6. **Adherence to driving cessation advice given to patients with cognitive impairment and consequences for mobility**

**ABSTRACT**

**Background:** Driving is related to social participation; therefore older drivers may be reluctant to cease driving. Continuation of driving has also been reported in a large proportion of patients with cognitive impairment. The aim of this study is to investigate whether patients with cognitive impairment adhere to driving cessation advice after a fitness-to-drive assessment and what the consequences are with regard to mobility.

**Methods:** Patients with cognitive impairment (n = 172) participated in a fitness-to-drive assessment study, including an on-road driving assessment. Afterwards, patients were advised to either continue driving, to follow driving lessons, or to cease driving. Approximately seven months thereafter, patients were asked in a follow-up interview about their adherence to the driving recommendation. Factors influencing driving cessation were identified using a binary logistic regression analysis. Use of alternative transportation was also evaluated.

**Results:** Respectively 92% and 79% of the patients adhered to the recommendation to continue or cease driving. Female gender, a higher Clinical Dementia Rating-score, perceived health decline, and driving cessation advice facilitated driving cessation. Patients who ceased driving made use of less alternative modes of transportation than patients who still drove. Nonetheless, around 40% of the patients who ceased driving increased their frequency of cycling and/or public transport use.

**Conclusions:** Adherence to the recommendations given after the fitness-to-drive assessments was high. However, a minority of patients did not adhere to driving cessation advice. There are large differences in mobility between patients with cognitive impairment. Physicians should discuss options for

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5 This chapter was based on Piersma, D., Fuermaier, A. B. M., de Waard, D., Davidse, R. J., de Groot, J., Doumen, M. J. A., ... Tucha, O. (submitted). Adherence to driving cessation advice given to patients with cognitive impairment and consequences for mobility.
alternative transportation in order to promote sustained safe mobility of patients with cognitive impairment.

6.1. Introduction

6.1.1. Driving with dementia

Research has shown that a large proportion of patients with dementia drives less safely than healthy older drivers (Berndt, Clark, & May, 2008; Piersma, Fuermaier, et al., 2016; Snyder, 2005). Not only severity of dementia plays a role (Lundberg et al., 1997) but there are also large individual differences in the patterns of dysfunctions, related to the different aetiologies of dementia (Piersma, de Waard, et al., 2016). A diagnosis of dementia alone is not sufficient to recommend driving cessation (Andrew, Traynor, & Iverson, 2015; Fox et al., 1997; Trobe, Waller, Cook-Flannagan, Teshima, & Bieliauskas, 1996), as there is a large proportion of patients with dementia who still drive safely in the early stages of their disease (Brown & Ott, 2004; Piersma, Fuermaier, et al., 2016). Continuation of driving after being diagnosed with dementia has been found repeatedly in patients with Alzheimer’s disease (Drachman & Swearer, 1993; Duchek et al., 2003; Fox, Bowden, Bashford, & Smith, 1997; Friedland et al., 1988; Fujito et al., 2016; Hunt, Morris, Edwards, & Wilson, 1993; Marie Dit Asse et al., 2016; Piersma, Fuermaier, et al., 2016). Research on driving with non-Alzheimer’s (non-AD) dementia is scarce, but indicated nonetheless that a proportion of patients with non-AD dementia may also continue to drive after having received their diagnosis (Fujito et al., 2016; Herrmann et al., 2006; Seiler et al., 2012). Nevertheless, with the progression of the disease, cognitive abilities needed for safe driving gradually decrease and driving cessation is likely to become inevitable (Liddle et al., 2016). It is difficult to define when a patient with dementia is no longer fit to drive (Perkinson et al., 2005) and the most appropriate moment to cease driving needs to be assessed on a case-by-case basis (Andrew et al., 2015).

6.1.2. Driving cessation of patients with dementia

Some patients with dementia cease driving suddenly, e.g. from one day to another, or as a result of an accident, diagnosis, or other critical event, while others cease driving gradually (Liddle et al., 2014). These patients may drive less kilometres (i.e. driving reduction) or avoid difficult driving situations (i.e. driving restriction) before ceasing driving entirely (Liddle et al., 2014). Ideally, patients with dementia cease driving voluntarily at an appropriate
moment, which may be achieved by actively involving patients in the decision making process (Jett et al., 2005). In the clinical context as well as in official evaluations for driving licence renewal, recommendations may be based on fitness-to-drive assessments. However, a proportion of patients with dementia continues to drive despite evidence of a decreased fitness to drive (Adler & Kuskowski, 2003). Some of these patients did not recall the assessment, others were not aware of their own cognitive impairment (due to decreased insight known to be associated with dementia) or believed that their cognitive impairment did not affect driving safety (Andrew et al., 2015; Byszewski et al., 2013; Chacko, Wright, Worrall, Adamson, & Cheung, 2015; Croston, Meuser, Berg-Weger, Grant, & Carr, 2009; Friedland, 1997; Gergerich, 2016; Perkinson et al., 2005). According to the last group, the assessment process was ‘not fair’ and did not accurately reflect their fitness to drive (Andrew, Traynor, & Iverson, 2015; Byszewski et al., 2013; Perkinson et al., 2005). These findings suggest that fitness-to-drive assessments should be comprehensive, comprising several types of tasks and sources of information, and that guidance for patients with dementia and their family members in interpreting a recommendation about driving is essential (Betz, Scott, Jones, & Diguiseppi, 2016; Byszewski et al., 2010; Chacko et al., 2015; Liddle, Turpin, Carlson, & McKenna, 2008). As some patients do not decide to cease driving by themselves when they become unfit to drive, the decision has to be imposed on them, e.g. by family members, physicians, or driving licence authorities (Jett et al., 2005). Discussions about driving are emotionally charged and patients with dementia may respond angry and with a shock when driving cessation is recommended (Betz et al., 2016; Byszewski et al., 2010). The decision to cease driving is not easily made as driving is associated with social participation, independence, and well-being (Davis & Ohman, 2016; Persson, 1993). Similarly, driving cessation is linked to a reduced social network, lower activity levels, and faster health decline (Rebok & Jones, 2016). For example, it has been reported that driving cessation is associated with an almost doubled risk of depressive symptoms in older adults (Chihuri et al., 2016). Furthermore, cognitive decline was found to be accelerated after driving cessation (Choi, Lohman, & Mezuk, 2014).

