic Review Examining Associations between Cardiovascular Conditions and Driving Outcomes among Older Drivers. *Geriatrics*, 5(2), 27.
- Bellagamba, D., Vionnet, L., Margot-Cattin, I., Vaucher, P., (2020). Standardized on-road tests assessing fitness-to-drive in people

- with cognitive impairments: A systematic review. *PLoS ONE*, 15(5), e0233125.
- Classen, S., McCarthy D. P., Shechtman, O., Awadzi, K. D., Lanford, D. N., Okun, M. S.,...Fernandez, H. H. (2009). Useful field of view as a reliable screening measure of driving performance in people with Parkinson's disease: results of a pilot study. *Traffic Inj. Prev*,10, 593-598.
- Crivelli, L., Russo, M. J., Farez, M. F., Bonetto, M., Prado, C., Calandri, I. L., Campos, J., Cohen, G., Méndez, P. C., Sabe, L. R., &Allegri, R. F. (2019). Driving and Alzheimer's disease. A neuropsychological screening battery for the elderly. *Dement Neuropsychol*,13,3, 312-320.
- Crowe, C. L., Kanno, S., Andrews, H., Strogatz, D., Li, G., DiGiuseppi, C., Hill, L., Eby, D. W., Molnar, L. J., &Mielenz, T. J. (2020). Associations of Frailty Status with Low-Mileage Driving and Driving Cessation in a Cohort of Older Drivers. *Geriatrics*, 5(1), 19.
- Eby, D. W., Molnar, L. J., Shope J. T., & Dellinger, A. M. (2007). Development and pilot testing of an assessment battery for older drivers. *J. Saf. Res.*, 38(5),535-543.
- Falkenstein, M., Karthaus, M., &Brüne-Cohrs, U. (2020). Age-Related Diseases and Driving Safety. *Geriatrics* , 5(4), 80.
- Freund, B., Gravenstein, S., & Ferris, R. (2002). Use of the clock drawing test as a screen for driving competency in older adults. *American Geriatrics Society Annual Meeting*, Washington, D.C.
- Katsouri, I. (2018). *Evaluating the driving ability of older adults with dementia*. Thesis/dissertation. Medical Department, Aristotle University of Thessaloniki. <https://www.didaktorika.gr/eadd/handle/10442/42720>
- Katsouri, I., Athanasiadis, L., Bekiaris, E., Touliou, K. & Tsolaki, M. (2015a). Mild Cognitive Impairment and Driving Habits. *International Journal of Prevention and Treatment*, 4(2A), 1-10.
- Katsouri, I., Athanasiadis, L., Bekiaris, E. & Tsolaki, M. (2015b). Observations relative to driving in elderly people with Alzheimer's disease. *Hell J of Nucl Med*, 18(Suppl), 364-374.
- Katsouri, I., Athanasiadis, L., Bekiaris, E. & Tsolaki, M. (2019). Differences between professional and non-professional drivers with cognitive disorders. *Hell J of Nucl Med*, 22(Suppl), 17-31.
- Katsouri, I. & Tsolaki, M. (2012). Determination of driving ability in patients with dementia. *Iatriki*, 101(3), 218-230. [in Greek]
- Katsouri, I. & Tsolaki, M. (2013). Occupational therapy assessment of safe driving ability for elderly with Alzheimer disease. *Rev. Clin. Pharmacol. Pharmacokinet. Int. Ed.*, 31(3), 158-164.
- Kwok, J.C. W., Gélina, I., Benoit, D., & Chilingaryan, G. (2015). Predictive validity of the Montreal Cognitive Assessment (MoCA) as a screening tool for on-road driving performance. *Br. J. Occup. Ther.*, 78(2), 100-108.
- Lajunen, Timo and Summala Heikki. (1995) "Driving experience, personality, and skill and safety-motive dimensions in drivers' self-assessments." *Personality and Individual Differences*, vol. 19, 3: 307-318.
- Mathias, S et al. (1986) "Balance in elderly patients: the "get-up and go" test." *Archives of physical medicine and rehabilitation* vol. 67,6: 387-9.
