
A Self-assessment Tool to Assist Senior Drivers in Remaining Mobile in a Safe Way

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Abstract

Acquiring and maintaining driving skills is increasingly viewed as a lifelong process. Permanent road safety education programs have been developed in many countries, targeting different groups of road users. Of central importance is that drivers recognize their own limitations and act accordingly while driving. One way to make drivers aware of their task capacity balance is to use assessments, which provide information about levels of driving performance under different task conditions and the underlying attributes that need further attention. Based on this information, advice that is tailored to the specific needs of the driver can then be provided. A Dutch project targeting senior drivers developed a web-based driving awareness test that informs drivers of their performance limits and provides them with feedback on what actions they can take to remain mobile in a safe manner.

Keywords

Elderly drivers; senior drivers; fitness-to-drive; self-assessment; safe mobility.

Introduction

Informing elderly drivers about their fitness-to-drive can help them to remain mobile in their cars in a safe way. In The Netherlands a self-assessment tool was developed to make drivers aware of possible limitations in their driving performance and to provide feedback on actions they can take to continue driving safely.

Background

Road safety of elderly drivers

In the past decades the share of over-65s in the Dutch population has gradually increased from 11% in 1980 to 17% in 2014. According to a prognosis of Statistics Netherlands, the share of over-65s will continue to increase to 26% around the year 2040 and will then begin to show a small decline. In absolute numbers this will amount to 4.8 million people. Moreover, the proportion of over-80s within the group of over-65s will show a large increase from a quarter in 2014 to a maximum of 44 per cent in 2053 (SWOV, 2015).

The elderly have a higher than average fatality rate in traffic. The most important cause of this high fatality rate among the 75-year-olds and older is their greater physical vulnerability. In addition, functional limitations can lead to the elderly more frequently being involved in certain types of crashes, for example when taking a left turn at intersections. On the other hand, many elderly road users are safer in a car than, for instance, on a bicycle or e-bike. In addition, the elderly often have already stopped cycling, partly because of loss of balance. Therefore, a farewell to their car is often a farewell to part of their social lives as well. This farewell may have negative consequences for the well-being of

the individual, but also for society as a whole (e.g., the extra costs of door-to-door community transport).

With a progressive decline in functions, adaptations to the road and vehicle surroundings cannot always prevent individuals becoming unfit to drive a vehicle. Therefore, a procedure that leads to a timely withdrawal from traffic is necessary. The problem is determining the threshold: when is someone still fit to drive and under which preconditions (vehicle adaptations, aids, training, limited driving license)? What actions can be taken to stay mobile safely?

Of central importance is that elderly drivers recognize their own limitations and act accordingly while driving. One way to make elderly drivers aware of their task capacity balance is to use assessments, which provide information about levels of driving performance under different task conditions and the underlying attributes that need further attention. Based on this information, advice that is tailored to the specific needs of the driver can then be provided.

Self-assessment tool for senior drivers

A Dutch project targeting senior drivers developed a web-based driving awareness test that informs drivers of their performance limits and provides them with feedback on what actions they can take to remain mobile in a safe manner. Self-assessments can be used to inform the elderly about the functional limitations that come with aging, and the aids available to continue driving a car safely for as long as possible.

Aims of the self-assessment tool:

- Elicit awareness in elderly drivers about strengths and weaknesses in driving and possible points of improvement
- Provide a basis for customized follow-up activities:
 - mobility advice (when and how to travel)
 - training and coaching
 - self-imposed restrictions
 - follow-up research regarding fitness to drive
- Final purpose: staying mobile in a safe way

Test development

A first prototype of the test was developed and evaluated in 2015 (Nägele, Roelofs and Kuiken, 2015). In this study 4,500 participants between 25 and 100 years old participated, with an overrepresentation of the age category above 65 years old. Since 2015 the driving awareness test has been refined in follow-up studies, including standard setting and optimal assembly of short subtest versions (Roelofs and Verschoor, 2018) and development of detailed and actionable feedback reports (Vissers, Roelofs, van den Berg and Nägele, 2017). Furthermore, studies were conducted to determine the best way to reach the target group of senior drivers and how the test could best be implemented (Ideate, 2016; Ideate, 2018). Since 2020 the Dutch driving test authority CBR is responsible for the contents of the driving awareness test ('Rij Bewust Test' in Dutch). In this year the test was launched on the websites of the CBR (<https://www.cbr.nl/nl/rijbewijs-houden/nl/gezondheidsverklaring/uw-situatie/doe-de-rij-bewust-test.htm>) and of the road safety organization VVN (<https://vvn.nl/rijbewust>).

Test content

Using optimal test assembly techniques, shorter versions of the assessments were constructed that were optimally reliable for the purpose while minimizing the test taker's burden, without losing

content coverage (Roelofs and Verschoor, 2018). As a result, the current version of the driving awareness test for senior drivers consists of the following sub tests: 1) Dealing with task strain; 2) Operating and maneuvering the vehicle smoothly; 3) Preventing driving errors in traffic and 4) Risk avoidance.

A closer look at the four subtests

Dealing with task strain

The items of this subtest measure to which level of complexity drivers still can perform driving tasks with relaxed attention (8 items; $\alpha = .79$).

Operating and manoeuvring the vehicle smoothly

This subtest contains questions about the extent to which drivers are able to operate and manoeuvre the vehicle in a smooth and comfortable way in situations with different task complexity (10 items; $\alpha = .73$).