6.1.3. Factors influencing driving cessation

In the process of driving cessation, safety risks for the public as well as the individual with dementia have to be balanced against negative consequences of driving cessation. This process is affected by multiple aspects, including intrapersonal, interpersonal, and environmental factors (Rudman et al.,
Intrapersonal factors are factors related to the driver, interpersonal factors are derived from relationships with others involved in decisions about driving, and environmental factors are external influences not associated to the driver or the relationship with others.

Intrapersonal factors include, among others, age, gender, the presence and awareness of decline in physical, visual, and cognitive abilities as well as an opinion regarding the importance of driving and one’s own driving safety. With increasing age, driving cessation becomes more likely (Talbot et al., 2005), especially females have been found to be more likely to cease driving than men, even prematurely (Anstey, Windsor, Luszcz, & Andrews, 2006; Rebok & Jones, 2016). An important reason for driving cessation among older drivers is perceived health decline. In particular visual and cognitive impairment have been found to predict driving cessation (Anstey, Windsor, Luszcz, & Andrews, 2006; Croston, Meuser, Berg-Weger, Grant, & Carr, 2009; Emerson et al., 2012; Foley, Masaki, Ross, & White, 2000; Freeman, Muñoz, Turano, & West, 2005; Herrmann et al., 2006; Huisingh, McGwin, & Owsley, 2016; Kowalski et al., 2012; MacLeod, Satariano, & Ragland, 2014; Talbot et al., 2005). Cognitive impairment is strongly associated with various aetiologies of dementia that are characterized by distinct symptoms and impairments, therefore driving cessation might be more likely in one or the other aetiology of dementia. Seiler and colleagues reported that as many as 90.9% of the patients with Lewy body dementia (DLB) ceased driving whereas only about 55-65% of the patients with Alzheimer’s disease (AD), vascular dementia (VaD) and frontotemporal dementia (FTD) ceased driving (Seiler et al., 2012). Furthermore, older people reported other reasons for driving cessation such as no need to drive anymore (e.g. because of retirement), decreased confidence while driving or lack of enjoyment during driving (Brayne et al., 2000; Cooper et al., 1993; Kowalski et al., 2012; Persson, 1993; Tuokko et al., 2016). Costs of fuel and upkeep of the car may also play a role (Kowalski et al., 2012; Persson, 1993).

Interpersonal factors comprise the opinions of family members about the patient’s driving safety and recommendations of authority figures about driving. Family members may encourage driving cessation by expressing concerns about driving safety or even by taking away the keys (Persson, 1993; Seiler et al., 2012), however, about half of the family members with doubts about the patient’s driving safety were found not to attempt promoting driving cessation (Mizuno, Arai, & Arai, 2008). If family members do bring up the topic, older drivers may not be willing to follow up their
advice (Persson, 1993). Moreover, there is a minority of family members who encourage continuation of driving because they believe the patient still drives safely or they benefit from the patient’s driving (Croston, Meuser, Berg-Weger, Grant, & Carr, 2009; Friedland, 1997; Liddle et al., 2016). Patients with dementia themselves may also feel responsible for mobility needs of family members (Liddle et al., 2016; Tuokko et al., 2016). In the majority of cases, both patients with dementia and their family members need support from physicians regarding counselling and evaluation of the patient’s fitness to drive (Perkinson et al., 2005; Persson, 1993). There are indications that recommendations to cease driving from authority figures, such as physicians, facilitate driving cessation (Brayne et al., 2000; Croston, Meuser, Berg-Weger, Grant, & Carr, 2009; Mizuno et al., 2008; Persson, 1993). In a sample of ex-drivers with dementia, driving cessation was facilitated by encouragement from physicians in 42.3% of the cases, from the police (in 11.5% of the cases), public health nurses (in 3.8% of the cases) and local authorities (in 3.8% of the cases) (Mizuno et al., 2008).

Environmental factors include traffic accidents and availability of alternative transportation. Traffic accidents and near misses have been reported as reasons for driving cessation (Croston et al., 2009; Rudman et al., 2006; Seiler et al., 2012). Nevertheless, patients with dementia have been reported to continue driving for up to three years after experiencing a traffic accident (Cooper et al., 1993; Trobe et al., 1996). Additionally, not having caused any accident may also be a reason to continue driving (Rudman et al., 2006). Byszewski and colleagues suggested that discussing alternative transportation may enhance acceptance of driving cessation (Byszewski et al., 2010), but mixed results have been obtained about the use of alternative modes of transport by ex-drivers with cognitive impairment. Talbot and colleagues reported that patients living in a city, i.e. where alternative modes of transport are available, are more likely to cease driving (Talbot et al., 2005). However, Taylor and Tripodes found that the majority of patients with dementia may depend on rides of their partners, family members, or friends and observed no increase in walking, using public transport, taxis, or van services after driving cessation (Taylor & Tripodes, 2001).

6.1.4. Objectives

This study has four aims. The first aim of this study is to evaluate how many patients with dementia adhere to the recommendation given after the fitness-to-drive assessment. The second aim of this study is to identify which factors play a role in driving cessation or continuation in patients with dementia.
who underwent a fitness-to-drive assessment, first by identifying reasons for
driving cessation as reported by patients with dementia during the follow-up
interviews, and second by means of a logistic regression analysis that predicts
driving cessation on the basis of multiple intrapersonal, interpersonal, and
environmental factors. Based on the literature, major factors hypothesized to
be related to driving cessation are increasing severity of cognitive
impairment and recommendations to cease driving. Other factors studied
that might contribute to driving cessation include older age, female gender,
aetiology of dementia, perceived health decline, traffic accidents, and
available alternative transportation. Research on driving with non-AD
dementia is scarce, therefore the third aim of this study is to investigate
whether patients with different aetiologies of dementia show a different
likelihood of driving cessation. Based on the study of Seiler and colleagues
(Seiler et al., 2012), patients with DLB are expected to cease driving more
frequently compared to patients with other aetiologies of dementia. The
fourth and final aim is to evaluate transportation options for patients with
dementia beyond driving. Eventually, implications of how driving cessation
and alternative transportation could be addressed in clinical practice will be
provided.