- Moon, S., & Park, K. (2020). The Predictors of Driving Cessation among Older Drivers in Korea. *Int. J. Environ. Res. Public Health*, 17(19), 7206

- Owsley, C., Stalvey, B., Wells, J., & Sloane, M. E. (1999). Older drivers and cataract: Driving habits and crash risk. *J Gerontol A Biol Sci Med Sci*, 54(4), 203-211.
- Piersma, D., Fuermaier, A. B. M., Waard, D. D., Davidse, R. J., Groot, J. D., Doumen, M. J. A., Bredewoud, R. A., Claesen, R., Lemstra, A. W., Scheltens, P., Vermeeren, A., Ponds, R., Verhey, F., Deyn, P. P. D., Brouwer, W.H., & Tucha, O. (2018a). Assessing Fitness to Drive in Patients With Different Types of Dementia. *Alzheimer Dis Assoc Disord*, 32, 1, 70-75
- Piersma, D., Fuermaier, A. B. M., Waard, D. D., Davidse, R. J., Groot, J. D., Doumen, M. J. A., Ponds, R. W. H. M., Deyn, P. P. D., Brouwer, W. H., & Tucha, O. (2018b). Adherence to driving cessation advice given to patients with cognitive impairment and consequences for mobility. *BMC Geriatrics*, 18(1), 216.
- Pyun, J. M., Kang, M. J., Kim, S., Baek, M. J., Wang, M. J., & Kim, S. Y. (2018). Driving Cessation and Cognitive Dysfunction in Patients with Mild Cognitive Impairment. *J. Clin. Med.*, 7(12), 545.
- Reason J., et al. (1990) "Errors and violations on the roads: a real distinction?" *Ergonomics* vol. 33, 10-11: 1315-32.
- Scott, T., Liddle, J., Mitchell, G., Beattie, E., & Pachana, N. (2019). Implementation and evaluation of a driving cessation intervention to improve community mobility and wellbeing outcomes for people living with dementia: study protocol of the 'CarFreeMe' for people with dementia program. *BMC Geriatrics*, 19, 1 66, Mar.
- Scott, T. L., Liddle, J., Pachana, N. A., Beattie, E., & Mitchell, G. K. (2020). Managing the transition to non-driving in patients with dementia in primary care settings: facilitators and barriers reported by primary care physicians. *Int. Psychogeriatr.*, 32(12), 1419-1428.
- Stout, S. H., Babulala, G. M., Maa, C., Carrd, D. B., Heada, D. M., Granta, E. A., Williams, M. M., Holtzman, D. M., Fagana, A. M., Morris, J. C., & Roe, C. M. (2018). Driving cessation over a 24-year period: Dementia severity and cerebrospinal fluid biomarkers. *Alzheimers Dement*, 14, 610-616
- Taylor, J. E., Stephens, A. N., & Sullman, M. J. M. (2021). Psychometric properties of the Driving Cognitions Questionnaire, Driving Situations Questionnaire, and Driving Behavior Survey. *Transp Res Part F Traffic Psychol Behav*, 76, 202-214.
- Tzonichaki I. (2019) *Elderly psychiatric disorders, Occupational therapy assessment of people with Alzheimer's dementia*. In chapter 11: Occupational therapy for the elderly. G.B. Parisianos, Athens. 59-61 [in Greek]
- Velayudhana, I., Baillon, S., Urbaskova, G., McCulloch, L., Tromans, S., Storey, M., Lindesay, J., & Bhattacharyya, S. (2018). Driving Cessation in Patients Attending a Young-Onset Dementia Clinic: A Retrospective Cohort Study. *Dement Geriatr Cogn Disord*, 8, 190-198
- Vivoda, J. M., Cao, J., Koumoutzis, A., Harmon, A. C., & Babulal, G. M. (2021). Planning for Driving Retirement: The Effect of Driving Perceptions, Driving Events, and Assessment of Driving Alternatives. *Transp Res Part F Traffic Psychol Behav*, 76, 193-201.