

Challenging situations, self-reported driving habits and capacity among older drivers (70+) in Sweden

A questionnaire study

Per Henriksson

Lena Levin

Tania Willstrand

Björn Peters

Preface

The questionnaire study presented in this report is part of a major research project – *SAFE MOVE – Safe Mobility for Older Drivers* – carried out in collaboration between VTI, Mobilitetscenter and Volvo Cars in Sweden and IFSTTAR, CNRS, INSERM, University of Bordeaux, University of Caen, University Claude Bernard Lyon, OKTAL, Continental, Peugeot and Citroën in France.

The aim is to increase knowledge and the practice of safe mobility among older drivers by taking three complementary approaches in three sub-projects.

- SP1: Survey assessment of older drivers, on-road and cognitive tests
- SP2: Simulator-based assessment and training of older drivers
- SP3: Assistance systems for older drivers.

Aims of SAFE MOVE are: (1) to elucidate determinants that may regulate driving leading to safe mobility; (2) to investigate the potential use of a driving simulator in the training of older drivers; and (3) to adapt driver assistance systems to the needs of older drivers.

The project manager in Sweden for the first part, including the survey assessment of older drivers (70+), is Lena Levin (PhD), who, along with Per Henriksson (Research Assistant), is responsible for the report containing a descriptive data analysis of 1,362 questionnaires. Henriksson carried out the statistical analyses and wrote the main parts of Section 3. Björn Peters and Tania Willstrand, project managers for the entire SAFE MOVE project, commented on and produced additional material for the report.

We thank Jan Andersson (Research Director at VTI) for peer reviewing an earlier version of the report and for his good advice, which resulted in plans for further analysis and forthcoming publications on the topic “older drivers’ safety, confidence and independence”.

Linköping December 2013

Lena Levin, VTI

Acknowledgement

The SAFE MOVE project is supported in Sweden by SAFER, VGR, VINNOVA and VTI.



Quality review

Internal peer review was carried out on 11 October 2013 by Jan Andersson. Lena Levin and Per Henriksson edited the final version of the report. The Research Director Jan Andersson examined and approved the report for publication on 14 February 2014. The conclusions and recommendations expressed are the authors' own and do not necessarily reflect VTI's opinion as an authority.

Intern peer review har genomförts 11 oktober 2013 av Jan Andersson. Lena Levin och Per Henriksson har genomfört justeringar av slutligt rapportmanus. Forskningschef Jan Andersson har därefter granskat och godkänt publikationen för publicering 14 februari 2014. De slutsatser och rekommendationer som uttrycks är författarnas egna och speglar inte nödvändigtvis myndigheten VTI:s uppfattning.

Table of contents

Abbreviations.....	4
Summary.....	5
Sammanfattning	7
1 Introduction	9
1.1 Safe mobility for older drivers	9
1.2 Assessment of driving skills	11
1.3 Aim of the survey study.....	11
2 Method.....	13
2.1 Target population, sample and response rate.....	13
2.2 The questionnaire	14
2.3 Data analysis	14
3 Results.....	15
3.1 Description of all respondents.....	15
3.2 Characteristics of the active drivers	15
3.3 Health status.....	18
3.4 The car and the driving licence	22
3.5 Driving habits	24
3.6 Access to and use of public transport	28
3.7 Perceived difficulties with driving	29
3.8 Accident involvement.....	36
3.9 Attitudes and experiences associated with car driving.....	36
3.10 Further participation in the project	38
3.11 Variations in confidence in driving	39
4 Summarising discussion	45
References	49

Appendix. The Swedish questionnaire translated into English

Abbreviations

ADAS	Advanced Driver Assistance Systems
CES-D	Centre for Epidemiologic Studies Depression Scale
LDW	Lane Departure Warning
SP	Sub-project
SCB	Statistiska Centralbyrån (Statistics Sweden)
TPR	Total Population Register (Registret över totalbefolkningen)

Challenging situations, self-reported driving habits and capacity among older drivers (70+) in Sweden. A questionnaire study

by Per Henriksson, Lena Levin, Tania Willstrand and Björn Peters
Swedish National Road and Transport Research Institute (VTI)
SE-581 95 Linköping

Summary

This survey study is part of a major research project *Safe Mobility for Older Drivers SAFE MOVE* carried out between Sweden and France in collaboration.

The older population is heterogeneous in relation to health, cognitive state and experience. At the beginning of the project, a literature review showed different combinations of convergence or divergence between crash frequency and level of confidence and avoidance.

The aim of the survey study in Sweden was to investigate health issues (frequent pathologies affecting vision, hearing, cognitive capacity and physical function), driving habits and use of a car (frequency, distance driven, other available modes of transport). We were also interested in which traffic situations were judged as difficult or dangerous, avoidance strategies adopted for such situations, type of car used, equipment (ADAS systems) and its frequency of use. Respondents were asked to report any accidents in the previous two years, and to self-estimate their cognitive functioning and driving ability.

Individuals fulfilling these criteria formed our target population:

- Born in 1941 or earlier (aged 70 years or more in the year 2011)
- Living in the county of Västra Götaland, Sweden
- Holder of a driving licence for category B, passenger car
- Still driving a car.

The total population meeting the three first criteria above comprised 143,389 individuals. A simple random sample of 3,000 was drawn. After one reminder, 1,962 questionnaires were returned (about 65 per cent). The data collection period was 13 September to 31 October 2012. Since we were focusing on active car drivers in this study, those who had ceased to drive were asked to answer only the first three questions and then to return the questionnaire. This resulted in a target group comprising 1,362 active drivers.

The overall picture of an older driver emerging from this study is one who enjoys car driving, uses the car often and is not particularly occupied by thoughts about stopping driving. Possible bias in this picture of older drivers may be due to the fact that those most interested in car driving were also those most interested in the study and thus in answering the questionnaire.

There are several “truths” about older drivers reported in the literature that are questionable in the light of the present study. It is sometimes said that older people drive old cars, but this phenomenon is not supported by the questionnaire data in our study. According to the reported year models, older people in this study drive the same cars as old/young drivers generally do in Sweden.

The changes in driving behaviour often attributed to ageing drivers, e.g. driving more slowly, less frequently and over shorter distances, are applicable in the case of about one-third of the drivers in the present study. Most did not change their driving habits at all when it came to these three specific dimensions, although a few followed an opposite path from what is usually reported in the literature.

Some typical gender differences still exist, e.g. women stop driving at a lower age and drive less frequently than men do. Women from this cohort (70+) passed their driving test later than men did.

A reservation for the representativeness of the results must however be done due to a probable bias; respondents can be expected to more frequently be car drivers and more confident in car driving etcetera, compared to non-respondents.

Analyses of this study confirm that health status is not the only reason someone stops driving; being less confident/apprehensive in the context of car driving may result in driving cessation. According to previous research, less confidence or apprehension is often reflected in drivers deliberately avoiding certain situations and conditions; for example, avoiding unfamiliar roads, darkness, rain, snow, parking in tight spaces. These are aspects of our study. We were also interested in finding out more about drivers who seem consistently less confident, and to support them continuing to drive for as long as possible. Knowledge of the challenging situations and conditions met by older drivers is paramount for further research and efforts into maintaining the safe mobility of older people. Findings indicate that preventive action, such as retraining sessions or developing driver assistance systems, will have to be taken into account if the risk associated with certain situations is to be reduced.

Utmanande situationer, självrapporterade körvanor och förmågor bland äldre bilförare (70+) i Sverige. En enkätundersökning

av Per Henriksson, Lena Levin, Tania Dukic, Björn Peters
VTI, Statens väg- och transportforskningsinstitut
581 95 Linköping

Sammanfattning

Enkätundersökningen som presenteras i föreliggande rapport ingår som en del i ett större forskningsprojekt *Safe Mobility for Older Drivers* som genomförts i samarbete mellan Sverige och Frankrike.

Den äldre befolkningen är heterogen med avseende på hälsa, kognitiv status och erfarenhet. En litteraturstudie som gjordes inledningsvis i projektet, fann både positiva och negativa samband mellan olycksfrekvens, hur självsäker en förare känner sig och vilka trafiksituationer som eventuellt undviks.

Syftet med enkätstudien i Sverige var att undersöka hälsotillståndet (ofta förekommande sjukdomar som påverkar syn, hörsel samt kognitiv och fysisk förmåga), körvanor och användning av bil (frekvens, körsträcka, alternativa transportmedel), trafiksituationer bedöms som svåra eller farliga, strategier för att undvika sådana situationer, typ av bil som används, utrustning (ADAS-system) och dess användningsfrekvens. Respondenterna ombads också att rapportera alla olyckor under de senaste två åren och att själv bedöma sin kognitiva funktion och körförmåga.

Personer som uppfyllde följande kriterier bildade vår målgrupp:

- Född 1941 eller tidigare (70 år eller äldre år 2011).
- Bosatt i Västra Götalands län.
- Innehavare av körkortskategori B, personbil.
- Kör fortfarande bil.

Antalet personer som uppfyllde de tre första kriterierna omfattade 143 389 individer. Ett slumpmässigt urval på 3 000 personer drogs vilka tillsändes en enkät. Efter en påminnelse hade 1 962 enkäter returnerats, vilket innebär en svarsfrekvens på cirka 65 procent. Datainsamling pågick under perioden 13 september – 31 oktober 2012. Eftersom fokus låg på aktiva bilförare i denna studie, behövde de som hade slutat att köra endast besvara de tre första frågorna och sedan skicka tillbaka enkäten. Till analysen kvarstod därmed 1 362 aktiva förare.

Den generella bilden av en äldre förare som framträder i denna studie är en person som tycker om bilkörning, ofta använder bilen och inte är särskilt upptagen av tankar kring att sluta köra. Eventuellt skulle denna bild av äldre förare kunna vara ”skev” på grund av att de som är mest intresserade av bilkörning också var mest intresserade av studien och därmed besvarade enkäten.

Det finns flera "sanningar" om äldre förare som rapporteras i litteraturen som kan ifrågasättas i ljuset av föreliggande studies resultat. Det påstås ibland att äldre kör gamla bilar, men detta stöds inte av våra enkätdata. Enligt de uppgivna årsmodellerna på bilarna som körs, kör äldre i denna studie lika gamla/nya personbilar som förare generellt i Sverige.

De förändringar av körbeteenden som ofta tillskrivs åldrande förare, till exempel att de kör långsammare, mer sällan och kortare sträckor, gäller för ungefär en tredjedel av respondenterna. De flesta hade inte ändrat sina körvanor beträffande hastighet, frekvens och körsträckornas längd; för några hade ändringarna till och med gått i motsatt riktning jämfört med vad som vanligen rapporteras i litteraturen.

Flera typiska könsskillnader existerar fortfarande, till exempel slutar kvinnor att köra i lägre åldrar och kör mer sällan än män. Kvinnor från denna kohort (70+) förvärvade körkortet i senare ålder jämfört med män.

En reservation för hur representativa resultaten är måste dock göras på grund av en möjlig skevhet i materialet: respondenter kan förväntas att i större utsträckning vara frekventa bilförare och känna sig mer trygga som bilförare och så vidare jämfört med icke-svarande.

Resultatet från denna studie bekräftar att dålig hälsa inte är den enda anledningen till att äldre slutar köra bil; att vara mindre självsäker eller mer ängslig i samband med bilkörning kan få till följd att man upphör att köra. Enligt tidigare forskning är mindre självsäkerhet och oro förknippat med förare som medvetet undviker vissa situationer och förhållanden, till exempel okända vägar, mörker, regn, snö och att parkera i trånga utrymmen. Detta är aspekter som tas upp i vår studie. Vi var också intresserade av att veta mer om förare som tycks vara genomgående mindre självsäkra och att stödja dem så att de kan fortsätta att köra så länge som möjligt. Kunskap om utmanande situationer och förhållanden som äldre förare ställs inför är av största vikt för fortsatt forskning och satsningar på att upprätthålla säker mobilitet för äldre. Fynd tyder på att förebyggande åtgärder, till exempel fortbildningskurser eller utveckling av förarstödssystem, måste övervägas om riskerna i vissa situationer ska kunna minskas.

1 Introduction

1.1 Safe mobility for older drivers

The term ‘mobility’ refers to the means by which people gain access to the goods, services and activities they need for their livelihood and well-being. Safe mobility is essential at all ages, and especially for vulnerable groups (e.g. children, older people, and the disabled). In this study, we focus on older people’s mobility and, more specifically, older car drivers. Use of a car as mode of transport in old age has increased in recent decades. The development in older people’s travel behaviour reflects an increase in driving-licence holders and in access to a car. A study of cohorts from Norway, Sweden and Denmark based on the national travel studies from 1985 to 2005 indicates that older people retain their car-use habits well into high age (Hjorthol, Levin, & Sirén, 2010). Driving is often the only mode of transport of those living in suburban and rural areas, and for many retired (i.e. older) people it is an important activity supporting the everyday activities that create meaning in life (Nelson, 2010; Rosenbloom, 2001, 2009).

Driving is a complex task requiring a range of visual, psychomotor and cognitive skills: “Driving skill refers to the smoothness and safety of driving in actual traffic, using one’s knowledge, basic abilities and resources efficiently, and is generally believed to be strongly dependent on learning and experience” (Brouwer & Ponds, 1994, p. 151).

Previous research has shown that older drivers are (generally) less often involved in severe car accidents than younger drivers are. In absolute number, older drivers do not have more accidents than younger drivers and they drive over shorter distances (Hakamies-Blomqvist, 2006; Hakamies-Blomqvist, Sirén, & Davidse, 2003; Langford & Koppel, 2006), but those over 70 years have an increased crash rate per mile travelled compared to middle-age drivers (Li, Braver, & Chen, 2003; Ryan, Legge, & Rosman, 1998). When involved in a crash, frail, older, drivers may be at increased risk of injury or even death (Lafont & Laumon, 2003; OECD, 2001; Whelan, Langford, Oxley, Koppel, & Charlton, 2006). In the course of ageing, a number of physical and cognitive changes, as well as specific health problems, can affect driving ability adversely. Measures such as visual attention, processing speed and executive functions have repeatedly been found associated with driving ability (Anstey, Wood, Lord, & Walker, 2005; Lafont, Amoros, Gadegebeku, Chiron, & Laumon, 2008).

When all this is taken into account, driving in old age could be considered a public health issue. While physical impairment can be compensated by technical vehicle adaptations, cognitive impairment may limit a person’s fitness to actually drive (Peters, 2001). In Sweden, there is no mandatory age-related assessment of fitness to drive, but there is a mandatory obligation on the part of all physicians to report driving licence holders considered medically unfit to drive.

Previous research shows that few people report health problems in connection with car driving, while a greater proportion say that they have problems using public transport, walking and cycling. It has also been found that both confidence and awareness of areas of weakness are likely to have an impact on safety and driving regulation (Parker, MacDonald, Sutcliffe, & Rabbitt, 2001). Research reviews state that illness and health conditions can affect driving ability to such an extent that the safety of the older driver and of other road users is endangered. There are studies showing that older drivers are indeed highly confident when driving, and that they compensate for their decreased capability in certain situations (e.g. complex intersections, highways) and road

conditions (e.g. at night, snow, rain, icy road conditions) (cf. Levin, Ulleberg, Siren, & Hjorthol, 2012). The literature has descriptions of self-regulation or driving cessation for older drivers. There is general agreement that at least some older drivers are aware of their cognitive and functional decline and adjust their driving patterns to suit the conditions in which they feel safest (Molnar & Eby, 2008). Several studies demonstrate self-regulation in drivers choosing to drive less or in avoiding specific driving situations. Previous research documents how older drivers take fewer trips or drive shorter distances; they avoid certain difficult driving situations, such as driving at night, in bad weather, on wet roads and busy traffic (see e.g. Charlton et al., 2006; Levin et al., 2007). They feel less confident when navigating in an unfamiliar area, when following a route travelled only once before, when joining a motorway, when changing lanes on a motorway and in heavy traffic (Parker et al., 2001).

There are also findings suggesting that older drivers may self-regulate their driving not because they believe they have limitations, but as a result of perceiving other road users as driving dangerously (Siren & Rishøj Kjær, 2011). Previous research has shown that older drivers are sometimes nervous, worried or scared when driving, and this can have implications for their confidence and safety on the road (Parker et al., 2001). Also, gender differences about self-regulatory driving in later life have been highlighted in recent research. These findings, for example women ceasing to drive at an earlier age and in better health than men, could be related to variations in confidence levels among women and men (Bauer, Adler, Kuskowski, & Rottunda, 2003; Kostyniuk & Molnar, 2008; Ragland, Satariano, & MacLeod, 2004). Choi et al. (2013) believe that these findings can also be understood in the context of “gender roles”, i.e. that recent and current cohorts of older people grew up in the mid-20th century when traditional gender roles influencing mobility were pertinent.

Older driver self-regulation studies typically define self-regulation using a measure of the extent to which driving in pre-defined ‘difficult’ driving situations is avoided, such as driving at night and on slippery roads. In a study from Queensland, Sullivan et al. (2011) stated that it is “problematic” to rely on older drivers voluntarily deciding to give up their driving license. Their statement is based on a study of 98 drivers with an average age of 71 and a mean 51 years of driving experience. They were asked to self-rate their driving ability and then undertake a computer-simulated task in which they had to recognize and react to potential road hazards. Participants also rated their driving confidence and reported on the extent to which they avoided potentially dangerous driving situations and conditions such as driving at night or in the rain. Sullivan et al. (2011) showed that there was little relationship between the participants’ performance on the test and the ratings they gave themselves.

The Swedish Transport Agency has issued some guidelines to help older drivers in self-assessing their fitness to drive (Transportstyrelsen, 2013). In addition, the Swedish Transport Administration (formerly the Swedish Road Administration) has produced two short advisory memos on vehicle choice, with overviews of car requirements and support systems to the advantage of older and disabled people (Vägverket, 2007, 2008).¹

¹ The brochure *Bilar för äldre* has recently become available in pdf at the homepage of the Swedish Transport Administration (Trafikverket) www.trafikverket.se. The brochure *Modellen för dig* was downloaded at the url: www.dhr.se/index.php?page=Bilstod&download_file=384 (both brochures were available in March 2012).

In Denmark, traffic safety researchers (Siren & Meng, 2010, 2012) have recently carried out analyses of Danish accident data and have presented an international literature review of dementia tests striving to evaluate the effects on traffic safety. According to these analyses and to previous studies, there are no significant effects on traffic safety from the screening of older drivers. The Danish researchers point out the difficulty in separating out the “unsafe drivers” and believe we have to take account of the fact that screening can also have negative effects on the willingness of older drivers to renew their licence. Previous research has shown that older women, in particular, are often too hesitant about renewing their driving licence, something that may have negative effects on their mobility (cf. Choi et al., 2013). In this case, screening at a specific age (e.g. at 70 or 75 years) would perhaps have an unwanted effect of restraining healthy older people from driving. It is complex measuring older people’s traffic safety and there are often several reasons for accidents occurring. Consequently, we need to know more about older drivers’ capacity and about their preferences and experiences of driving.

The background for the present report is older people’s need for safe mobility. It aims at examining how older driving licence holders today use the car and what they think about their own capacity and ability as careful drivers. The report is part of a research project called *SAFE MOVE for Older Drivers* and was carried out in collaboration between Sweden and France.