6.2. Materials and methods

In this study, driving cessation was investigated in a cohort of patients with
various aetiologies of dementia, including AD, VaD, FTD and DLB, who
underwent a comprehensive fitness-to-drive assessment in the Netherlands.
The fitness-to-drive assessment consisted of clinical interviews, neuro-
psychological assessment, driving simulator rides and an on-road driving
assessment according to a protocol as described by Piersma and colleagues
(Piersma, Fuermaier, et al., 2016). Prior to participation in the present study,
all patients had a wish to continue driving. Depending on the outcome of the
fitness-to-drive assessment, they were recommended to either cease driving,
to follow driving lessons and undergo an official relicensing procedure
subsequently, or to continue driving. Approximately seven months after the
fitness-to-drive assessment, patients were asked about their adherence to the
recommendation, reasons for driving cessation or continuation, and use of
alternative transportation during a follow-up interview.
6.2.1. Participants

Participants with cognitive impairment were recruited via multiple health care centres and from the general community by means of advertisements. Inclusion criteria were an age above 30, a diagnosis of mild cognitive impairment, dementia, or Parkinson’s disease (PD) with self-reported cognitive decline, a current valid driver’s licence and a wish to continue driving. Exclusion criteria were the diagnosis of other neurological or psychiatric conditions that may influence driving performance and usage of medications with a severe influence on driving ability (International Council on Alcohol, Drugs and Traffic Safety Category III). Since not all participants had a diagnosis of dementia, they will be referred to as patients with cognitive impairment.

One hundred and seventy-two patients with cognitive impairment completed a fitness-to-drive assessment study which included off-road assessments and an on-road driving assessment as well as a telephonic follow-up interview. Patients were aged 49 to 91 years (mean = 71.3 years; SD = 8.8 years) and 128 (74.4%) of the patients were men. Patients had held a driver’s licence for 11 to 73 years (mean = 49.7 years; SD = 9.0 years) and the estimation of their total distance driven ranges from 87,000 to 12,183,000 km (mean = 1,720,000 km; SD = 2,692,000 km). Eighty-three (48.3%) patients were diagnosed with AD, 15 (8.7%) patients with VaD, 10 (5.8%) patients with AD and VaD, 13 (7.6%) patients with FTD, 8 (4.7%) patients with DLB, 17 (9.9%) patients with PD and 12 (7.0%) patients with other aetiologies of cognitive impairment. The aetiology of cognitive impairment was unclear in 14 (8.2%) cases.

6.2.2. Measures

The measures used for the present study represent a selection of measures as obtained from a comprehensive assessment following the protocol as described by Piersma and colleagues (Piersma, Fuermaier, et al., 2016). The preselection of measures was based on the literature and intended to cover relevant factors for driving cessation (Anstey, Windsor, Luszcz, & Andrews, 2006; Brayne et al., 2000; Byszewski, Molnar, & Aminzadeh, 2010; Croston, Meuser, Berg-Weger, Grant, & Carr, 2009; Davis & Ohman, 2016; Emerson et al., 2012; Foley, Masaki, Ross, & White, 2000; Herrmann et al., 2006; Kowalski et al., 2012; Liddle et al., 2016; MacLeod, Satariano, & Ragland, 2014; Mizuno, Arai, & Arai, 2008; Rebok & Jones, 2016; Rudman et al., 2006; Seiler et al., 2012; Talbot et al., 2005; Taylor & Tripodes, 2001; Tuokko et al., 2016).
Intrapersonal factors
Intrapersonal factors used for the prediction of driving cessation included age, gender, diagnosis (AD vs. other), level of cognitive impairment, decline in health, visual acuity (range 0-1), visual contrast sensitivity (range 0-16), importance of driving for the individual patient, and the opinion of patients about their own driving safety. The level of cognitive impairment was measured by the total score of the Clinical Dementia Rating (CDR) scale (Morris, 1993) and the total score of the Mini-Mental State Examination (MMSE) (Folstein et al., 1975; Kok & Verhey, 2002). Decline in health was determined by asking the patient during a follow-up interview by telephone whether they experienced changes in their health since their fitness-to-drive assessment. Answers were coded into three categories: (1) no, (2) to some extent, and (3) yes. During clinical interviews, patients were asked whether driving was important to them. Answer options were: (1) very important, (2) important, (3) practical but not important, and (4) unimportant. During the same interviews, patients were asked how they experienced their driving safety. Answers were divided into three categories: (1) still driving as safely as when they were middle-aged, (2) driving less safely compared to when they were middle-aged or (3) driving unsafely.

Interpersonal factors
Interpersonal factors included the recommendation given by a researcher after the fitness-to-drive assessment, whether an authority figure (e.g. physician, driving instructor) recommended driving cessation, and the opinion of an informant about the driving safety of the patient. The recommendation after completion of the fitness-to-drive assessment was given by one of the researchers involved and represented either (1) cease driving, (2) follow driving lessons and sign up for an official relicensing procedure or (3) continue driving. During the follow-up interview, reasons for driving cessation were asked. Besides the recommendation of a researcher after the fitness-to-drive assessment, also a recommendation to cease driving from an authority figure could be reported. Lastly, the opinion of an informant about the driving safety of the patient was asked during a clinical interview. Answers were divided into three categories: (1) still driving as safely as when the patient was middle-aged, (2) driving less safely compared to when the patient was middle-aged or (3) driving unsafely.

Environmental factors
Three environmental factors were considered, i.e. the opportunity to be passenger of another private car (yes or no), the number of other modes of
transport used (e.g. walking, cycling, public transport, and taxis), and the number of car accidents. Accidents included accidents in the twelve months prior to study participation and (almost) accidents after the fitness-to-drive assessment prior to the telephonic follow-up interview.

**Indications of driving reduction, restriction, and cessation**

Driving reduction and restriction were considered as indications of a process of driving cessation. The variables were based on questions in a driving questionnaire. Driving reduction was derived from the patients’ estimations of their driving experience in the previous twelve months minus the patient’s estimations of their average driving experience per year since they obtained their driving licence. The questions for driving experience were both categorical with the following answer options: (1) less than 1.000 km, (2) 1.000–5.000 km, (3) 5.000–10.000 km, (4) 10.000–20.000 km, (5) 20.000–30.000 km, (6) 30.000–50.000 km, (7) more than 50.000 km. Driving restriction was calculated by summing up the number of driving situations that were being avoided (Sum of avoided driving situations). The patients answered a multiple-choice question: ‘Do you attempt to avoid the following traffic situations?’ Answer options were peak hours/crowded roads, motorways, adverse weather conditions (like rain, fog or snow), slippery roads/snow on the road, driving when it is dark, turning left, driving unfamiliar roads, driving abroad, another traffic situation, and none. The sum of avoided driving situations can range from 0 to 9. The final outcome measure was whether the patient was still driving or not (StillDriving), which was asked during the telephonic follow-up interview.