Preventing driving errors in traffic

The items of this subtest measure if drivers are able to prevent driving errors in different situations (12 items; $\alpha = .71$). Possible errors may concern the following criteria for safe driving: traffic safety, traffic flow and vehicle control.

Risk avoidance

In this last subtest drivers are asked to which extent they avoid risky situations in traffic and take actions to make the driving task easier, for instance by adapting their speed (8 items; $\alpha = .80$).

Personalized feedback

After completing the test, senior drivers receive personal feedback on their scores on the four subtests. Both strengths and shortcomings are noted and suggestions are given as to what actions can be taken to remain mobile in a safe manner.

User experience

It is of high importance to gain insights into users' experience and evaluation of the test to ensure adequate follow-up on the test results. Therefore, a small-scale evaluation study involving the current version of the online driving awareness test was conducted in 2020 (Jalvingh, 2020). The most important findings from this study are summarized below.

Method

In 2018 a panel consisting of 161 senior drivers filled out a short online questionnaire after completing the online driving awareness test.

The questionnaire consisted of thirteen statements to assess the personal evaluation of the test and additional items on general usefulness of the test for seniors, usefulness of the feedback report, intention to follow-up on the test results, continuing to drive in a safe manner and best places to offer the driving awareness test to senior drivers. Because the questionnaires were completed afterwards, test results could not be matched with participants' responses on the questionnaire.

Results

Participants' gender was almost equally distributed and most participants were between 66 and 75 years of age (Table 1, Table 2). Women had driven less kilometres than men in the previous twelve months ($p < .05$).

Table 1

Gender Distribution in the User Experience Study

Gender	N	%
Man	83	51.6%
Woman	76	47.2%
Unknown	2	1.2%

Table 2

Age Distribution in the User Experience Study

Age	N	%
52 – 65 years old	40	24.8%
66 – 75 years old	79	49.1%
76+ years old	39	24.2%
Unknown	3	1.9%

By using factor analysis (principal component analysis with varimax rotation) eleven of the thirteen items on personal evaluation of the test were transposed into two factors: “usefulness” (five items, $\alpha = .87$) and “comprehensiveness” (six items, $\alpha = .83$).

Overall evaluation was positive. Average scores for usefulness and comprehensiveness of the test were 7.3 and 8.3 points out of 10, respectively. The driving awareness test as a whole and the feedback report received average marks of 7.4 and 7.5. Men’s scores on usefulness were higher than women’s and average scores on usefulness increased with age ($p < .05$).

Most participants (86.3%) had no trouble completing the questionnaire. Additionally, more than 87% of participants responded positively on statements concerning the use of the test for other people (e.g., “The driving awareness test could be a suitable tool for seniors to continue driving in a safe manner”). Women responded more negatively on three of the four statements than men ($p < .05$).

In contrast to the positive results, 36.6% of participants (fully) agreed with the statement “The information in the feedback report is of little use for me”, which was analysed separately. More than half of participants (55.4%) did not intend to use any of the advice given in the feedback report. Results on the most useful parts of the feedback report were quite ambiguous.

About a third of participants (32.2%) had never discussed safe driving with anyone before. Participants who did, discussed the topic mostly with their spouse and/or children. If they had to choose, most participants would like to discuss safe driving with their spouse, other family members, a friend, or their family doctor. Men had talked about this topic with their spouses significantly more often than women and vice versa men’s spouses had addressed their concerns about their driving skills more often than women’s ($p < .05$). Women would more often not discuss the topic of safe driving with anyone.

Results on best places to offer the driving awareness test were mixed, although participants seemed to favour traffic safety organizations (the Dutch ANWB and VVN), meetings and websites for seniors, municipalities, and family doctors.

Conclusions and discussion

The driving awareness test was positively evaluated by a panel of 161 senior drivers. Both personal and external usefulness received high scores, as did comprehensiveness of the test. Women seemed less enthusiastic about the usefulness of the test than men, possibly because they drive less kilometres per year and therefore find the results less applicable. There was a positive correlation between age and average score on usefulness of the test.

Intentions to follow-up on the test results and feedback report were low. Because results on the driving awareness test could not be matched to the responses on the questionnaire, it was not possible to verify whether participants' scores on the test were higher than average. However, it is possible that senior drivers find the driving awareness test mostly useful for other people, rather than themselves, as people tend to overestimate their driving skills (De Craen et al., 2007).

Participants would mostly choose to discuss the topic of safe driving with their loved ones or their family doctor. Men have discussed and would discuss safe driving more often with their spouse than women. In addition, men's spouses have addressed their concern about their partners' driving skills more often than women's. It would be interesting to further research who initiates this conversation: the senior driver who notices a decline in their driving skills, or the concerned spouse?

Possible places to offer the driving awareness test to senior drivers are traffic safety organizations, physical and digital meeting spots for seniors, municipalities, and family doctors.

Current application of the test

On 16th of July 2020, the intellectual property of the Driving Awareness Test was transferred from the government (ministry of Infrastructure and the province of Overijssel) to CBR, the Dutch Driving License Agency. CBR subsequently sought collaboration with the Dutch traffic safety organization VVN for the outreach and communication of the test. A number of changes was made: the set of photographs was replaced, the feedback report was adapted in text and layout, and the phrasing of some of the questions was changed. Several successful communication campaigns have been carried out, which led to over 170.000 completed assessments in less than 2 years.

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