This report, the second² in the first sub-project, presents and discusses results from a survey study of active car drivers aged over 70 years living in the southwest of Sweden (Västra Götaland).

1.2 Assessment of driving skills

It is interesting to investigate driving activity more thoroughly, i.e. how people interpret their driving skills, and how this affects their willingness to regulate driving in old age. Awareness of difficulties and hazards is then crucial. There is reason to believe that the sensorimotor-transformation process is affected by ageing (Gamache, Hudon, Teasdale, & Simoneau, 2010). In previous research it has been stated that some drivers resume driving prematurely after a layoff, perhaps because they underestimate their cognitive and driving capacities, which is often the case in women (Rosenbloom, 2006). As a consequence, they are not at risk of accident, but they are at risk of reduced social activity and decreased physical and mental health on the grounds of low mobility and remoteness from social activities (Marottoli et al., 2000; Ragland, W., & MacLeod, 2005). Some drivers tend not to pass judgement on their own driving ability or even deny having reduced ability at all compared to when they were younger. They driving in a manner beyond their real capabilities and are accident prone as a result. This is considered as more often the case for men, who at any age of the population category are at higher risk of accidents, even in the course of ageing. Nevertheless, the processing that links to action is not that clear, and more research is needed if we are fully to understand the connection to ageing (Lambert, Seegmiller, Stefanucci, & Watson, 2013).

1.3 Aim of the survey study

The aim of the study in Sweden was to investigate self-reported health issues (frequent pathologies affecting vision, hearing, cognitive capacity and physical function), driving

² The first part of subproject one is a literature review (Lallemand et al., 2013).

habits and car use (frequency, distance driven, other available modes of transport), traffic situations judged as difficult or dangerous, avoidance strategies of such situations, type of car driven, equipment (ADAS systems) and frequency of use. Respondents were asked about accidents in the previous two years and to make a self-estimation of their own cognitive functioning and driving ability.

The results will form input to other parts in the Save Move project concerning training and design of technical support systems.

2 Method

2.1 Target population, sample and response rate

People fulfilling these criteria formed our target population:

- Born in 1941 or earlier (aged 70 years or more in the year 2011)
- Living in the county of Västra Götaland, Sweden
- Holder of a driving licence for category B, passenger car
- Still driving a car.

The lower age limit was chosen due to the fact that possible problems with car driving occur more frequently beyond the age of 70 years. Furthermore, for practical reasons only persons who lived in the county in which Gothenburg is situated were chosen because participation in subsequent sub-projects of Safe Move required physical visits to the Mobilitetscenter in Gothenburg.

On commission for VTI, SCB (Statistics Sweden) selected the sample from the latest version of the national driving licence register (dated 31 December 2011). SCB administered the questionnaire, registered the answers and delivered an SPSS file with the result to VTI. Besides respondents' answers, SCB added some variables from official registers³. The total population meeting the first three of the above criteria comprised 143,389 individuals. A simple random sample of 3,000 was drawn. After one reminder, 1,962 questionnaires were returned (about 65%). The data collection period was 13 September to 31 October 2012. Table 1 gives the response rate and, if known, the reasons for non-participation in the study.

Table 1 Response rate and causes of non-response. Information from SCB.

	No.	%
Total sample	3 000	
Deceased	4	
Net sample	2 996	100.0
Answers	1 962	65.5
Did not answer	1 034	34.5
Of which:		
<i>No contact</i>	<i>877</i>	<i>29.3</i>
<i>Wrong address</i>	<i>11</i>	<i>0.4</i>
<i>Refused (contacted SCB)</i>	<i>87</i>	<i>2.9</i>
<i>Not able to answer (sickness, physical or psychic disorder or problem with language)</i>	<i>23</i>	<i>0.8</i>
<i>Questionnaire returned, but no questions answered</i>	<i>11</i>	<i>0.4</i>
<i>Other person than the receiver of the questionnaire answered</i>	<i>25</i>	<i>0.8</i>

³ The Total Population Register (TPR), the Statistical Register of Vehicles the Driving License Register in Sweden.

Since we were focusing on active car drivers in this study, respondents who had ceased to drive were asked to answer only the first three questions and then return the questionnaire. It turned out that about 30% were no longer driving. It was not possible to determine the driving status of another three respondents and they were excluded from the analysis. The result was a target group comprising **1,362 active drivers**.

2.2 The questionnaire

The questionnaire was constructed in collaboration with our French partners in the SAFE MOVE project (see appendix). Many of the questions in the Swedish and French versions of the questionnaire were identical, but there were more questions for the Swedish respondents. The French survey was conducted by interviewing people in their homes.

The Swedish questionnaire comprised 85 questions on 20 pages. Non-drivers were asked to answer only the first three questions and then return the questionnaire.

There were three parts dealing with:

- **Background** – sex, age, housing, family situation, education level, income, etc.
- **Health** – overall health status, daily activities, possible disabilities affecting car driving, medication, etc.
- **Mobility and car driving** – legitimacy to hold a driving licence, characteristics of the car, driving habits and possible changes in habits, use of other modes of transport than the car, accident involvement, traffic/weather situations avoided or perceived as more difficult than normal, self-estimation of driving ability, any temporary periods of non-driving, any completed training courses for older drivers, personality, etc.

For most of the questions, the respondent was asked to tick boxes, but in some cases it was possible to give written answers, which were scanned and inserted by SCB in MSWord documents.

2.3 Data analysis

The data were analysed in SPSS after some minor corrections. Relationships between groups were tested with Chi-square (categorical data) or t-test/analysis of variance (continuous data). Significance level was set to 5%.

A few of the open questions were analysed and the results are presented in this report. The other open answers will be subject to further analysis in collaboration with a PhD student from the French research team (Marie dit Asse, et al., forthcoming).

3 Results

The first sub-section gives some facts about all respondents, including those who had stopped driving. All sections from 3.2 onwards present the results from analyses of the active drivers' answers.

3.1 Description of all respondents

Of those who answered the questions and returned the questionnaire, about 70% were still driving. There were large gender differences: 82% of the men stated that they were active drivers compared to only 55% of the women. Those who had ceased to drive were asked to give the year they stopped driving. Combining this information with birth year, it was found that men stopped driving at 80 years of age, while the women ceased earlier: at age 72 years (median ages).

Drivers and non-drivers were compared concerning some relevant register variables in the following table.

Table 2 Characteristics of drivers and non-drivers.

Variable	Drivers (n=1 362)	Non-drivers (n=597)
Average age	77	82
% females	37	67
% married	61	40
% unmarried	7	7
% living with a cohabitee	13	13
% widow/widower	19	39
Average gross income in 2010, kSEK	221	170
% who own at least one car licensed for use	77	15
% who own at least one car which is off-road-notified	3	2
% holding a driving licence category C (heavy lorry)	11	1
% holding a driving licence category D (bus)	4	1

We can conclude that non-drivers are significantly more often females, more often widows/widowers, more seldom married, older and earn less money than active drivers. Further, drivers are significantly more often holders of driving licences of category C or D compared to non-drivers.

3.2 Characteristics of the active drivers

A majority were men (63%). The active drivers were on average 77 years old (range: 71 – 95 years; men 77.5 years, women 75.9 years). These two variables were obtained by SCB from the register of the Swedish total population, TPR (but were also included in the questionnaire). In most cases the respondents lived together with a spouse (68%). Thirty per cent lived alone, while the remaining 2% lived in other family constellations.

Other variables taken by SCB from the population register were civil status, country of birth and citizenship. Sixty-one per cent of drivers were married and 13% lived with a partner (cohabitee). Seven per cent were unmarried while 19% were widows/widowers. Just above 90% were born in Sweden and 5% in the other Nordic countries. Furthermore, about 3% were born in other European countries. Hence, less than 1% was born outside Europe. Concerning citizenship, almost the entire group (98%) comprised citizens in Sweden and close to 2% in the other Nordic countries. Only 0.5% was citizens in either other countries in Europe or in North America.

Few (3%) were still working full or part time. Those who had retired, either fully or part time, did so at age 65 years (median age; range 50-85 years), and of those who were fully retired, 21% had done paid work after retirement.

Eighty-two per cent of the respondents were in employment when they were of working age. Some had run an enterprise (14%) and a small percentage were home workers (2%). Combinations of these were also reported by respondents (3%).

Three out of four (73%) had not moved after retirement, but 13% did move during their final five-year period. About half of the respondents had completed compulsory school, while 16% had upper secondary school education. About 30% had a university degree (14% less than 3 years, 17% 3 years or longer). Fewer than 2% had achieved a doctoral degree. Compared to the education level in general in Sweden, the respondents had a higher education. For example, of people aged 70 or more in the year 2011, one-third had finished upper secondary school and 16% had a university degree (SCB, 2013b).

Data on income were obtained from two sources. Besides the data provided by respondents in the questionnaire (household incomes), we also received data from an SCB register (individual incomes). Gross income per month in the household is shown in Figure 1. Besides salary, different types of subsidy had to be taken into account when answering this question.

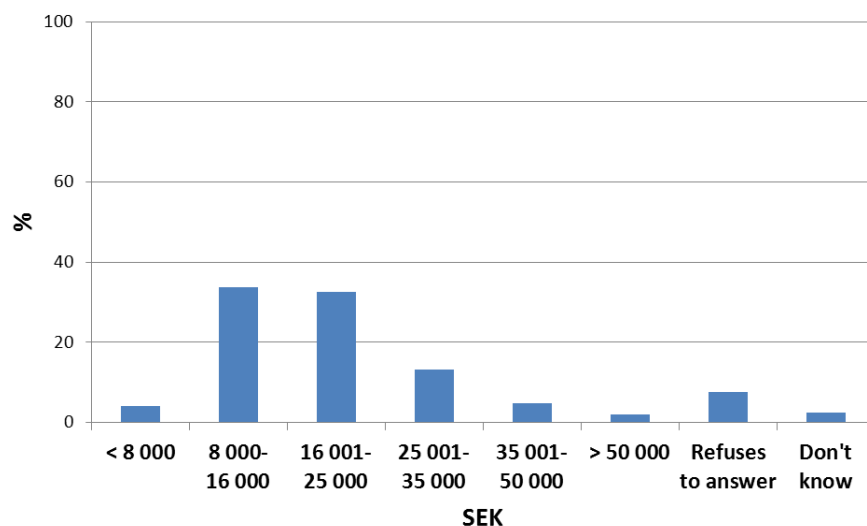


Figure 1 Gross income in SEK for the household, per month. 1 SEK \approx 0.12 €

Two out of three households had a monthly gross income of more than SEK 8,000, but not over SEK 25,000.

One of the background variables added by SCB from the population register was the respondent's earned income during the year 2010 (see Figure 2).

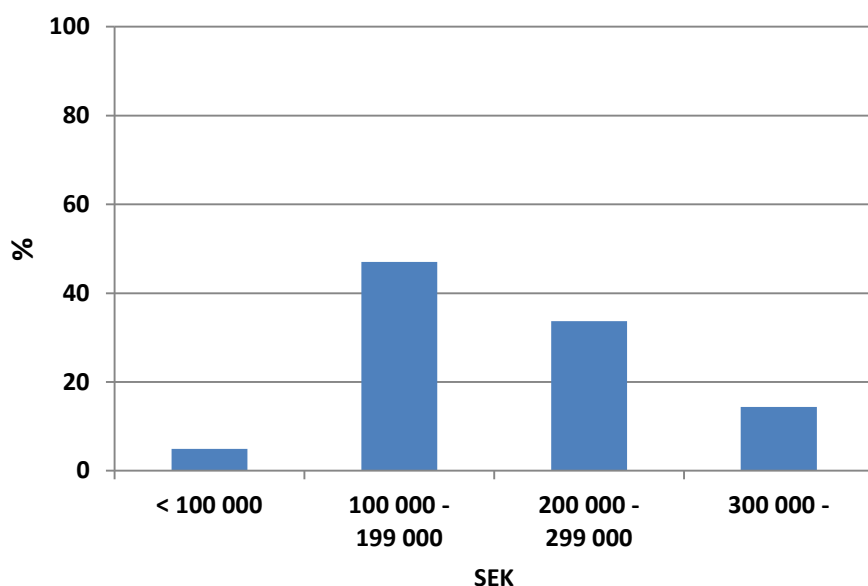


Figure 2 Gross earned annual income in SEK for the respondent, data from the year 2010. Source: The Total Population Register. 1 SEK \approx 0.12 €

Frequency of use of mobile phones, the Internet and computers was requested in the questionnaire. Use of a computer and mobile phone is depicted in Figure 3.

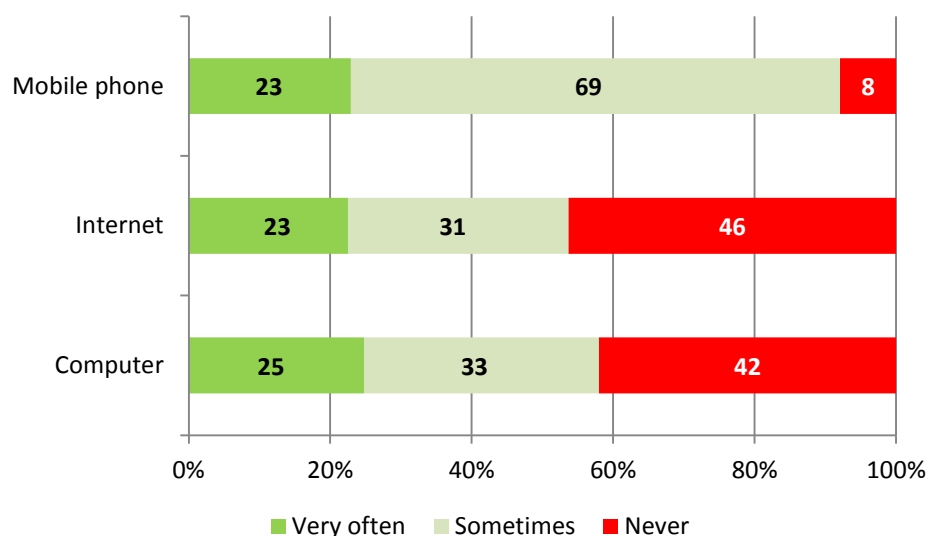


Figure 3 Use of mobile phones, the Internet and computers.

Only 8% never used a mobile phone. More than every second respondent used the Internet or computers. Data on use of/access to the Internet among older people in general in Sweden can be obtained from two national surveys. According to SCB (2013a), 24% of people aged 65 to 74 years never use the Internet. Findahl (2012) reports that 22% in the group aged 65 to 75 years do not have access to the Internet; the corresponding figure for 76+ is 61%.

Further analyses showed that about 6% do not use any of the three tools (mobile phone, Internet or computers).

3.3 Health status

One aim of the questionnaire was to map the health status of respondents (self-reported) and how this relates to everyday activities, and to estimate their ability to drive according to current health. The part of the questionnaire about health-related issues was introduced with a question about self-estimated health. Estimations would be indicated on a graded 1–5 scale, where 1 corresponded to “Very bad” and 5 to “Very good”. Together with ratings of vision and hearing abilities, the results are presented in Figure 4.

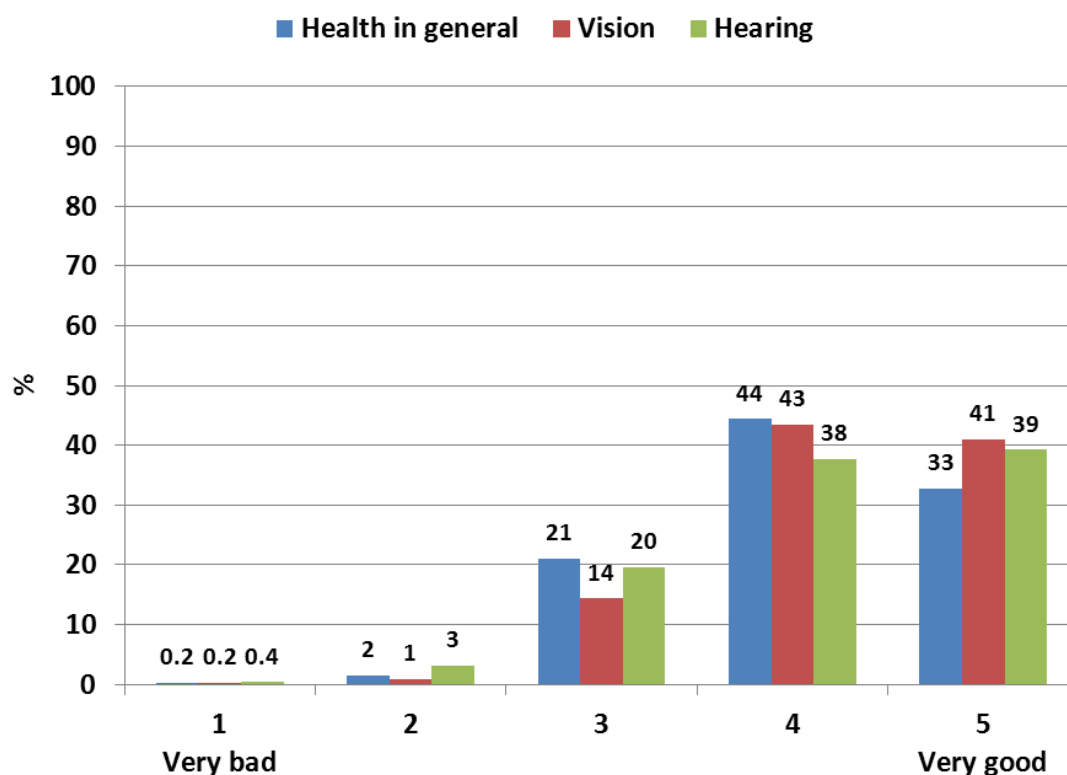


Figure 4 Self-estimated general health status, sight and hearing abilities.

As can be seen in Figure 4, about 77% rated their health as very good or “good” or “very good” (=4 or 5 on the 5-grade scale). Compared to other people of the same age (also using a 1–5 graded scale), 27% of the respondents considered that their health was much better (=5 on the scale) and 49% ticked a 4; these were the only deviations from the self-estimated results shown in the figure.

A few had problems with sight. In another question the respondent was asked if he/she could recognize a familiar face at a distance of four metres (using glasses or lenses if need be) and 0.7% answered yes, but with difficulty, and 0.3% were unable to recognize the person. A majority (two-thirds) used either glasses or lenses when driving.

Respondents rated their hearing ability as worse than their vision impairment: 3.5% had poor or very poor hearing ability (the corresponding proportion for vision was about 1%). Fifteen per cent used a hearing aid when driving.

Several questions asked the respondent to estimate their ability concerning different issues today compared with their ability at age 40 and, also compared with other people of the same age (see Appendix).

The following figure shows how the respondents thought about the time devoted to daily activities such as cooking food, gardening, etc.