6.2.3. Procedure

Patients with cognitive impairment participated in the study on a voluntary basis. Patients received no direct reward for participation, but patients who passed the on-road driving assessment could use this outcome in an official relicensing procedure. Failing the on-road driving assessment did not lead to revocation of the patients’ driving licences.

The procedure of the fitness-to-drive assessment will be described briefly. Participants were invited twice. On the first occasion, clinical interviews with the participant and an informant were conducted, as well as a comprehensive neuropsychological assessment and driving simulator rides. Participants invited an informant of their choice, which was in most cases their partner. During the first session, participants were also screened to assure that they met the minimum legal requirements for the on-road driving assessment.
with regard to visual functions (visual acuity of 0.5, horizontal field of view of 120 degrees) and motor functions (no major impairments of both hands, or legs). The first session lasted approximately four hours in total, including around half an hour driving simulation. On the second occasion, the on-road driving assessment took place, which lasted around 45 minutes.

After the fitness-to-drive assessment, a recommendation regarding driving cessation or continuation was given by one of the researchers involved based on both the off-road and on-road assessments as well as clinical judgment. If patients were recommended to continue driving, this was communicated via postal mail. These patients received an overview of their personal fitness-to-drive assessment results corroborated with an explanation of the findings and the recommendation in writing. If patients were recommended to follow driving lessons or to cease driving, they were informed about this outcome by phone and were invited for an appointment with a neuropsychologist to discuss the fitness-to-drive assessment results and the recommendation. After this appointment, these patients also received an overview of their personal fitness-to-drive assessment results, an explanation of the findings, the recommendation, and a summary of the conversation with the neuropsychologist in writing from one of the researchers involved.

The follow-up interview took place by telephone three to twenty months (M = 7.3 months, SD = 3.6 months) after participation in the fitness-to-drive assessment study. Questions were asked to the patient (n = 78), to the patient and the patient’s partner together (n = 29) or to an informant only (n = 65). Informants were usually the partners of the patient (n = 57), other informants were four daughters, two sons, one daughter-in-law and one brother of the patient. Questions regarded whether the health of the patient declined, whether or not the patient ceased driving including reasons for this choice as well as use of alternative transport options since study participation. This interview lasted around 30 minutes per patient.

6.2.4. Statistical analyses

Missing data
Values were missing in less than 3% of cases per variable and occurred in the variables decline in health (0.6%), corrected binocular vision (1.2%), visual contrast sensitivity (0.6%), the patient’s judgement of driving safety (0.6%), the informant’s judgement about driving safety of the patient (2.9%), number of other modes of transport (1.7%), driving reduction (1.7%), driving restriction (0.6%), and important modes of transport to continue to use (1.2%). Missing values were due
to technical or administrative failures in the assessments, and were not replaced.

**Adherence to the recommendation**
Adherence to the recommendations given after the fitness-to-drive assessment was investigated using driving cessation rates and information from the follow-up interview on whether patients followed driving lessons and signed up for an official relicensing procedure. Reported reasons for non-adherence to the recommendations were recorded.

**Factors related to driving cessation**
Factors related to driving cessation were explored in two ways, i.e. first by describing reported reasons for driving cessation in the follow-up interviews and second by predicting driving cessation in a logistic regression analysis.

*Reported reasons for driving cessation*
Patients who ceased driving were asked for their reasons for driving cessation in the follow-up interviews. Percentages of reported reasons for driving cessation were examined.

*Prediction of driving cessation*
Current and retired drivers were statistically compared on predictor variables. The goal of this exploratory analysis was to predict driving cessation as indicated by the dichotomous variable *StillDriving*. Prediction is a statistical term meaning that the dependent variable *StillDriving* is hypothesized to be influenced by the independent variables. The independent variables (predictor variables) included intrapersonal factors, interpersonal factors, environmental factors, and two factors related to the process of driving cessation (see Measures). The first analyses involved correlations with *StillDriving* (point biserial correlation coefficients). Predictor variables correlating significantly (p < 0.05) with *StillDriving* were selected for the second analysis, i.e. binary logistic regression with forced entry of predictor variables.

**Driving cessation per aetiology**
In order to evaluate differences in driving cessation rates between patients with different aetiologies of cognitive impairment, the numbers and percentages of patients who ceased driving at follow-up were calculated per aetiology.
Mobility of patients with cognitive impairment

Initially, it was examined which modes of transport were important for patients with cognitive impairment to continue to use. For a further exploration of mobility of patients with cognitive impairment, use of alternative transportation (i.e. being passenger of other car drivers and using other modes of transport than driving a car) by patients who were still driving as well as patients who were no longer driving was described in more detail. In addition, changes in frequencies of walking, cycling, and public transport use after the fitness-to-drive assessment were compared between current and retired drivers based on the question “Do you walk/cycle/use public transport less or more since the fitness-to-drive assessment?”. Finally, reasons for not walking, cycling, or using public transport were examined.

6.3. Results

6.3.1. Adherence to the recommendation

Table 6.1 presents an overview of the number of patients with cognitive impairment who continued and ceased driving at follow-up divided by recommendation. The vast majority of patients who were recommended to continue driving adhered to this recommendation (92.4%). Six (7.6%) patients who decided to cease driving for one or two reasons: family members advocated driving cessation (n = 3), the patient felt driving was no longer safe (n = 2), an authority figure recommended driving cessation (n = 1), perceived health decline (n = 1), perceived stress related to the official relicensing procedure (n = 1), feeling uncomfortable driving or afraid to drive (n = 1), and a near miss occurred (n = 1).