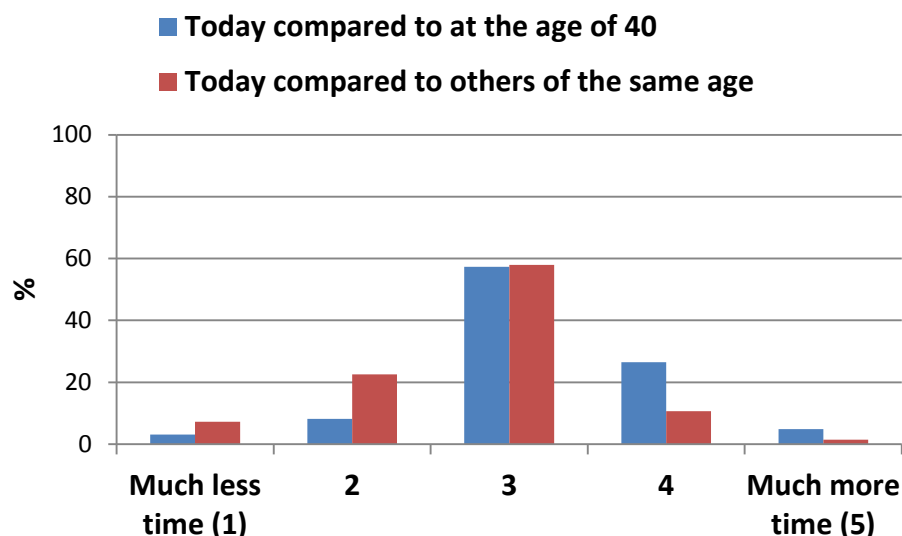


Figure 5 Time for daily activities compared to before and with others of the same age.

As expected, there is a tendency for respondents to believe that they devote more time today to these activities than they did when middle-aged; on the other hand, this amount of time is perceived as less compared to other people of the same age.

Planning or organisation of daily activities was not something that was regarded as more difficult today than when aged 40 (see next figure).

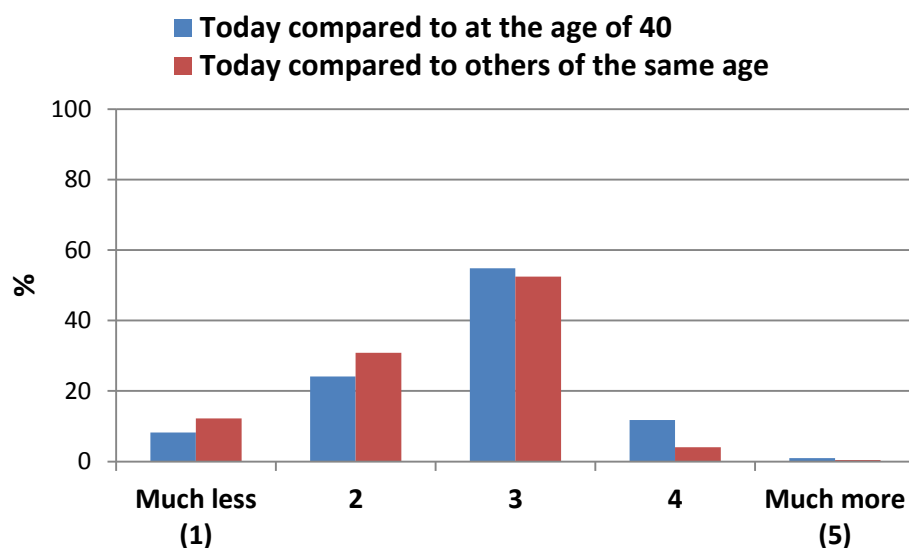


Figure 6 Difficulties planning or organizing daily activities compared to the past and with others of the same age.

A higher percentage of the respondents described themselves as having less difficulty with tasks of this kind than did other people of the same age.

A similar picture can be seen when it comes to disturbances (sounds or incidents) experienced around the respondent.

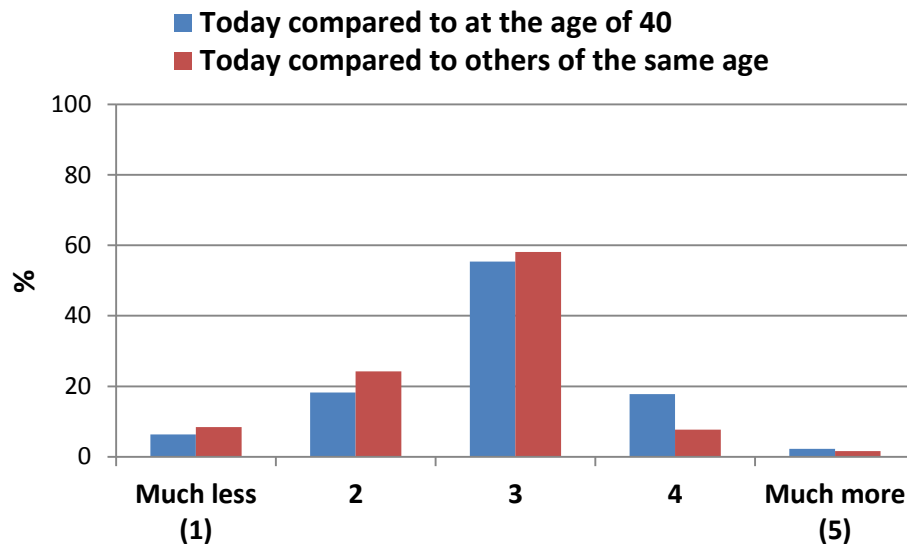


Figure 7 Disturbed by sounds or incidents around the respondent compared to the past and with others of the same age.

A few now found it more difficult than in the past to adapt to unforeseen events (e.g. expected visits, see figure 8).

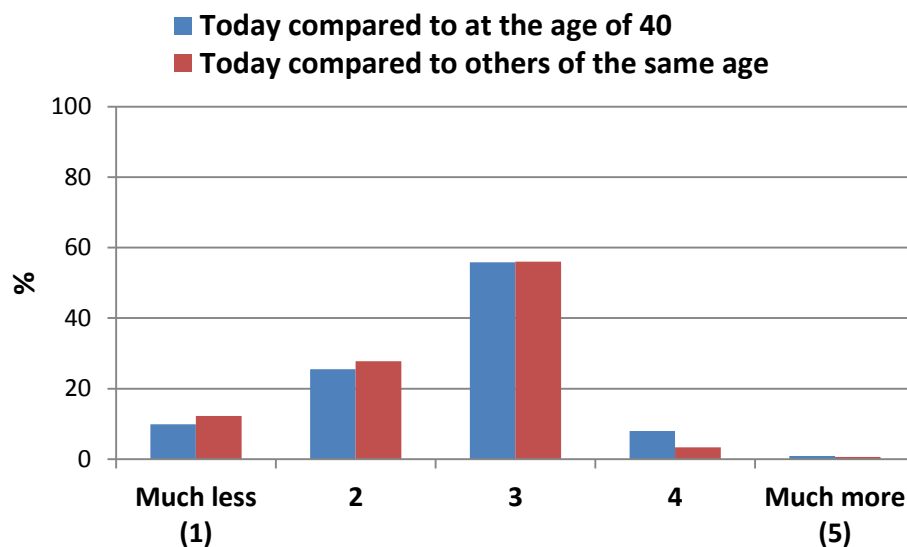


Figure 8 Difficulty adapting to unforeseen events compared to the past and with others of the same age.

In general, there were significant differences between how the respondents perceived themselves compared with how others of the same age did, and how they perceived themselves at age 40 years. The respondents thought more often they were “better” than others compared to their retrospective perception of themselves.

Finally, owing to an incorrect formulation in the questionnaire, no comparison with other people of the same age was possible concerning difficulties with concentration. The respondent’s self-reported ability to concentrate today had not changed dramatically compared to what it was at middle age (see Figure 9).

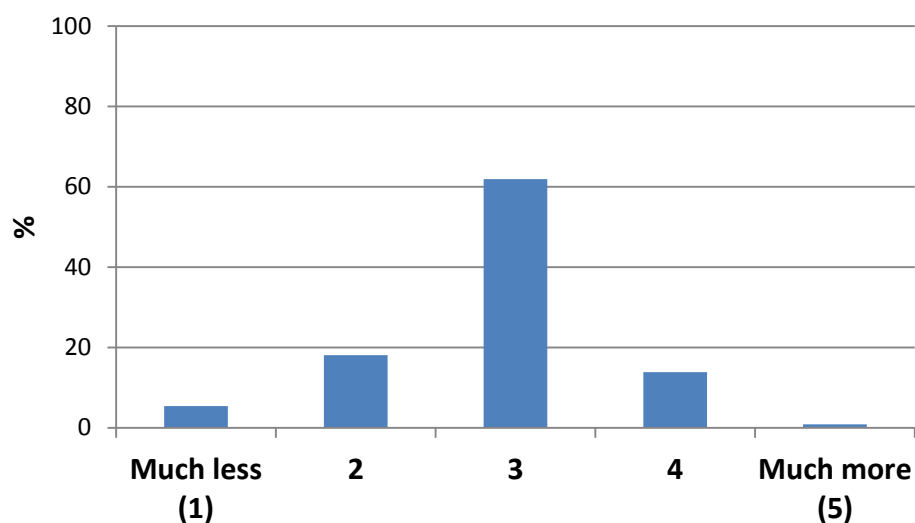


Figure 9 Difficulty concentrating compared to that at age 40.

For five disabilities/impairments listed in the questionnaire, the respondent was asked to indicate if she/he suffered from any of them and, if so, to indicate whether it/they affected car driving. These were vision, hearing, locomotion, sleeping disorder and illness affecting cognitive capacity, and were chosen because they have been found to be partly related to the ageing process.

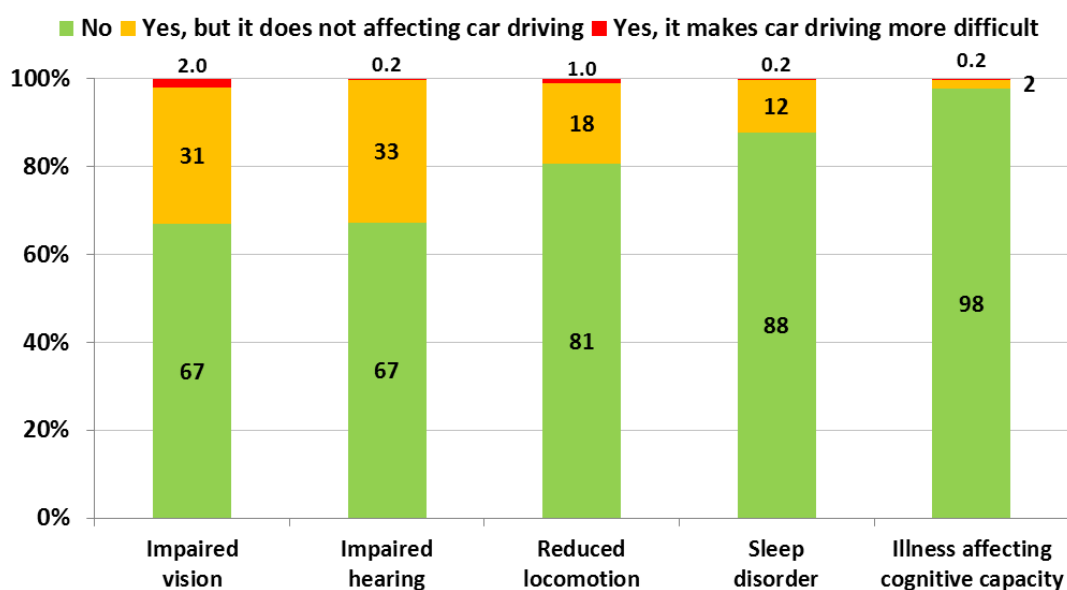


Figure 10 Possible disabilities/impairments and their effect on car driving.

One out of three respondents had impaired vision and/or hearing. Two per cent believed that their vision impairment made driving more difficult. The negative effect of hearing impairment and sleep disorders on driving was negligible according to respondents. Furthermore, 1% described difficulties with driving due to reduced ambulation. Few of the respondents reported cognitive impairment (e.g. dementia, consequences of a stroke or Parkinson's disease; these examples were listed in the questionnaire). The result was not unexpected: few people with (severe) cognitive impairment are fit to drive and have

probably already stopped driving. Another possible explanation for the low prevalence can be that some drivers with cognitive impairments are not conscious of their cognitive status.

Twenty per cent did not take any prescribed medication at all. Half took 1-3 prescribed medications each day, while 10% took six or more (see Table 3).

Table 3 Use of prescribed medications, number per day.

No. of prescribed drugs taken each day	%
0	20.0
1	16.2
2	18.1
3	17.2
4	11.3
5	7.2
6 or more	9.9
Total	100.0

Very few (0.5%) reported having to take medication to be fit to drive a car.

More than every second respondent (54%) believed that some bodily functions deteriorate during the ageing process.

3.4 The car and the driving licence

SCB provided data about car ownership from the vehicle register. The number of cars properly registered for use (vehicle tax and traffic insurance paid) and those that were off-road-notified are given separately in the statistics.

Table 4 Number of vehicles licensed for use and off-road-notified owned by the respondents. Source: data from the Statistical Register of Vehicles 2012-06-30, provided by SCB.

No. of vehicles	Licensed for use, %	Off-road-notified, %
0	22.7	96.6
1	72.2	2.9
2	4.5	0.2
3	0.4	0.1
4	0.0	0.1
5	0.1	0.0
7	0.1	0.0
Total	100.0	100.0

In 72% of cases the respondent owned one car that could be used; 5% owned two or more cars. However, 23% were not registered owners of a car that could be driven and hence must be the drivers of cars owned by another people. Few, about 3%, were owners of cars that were off-road-notified.

From a third register (the driving licence register), SCB complemented the questionnaire data with the kinds of vehicle the respondent was authorised to drive. Besides licence category B for passenger cars, many were allowed to have a motorcycle (category A, 96%⁴). About 11% were allowed to drive a lorry (category C) and 4% a bus (category D).

The age at which a licence for a passenger car was acquired varied between men and women – men at the age of 19 and women at 25 (median ages). Overall age for the respondents was 20 years. Three per cent acquired a licence at age 41 years or above. Only 3.5% reported meeting the conditions required to drive a passenger car, with about half of them needing spectacles or lenses. This is a low percentage compared to the number reported using glasses or lenses while driving. The explanation is that the driving licence could have been acquired as a young adult, with sight deteriorating in high age. Eyesight tests are not mandatory in Sweden when category A or B driving licences are being renewed.

The respondents were asked to describe the car they usually drove. For the most part, this was one that had been driven for six years and the year model was 2004 (median values), which means that older persons in the county of Västra Götaland drive cars that are similar when it comes to model year compared to the total fleet of passenger cars in Sweden (see (Trafikanalys, 2013).

In 23% of cases, the most often driven car was equipped with automatic transmission (for other types of systems and aids, see Table 5).

Table 5 Systems in the most often used car and how often they are used.

System	% of the car equipped with the system			Of those who had the system, % use it...		
	<i>Yes</i>	<i>No</i>	<i>Don't know</i>	<i>always</i>	<i>sometimes</i>	<i>never</i>
Parking aid system	11.7	87.4	0.9	74.8	22.6	2.6
Cruise control	48.9	50.4	0.7	18.3	62.0	19.7
Warning system for vehicles in the blind spot	2.9	93.9	3.2	64.3	21.4	14.3
LDW	1.4	95.4	3.2	80.0	20.0	0.0
Navigation system	8.6	89.7	1.7	3.5	90.6	5.9

The most frequently used system in the most often driven car, according to the respondents, was cruise control, with almost every second car equipped with this aid, but 20% never using it. Few cars were equipped with systems warning of vehicles in the blind spot or of the driver unintentionally straying from the lane.

⁴ Before 1 January 1976, a person who obtained a driving licence category B automatically obtained the A-authority.

Forty-two per cent reported driving another/other vehicle(s) from the one described, and, of those, 62% drove another passenger car; 44% rode a bicycle (see Figure 11).

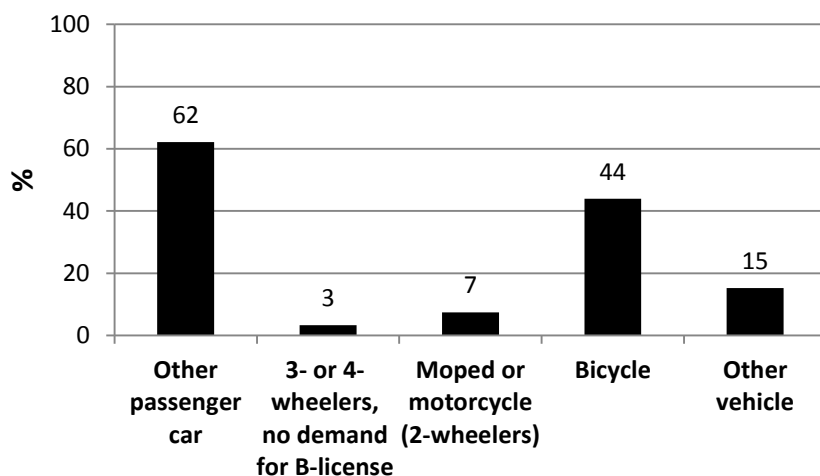


Figure 11 Use of another vehicle than the most often driven.

A few used a moped, motorcycle or a vehicle with 3 or 4 wheels that did not require a B licence. In the category “other vehicle”, which 15% answered, recreational vehicles, tractors and lorries were the most common answers provided in the open question.

3.5 Driving habits

One question dealt with the role the car played in professional life. Nine per cent were professional drivers (lorry drivers, taxi drivers, etc.) and 23% used the car a great deal when working (craftsmen, police, etc.). About one out of two (52%) regularly commuted by car to work, while 28% stated that car driving was not necessary to get to/from work or to do their job.

The current median distance driven in a private car was 100 km per week. There was large variability in the open answers to this question, i.e. from 1 km to 9,000 km per week. In most cases, respondents giving a mileage exceeding 500 km/week probably had the annual mileage in mind. Anyway, the car was a frequently used transportation mode (see Figure 12).

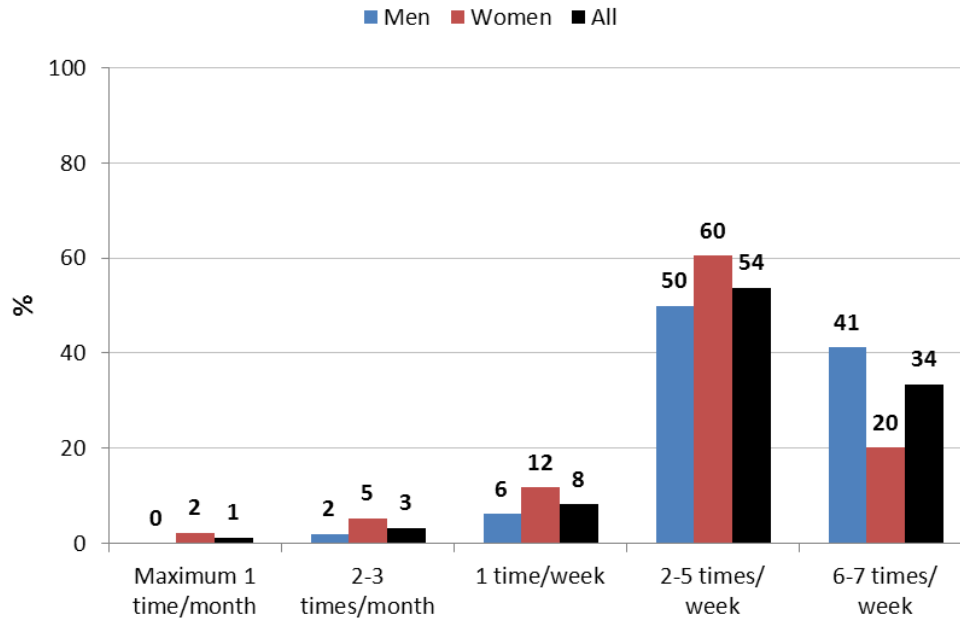


Figure 12 How frequently the respondent drove a passenger car by gender.