<table>
<thead>
<tr>
<th>Recommendation</th>
<th>Driving at follow-up</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>Continue driving (n = 79)</td>
<td>73 (92.4%)</td>
</tr>
<tr>
<td>Driving lessons (n = 31)</td>
<td>18 (58.1%)</td>
</tr>
<tr>
<td>Cease driving (n = 62)</td>
<td>13 (21.0%)</td>
</tr>
<tr>
<td>Total (n = 172)</td>
<td>104 (60.5%)</td>
</tr>
</tbody>
</table>
Thirty-one patients with cognitive impairment were recommended to follow driving lessons and sign up for the official relicensing procedure, thirteen of them ceased driving whereas eighteen patients continued to drive. Of the thirteen patients who ceased driving, one (7.7%) patient followed driving lessons, but was recommended to cease driving by the driving instructor, and two (15.4%) patients signed up for the official relicensing procedure. The procedure was still pending for one patient while the other patient failed the on-road driving assessment for driving licence renewal. Of the eighteen patients who were still driving, twelve (66.7%) patients followed driving lessons and eight (44.4%) patients signed up for the official relicensing procedure. This procedure was still pending in five cases, and three patients renewed their driving licence. Five patients who continued to drive (27.8%) did not follow driving lessons and also did not sign up for the official relicensing procedure. Notably, several patients reported that they restricted or reduced their driving after the fitness-to-drive assessment. Moreover, two patients had planned to sign up for the official relicensing procedure in a few months depending on their health status.

The majority of patients with cognitive impairment who were recommended to cease driving, adhered to this recommendation (79.0%). Nevertheless, thirteen patients who were recommended to cease driving decided to continue driving. These patients were asked whether they considered driving cessation. Two of these thirteen patients were considering driving cessation and reduced driving very much already. One more patient was willing to cease driving in the future, when the partner would advocate driving cessation. However, ten patients were not considering to cease driving at all, with five patients giving reasons for driving continuation (driving is going well (n = 2), having a partner as co-pilot (n = 2), because of mobility needs (n = 1)).

6.3.2. Factors related to driving cessation

In order to investigate which factors play an important role in driving cessation, two approaches were used. First, reported reasons for driving cessation were evaluated. Second, a regression analysis was performed to predict driving cessation using multiple intrapersonal, interpersonal, and environmental factors as well as two factors related to the process of driving cessation.
Reported reasons for driving cessation
An overview of reported reasons for driving cessation (n = 68) is shown in Figure 6.1. Forty-three patients with cognitive impairment reported one reason for driving cessation, while two reasons were reported by nineteen patients, three reasons by three patients and five reasons by one patient. Two patients who were not driving did not report a reason for driving cessation, since they did not make a definite choice about whether they would never drive anymore.

Figure 6.1. Percentages of reported reasons for driving cessation by patients with cognitive impairment who ceased driving (multiple answers possible, n = 68).

Prediction of driving cessation
Current and retired drivers with cognitive impairment were statistically compared on factors that may predict driving cessation in Table 6.2. Significant differences between current and retired drivers were found in several variables, i.e. retired drivers were older, had more often a diagnosis of AD, a higher CDR-score, a lower MMSE-score, more pronounced health decline, and a lower visual contrast sensitivity than current drivers. Moreover, retired drivers were more often recommended to cease driving, both after the fitness-to-drive assessment and by authority figures, than current drivers. Furthermore, retired drivers used less alternative modes of transport to the private car than current drivers. In addition, trends (.05 < p < .10) were found for retired drivers being more often female, finding driving less important, and being more often a passenger of other car drivers than current drivers.
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Table 6.2. Comparison of current and retired drivers with cognitive impairment on predictor variables.

<table>
<thead>
<tr>
<th>Group</th>
<th>Current drivers (n = 104)</th>
<th>Retired drivers (n = 68)</th>
<th>p Value (df)</th>
</tr>
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<tbody>
<tr>
<td><strong>Intrapersonal factors</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age in years, mean (SD), y</td>
<td>70.2 (8.7)</td>
<td>73.0 (8.7)</td>
<td>.032 (171)*</td>
</tr>
<tr>
<td>Male sex, No. (%)</td>
<td>83 (79.8%)</td>
<td>45 (66.2%)</td>
<td>.051 (1)*</td>
</tr>
<tr>
<td>Diagnosis of AD, No. (%)</td>
<td>53 (51.0%)</td>
<td>40 (58.8%)</td>
<td>.035 (1)*</td>
</tr>
<tr>
<td>CDR-score, No. (%)</td>
<td></td>
<td></td>
<td>&lt;.001 (2)*</td>
</tr>
<tr>
<td>0</td>
<td>15 (14.4%)</td>
<td>1 (1.5%)</td>
<td></td>
</tr>
<tr>
<td>0.5</td>
<td>86 (82.7%)</td>
<td>44 (64.7%)</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>3 (2.9%)</td>
<td>23 (33.8%)</td>
<td></td>
</tr>
<tr>
<td>MMSE-score, mean (SD)</td>
<td>24.9 (3.5)</td>
<td>22.4 (4.2)</td>
<td>&lt;.001 (171)*</td>
</tr>
<tr>
<td>Health decline, No. (%)</td>
<td></td>
<td></td>
<td>.004 (2)*</td>
</tr>
<tr>
<td>No</td>
<td>76 (73.1%)</td>
<td>33 (49.2%)</td>
<td></td>
</tr>
<tr>
<td>To some extent</td>
<td>7 (6.7%)</td>
<td>5 (7.5%)</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>21 (20.2%)</td>
<td>29 (43.3%)</td>
<td></td>
</tr>
<tr>
<td>Visual acuity (0-1), mean (SD)</td>
<td>.88 (0.21)</td>
<td>.84 (0.21)</td>
<td>.181 (169)*</td>
</tr>
<tr>
<td>Contrast sensitivity (0-16), mean (SD)</td>
<td>12.84 (0.68)</td>
<td>12.55 (0.96)</td>
<td>.022 (170)*</td>
</tr>
<tr>
<td>Importance of driving, mean (SD)</td>
<td>1.57 (0.73)</td>
<td>1.78 (0.83)</td>
<td>.091 (171)*</td>
</tr>
<tr>
<td>Patient’s judgement of driving safety, No. (%)</td>
<td></td>
<td></td>
<td>.136 (2)*</td>
</tr>
<tr>
<td>Safe</td>
<td>88 (85.4%)</td>
<td>52 (76.5%)</td>
<td></td>
</tr>
<tr>
<td>Less safe than when middle-aged</td>
<td>15 (14.6%)</td>
<td>16 (23.5%)</td>
<td></td>
</tr>
<tr>
<td>Unsafe</td>
<td>0 (0.0%)</td>
<td>0 (0.0%)</td>
<td></td>
</tr>
<tr>
<td><strong>Interpersonal factors</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recommendation given after fitness-to-drive assessment, No. (%)</td>
<td></td>
<td></td>
<td>&lt;.001 (2)*</td>
</tr>
<tr>
<td>Continue driving</td>
<td>73 (92.4%)</td>
<td>6 (7.6%)</td>
<td></td>
</tr>
<tr>
<td>Driving lessons</td>
<td>18 (58.9%)</td>
<td>13 (41.9%)</td>
<td></td>
</tr>
<tr>
<td>Cease driving</td>
<td>13 (21.0%)</td>
<td>49 (79.0%)</td>
<td></td>
</tr>
<tr>
<td>Authority figure recommended driving cessation, No. (%)</td>
<td>1 (1.0%)</td>
<td>12 (17.6%)</td>
<td>&lt;.001 (1)*</td>
</tr>
<tr>
<td>Informant’s judgement of driving safety, No (%)</td>
<td></td>
<td></td>
<td>.190 (2)*</td>
</tr>
<tr>
<td>Safe</td>
<td>68 (66.6%)</td>
<td>42 (64.6%)</td>
<td></td>
</tr>
<tr>
<td>Less safe than when middle-aged</td>
<td>32 (31.4%)</td>
<td>18 (27.7%)</td>
<td></td>
</tr>
<tr>
<td>Unsafe</td>
<td>2 (2.0%)</td>
<td>5 (7.7%)</td>
<td></td>
</tr>
</tbody>
</table>
### Environmental factors

<table>
<thead>
<tr>
<th>Environmental factors</th>
<th>Group</th>
<th>p Value (df)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Current drivers (n = 104)</td>
<td>Retired drivers (n = 68)</td>
</tr>
</tbody>
</table>
| Passenger of other drivers, No. (%) | 90 (86.5%) | 65 (95.6%) | .067 (1)
| Sum of modes of transport used other than the private car, mean (SD) | 2.48 (0.83) | 2.12 (1.04) | .013 (168)
| Car accidents, mean (SD) | 0.10 (0.33) | 0.16 (0.51) | .484 (171)

### Process of driving cessation

<table>
<thead>
<tr>
<th>Process of driving cessation</th>
<th>Group</th>
<th>p Value (df)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Current drivers (n = 104)</td>
<td>Retired drivers (n = 68)</td>
</tr>
</tbody>
</table>
| Driving reduction, mean (SD) | -1.49 (1.49) | -1.83 (1.72) | .151 (168)
| Driving restriction, mean (SD) | 1.85 (1.77) | 2.34 (2.30) | .343 (170)

* Mann-Whitney U test  
* Fisher’s Exact test  
* χ² test

Statistical significance (p < .05) is indicated by *.

Abbreviations: AD, Alzheimer’s disease; CDR-score, Clinical Dementia Rating Total Score; MMSE-score, Mini Mental State Examination Total Score.

For the binary logistic regression analysis, factors that correlated significantly (p < .05) with StillDriving were selected. Intrapersonal factors that correlated significantly with StillDriving were age (r = -.156, p = .041), gender (r = -.153, p = .045), CDR-score (r = -.437, p < .001), MMSE-score (r = .309, p < .001), health decline (r = -.254, p = .001), and contrast sensitivity (r = .171, p = .025). Interpersonal factors that correlated with StillDriving included the recommendation given after the fitness-to-drive assessment (r = .657, p < .001) and recommendations of driving cessation from authority figures (r = -.309, p < .001). One environmental factor correlated with StillDriving, i.e. the sum of modes of transport used other than the private car (r = .188, p = .015) with retired drivers using less modes of transport than current drivers. Subsequently, the factors correlating significantly with StillDriving were entered in a binary logistic regression analysis to determine the validity of the factors in predicting StillDriving. A significant model emerged to predict StillDriving, χ²(9, N = 167)= 104.8, p < .001. The model explained 46.6% of the total variance (Cox & Snell R²) and classified 85.6% of the patients correctly as still driving or not. The factors that contributed significantly to the prediction were gender, CDR-score, health decline, and the recommendation given after the fitness-to-drive assessment, and there was a trend found for recommendations of driving cessation from authority figures (Table 6.3).
Table 6.3. Summary of binary logistic regression analysis for the prediction of driving continuation (n = 101) versus driving cessation (n = 66) in patients with cognitive impairment.

<table>
<thead>
<tr>
<th>Predictor variable</th>
<th>B</th>
<th>SE B</th>
<th>Wald</th>
<th>p</th>
<th>Odds ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>0.002</td>
<td>0.002</td>
<td>0.800</td>
<td>.371</td>
<td>1.002</td>
</tr>
<tr>
<td>Gender</td>
<td>-1.149</td>
<td>0.575</td>
<td>3.991</td>
<td>.046*</td>
<td>0.317</td>
</tr>
<tr>
<td>CDR-score</td>
<td>-4.512</td>
<td>1.498</td>
<td>9.075</td>
<td>.003*</td>
<td>0.011</td>
</tr>
<tr>
<td>MMSE-score</td>
<td>-0.026</td>
<td>0.070</td>
<td>1.137</td>
<td>.712</td>
<td>0.975</td>
</tr>
<tr>
<td>Health decline</td>
<td>-0.658</td>
<td>0.288</td>
<td>5.211</td>
<td>.022*</td>
<td>0.518</td>
</tr>
<tr>
<td>Contrast sensitivity</td>
<td>0.201</td>
<td>0.340</td>
<td>.348</td>
<td>.555</td>
<td>1.222</td>
</tr>
<tr>
<td>Authority figure recommended driving cessation</td>
<td>-2.149</td>
<td>1.249</td>
<td>2.961</td>
<td>.085</td>
<td>0.112</td>
</tr>
<tr>
<td>Recommendation after fitness-to-drive assessment</td>
<td>1.748</td>
<td>0.321</td>
<td>29.724</td>
<td>&lt;.001*</td>
<td>5.743</td>
</tr>
<tr>
<td>Sum of other used modes of transport</td>
<td>-0.234</td>
<td>0.290</td>
<td>0.649</td>
<td>.420</td>
<td>0.792</td>
</tr>
<tr>
<td>Constant</td>
<td>-1.101</td>
<td>5.568</td>
<td>.039</td>
<td>.843</td>
<td>0.333</td>
</tr>
</tbody>
</table>

Total $R^2=0.466^*$
Statistical significance (p < .05) is indicated by *.