A large majority (87%) drove a car several times per week. How men and women answered to this question differed significantly. The largest gender differences were found among the most frequent car drivers; over 40% of men drove almost every day, while only 20% of women did. The distances driven on each occasion could be long; 46% stated a distance exceeding 150 km (return journey included) and 35% that it could be between 50 and 150 km. Hence, 19% drove distances of maximum 50 km, return journey included. Again, there was a significant difference between men and women: men drove more often longer distances than women did and vice versa.

Driving was not continuous for everyone. About 5% (representing 72 respondents) had intervals in their driving as a driving licence holder. Based on answers from 56 respondents, these varied greatly between 1 and 40 years; the median being 5.5 years. The reasons for a temporary stop in driving are presented in the table below (seven respondents did not answer this question), where the answers have been coded within a number of categories (the respondents could express themselves freely).

Table 6 Courses for a longer stop in car driving. Base: 65 respondents.

Course	% answered
Did not have access to a car	31
Illness/operation	22
Not necessary to have a car	14
Other person drove	11
Lived in another place	9
Revoked licence	5
Traffic accident	3
Economic reasons	3
Others	3
Total	100

In some cases the courses may overlap: the general statement that the respondent did not have access to a car can conceal courses, as there was no need for a car or that the economic situation did not allow car ownership.

All who reported having a revoked licence were males; all who temporarily stopped due to a traffic accident were females and others who claimed that another person used to drive the car. However, the number of respondents is small in these subgroups.

When resuming driving, close to 20% (13 out of 68 respondents) turned to a driving school for driving lessons. Most (7 persons) reported their temporary driving stop as due to not owning a car at the time and a further two had had their licence revoked for a period.

Given that the respondent was travelling by car and belonged to a household with a minimum of two members, how frequently was he/she the driver? On 40% of occasions, the respondent was always the driver; in 37% usually the driver; and in 23% sometimes the driver. There were significant gender differences (see Figure 13).

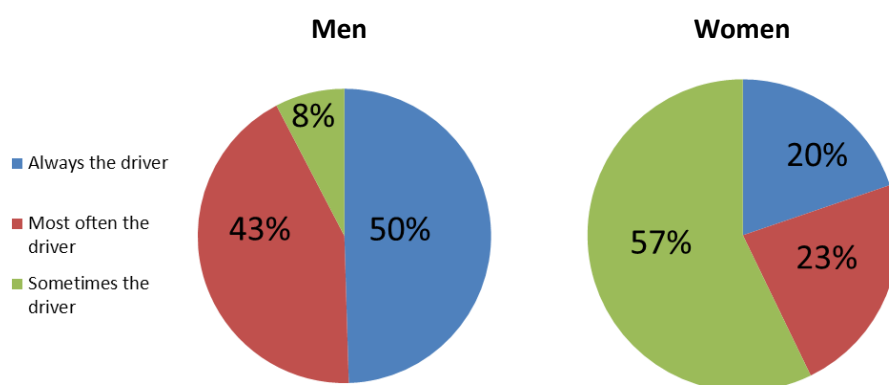


Figure 13 How the driving was divided in households with minimum two members; percentage among men and women.

Only one out of five women was always the driver, compared to every second man. However, the question was formulated rather vaguely: “When you go by car, who is usually the driver?” We actually don’t know whether the respondent is accompanied by someone in the car and whether the possible other occupant(s) hold(s) a driving licence or not.

The purposes for which the car was used and the frequency are given in Figure 14.

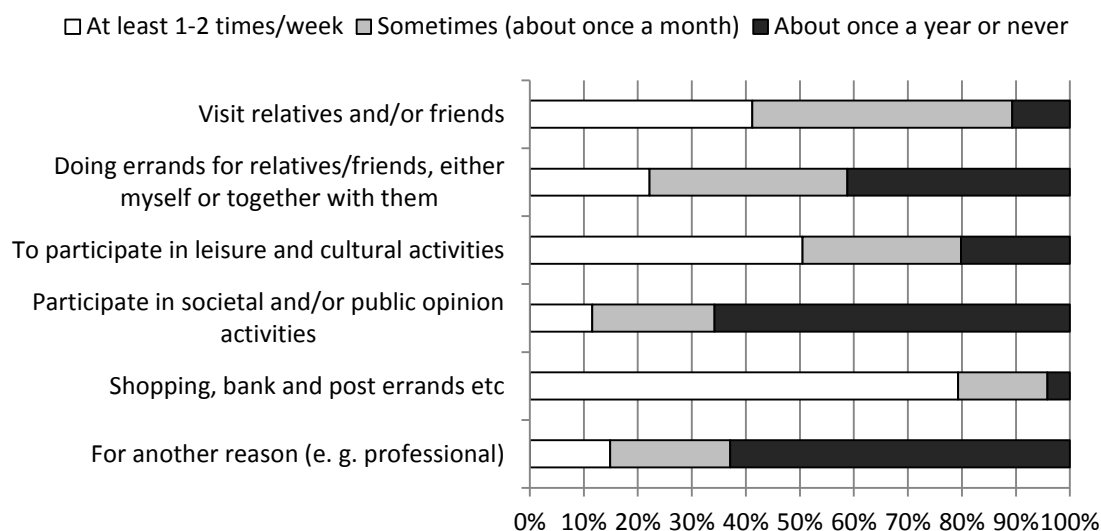


Figure 14 How often some errands were done by car.

The car was used several times per week by 80% of respondents to go shopping, visit the bank or post office. Half the group drove a car at a similar frequency to when attending cultural or leisure activities. Once a month or more often, the respondent helped relatives or friends with errands.

A general question was whether respondents had changed their driving habits compared to when aged 40 years, and every second (51%) had done so. For three specific driving habits – speed, how often the car was used and distance driven – the respondent was

asked to indicate possible changes. The results based on answers from all active drivers are given in Figure 15.

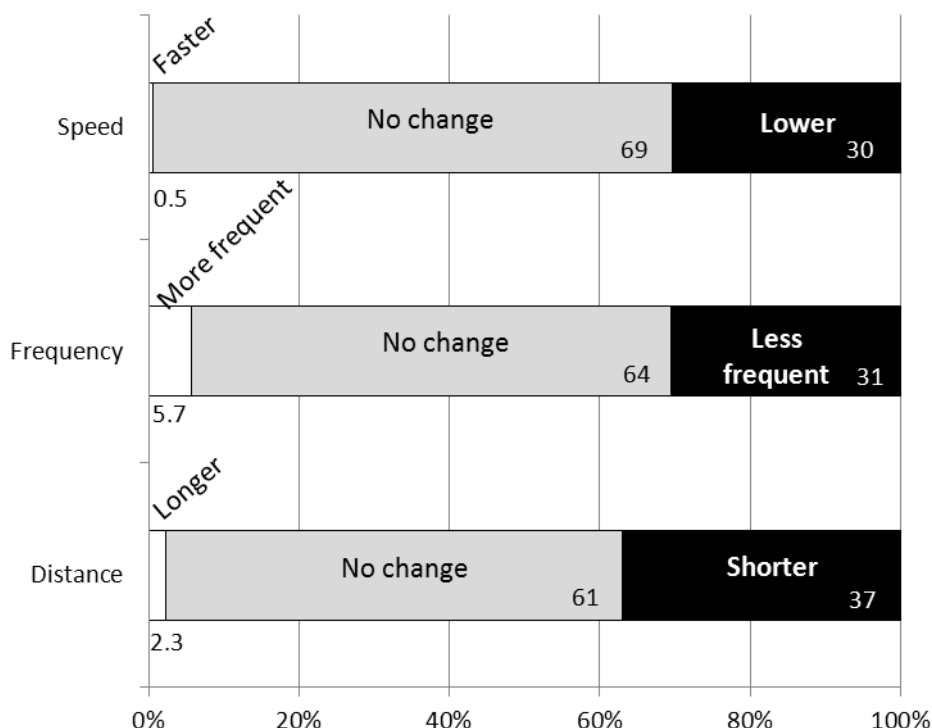


Figure 15 Changes of driving habits compared to at age 40 years.

Between 60% and 70% of the respondents had not changed their driving habits in respect of these three driving characteristics. Close to 37% drove shorter distances and 2% longer. About 30% drove less frequently and/or at lower speed, but 6% used the car more often. Few respondents maintained a higher speed as an old driver than they did in middle age. The respondents were given an opportunity to describe in their own words how their driving habits had changed. Several said that today they drove more carefully and followed the speed limits. Another question revealed that only 7% had changed their driving habits for safety reasons and/or apprehension in traffic (men 4%; women 11%; $p < 0.01$).

3.6 Access to and use of public transport

In the county of Västra Götaland, 18 municipalities offer a “Senior citizens’ card” to people turning 65 or 75 years of age.⁵ The card entitles the holder to free travel with Västtrafik, which is the public transport company. The times at which free travel is permitted differ among municipalities; it can be either all day or limited to low traffic periods.

⁵ Available at: <http://www.vasttrafik.se/#!/biljetter-priser/ovriga-kort/seniorkort/> Accessed 2013-08-08. The 18 municipalities are: Ale, Borås, Falköping, Göteborg, Götene, Hjo, Härryda, Karlsborg, Lidköping, Lysekil, Mariestad, Skara, Skövde, Strömstad, Tibro, Trollhättan, Uddevalla, Vänersborg.

The answers to questions dealing with access to and use of public transport are therefore separated into respondents who lived in a municipality that offered a senior citizens' card and those that did not. However, no information is available about whether the individual actually used the card or not.

In this context, "access to" was defined as within walking distance to a public transport stop (length not specified in the questionnaire, and thus it was up to respondents to evaluate their ability to walk to the stop). Regardless of accessibility, all respondents were asked how frequently public transport was used.

As indicated in Tables 7 and 8, public transport was far less utilised than private car within this group of active drivers. Journeys by bus and tram were more frequent in municipalities that offered the senior card. When not offered, less than 1% travelled by bus several times a week. Unfortunately, there was no "Never" alternative available in the question. Several respondents refrained from ticking any of the boxes and instead wrote "never" beside the question.

Table 7 Access to public transport and frequency of use in municipalities that provide a "Senior citizens' card".

	Within walking distance			How often the travel mode is used				
	Yes	No	Don't know	Maximum 1 time/ month	2-3 times/ month	1 time/ week	2-5 times/ week	6-7 times/ week
Bus	83.3	15.1	1.6	58.0	16.8	9.7	14.2	1.3
Tram*	47.3	52.7	0.0	39.6	21.1	16.2	21.1	1.9
Train	19.0	80.4	0.6	97.3	1.3	0.4	0.7	0.2

**Gothenburg only.*

Table 8 Access to public transportation and frequency of use in municipalities that do not provide a "Senior card".

	Within walking distance			How often the travel mode is used				
	Yes	No	Don't know	Maximum 1 time/ month	2-3 times/ month	1 time/ week	2-5 times/ week	6-7 times/ week
Bus	67.9	29.5	2.6	90.3	8.2	0.9	0.6	0.0
Tram*	27.1	72.9	0.0	83.3	11.1	2.8	2.8	0.0
Train	24.4	75.2	0.4	96.0	4.0	0.0	0.0	0.0

**Möln dal only.*

3.7 Perceived difficulties with driving

A number of situations and circumstances taken from accident statistics and previous research reviews, and that may pose difficulties for older drivers, were listed in the questionnaire (cf. Levin et al., 2007; Whelan et al., 2006). The respondent was asked (a) to express whether he/she perceived the situation/circumstance more difficult today as an older driver and (b) whether he/she takes action to avoid it. The questions were to be

answered from the point of view of a 40-year-old driver.⁶ The results are presented in two figures arranged in decreasing order of the most difficult situations. Situations perceived as more difficult by about 10% or more of the respondents are shown in Figure 16. Furthermore, the percentages given in the figures concerning degree of difficulty are based on respondents who answered yes or no; those who did not expose themselves to the situation/circumstance (answering “Not applicable”) were excluded.

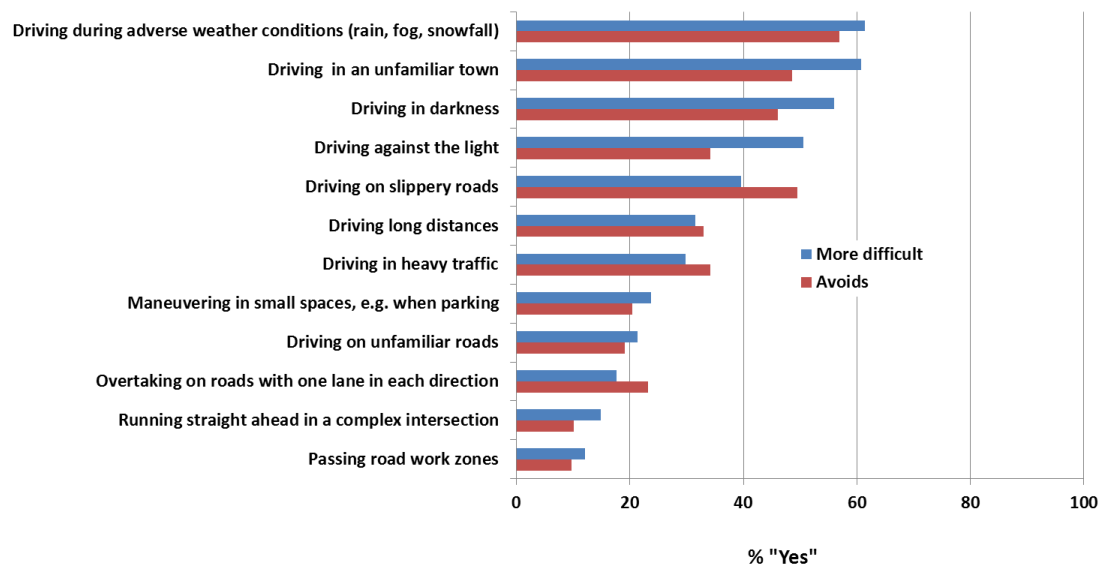


Figure 16 The extent to which situations and circumstances were perceived as more difficult as an older driver and which were avoided.

More than 60% were of the opinion that driving in bad weather or in an unfamiliar town was more difficult today compared to when they were aged 40. Usually the two bars in the figure are of equal length, i.e. the situation is avoided to a similar degree as perceived more difficult. Examples of large deviations from this pattern are driving into bright light (more often perceived difficult than it was avoided) and driving on slippery roads (more often avoided than perceived difficult). The only situation that explicitly related to intersections in Figure 16 was going straight ahead at a complex intersection. Situations not perceived as particularly difficult and seldom avoided are shown in Figure 17.

⁶ If acquiring a licence after his/her 40th birthday, the respondent was asked instead to compare with his/her age when gaining five years' driving experience.

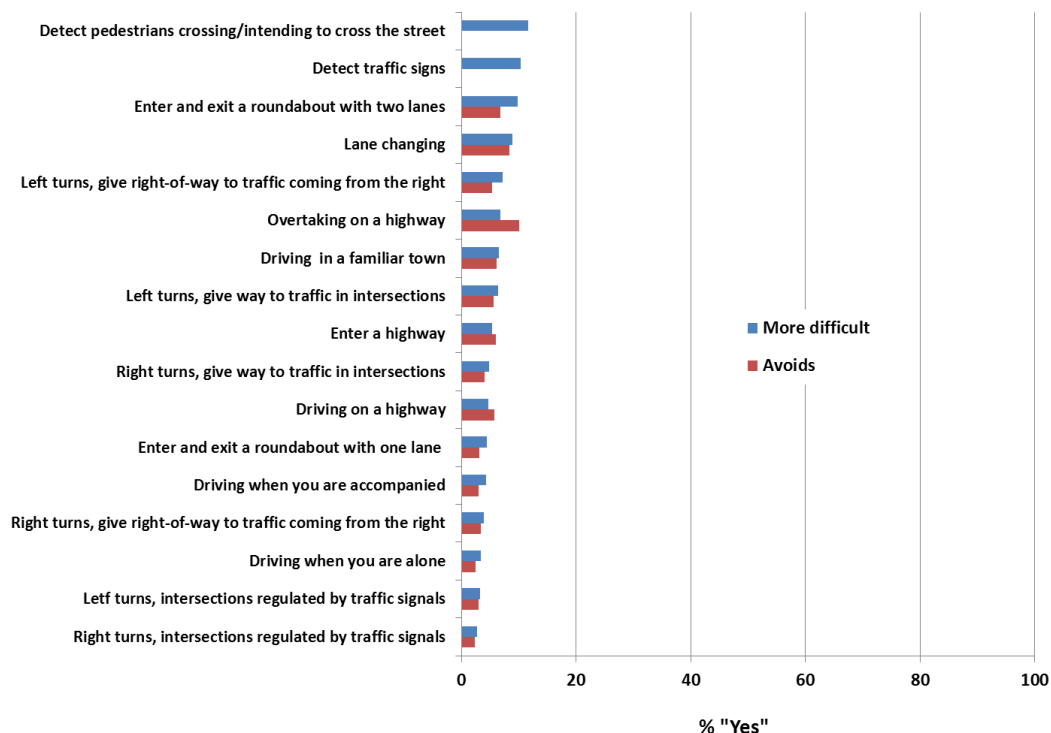


Figure 17 The extent to which situations and circumstances were perceived as more difficult as an older driver and which were avoided (continued).

It was not appropriate to ask whether the two situations at the top in Figure 17 were avoided or not. As can be seen, turning left at intersections with different types of regulation was regarded as a fairly uncomplicated manoeuvre. However, according to accident statistics, it is well known that older drivers are overrepresented in accidents that occur when left turns are being made at intersections.

Usually women found the situations as more difficult than men did compared with when they were in their 40s. Some main differences that are worth highlighting are *lane changing* (5.9% of the men found it more difficult, 13.6% of the women), *passing road work zones* (7.9%; 18.5%), *overtaking on roads with one lane in either direction* (10.8%; 27.1%), *manoeuvring in small spaces*, e.g. when parking (16.2%; 34.8%) and *driving on slippery roads* (22.8%; 62.8%).

For three further driving situations, the respondent was asked whether any changes had taken place since they were 40:

- Compared with when you were aged 40, does it happen less or more often than before that you automatically took the usual route when you wished to go elsewhere?*
- Compared with when you were aged 40, do you find it less or more difficult to react to a sudden hazard, such as a pedestrian or a vehicle detected at the last moment?*
- Compared with when you were aged 40, do you ever or very often today stop performing secondary tasks when in a complex traffic situation, e.g. talking to passengers in the car, when it is raining heavily or open the side window at a complicated intersection?*

Answers were to be provided on a 5-grade scale. Respondents who did not experience the situation could tick a box “Not appropriate” and are not included in the following figure.

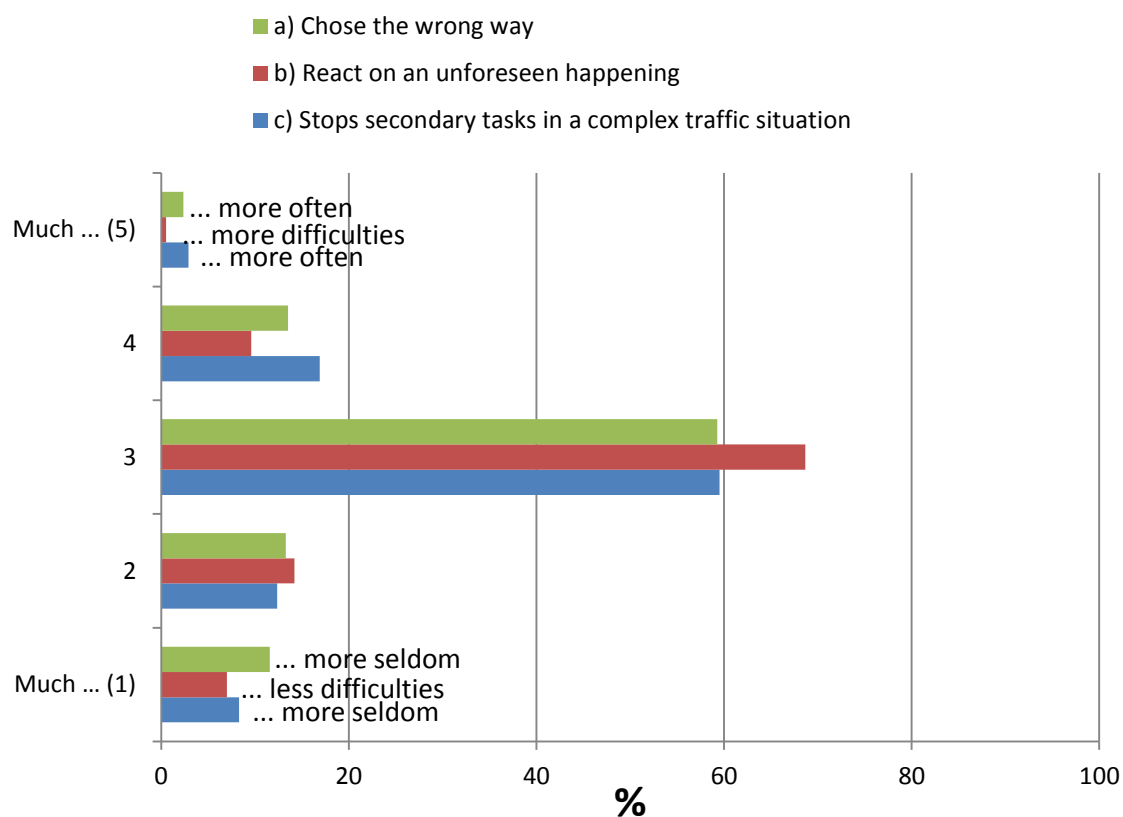


Figure 18 Possible changes of behaviour in three situations today compared with at age 40.

The trend was mildly positive; with a little less difficulty and less often the three situations were mastered/encountered today compared to at age 40 years. The average values are just below 3.0 (2.82, 2.82 and 2.94 for (a), (b) and (c), respectively).

Few (6.2%) had ever considered giving up driving. In order to understand the factors that can be relevant when deciding to stop driving, the situations and circumstances shown in Figure 16 and Figure 17 were analysed. Those who had considered stopping were more likely today to avoid a particular situation compared to those who had not considered giving up driving. This was evident for all 27 situations. For the 10 most avoided situations as reported by the group, whose future driving was indefinite, see Figure 19. All differences are statistically significant.

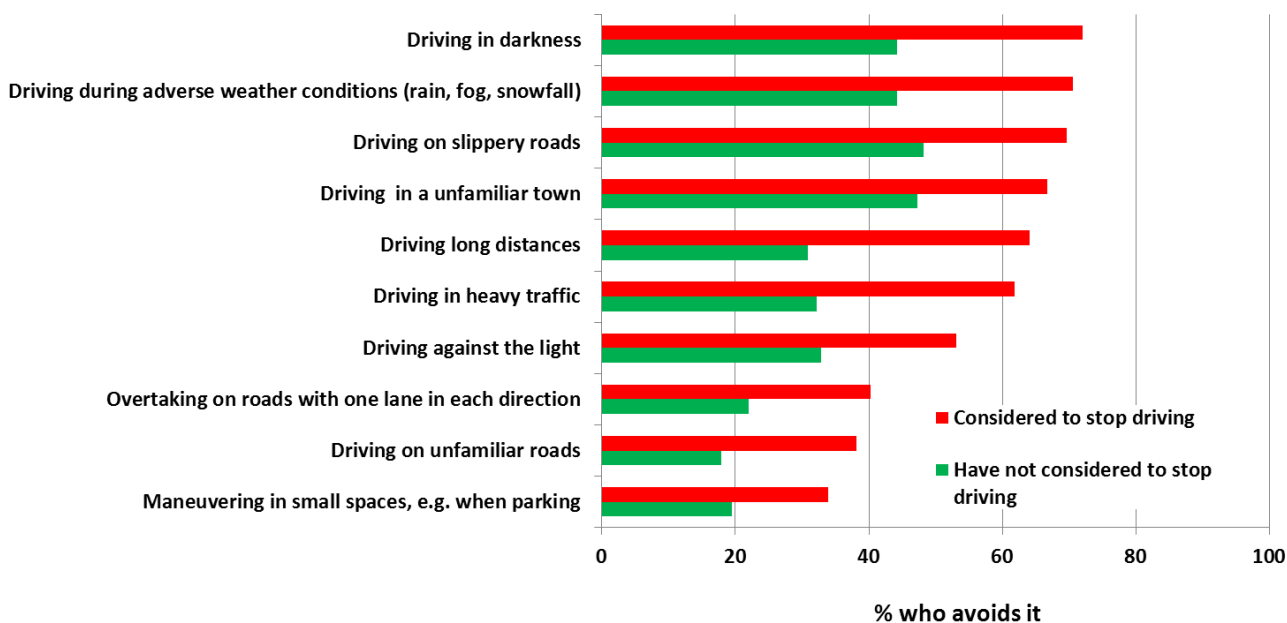


Figure 19 The extent to which situations and circumstances were avoided, by plans of continued driving.

The group thinking about not driving any longer to a larger extent was the ones who avoided situations, i.e. up to 72%. For the remaining situations where significant differences were found between the two groups, the result presented is sorted by largest differences (see Figure 20).

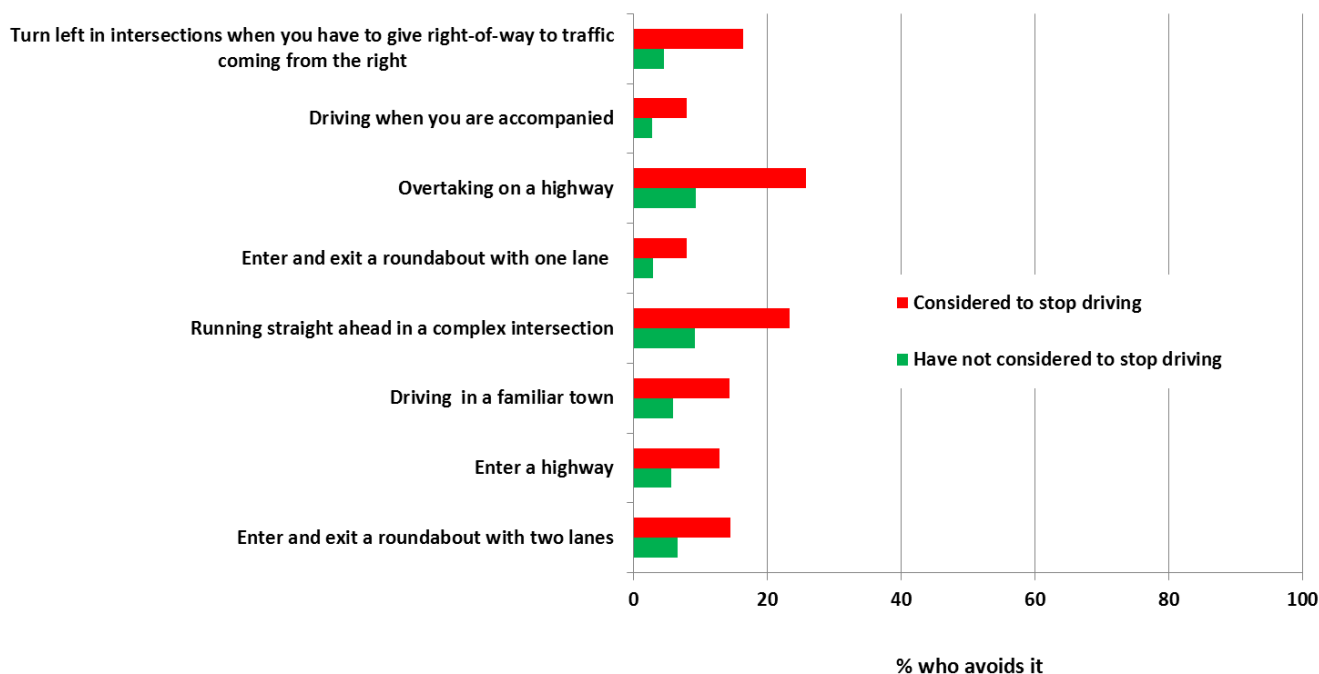


Figure 20 Largest differences between respondents who had considered giving up driving and those who did not in terms of percentage of avoiding certain situations.

The percentage of avoidance differs by a factor of 2 or above for all situations. Interestingly, a turn manoeuvre is at the top of Figure 20. Avoiding left turns at

intersections that are not regulated by signs or signals is reported about 3.5 times more often by drivers who had considered quitting driving compared to those who had not. Other big differences between the two groups can be found for driving with company, overtaking on highways and entering/exiting roundabouts with one lane (2.8–2.9 times more often avoided among those who had considered giving up driving).

There was no significant difference between women and men concerning the proportion thinking about stopping driving. However, the factors that may contribute to it were different between women and men (see Figure 21).

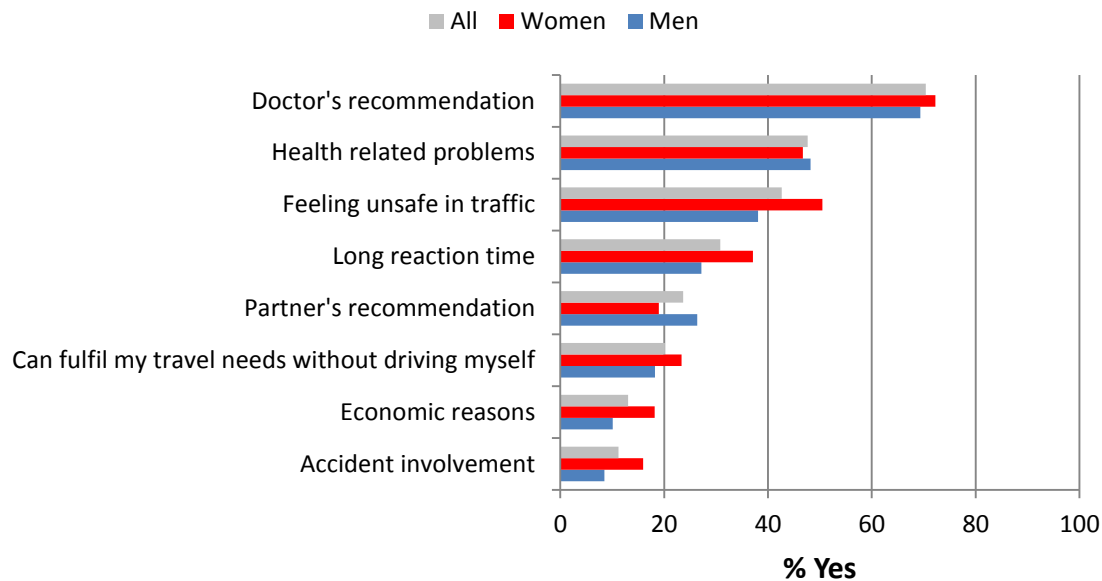


Figure 21 Factors that may lead to someone ceasing to drive. Percentage of men, women and all who ticked each factor.

According to the older female drivers, a feeling of insecurity in traffic led to more women than men stopping driving, and to: feeling that they could fulfil their travel needs in other ways, worrying about slow reaction times, having limited financial resources and being involved in an accident. Only one factor, partner's recommendation, was a significantly greater concern among men. Perhaps this reflects the fact that it is more common that men still have a partner who can advise them on driving issues. There were no significant gender differences for the two most chosen factors – namely doctor's recommendation and health problems.

The consequence of a life without car driving was captured in one question. Four specified consequences were listed in the questionnaire besides one open alternative. Only one was to be chosen. The result is presented in Table 9.

Table 9 Expected consequences of driving cessation.

Consequence	Men, %	Women, %	All, %
My life would be poorer	68.7	65.5	67.5
It would be a disaster	20.8	17.9	19.7
My life will not change	7.5	13.0	9.5
Other	2.7	3.4	3.0
It would feel like a relief	0.2	0.2	0.2
Total	100.0	100.0	100.0

A vast majority (87%) anticipated negative consequences in their lives when they ceased to drive. But close to one in ten respondents didn't foresee any changes taking place. Furthermore, three (equal to 0.2%) even expressed relief at not having to drive any more. A significant difference was found when comparing men and women – the largest for the third alternative in Table 9. Women (13%) more than men (8%) expected that ceasing to drive would not change their lives.

One question dealing with refresher courses for older drivers was too complicated, because about 2/3 of the respondents did not follow the instructions on how to answer it. However, of the 471 who correctly answered either Yes or No on the first question whether they had participated in such a course, 6% answered Yes. Of the 29 respondents, 27 answered the follow-up question about possible changes in driving as a consequence of participating in the course. Four answered that changes had been made. Issues mentioned were: more economic driving, better planning of travelling and skid driving. One bought a car with automatic transmission.

Of those who had not participated in a refresher course (442 or 94%), 377 answered the follow-up question about possible interest in such a course. Twenty per cent (77 individuals) were positive, every second negative and 30% had no opinion.

In an open-ended question, the respondent could describe which driving skills he/she would like to improve on (mentioned in the question were, for example, speed adaptation, driving at roundabouts, and use of technical support systems). Answers from 147 respondents have been analysed and are presented in Table 10.

Table 10 Topics respondents would like to improve/learn more about. Base: 147 respondents.

Item/Topic	No. of answers	%
Roundabout	44	23.2
Driver support systems (ADAS/IVIS)	41	21.6
Reversing (5 of which with trailer)	15	7.9
Parallel parking	14	7.4
Speed control	14	7.4
Road signs	10	5.3
General	10	5.3
Slippery driving conditions	10	5.3
Traffic rules	7	3.7
ECO driving	7	3.7
Overtaking	4	2.1
City driving	3	1.6
Review of own driving performance	2	1.1
Motorway driving	2	1.1
Driving in the dark	2	1.1
Driving alone (without co-driver)	1	0.5
Give way right	1	0.5
Engine function	1	0.5
Ramps (merging)	1	0.5
Assistive technology (hand control, swivel seat)	1	0.5
Total	190	100.0

As can be seen, the examples in the question were often mentioned by the respondents.

3.8 Accident involvement

Four of the respondents had been involved in an accident during the previous two-year period (2010-2012) with personal injuries as a consequence. The accidents occurred in June, August and September (2) and the respondent was the driver in three of the cases. Furthermore, one respondent answered that he/she did not know if he/she had been involved in an accident during this period.

Concerning less serious accidents with only property damage as a consequence, 47 individuals (equal to 3.5%) had experienced one accident and one respondent two accidents of this kind during the same period. For 45 of the accidents, information about accident month is known. Owing to the small number, any tendency over the year is uncertain; however, most of the accidents occurred in July (7) and one each in October and December. The respondent was the driver in 88% of the 42 cases where information about the driver was available in the questionnaire.

3.9 Attitudes and experiences associated with car driving

Previous research has shown that older drivers can feel nervous, worried or fearful when driving, and this was captured in one question (this has not been featured much before and therefore more research should be done to investigate thoroughly the situations and

conditions in which older drivers feel worried and fearful). In this study, however, few perceived driving a car as a frightening activity (see Figure 22).

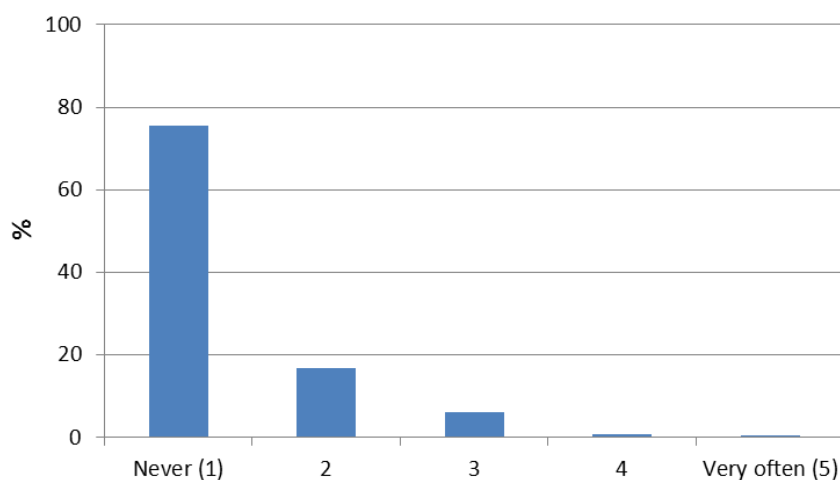


Figure 22 The extent to which the respondent feels frightened when driving a car.

Furthermore, 91% thought it was fun to drive. A majority (71%) felt that car driving was a necessity to achieve an independent life, but that it had a physical impact; 48% believed that it caused more tiredness today compared with when they were aged 40.

Less than 1% of the respondents reported that medicines had made them a poor car driver. Over 95% answered “No” while 4% did not know. Only respondents who stated in a previous question that they took medication were included in this analysis.

When asked to rate themselves as car drivers, a majority (close to 60%) described themselves as good drivers (see Figure 23).