6.3.3. Driving cessation rates per aetiology of cognitive impairment

At the time of follow-up, 104 (60.5%) patients with cognitive impairment were still driving whereas 68 (39.5%) patients with cognitive impairment had ceased driving. The lowest rate of driving cessation was found in patients with DLB (1 of 8 patients; 12.5%). In patients with PD, the rate of driving cessation was similar (3 of 17 patients; 17.6%). Patients with FTD ceased driving in 30.8% of the cases (4 of 13 patients). In the group of patients with AD, 38.2% of the patients ceased driving (32 of 83 patients). The driving cessation rates were higher in patients with VaD (10 of 15 patients; 66.7%) and mixed dementia (AD + VaD) (8 of 10 patients; 80.0%). Of the patients with other or unclear diagnoses, 38.5% ceased driving (10 of 26 patients).

6.3.4. Mobility of patients with cognitive impairment

Important modes of transportation

During the follow-up interviews, patients with cognitive impairment (n = 170) were asked which modes of transportation they found important to continue to use. Patients with cognitive impairment reported none until up to six modes of transport. Driving (i.e. driving themselves or being passenger of other drivers) was by far the most important mode of transportation followed by cycling (Figure 6.2).
Driving included both being a driver and being a passenger of a private car. **Other included motorised quadricycles, a motorcycle, and a transportation service of day care.**

**Figure 6.2.** Percentages of patients indicating the importance to continue to use certain modes of transportation (multiple answers possible, n = 170).

**Used modes of transportation**
Used modes of transportation were analysed for current and retired drivers with cognitive impairment. Of the current drivers with cognitive impairment, 86.5% reported also being passenger of other drivers: 63.5% were passenger of their partner, 28.8% of other family members, 22.1% of friends, and 3.8% of other drivers such as neighbours or colleagues. Drivers with cognitive impairment also used other modes of transport, especially walking and cycling (*Table 6.4*). Of the retired drivers with cognitive impairment, 95.6% reported being passenger of other drivers: 58.8% were passenger of their partner, 47.1% of other family members, 17.6% of friends, and 4.4% of other drivers such as a former colleague or a professional caretaker. In comparison to current drivers, a smaller proportion of retired drivers was walking, cycling and using public transport and a larger proportion of retired drivers used taxis (*Table 6.4*).
Driving included both being a driver and being a passenger of a private car. Other included motorised quadricycles, a motorcycle, and a transportation service of day care. Figure 6.2. Percentages of patients indicating the importance to continue to use certain modes of transportation (multiple answers possible, n = 170).

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<table>
<thead>
<tr>
<th>Mode of transportation</th>
<th>Current drivers (n = 104)</th>
<th>Retired drivers (n = 68)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passenger of other driver(s)</td>
<td>86.5%</td>
<td>95.6%</td>
</tr>
<tr>
<td>Walking</td>
<td>91.1%</td>
<td>79.4%</td>
</tr>
<tr>
<td>Cycling</td>
<td>84.5%</td>
<td>58.8%</td>
</tr>
<tr>
<td>Public transport</td>
<td>52.0%</td>
<td>35.3%</td>
</tr>
<tr>
<td>Taxis</td>
<td>10.7%</td>
<td>25.0%</td>
</tr>
<tr>
<td>Other modes*</td>
<td>11.7%</td>
<td>13.2%</td>
</tr>
</tbody>
</table>

*Other modes included an airplane, a boat, moped, motorcycle, motorised quadricycle, mobility scooter, buggy at a golf court, and transportation service of day care.

Changes in frequencies of walking, cycling, and public transport use

During the follow-up interview, patients were asked if their frequency of travel with commonly used non-car modes of transport (i.e. walking, cycling, and public transport) had changed, after the fitness-to-drive assessment. Even though the percentage of retired drivers cycling (58.8%) and using public transport (35.3%) was low compared with current drivers (84.5% respectively 52.0%), the percentage of retired drivers who increased the frequency of cycling (42.5%) and public transport use (41.7%) after the fitness-to-drive assessment was higher compared with current drivers (10.6% respectively 17.0%). Such an increase in frequency was not found for walking (Figure 6.3). Retired drivers who increased the frequency of cycling and public transport use after the fitness-to-drive assessment mentioned using these modes of transport instead of the car (i.e. driving themselves or being passenger of their partner). Despite the relative increase in cycling and public transport use of retired drivers compared with current drivers, the majority did not increase the frequency of walking, cycling, and public transport use. Moreover, the percentages of retired drivers who reduced walking, cycling, and public transport use were higher than corresponding percentages of current drivers (Figure 6.3).
Figure 6.3. Percentages of current and retired drivers with cognitive impairment who increased, did not change, or decreased their frequency of walking (n = 134), cycling (n = 125), and use of public transport (n = 77) after a fitness-to-drive assessment.

Reasons for not walking, cycling, and using public transport
Patients who were not walking (n = 23), not cycling (n = 44), and/or not using public transport (n = 93) were asked about their reasons (Figure 6.4). Patients with cognitive impairment reported each none up to three reasons. Figure 6.4 shows that not walking and not cycling was mostly associated with physical difficulties and falls. Dislike was another major reason for not walking for transport, whereas unfamiliarity and cognitive difficulties were other limiting factors for cycling. Not using public transport was largely explained by having no need to use public transport, because of using other modes of transportation in most cases. It is noteworthy that inconvenience of public transport was often reported, which could be related to physical difficulties, but also to cognitive difficulties (e.g. impairments in orientation) as well as unfamiliarity and distance from home.
Figure 6.3. Percentages of current and retired drivers with cognitive impairment who increased, did not change, or decreased their frequency of walking (n = 134), cycling (n = 125), and use of public transport (n = 77) after a fitness-to-drive assessment.

Reasons for not walking, cycling, and using public transport

Patients who were not walking (n = 23), not cycling (n = 44), and/or not using public transport (n = 93) were asked about their reasons (Figure 6.4). Patients with cognitive impairment reported each none up to three reasons. Figure 6.4 shows that not walking and not cycling was mostly associated with physical difficulties and falls. Dislike was another major reason for not walking for transport, whereas unfamiliarity and cognitive difficulties were other limiting factors for cycling. Not using public transport was largely explained by having no need to use public transport, because of using other modes of transportation in most cases. It is noteworthy that inconvenience of public transport was often reported, which could be related to physical difficulties, but also to cognitive difficulties (e.g. impairments in orientation) as well as unfamiliarity and distance from home.