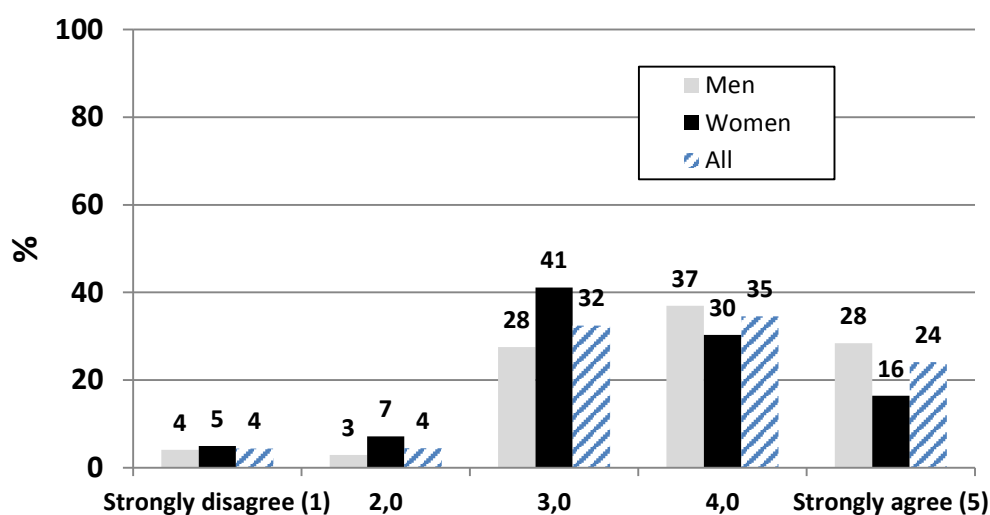


Figure 23 The extent to which the respondent disagreed/agreed with the statement “I am a good car driver”.

The gender difference is statistically significant. According to themselves, the older drivers in our study did not drive carelessly (see Figure 24).

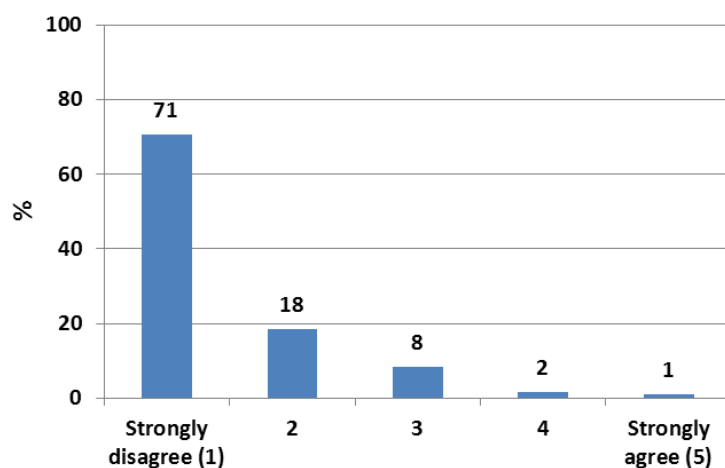


Figure 24 The extent to which the respondent disagreed/agreed with the statement “My manner of driving implies that I take risks in traffic”.

Nearly 90% disagreed and considered that their driving behaviour was not unsafe. Two out of three felt that their ability to drive had not changed since they were aged 40 (see Figure 25).

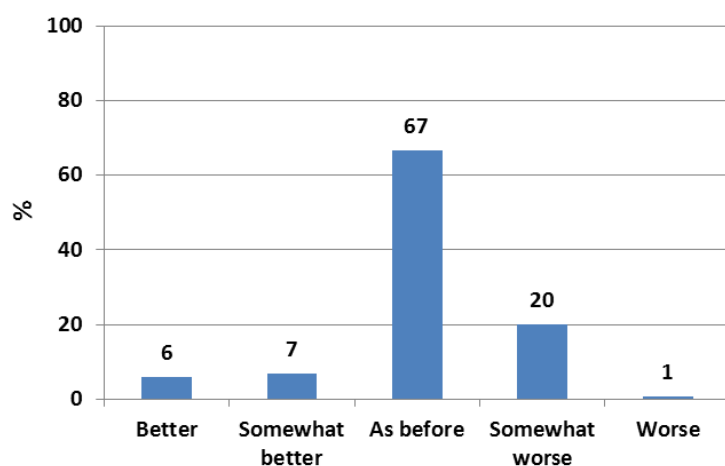


Figure 25 Change in driving compared to when the respondent was aged 40.

Thirteen per cent considered that they were better drivers today than when they were middle-aged. About every fifth respondent was of the opinion that the change was negative in this respect.

3.10 Further participation in the project

At the end of the questionnaire, those who would like to be contacted for further information and possibly participation in further testing, education/training and testing new driver support systems could provide their the name and address. Of the respondents, 177 were positive to further participation and provided their contact information; another three were positive but did not give their name and address.

Those who were willing to participate in further sub-projects differed in several respects from the not interested group, e.g. they were significantly younger, more often men, rated themselves as healthier and a better car driver, drove a car more often and longer distances.

How these 177 respondents tentatively grouped into confident drivers or less confident drivers (aimed at capturing drivers who were over or under confident) is described in the following section.

3.11 Variations in confidence in driving

Based on answers to 22 questions in the survey, an attempt was made to discriminate between those perceiving themselves as confident or less confident as car drivers among the 177 who were willing to participate in further project activities. An overall index was obtained indicating the higher positive value, the more confident the respondent was to drive and vice versa for a negative value.

This information was used to select subjects for further investigation (on-road assessment and cognitive testing). Questionnaire data, on-road assessment and cognitive testing are then be used to identify over and under estimators of own cognitive ability as car drivers as well as those who seem consistently to estimate their cognitive ability and driving performance.

To do this discrimination, these 22 questions that a priori were judged to best discriminate the drivers were selected (original questionnaire number is inserted):

Q15.	How do you consider your current health?
Q16.	Compared to people of your age, how do you consider your current health?
Q22.	Do you today need less or more time compared to when you were aged 40 years to do your daily activities as cooking or gardening?
Q23.	Compared to people of your age, do you need less or more time to do your daily activities?
Q24.	Do you today have less or more difficulties to concentrate compared to when you were aged 40 years?
Q26.	Do you today have less or more difficulties compared to when you were aged 40 years to plan or to organize your daily activities?
Q27.	Compared to people of your age, do you have less or more difficulties to plan or to organize your daily activities?
Q30.	Do you today have less or more difficulties compared to when you were aged 40 years to adapt yourself to unforeseen events, e.g. someone you know come to you unexpectedly?
Q31.	Compared to people of your age, do you think you have less or more difficulties to adapt yourself to unforeseen events?
Q62.	When driving, are there any of the following situations that you today find more difficult than you were 40 years old?
Q63.	When driving, compared to when you were 40 years old, do you avoid any of the

	following situations?
Q65.	Do you feel afraid when you are driving?
Q66.	Do you think it is funny to drive?
Q70.	I am a good driver?
Q71.	My driving style means that I take risks in traffic?
Q72.	Compared with when you were aged 40 years, how do you drive today?
Q74.	Have you changed your driving habits compared when you were aged 40 years?
Q75.	Have you changed your driving habits due to feelings of unsafeness or fear in traffic?
Q76.	Compared with you were aged 40 years, do you more seldom or more often today stop performing secondary tasks in a complex traffic situation, e.g. talking to passengers in the car when it rains heavily or open the side window in a complicated intersection?
Q77.	Compared with you were aged 40 years, do you find it less or more difficult to react on an unforeseen happening as a pedestrian or a vehicle detected at the last moment?
Q78.	Compared with you were aged 40 years, does it happen less or more often than before that you automatically chose the usual route when you wished to go elsewhere?
Q79.	Have you ever considered stopping driving?

First the answer alternatives were recoded into positive or negative values indicating the higher positive value, the more confident the respondent was to drive and vice versa for a negative value. Depending on the question structure, this code could range from -2 to +2 (5 grade scales) or -1 or 1 ("Yes" or "No" questions). When it comes to questions number 62 and 63, the recoded alternatives (-1 corresponded to "Yes"-answers, i.e. more difficult respectively more often avoided; 1 to "No"-answers) were summarised separately and an average value was obtained (based on how many of the alternatives each person responded to). The two averages (for Q62 and Q63) were then summarized.

An overall index was finally obtained by calculating an average for each respondent representing all the 22 selected questions.

The following table gives an overview of the 22 variables used to build the index besides some other interesting variables for five sub-groups. The three confident groups were created simply by dividing the "voluntary" group into three equal parts with the most confident in one group, the least confident in another, while the remaining formed the third group.

This first categorisation of the drivers has a tentative approach and will be the ground for further investigations in the next part of the project carried out at Mobilitetscenter in Gothenburg during the summer and autumn 2013.

Table 11 Comparison of the not interested and interested groups and three groups with different levels of confidence in driving.

Variable	Not interested (n=1185)	Interested (n=177)	p-value	Less confident (n=59)	Medium confident (n=59)	More confident (n=59)	p-value
% women	38.2	27.1	<0.01	37.3	25.4	18.6	n.s.
Average age	77.1	75.9	<0.01	76.1	76.4	75.2	n.s.
% married or living with a partner	72.8	81.4	<0.05	78.0	83.1	83.1	n.s.
			(χ^2 -test the whole question)				(χ^2 -test the whole question)w
% used car much in work	21.2	31.6	<0.01	23.7	30.5	40.7	n.s.
Self-estimated health (1=very bad; 5=very good)	4.06	4.23	<0.01	3.81	4.19	4.69	<0.01
Health compared with people of similar aged (1=much worse; 5=much better)	4.01	4.09	n.s.	3.66	4.10	4.52	<0.01
Less or more time to carry out daily activities (1=much less time; 5=much more time)	3.20	3.31	n.s.	3.75	3.36	2.81	<0.01
Compared to other; less or more time to carry out daily activities (1=much less time; 5=much more time)	2.77	2.73	n.s.	3.03	2.93	2.24	<0.01
Less or more difficulty concentrating (1=much less; 5=much more)	2.85	2.99	<0.05	3.36	3.14	2.49	<0.01
Less or more difficulty planning (1=much less; 5=much more)	2.72	2.81	n.s.	3.31	2.95	2.19	<0.01
Compared to other; less or more difficulty planning (1=much less; 5=much more)	2.50	2.50	n.s.	2.98	2.55	1.95	<0.01
Less or more difficulty adapting to unexpected events (1=much less; 5=much more)	2.63	2.74	n.s.	3.17	2.81	2.25	<0.01
Compared to other; less or more difficulty adapting to unexpected events (1=much less; 5=much more)	2.54	2.43	n.s.	2.81	2.60	1.88	<0.01
% who has made a longer driving stop	4.8	8.0	n.s.	13.8	6.8	3.4	n.s.

Variable	Not interested (n=1185)	Interested (n=177)	p-value	Less confident (n=59)	Medium confident (n=59)	More confident (n=59)	p-value
Years the present car has been driven, median	6	5		6	5	4	
Median distance driven/week, km	90	150		100	200	200	
% drive a car 6-7 times/week	31.6	45.9	<0.01	35.1	41.4	61.4	<0.05 (χ ² -test on three agg. alternatives and two original)
% sometimes drive longer distances (over 150 km incl. return journey)	42.9	63.7	<0.01	60.0	62.1	69.0	n.s. (χ ² -test the whole question)
% is always the driver	49.3	51.7	n.s.	45.6	55.9	53.4	n.s. (χ ² -test the whole question)
Average of proportion that finds 29 situations more difficult	30.7	17.9	<0.01	32.0	14.2	7.8	<0.01
Average of proportion that avoids 29 situations	21.5	13.5	<0.01	21.6	13.1	5.9	<0.01
Feel afraid when driving (1=never; 5=very often)	1.34	1.32	n.s.	1.64	1.21	1.12	<0.01
Fun to drive? % Yes	91.2	93.6	n.s.	84.2	98.3	98.2	<0.01
Driving is necessary to achieve independence? % Yes	71.3	72.7	n.s.	75.9	71.4	70.4	n.s.
Good driver? (1=strongly disagree; 5=strongly agree)	3.67	3.83	<0.05	3.36	4.00	4.12	<0.01
Risky driver? (1=strongly disagree; 5=strongly agree)	1.43	1.51	n.s.	1.60	1.40	1.53	n.s.
Driving today compared to at aged 40? (1=better; 5=worse)	3.03	3.02	n.s.	3.18	3.03	2.86	n.s.
Changed driving habits? % Yes	49.5	59.1	<0.05	82.8	55.9	39.0	<0.01
Changed driving habits due to feelings of unsafeness or freight?	6.9	6.3	n.s.	15.5	1.7	1.7	<0.01

Variable	Not interested (n=1185)	Interested (n=177)	p-value	Less confident (n=59)	Medium confident (n=59)	More confident (n=59)	p-value
% Yes							
Stops today performing dual task during difficult traffic situation (1=much more seldom; 5=much more often)	2.90	3.10	<0.05	3.35	3.11	2.80	<0.01
Difficulties today reacting on unforeseen event (1=much less; 5=much more)	2.80	2.94	<0.05	3.30	2.94	2.55	<0.01
Automatically choose the usual route when he/she wished to go elsewhere (1=much more seldom; 5=much more often)	2.81	2.87	n.s.	3.33	2.81	2.43	<0.01
Thought about driving cessation? % Yes	6.2	6.3	n.s.	12.1	3.4	3.4	n.s.
% who expects a poorer life when not driving any longer	67.2	69.5	n.s.	76.4	69.1	63.2	n.s.
			(x2-test the whole question)				(x2-test the whole question)

*Per person was first counted how many of the questions 62 respectively 63's alternative was ticked (see Appendix). Subsequently, the proportion of situations perceived as difficult respectively, avoided more often now, also per person were counted. Then the middle of these units was formed.

The significant differences seem to be quite reasonable; the interested group was younger, judged themselves as healthier, more frequently drivers, etc. than those who did not want to participate in further sub projects in the Safe Move project. A similar pattern appears for the three groups with different confidence in their driving performance.

This information was used to select subjects for further investigation (on-road assessment and cognitive testing). Questionnaire data, on-road assessment and cognitive testing will then be used to identify over, and under estimators of own cognitive ability as car drivers as well as those who seem to have a consistent estimation of their cognitive ability and driving performance.

4 Summarising discussion

The overall picture of an older driver emerging from this study is one who enjoys car driving, uses the car often and is not particularly occupied by thoughts about giving up driving. There is possibly a bias in this picture of the older driver which may be due to the fact that those who are the most interested in car driving were also those most interested in this study and thus answered the questionnaire.

There are several “truths” about older drivers reported in the literature that can be questioned in the light of the present study. Sometimes it is said that older people also drive old cars, a phenomenon that was not supported by our questionnaire data. According to the reported year models, older people in this study drive the same cars as old/young drivers generally do in Sweden. Also the respondents in this study project an image of a large majority of older drivers exuding confidence and expressing their feelings of independence in the situation of being a car driver. Only a few have hitherto (at the age of 70 or more) considered stopping driving.

Gender difference

The typical gender differences still exist, e.g. women stop driving at a lower age, drive less frequently than men, more often avoid driving in busy traffic, etc., and have a tendency to be more confident in using other modes of transport. Women from this cohort (70+) passed their driving licence later than men. A large gender difference was found in the questionnaire among the most frequent car drivers; over 40% of the men drove almost every day, and only 20% of the women. Also, how the driving was divided within households with a minimum of two people showed a large gender difference. About 50% of the men said they were always the driver and 43% usually the driver, while 20% of the women said they were always the driver and 23% usually the driver.

Confidence

The present study confirms that while health status is a reason for stopping driving, a person confident or less confident about driving may also cease to drive. However, the changes in driving behaviour that often are attributed to ageing drivers, e.g. driving slowly, less frequently and over shorter distances, are applicable in only a minority of the drivers in the present study.

Most of the respondents did not change their driving at all in respect of these three specified dimensions; some actually changed completely from what is usually reported in the literature. In this study, the majority of respondents agreed that being able to drive was necessary if they were to hold on to their independence, i.e. car driving gave them the opportunity to travel when and where they wanted to.

A high proportion of the respondents stated that they had fewer difficulties completing daily activities compared to other people of the same age. A similar picture can be seen when it comes to unforeseen hazards and loud noise. A few had more difficulties than before adapting to unforeseen incidents, which could indicate high self-confidence and perception of their ability to manage upcoming situations. In general, the respondents considered themselves “better” than others when they compared the retrospective perspectives of themselves.

According to previous research, confidence or lack of it can be seen in terms of the avoidance of certain situations and conditions, for example driving on unfamiliar roads

or in the dark, in rain, in snow, parking in tight spaces (Molnar & Eby, 2008; Parker et al., 2001; Ragland et al., 2004). These situations are also present in our study.

Challenging situations

In the present study of drivers over 70 years of age we found the following situations and circumstances perceived as more difficult and avoided by the respondents (listed with situations and circumstances perceived as difficult by 60% at the top and by 10-20% at the bottom) (see also Figure 16):

1. Driving during adverse weather conditions (rain, fog, snowfall)
2. Driving in an unfamiliar town
3. Driving in darkness
4. Driving against the light
5. Driving on slippery roads
6. Driving long distances
7. Driving in heavy traffic
8. Manoeuvring in small spaces, e.g. when parking
9. Driving on unfamiliar roads
10. Overtaking on roads with one lane in each direction
11. Driving straight ahead in a complex intersection
12. Passing road work zones

Also, but not equal (by 10% or less), the following situations and circumstances were found difficult and sometimes avoided (see also Figure 17):

- Detect pedestrians crossing/intending to cross the street
- Detect traffic signs
- Enter and exit a roundabout with two lanes
- Lane changing
- Left turns, give right-of-way to traffic coming from the right
- Overtaking on a highway
- Driving in a familiar town
- Left turns, give way to traffic in intersections
- Enter a highway
- Right turns, give way to traffic in intersections
- Driving on a highway
- Enter and exit a roundabout with one lane
- Driving when you are accompanied
- Right turns, give right-of-way to traffic coming from the right
- Driving when you are alone
- Left turns, intersections regulated by traffic signals
- Right turns, intersections regulated by traffic signals

These reported difficulties can indicate that drivers feel less confident when confronted by them and take avoidance measures in regulating their driving and thus become more confident drivers again. This procedure is also an indication of awareness, i.e. those who have identified their own experiences of difficult situations and conditions and then avoid them have reached a certain level of awareness about their own ability to drive.

However, many also answered that they had not changed their driving style very much during the previous 40 years. This is also interesting in connection with other studies, for example that of Parker et al. (2001), who noted that confidence level is unrelated to chronological age, suggesting that older drivers' judgements come from actual performance on the road rather than their age. Siren and Rishøj Kjær (2011) found that older drivers might self-regulate their driving, not as a result of recognizing their own limitations but by perceiving other road users behaving dangerously.

These self-reported accounts of driving trajectories may be interpreted with both a cognitive and social interaction perspective. They may reflect awareness of (limited) cognitive ability and they may reflect experiences and awareness of the social environment out on the roads, i.e. the behaviour of other road users and how they interact with each other, which is especially important in complex situations. The number of cars has increased in recent decades with more complex traffic situations being created. Future research needs to further investigate both the cognitive and the social impacts of older people's driving limitations.

Half of the respondents took between one and three prescribed medications, and 10% six or more. This needs further investigation, since it is well known that older people can have multiple medical recommendations from physicians but it is not always absolutely clear how these interact and affect alertness and car driving. However, this is not within the aim of the present study.

Further analysis

Safe mobility will be addressed in our continuing work with the French research team to identify determinants for driving regulation, i.e. factors leading to underestimation, consistent estimation or overestimation of cognitive performance and driving ability, and which may have effects on how safe older drivers are as road users. For drivers who are over or underestimating their driving capacities, possibilities to attend a driving simulator based training and learning management system will be developed. Assistance systems in the car itself will be developed taking account of the specific needs of older drivers, and online and offline adaptation will be created to support older drivers in previously identified critical traffic scenarios.