*Other included for cycling: feeling insecure on a bicycle, bicycle got stolen, a cycling accident, being hospitalized, and passiveness, and for public transport: costs, being hospitalized, partner dislikes public transport, experience with severe delay, feels nauseous in public transport, cannot take mobility scooter along, and maintaining driving skills

Figure 6.4. Percentages of reported reasons for not walking (n = 23), not cycling (n = 44), and not using public transport (n = 93) (multiple answers possible).

6.4. Discussion

In this study, 172 patients with cognitive impairment were interviewed about their adherence to a driving recommendation received after participation in a comprehensive fitness-to-drive assessment. The vast majority of patients adhered to a recommendation to either continue driving, to follow driving lessons and undergo an official relicensing procedure, or to cease driving after
Driving cessation occurred in most cases in response to a recommendation to cease driving, which was given after the fitness-to-drive assessment, by family members or by authority figures. These results indicate that interpersonal factors are very important for patients with cognitive impairment in the decision making process, which is in correspondence with previous studies in patients with dementia (Croston et al., 2009; Mizuno et al., 2008). Hence family members and physicians may have a crucial role in imposing the decision to cease driving on patients who ignore a negative outcome of a fitness-to-drive assessment (Adler & Kuskowski, 2003; Jett et al., 2005). Future research should focus on how this can be established effectively without harming the relationship with the patient (Gergerich, 2016; Jang et al., 2007). Personal factors, i.e. gender, CDR-score, and health decline also play a role in driving cessation. The observed gender effect supports findings from previous studies in which women have been found to cease driving earlier than men (Anstey et al., 2006; Rebok & Jones, 2016), but this gender difference was not always found (Talbot et al., 2005). Cognitive impairment and self-rated health have also been found to predict driving cessation in other studies in which no driving recommendation was given (Anstey, Windsor, Luszcz, & Andrews, 2006; Foley, Masaki, Ross, & White, 2000; Herrmann et al., 2006; Talbot et al., 2005). In brief, patients with cognitive impairment who underwent a fitness-to-drive assessment were more likely to cease driving if they were recommended to cease driving, were female, and had relatively severe cognitive impairment and/or pronounced health decline.

Consistent with previous studies (Fujito et al., 2016; Herrmann et al., 2006; Seiler et al., 2012), a considerable proportion of patients with various
aetiologies of cognitive impairment continued to drive. Driving cessation was most common among patients with VaD (66.7%) and patients with mixed dementia (AD + VaD) (80.0%). Contrary to the study of Seiler and colleagues in which patients with DLB had the highest rate of driving cessation (90.9%) (Seiler et al., 2012), in this study patients with DLB had the lowest rate of driving cessation (12.5%). In both studies, the time since diagnosis varied between patients from very recent to several years ago, therefore the patients in this study might have been in a milder stage of DLB than the patients in the study of Seiler and colleagues (Seiler et al., 2012). An explanation for the discrepancy in findings might be that the severity of cognitive impairment is more important for driving cessation than the aetiology of cognitive impairment. In line with this reasoning, CDR-scores were predictive of driving cessation, which corresponds with previous studies (D J Foley, Masaki, Ross, & White, 2000; Talbot et al., 2005). Nonetheless, patients with different aetiologies of dementia may become unfit to drive due to different driving difficulties resulting from different symptoms (De Simone et al., 2007; Fujito et al., 2016; Piersma, de Waard, et al., 2016).

Patients with cognitive impairment preferred to use the private car for transportation, as a driver but also as passenger. This preference was expected because patients were selected on their wish to continue driving, as they are the target group for fitness-to-drive assessments. Especially family members (other than the partner) started to drive retired drivers with cognitive impairment, which is in line with Liddle and colleagues’ argument that driving cessation is a family matter (Liddle et al., 2016). Remarkably, only a quarter of retired drivers with cognitive impairment used taxis. The group of retired drivers used less alternative modes of transportation than the group of current drivers, which may indicate that cognitive impairment may not only impact on driving but also on feasibility of using alternative modes of transportation. An alternative explanation might be that retired drivers are less healthy in general leading to limitations in mobility. Even though the patient sample as used for the present study was characterized by cognitive impairment, physical difficulties were equally often reported as reason for not cycling or not using public transport, and as the major reason for not walking. On the one hand, retired drivers with cognitive impairment as a group may be frailer than current drivers with cognitive impairment, and the independent mobility of especially retired drivers may be limited and decreasing. On the other hand, around 40% of retired drivers using alternative transportation was able to sustain mobility by increasing their frequency of cycling and public transport use. These patients may represent
a physically healthy group within the group of retired drivers with cognitive impairment. Research on traffic safety of patients with cognitive impairments using non-car modes of transportation is lacking, but would be helpful in order to indicate which alternative modes of transport should be advised for patients with cognitive impairment. It is important to note that cyclists and pedestrians are vulnerable road users compared to car drivers, therefore traffic safety of retired drivers with cognitive impairments may be compromised. In conclusion, there is a lot of variation in mobility of patients with cognitive impairment, ranging from having no options for transportation anymore after driving cessation to sustaining mobility through driving or increasing use of alternative modes of transportation.

### 6.4.1. Conclusions and implications for clinical practice

Severity of cognitive impairment is very relevant for fitness to drive and predictive for driving cessation. Therefore, clinical tools such as the CDR should be used to stage the severity of cognitive impairment in the context of driving recommendations. There is consensus that patients with a CDR-score of 2 or 3 should be recommended to cease driving (Lundberg et al., 1997). Patients with a CDR-score of 1 are less likely to be fit to drive than patients with a CDR-score of 0.5, but for both groups assessments are needed to investigate fitness to drive on an individual basis.

Physicians have a very important role in informing patients about the impact of cognitive impairment on driving, because patients may be compromised in the evaluation of their own functioning and abilities. Physicians should explain that driving cessation will probably become inevitable and support patients and their family members in adapting to this change. A proportion of patients will have a wish to continue driving. It is difficult to judge fitness to drive of individual patients in clinical practice (Gergerich, 2016), therefore referral to fitness-to-drive assessments (e.g. to driving licence authorities) is advised. This study showed that adherence to recommendations given after fitness-to-drive assessments is high, thus promoting driving cessation in patients who are unfit to drive while stimulating driving continuation in patients who are fit to drive. Still, physicians should discuss driving and mobility again after a fitness-to-drive assessment to assure that non-adherers are less likely to ignore the given driving recommendation, but also to acknowledge consequences of driving cessation. Depending on the personal situation, patients may need help in finding alternative modes of transportation to sustain their mobility, or might desire recognition of negative emotions related to driving cessation.