Knowledge of the challenging situations and conditions that older drivers come up against is a basis for further research and efforts aimed at maintaining the safe mobility of older adults. Findings about those who seem confident when driving and can analyse their ability and restrict their driving accordingly are also interesting to proceed with in further analysis of the questionnaire. What factors do characterise older drivers' feelings of independence and confidence in car driving? What solutions can contribute to their continuing feelings of independence and confidence when car driving is no longer the most obvious choice of transport mode?

Following statements from previous research (e.g. Sullivan et al., 2011), it may be misguided to focus solely on older drivers' voluntary decisions about giving up driving. We need a multiple methods design if we are to understand the complexity. More research has to be done to better understand factors determining awareness of difficulties as well as willingness to change and to analyse which subgroups are at risk of poor assessment of their driving skills. Apart from gender, which is a well-known determinant of driving cessation, willingness to change, as well as accident risk, certain other variables or driver characteristics can influence the regulation of driving activity related to cognitive performance.

The older population is heterogeneous in relation to health, cognitive state and experience. If we are to identify potential new subgroups with regard to self-estimations of cognitive ability, driving abilities and driving habits, it is crucial to study how various factors in real life influence the way older drivers regulate their driving habits. This survey was the first step in trying to understand complexity of regulation among older drivers.

Our next steps in the present research project contain analysis of an on-road driving test with 40 older drivers from the same cohort (70+) combined with cognitive tests, interviews and focus group discussion.

Findings from this survey study in combination with the driving tests and further investigations of the cohort may indicate situations and conditions to be taken into account in taking preventive action – such as retraining sessions or developing driver assistance systems – to reduce the risk associated with certain situations.

New technological driving aids have the potential to accommodate certain age-related functional changes, but they could be beyond the capacity of some older drivers and thus increase their distraction level. The challenge in SAFE MOVE is to design Driver Monitoring Functions to support future “adaptive” technologies specifically adapted to older drivers being able to adjust their assistance to the current driving context and to the specific driver characteristics, status, difficulties and help at this particular time. The SAFE MOVE approach will explore how specific driving assistance systems for different subgroups of older drivers can be designed and/or adapted – from under-confident to over-confident – according to respective needs in perception, situation awareness, decision-making and action planning.

References

- Anstey, K. J., Wood, J., Lord, S., & Walker, J. G. (2005). Cognitive, sensory and physical factors enabling driving safety in older adults. *Clin Psychol Rev*, 25(1), 45-65.
- Bauer, M. J., Adler, G., Kuskowski, M. A., & Rottunda, S. (2003). The influence of age and gender on the driving patterns of older adults. *Journal of Women & Aging*, 15(3), 3-16.
- Brouwer, W. H., & Ponds, R. W. (1994). Driving competence in older persons. *Disability and Rehabilitation*, 16(3), 149-161.
- Charlton, J. L., Oxley, J. A., Fildes, B., Oxley, P., Newstead, S., Koppel, S., & O'Hare, M. (2006). Characteristics of older drivers who adopt self-regulatory driving behaviours. *Transportation Research Part F: Traffic Psychology and Behaviour*, 9(5), 363-373.
- Choi, M., Adams, K. B., & Kahana, E. (2013). Self-Regulatory Driving Behaviours: Gender and Transport Support Effects. *Journal of Women & Aging*, 25, 104-118.
- Findahl, O. (2012). Svenskarna och Internet, 2012.
- Gamache, P.-L., Hudon, C., Teasdale, N., & Simoneau, M. (2010). Alternative Avenues in the Assessment of Driving Capacities in Older Drivers and Implications for Training. *Current Directions in Psychological Science*, 19(6), 370-374.
- Hakamies-Blomqvist, L. (2006). Are there safe and unsafe drivers? *Transportation Research Part F: Traffic Psychology and Behaviour*, 9, 349-352.
- Hakamies-Blomqvist, L., Sirén, A., & Davidse, R. (2003). Older drivers – a review. Linköping: Väg och transportforskningsinstitutet, VTI.
- Hjorthol, R., Levin, L., & Sirén, A. (2010). Mobility in different generations of older persons: The development of daily travel in different cohorts in Denmark, Norway and Sweden. *Journal of Transport Geography*, 18(5), 624-633.
- Kostyniuk, L. P., & Molnar, L. J. (2008). Self-regulatory driving practices among older adults: Health, age and sex differences. *Accident Analysis & Prevention*, 40, 1576-1580.
- Lafont, S., Amoros, E., Gadegbeku, B., Chiron, M., & Laumon, B. (2008). The impact of driver age on lost life years for other road users in France: A population based study of crash involved road users. *Accident Analysis & Prevention*, 40(1), 289-294.
- Lafont, S., & Laumon, B. (2003). Vieillesse et gravité des atteintes lésionnelles des victimes d'accident de la circulation routière: Ageing and injury severity among road traffic accident victims. *Recherche - Transports - Sécurité*, 79-80, 121-133.
- Lallemand, S., Paire-Ficout, L., Chavoix, C., Lafont, S., Levin, L., & Fabrigoule, C. (2013). Identification of the potential discrepancies of challenging situations/scenarios according to crash studies and drivers themselves. Literature review. Deliverable D1.1. Safe Move for older drivers.
- Lambert, A., Seegmiller, J., Stefanucci, J., & Watson, J. (2013). On Working Memory Capacity and Implicit Associations between Advanced Age and Dangerous Driving Stereotypes. *Applied Cognitive Psychology*, 27(3), 306-313.
- Langford, J., & Koppel, S. (2006). The case for and against mandatory age-based assessment of older drivers. *Transportation Research Part F: Traffic Psychology and Behaviour*, 9(5), 353-362.

- Levin, L., Dukic, T., Peters, B., Henriksson, P., Mårdh, S., Nygårdhs, S., . . . Heikkinen, S. (2007). Äldre i transportsystemet: Mobilitet, design och träningsproblematik. Linköping: Väg- och transportforskningsinstitutet.
- Levin, L., Ulleberg, P., Siren, A., & Hjorthol, R. (2012). Mobility for older people in Scandinavia. A literature review of best practice. Linköping and Oslo: VTI and TØI.
- Li, G., Braver, E., & Chen, L. (2003). Fragility versus excessive crash involvement as determinants of high death rates per vehicle/mile of travel among older drivers. *Accident Analysis and Prevention*, 35(227-235).
- Marottoli, R., Mendes de Leon, C., Glass, T., Williams, C., Cooney, L., & Berkman, L. (2000). Consequences of driving cessation: Decreased out-of-home activity levels. *Journal of Gerontology: Social Science*(55B), 334-340.
- Molnar, L. J., & Eby, D. W. (2008). The relationship between self-regulation and driving related abilities in older drivers: an exploratory study. *Traffic injury prevention*, 9(4), 314-319.
- Nelson, A. C. (2010). Catching the next wave: Older adults and the 'NewUrbanism'. *Generations*, 33(4), 37-42.
- OECD. (2001). Aging and Transport. Mobility Needs and Safety Issues. Paris: OECD Organisation for Economic Co-operation and Development.
- Parker, D., MacDonald, L., Sutcliffe, P., & Rabbitt, P. (2001). Confidence and the older driver. *Ageing and Society*, 21(2), 169-182.
- Peters, B. (2001). A framework for evaluating adapted passenger cars for drivers with physical disabilities (Doctoral thesis). Linköping: Linköpings Universitet.
- Ragland, D., Satariano, W. A., & MacLeod, K. E. (2004). Reasons given by older people for limitation or avoidance of driving. *The Gerontologist*, 44, 237-244.
- Ragland, D., W, S., & MacLeod, K. (2005). Driving cessation and increased depressive symptoms. *The journals of gerontology. Series A, Biological sciences and medical sciences*, 60(3), 399-403.
- Rosenbloom, S. (2001). Sustainability and automobility among the elderly: An international assessment. *Transportation*, 28(4), 375-408.
- Rosenbloom, S. (2006). Is the Driving Experience of Older Women Changing? Safety and Mobility Consequences over Time. *Transportation Research Record*, 1956(1), 127 - 132.
- Rosenbloom, S. (2009). Meeting transportation needs in an aging-friendly community. *Generations*, 33(2), 33-43.
- Ryan, G. A., Legge, M., & Rosman, D. (1998). Age related changes in drivers crash risk and crash type. *Accident Analysis and Prevention*, 30(3), 379-387.
- SCB. (2013a). Privatpersoners användning av datorer och internet 2012.
- SCB. (2013b). Statistikdatabasen. *Utbildning och forskning; Befolkningens utbildning*. Retrieved 2013-04-12
- Siren, A., & Meng, A. (2010). Helredsmässig control ved ældre bilisters kørekortfornyelse – Evaluering af de sikkerhedsmæssige effekter af demenstesten. Kgs. Lyngby: DTU Transport.

- Siren, A., & Meng, A. (2012). Cognitive screening of older drivers does not produce safety benefits. *Accident Analysis & Prevention*, 45, 634-638.
- Siren, A., & Rishøj Kjær, M. (2011). How is the older road users' perception of risk constructed? *Transportation Research Part F: Traffic Psychology and Behaviour*, 14, 222-228.
- Sullivan, K., Smith, S., Lurie-Beck, J. K., & Horswill, M. (2011). Are older drivers' perceptions of their driving ability accurately reflected in performance on a driving simulation task? Final Report. Queensland: Queensland University of Technology.
- Trafikanalys. (2013). Statistik, Fordon 2012. Retrieved 2013-04-17, from <http://www.trafa.se/sv/Statistik/Vagtrafik/Fordon/>
- Transportstyrelsen. (2013). Trafikmedicin [Traffic Medicine]. Retrieved 8 May, 2013, from <http://www.transportstyrelsen.se/sv/Vag/Trafikmedicin/>
- Whelan, M., Langford, J., Oxley, J., Koppel, S., & Charlton, J. (2006). The elderly and mobility: A review of the literature (pp. 118). Clayton, Australia: Monash University Accident Research Centre.
- Vägverket. (2007). Bilar för äldre. Borlänge: Vägverket.
- Vägverket. (2008). Modellen för dig. En hjälp för funktionshindrade att välja bil och anpassning. Borlänge: Vägverket och VTI.

Appendix. The Swedish questionnaire translated into English

Part A. Background questions

1.	Are you a man or woman? <input type="checkbox"/> Man <input type="checkbox"/> Woman				
2.	Which year were you born? Year: <table border="1"><tr><td>1</td><td>9</td><td></td><td></td></tr></table>	1	9		
1	9				
3.	Do you drive a car? <input type="checkbox"/> Yes —————→ <i>Continue with Q4.</i> <input type="checkbox"/> No When did you stop to drive a car? Year: <table border="1"><tr><td></td><td></td><td></td><td></td></tr></table> <i>If you never had driven a car or stopped to drive, you don't need to answer any more questions.</i> <i>Please return the questionnaire in the replay envelope. Thanks for your cooperation!</i>				
4.	How does your household look like? <input type="checkbox"/> I live alone in the household <input type="checkbox"/> I live together with my partner (two persons in the household) <input type="checkbox"/> I live together with my partner and/or other members of the family. <i>Describe the household members:</i> <table border="1"><tr><td></td></tr></table> <input type="checkbox"/> I live together with persons that not belong to the family (e.g. friends) <input type="checkbox"/> I live in a nursing home (e.g. old people's home, group living scheme or dementia dwelling)				
5.	Did you move after the retirement? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> I am not retired If yes, describe the main reason: <table border="1"><tr><td></td></tr></table>				

6. Did you move during the last five years?

- ☐ Yes
☐ No

If yes, describe the main reason:

7. Which is your highest completed level of education?

- ☐ Elementary school/nine-year compulsory school
☐ Upper secondary school (2 or 3 years)
☐ University/college, less than 3 years
☐ University/college, 3 years or more
☐ Postgraduate studies

☐ Other, describe:

8. During my working life, I have mainly:
(chose only one alternative)

- ☐ Been employed
☐ Been self-employed
☐ Worked in the own household

☐ Had other occupation, describe:

9. Tick the alternative/alternatives that describe/s which role car driving had in your working life:

- ☐ I have been a professional driver (lorry, cab or bus)
☐ I have used the car often in my work (e.g. craftsmen, messenger's car, police on patrol duty)
☐ I have regularly commuted with car to my work
☐ The car has not been a necessity to do my work or to get to/from the work

10. a) Are you retired?

- ☐ Yes, partly
☐ Yes, fully
☐ No → Continue with Q11.

b) If yes, at which age did you retire, fully or partly? Age:

c) If you are fully retired, have you since the retirement done any work you got paid for?
(do not consider voluntary work, etc.)

- ☐ Yes
☐ No

11. How big is the household's total monthly income after taxes?

Income includes wages, unemployment compensation, compensation from the Social Insurance Agency, business incomes, pensions, etc., as well as children, study and child subsidies.

- ☐ Less than 8 000 SEK
☐ 8 000 – 16 000 SEK
☐ 16 001 – 25 000 SEK
☐ 25 001 – 35 000 SEK
☐ 35 001 – 50 000 SEK
☐ Over 50 000 SEK
☐ Wishes not to answer
☐ Do not know

12. Do you use computers?

- ☐ Yes, sometimes
☐ Yes, very often
☐ No

13. Do you use a mobile phone?

- ☐ Yes, sometimes
☐ Yes, very often
☐ No

14. Do you use Internet?

- ☐ Yes, sometimes
☐ Yes, very often
☐ No

Part B. Your health

15. How do you consider your current health?

- | | | | | | | |
|-----------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-----------|
| | 1 | 2 | 3 | 4 | 5 | |
| Very poor | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Very good |

16. Compared to people of your age, how do you consider your current health?

- | | | | | | | |
|------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------|
| | 1 | 2 | 3 | 4 | 5 | |
| Much worse | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Much better |

17. How do you consider your vision?

Corrected with glasses or contact lenses if needed

- | | | | | | | |
|-----------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-----------|
| | 1 | 2 | 3 | 4 | 5 | |
| Very poor | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Very good |

18.	Can you recognize a familiar face at 4 meters (with glasses or lenses if necessary)? <input type="checkbox"/> Yes, without difficulties <input type="checkbox"/> Yes, with difficulties <input type="checkbox"/> No	
19.	Do you use glasses or lenses when driving? <input type="checkbox"/> Yes <input type="checkbox"/> No	
20.	How do you consider your hearing? <i>Corrected with hearing aids if needed</i>	
	<div style="display: flex; justify-content: space-around; font-weight: bold;"> 12345 </div> <div style="display: flex; justify-content: space-between; align-items: flex-end; padding: 5px 0;"> <div style="width: 30%;"> Very poor (I am not able to hear screams) </div> <div style="width: 40%; text-align: center;"> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> </div> <div style="width: 30%; text-align: right;"> Very good (No or very mild problems) </div> </div>	
21.	Do you use a hearing aid when driving? <input type="checkbox"/> Yes <input type="checkbox"/> No	
22.	Do you today need less or more time compared to when you were aged 40 years to do your daily activities as cooking or gardening?	
	<div style="display: flex; justify-content: space-around; font-weight: bold;"> 12345 </div> <div style="display: flex; justify-content: space-between; align-items: flex-end; padding: 5px 0;"> <div style="width: 30%;"> Much less time than before </div> <div style="width: 40%; text-align: center;"> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> </div> <div style="width: 30%; text-align: right;"> Much more time than before </div> </div>	
23.	Compared to people of your age, do you need less or more time to do your daily activities?	
	<div style="display: flex; justify-content: space-around; font-weight: bold;"> 12345 </div> <div style="display: flex; justify-content: space-between; align-items: flex-end; padding: 5px 0;"> <div style="width: 30%;"> Much less time than others </div> <div style="width: 40%; text-align: center;"> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> </div> <div style="width: 30%; text-align: right;"> Much more time than others </div> </div>	
24.	Do you today have less or more difficulties to concentrate compared to when you were aged 40 years?	
	<div style="display: flex; justify-content: space-around; font-weight: bold;"> 12345 </div> <div style="display: flex; justify-content: space-between; align-items: flex-end; padding: 5px 0;"> <div style="width: 30%;"> Much less difficulties than before </div> <div style="width: 40%; text-align: center;"> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> </div> <div style="width: 30%; text-align: right;"> Much more difficulties than before </div> </div>	
25.	Compared to people of your age, do you have less or more difficulties to concentrate?	
	<div style="display: flex; justify-content: space-around; font-weight: bold;"> 12345 </div> <div style="display: flex; justify-content: space-between; align-items: flex-end; padding: 5px 0;"> <div style="width: 30%;"> Much less difficulties than before </div> <div style="width: 40%; text-align: center;"> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> </div> <div style="width: 30%; text-align: right;"> Much more difficulties than before </div> </div>	
26.	Do you today have less or more difficulties compared to when you were aged 40 years to plan or to organize your daily activities?	
	<div style="display: flex; justify-content: space-around; font-weight: bold;"> 12345 </div> <div style="display: flex; justify-content: space-between; align-items: flex-end; padding: 5px 0;"> <div style="width: 30%;"> Much less difficulties than before </div> <div style="width: 40%; text-align: center;"> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> </div> <div style="width: 30%; text-align: right;"> Much more difficulties than before </div> </div>	

27.	Compared to people of your age, do you have less or more difficulties to plan or to organize your daily activities?																								
	<div style="display: flex; justify-content: space-around; margin-bottom: 5px;"> 12345 </div> <div style="display: flex; justify-content: space-between;"> Much less difficulties than others <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Much more difficulties than others </div>																								
28.	Are you today less or more distracted by noises or activities around you compared to when you were aged 40 years?																								
	<div style="display: flex; justify-content: space-around; margin-bottom: 5px;"> 12345 </div> <div style="display: flex; justify-content: space-between;"> Much less distracted than before <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Much more distracted than before </div>																								
29.	Compared to people of your age, are you less or more distracted by noises or activities around you?																								
	<div style="display: flex; justify-content: space-around; margin-bottom: 5px;"> 12345 </div> <div style="display: flex; justify-content: space-between;"> Much less distracted than others <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Much more distracted than others </div>																								
30.	Do you today have less or more difficulties compared to when you were aged 40 years to adapt yourself to unforeseen events, e.g. someone you know come to you unexpectedly?																								
	<div style="display: flex; justify-content: space-around; margin-bottom: 5px;"> 12345 </div> <div style="display: flex; justify-content: space-between;"> Much less difficulties than before <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Much more difficulties than before </div>																								
31.	Compared to people of your age, do you think you have less or more difficulties to adapt yourself to unforeseen events?																								
	<div style="display: flex; justify-content: space-around; margin-bottom: 5px;"> 12345 </div> <div style="display: flex; justify-content: space-between;"> Much less difficulties than others <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Much more difficulties than others </div>																								
32.	Do you suffer from any of the following health problems, and, if yes, do they affect your car driving?																								
	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 55%;"></th> <th style="width: 20%; text-align: center;">No</th> <th style="width: 20%; text-align: center;">Yes, but it does not affect my car driving</th> <th style="width: 25%; text-align: center;">Yes, and it makes my car driving more difficult</th> </tr> </thead> <tbody> <tr> <td>Impaired vision</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr style="background-color: #f9f9f9;"> <td>Impaired hearing</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td>Reduced ability to move around</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr style="background-color: #f9f9f9;"> <td>Sleep disorders</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td>Deceases affecting the thinking ability (e.g. dementia, injury as a consequence of a stroke or Parkinson's disease)</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> </tbody> </table>		No	Yes, but it does not affect my car driving	Yes, and it makes my car driving more difficult	Impaired vision	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Impaired hearing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Reduced ability to move around	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sleep disorders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Deceases affecting the thinking ability (e.g. dementia, injury as a consequence of a stroke or Parkinson's disease)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	No	Yes, but it does not affect my car driving	Yes, and it makes my car driving more difficult																						
Impaired vision	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																						
Impaired hearing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																						
Reduced ability to move around	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																						
Sleep disorders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																						
Deceases affecting the thinking ability (e.g. dementia, injury as a consequence of a stroke or Parkinson's disease)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																						
33.	How many prescribed medicines do you take per day?																								
	No: <div style="border: 1px solid black; width: 40px; height: 20px; display: flex; align-items: center; justify-content: center;"> <div style="border-right: 1px solid black; width: 15px; height: 100%;"></div> <div style="width: 10px; height: 100%;"></div> </div>																								

34. Do you have any disease which implies that you need to take medicines to drive a car?

- ☐ Yes
☐ No
☐ Don't know

35. In your opinion, are there any abilities that decline with age?

- ☐ Yes
☐ No

If yes, describe which abilities:

<hr/> <hr/> <hr/> <hr/> <hr/>

Part C. Mobility and driving

36. At what age did you acquire your driving license for passenger cars (category B)?

Aged

--	--

 years

37. Do you have a driving licence with conditions?

- ☐ Yes
☐ No

If yes, please write the figure code/codes that are printed on the reverse side of the licence:

--

38. a) Have you ever, as a driving licence holder, stopped driving during a longer period?

☐ Yes

☐ No → Continue with Q39.

If yes, for how many years?

--	--

b) What was the main reason to stop driving?

<hr/> <hr/> <hr/>

c) What was the main reason to start driving again?

<hr/> <hr/> <hr/>

d) When you resumed driving, did you turn to a driving school in order to take driving lessons?

☐ Yes

☐ No

39. What car do you drive most often (mark, model and model year)?
(e.g. Volvo 850 1995)

[illegible][illegible]

--	--	--	--

40. Which kind of gearbox is the car you most often drive equipped with?

- ☐ Automatic gearbox
- ☐ Manual gearbox

41. For how many years have you driven the car you most often use?

 years

42. a) Is the car you most often use equipped with a parking aid system?
(the system informs about the presence of an obstacle and the distance between the vehicle and the obstacle)

- ☐ Yes
- ☐ No —————→ *Continue with Q43a*
- ☐ Don't know

b) If yes,

- ☐ I always use it
- ☐ I use it sometimes
- ☐ I never use it

43. a) Is the car you most often use equipped with cruise control?
(the driver sets the vehicle speed and it keeps it until the driver disconnects the system or breaks)

- ☐ Yes
- ☐ No —————→ *Continue with Q44a*
- ☐ Don't know

b) If yes,

- ☐ I always use it
- ☐ I use it sometimes
- ☐ I never use it

44. a) Is the car you most often use equipped with a warning system for vehicles in the blind spot?
(can be called BLIS, BSA, Side Assist etc.)

☐ Yes

☐ No → Continue with Q45a

☐ Don't know

b) If yes,

☐ I always use it

☐ I use it sometimes

☐ I never use it

45. a) Is the car you most often use equipped with a lane departure warning system?
(LDW; warns the driver when he/she unintentionally leaves the driving lane (without activating his turn signal), by a beep or a vibration in the steering wheel or seat)

☐ Yes

☐ No → Continue with Q46a

☐ Don't know

b) If yes,

☐ I always use it

☐ I use it sometimes

☐ I never use it

46. a) Is the car you most often use equipped with a navigation system?
(GPS etc.)

☐ Yes

☐ No → Continue with Q47a

☐ Don't know

b) If yes,

☐ I always use it

☐ I use it sometimes

☐ I never use it

47. a) Is the car you most often use equipped with any other system that you use?

- ☐ Yes
☐ No —————> *Continue with Q48*
☐ Don't know

b) If yes,

- ☐ I always use it
☐ I use it sometimes
☐ I never use it

c) If yes, please describe it:

<hr/> <hr/>

48. Do you occasionally drive another vehicle than the one you have described above?

- ☐ No —————> *Continue with Q49*
☐ Yes, describe which type/types:
☐ Another passenger car
☐ 3- or 4-wheeler with no demand for licence B (e.g. micro cars)
☐ Moped or motorcycle (two-wheelers)
☐ Bicycle
☐ Other, describe:

--

49. How many kilometers, on average, do you drive a passenger car per week?

<table border="1"><tr><td></td><td></td><td></td><td></td></tr></table>					km

50. How often do you drive a passenger car?

- ☐ Maximum 1 time/month
☐ 2-3 times/month
☐ 1 time/week
☐ 2-5 times/week
☐ 6-7 times/week (i.e. every or almost every day)

51. Do you sometimes drive longer distances with passenger car?

- ☐ Yes, the distances can be between 50 km and 150 km (return journey included)
☐ Yes, the distances can be over 150 km (return journey included)
☐ No, the distances are 50 km as longest (return journey included)

52. When you go by car, who is usually the driver?

- ☐ I am always the driver
☐ I am most often the driver
☐ I am sometimes the driver

53. How often do you drive to ...

Tick the alternative which best corresponds to how often you drive in these situations.

	At least 1-2 times/week	Sometimes (about once a month)	About once a year or never
...visit relatives and/or friends?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
...do errands for relatives/friends, either yourself or together with them?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
...participate in cultural and leisure activities?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
...participate in societal or public opinion activities?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
...purchase, bank and post errands etc.?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
...for another reason (e. g. professional)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

54. Do you have access to bus within walking distance from your residence?

- ☐ Yes
☐ No
☐ Don't know

55. How often do you go by bus?

- ☐ Maximum 1 time/month
☐ 2-3 times/month
☐ 1 time/week
☐ 2-5 times/week
☐ 6-7 times/week (i.e. every or almost every day)

56. Do you have access to tram within walking distance from your residence?

- ☐ Yes
☐ No
☐ Don't know

57. How often do you go by tram?

- ☐ Maximum 1 time/month
☐ 2-3 times/month
☐ 1 time/week
☐ 2-5 times/week
☐ 6-7 times/week (i.e. every or almost every day)

58. Do you have access to train within walking distance from your residence?

- ☐ Yes
☐ No
☐ Don't know

59. How often do you go by train?

- ☐ Maximum 1 time/month
☐ 2-3 times/month
☐ 1 time/week
☐ 2-5 times/week
☐ 6-7 times/week (i.e. every or almost every day)

60. a) Have you been involved in an accident with a passenger car during the last two years when somebody was injured or killed?

- ☐ Yes
☐ No —————→ *Continue with Q61*
☐ Don't know

b) If yes, describe the accident (accidents, maximum two)

Accident 1) Occurred in month

--	--

 year

--	--	--	--

Were you the driver?

- ☐ Yes
☐ No

Accident 2) Occurred in month

--	--

 year

--	--	--	--

Were you the driver?

- ☐ Yes
☐ No

61. a) Have you been involved in an accident with a passenger car during the last two years when consequences only were property damages?

☐ Yes

☐ No —————> Continue with Q62

☐ Don't know

b) If yes, describe the accident (accidents, maximum three)

Accident 1) Occurred in month

--	--

 year

--	--	--	--

Were you the driver?

☐ Yes

☐ No

Accident 2) Occurred in month

--	--

 year

--	--	--	--

Were you the driver?

☐ Yes

☐ No

Accident 3) Occurred in month

--	--

 year

--	--	--	--

Were you the driver?

☐ Yes

☐ No

In some of the following questions you are asked to try to compare your car driving today with the situation when you were aged 40 years. If you acquired the driver's licence category B after the age of 40, instead compare with the age when you have had the B licence for five years. An example: you acquired the B licence when you were 44 years old. Compare your car driving today with how it was when you were aged 49 years.

62. When driving, are there any of the following situations that you today find more difficult than you were 40 years old?			
	Yes	No	Not encountered
Driving in heavy traffic	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Overtaking on roads with one lane in each direction	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lane changing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Driving against the light	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Driving in darkness	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Driving during adverse weather conditions (rain, fog, snowfall)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Driving on slippery roads	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Manoeuvring in small spaces, e.g. when parking	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Driving when you are alone	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Driving when you are accompanied	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Driving on unfamiliar roads	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Driving long distances	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Detect pedestrians crossing/intending to cross the street	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Passing road work zones	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Detect traffic signs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Enter a highway	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Driving on a highway	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Overtaking on a highway	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Running straight ahead in a complex intersection	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Driving in a familiar town	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Driving in a unfamiliar town	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Enter and exit a roundabout with one lane	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Enter and exit a roundabout with two lanes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Turn left in intersections when you have to give right-of-way to traffic coming from the right	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Turn left in intersections when you have to give way to traffic	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Turn left in intersections regulated by traffic signals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Turn right in intersections when you have to give right-of-way to traffic coming from the right	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Turn right in intersections when you have to give way to traffic	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Turn right in intersections regulated by traffic signals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
63. When driving, compared to when you were 40 years old, do you avoid any of the following situations?			
	Yes	No	
Driving in heavy traffic	<input type="checkbox"/>	<input type="checkbox"/>	
Overtaking on roads with one lane in each direction	<input type="checkbox"/>	<input type="checkbox"/>	
Lane changing	<input type="checkbox"/>	<input type="checkbox"/>	
Driving against the light	<input type="checkbox"/>	<input type="checkbox"/>	
Driving in darkness	<input type="checkbox"/>	<input type="checkbox"/>	
Driving during adverse weather conditions (rain, fog, snowfall)	<input type="checkbox"/>	<input type="checkbox"/>	
Driving on slippery roads	<input type="checkbox"/>	<input type="checkbox"/>	
Manoeuvring in small spaces, e.g. when parking	<input type="checkbox"/>	<input type="checkbox"/>	
Driving when you are alone	<input type="checkbox"/>	<input type="checkbox"/>	
Driving when you are accompanied	<input type="checkbox"/>	<input type="checkbox"/>	
Driving on unfamiliar roads	<input type="checkbox"/>	<input type="checkbox"/>	
Driving long distances	<input type="checkbox"/>	<input type="checkbox"/>	
Detect pedestrians crossing/intending to cross the street	<input type="checkbox"/>	<input type="checkbox"/>	
Passing road work zones	<input type="checkbox"/>	<input type="checkbox"/>	
Detect traffic signs	<input type="checkbox"/>	<input type="checkbox"/>	
Enter a highway	<input type="checkbox"/>	<input type="checkbox"/>	
Driving on a highway	<input type="checkbox"/>	<input type="checkbox"/>	
Overtaking on a highway	<input type="checkbox"/>	<input type="checkbox"/>	
Running straight ahead in a complex intersection	<input type="checkbox"/>	<input type="checkbox"/>	
Driving in a familiar town	<input type="checkbox"/>	<input type="checkbox"/>	

Driving in a unfamiliar town	<input type="checkbox"/>	<input type="checkbox"/>
Enter and exit a roundabout with one lane	<input type="checkbox"/>	<input type="checkbox"/>
Enter and exit a roundabout with two lanes	<input type="checkbox"/>	<input type="checkbox"/>
Turn left in intersections when you have to give right-of-way to traffic coming from the right	<input type="checkbox"/>	<input type="checkbox"/>
Turn left in intersections when you have to give way to traffic	<input type="checkbox"/>	<input type="checkbox"/>
Turn left in intersections regulated by traffic signals	<input type="checkbox"/>	<input type="checkbox"/>
Turn right in intersections when you have to give right-of-way to traffic coming from the right	<input type="checkbox"/>	<input type="checkbox"/>
Turn right in intersections when you have to give way to traffic	<input type="checkbox"/>	<input type="checkbox"/>
Turn right in intersections regulated by traffic signals	<input type="checkbox"/>	<input type="checkbox"/>
64. If there are any situations in question 63 that you stated that you avoid, describe below how you instead cope with the situation:		
<hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>		
65. Do you feel afraid when you are driving?		
Never	1	2
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	3	4
	<input type="checkbox"/>	<input type="checkbox"/>
	5	Very often
	<input type="checkbox"/>	
66. Do you think it is funny to drive?		
<input type="checkbox"/> Yes		
<input type="checkbox"/> No		
67. Do you need to drive to be independent?		
<input type="checkbox"/> Yes		
<input type="checkbox"/> No		

68. Do you get tired more often today when driving compared to when you were aged 40 years?

- ☐ Yes
☐ No

69. Have you ever felt that your driving was impaired by taking medicines?

- ☐ Yes
☐ No

☐ Don't know

If yes, which medicine/s?

--

70. I am a good driver?

- | | | | | | | |
|-------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|----------------|
| | 1 | 2 | 3 | 4 | 5 | |
| Strongly disagree | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Strongly agree |

71. My driving style means that I take risks in traffic?

- | | | | | | | |
|-------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|----------------|
| | 1 | 2 | 3 | 4 | 5 | |
| Strongly disagree | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Strongly agree |

72. Compared with when you were aged 40 years, how do you drive today?

- ☐ Better
☐ Somewhat better
☐ As before
☐ Somewhat worse
☐ Worse

73. Compared to people of your age, do you think you drive...

- ☐ Better
☐ Somewhat better
☐ As before
☐ Somewhat worse
☐ Worse

74. Have you changed your driving habits compared when you were aged 40 years?

- ☐ Yes
☐ No → Continue with Q75
☐ Don't know

If yes:

a) Did you change the length of your distances travelled?

- ☐ Yes, longer
☐ Yes, shorter
☐ No

b) Did you change how frequently you drive?

- ☐ Yes, drive more often
☐ Yes, drive more seldom
☐ No

c) Did you change your driving speed?

- ☐ Yes, drive faster
☐ Yes, drive slower
☐ No

Other, describe what:

75. Have you changed your driving habits due to feelings of unsafeness or fear in traffic?

- ☐ Yes
☐ No

76. Compared with you were aged 40 years, do you more seldom or more often today stop performing secondary tasks in a complex traffic situation, e.g. talking to passengers in the car when it rains heavily or open the side window in a complicated intersection?

- | | 1 | 2 | 3 | 4 | 5 | |
|--|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-----------------------------|
| Much more seldom than before | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Much more often than before |
| <input type="checkbox"/> Not encountered | | | | | | |

77. Compared with you were aged 40 years, do you find it less or more difficult to react on an unforeseen happening as a pedestrian or a vehicle detected at the last moment?

- | | 1 | 2 | 3 | 4 | 5 | |
|--|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|------------------------------------|
| Much less difficulties than before | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Much more difficulties than before |
| <input type="checkbox"/> Not encountered | | | | | | |

78. Compared with you were aged 40 years, does it happen less or more often than before that you automatically chose the usual route when you wished to go elsewhere?

	1	2	3	4	5	
Much more seldom than before	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Much more often than before
<input type="checkbox"/> Not encountered						

79. Have you ever considered stopping driving?

- ☐ Yes
☐ No

80. Which one/ones of the following circumstances would get you thinking in terms of driving cessation?

- ☐ That my doctor recommends it
☐ That my partner recommends it
☐ That I feel unsafe in traffic
☐ That I have health problems
☐ That I have a reduced reaction time
☐ Due to economic reasons
☐ That my travel needs can be fulfilled without driving myself
☐ That I have been involved in an accident

Other, describe:

81. How would your life look like if you no longer were able to drive a car?

Please tick only one alternative.

- ☐ It would be a relief
☐ There would be no changes in my life
☐ My life would feel poorer
☐ It would be a disaster

☐ Other, describe:

82. Have you participated in a refreshing course for older drivers?

☐ Yes → Did you change anything in your car driving as a consequence of what was addressed in the course?

☐ Yes

☐ No

☐ Don't know

If yes, what did you change?

☐ No → Would you be interested in a course of this kind?

☐ Yes

☐ No

☐ Don't know

Why?

83. Which driving abilities would you like to improve, e.g. speed adaptation, driving in roundabouts, and usage of technical support system your car is equipped with or anything else?

84. Finally we ask you to indicate to which extent the following characteristics apply to you.

I see myself as someone who...	Strongly disagree	Disagree a little	Neither agree nor disagree	Agree a little	Strongly agree
Is talkative	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tends to find fault with others	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Does a thorough job	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is original, comes up with new ideas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is reserved	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is helpful and unselfish with others	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is relaxed, handles stress well	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is a reliable worker	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Can be tense	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Generates a lot of enthusiasm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Has a forgiving nature	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Worries a lot	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Has an active imagination	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tends to be quiet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tends to be lazy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is inventive	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is considerate and kind to almost everyone	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Gets nervous easily	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Likes to reflect, play with ideas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is easily distracted	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

85. Would you like to be contacted for further information and possibly participation in further testing, education/training and test new support system, enter the name and address. Entering a name and address does not guarantee that you will be contacted and it does not mean that you pledge yourself to participation in a subsequent part of the research. But it helps us to get in contact with people who are interested in (after receiving further information) to possibly participate later in the project.

If you wish to be contacted for possible participation in the driving test, fill in the contact information (completely optional):

☐ Yes

☐ No

Name:

Address:

Thanks for your answers!

VTI, Statens väg- och transportforskningsinstitut, är ett oberoende och internationellt framstående forskningsinstitut inom transportsektorn. Huvuduppgiften är att bedriva forskning och utveckling kring infrastruktur, trafik och transporter. Kvalitetssystemet och miljöledningssystemet är ISO-certifierat enligt ISO 9001 respektive 14001. Vissa provningsmetoder är dessutom ackrediterade av Swedac. VTI har omkring 200 medarbetare och finns i Linköping (huvudkontor), Stockholm, Göteborg, Borlänge och Lund.

The Swedish National Road and Transport Research Institute (VTI), is an independent and internationally prominent research institute in the transport sector. Its principal task is to conduct research and development related to infrastructure, traffic and transport. The institute holds the quality management systems certificate ISO 9001 and the environmental management systems certificate ISO 14001. Some of its test methods are also certified by Swedac. VTI has about 200 employees and is located in Linköping (head office), Stockholm, Gothenburg, Borlänge and Lund.



HUVUDKONTOR/HEAD OFFICE
LINKÖPING
POST/MAIL SE-581 95 LINKÖPING
TEL +46(0)13 20 40 00
www.vti.se

BORLÄNGE
POST/MAIL BOX 92
SE-721 29 BORLÄNGE
TEL +46(0)243 446 860
www.vti.se

STOCKHOLM
POST/MAIL BOX 55685
SE-102 15 STOCKHOLM
TEL +46(0)8 555 770 20
www.vti.se

GÖTEBORG
POST/MAIL BOX 8072
SE-402 78 GÖTEBORG
TEL +46(0)31 750 26 00
www.vti.se

LUND
POST/MAIL Medicon Village
SE-223 81 LUND
TEL +46(0)46 540 75 00
www.vti.se