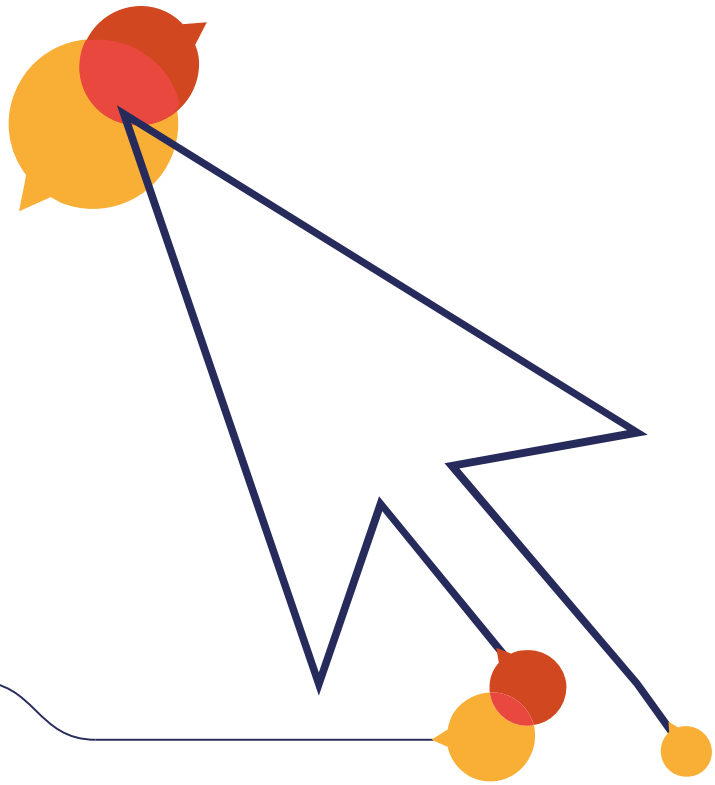
ROSPA

accidents don't have to happen

Older Drivers Policy Paper



Last Updated: June 2021

Contents

Executive Summary

This paper discusses the main factors that increase crash risk with age and ways to help older drivers sustain a good level of safe mobility.

Older people are a large and increasing proportion of the population. Mobility is vital to maintaining a full and independent life, but as we grow older, it is inevitable that our general health and fitness begins to deteriorate. This often causes concern that older drivers may be at a higher risk of being involved in road crashes. Therefore, we need to help people maintain safe mobility as they get older.

Road safety activities play a fundamental role in decreasing the risk of being involved in road crashes. Ultimately, age related conditions may eventually mean that individual drivers reach a point when they must give up driving. However, policies that prematurely remove an elderly person's entitlement to drive can have negative consequences for their health and quality of life. These consequences can outweigh the reduction in crash risk to the driver and the rest of society. Therefore, interventions must be proportionate to the risk, and a judgement must be made as to whether an individual intervention gets the balance right.

Engineering measures, such as road or vehicle design, help to prevent accidents and injuries to older road users, but they are not covered within the scope of this paper, which primarily considers education, training and publicity measures. However, they are fundamental to helping drivers maintain a good level of safe mobility.

For the purpose of this policy paper, older drivers are defined as drivers over the age of 60 years. However, this does not mean that accident risk increases from the age of 60 years; in fact, the data indicates that crash risk only increases in age groups over 70 years. Older drivers do not form a homogenous group; wide variations in their characteristics and driving abilities exist.

The main conclusions from this paper are as follows.

In 2019*, 203 drivers aged 60 and above were killed, 1,868 were seriously injured and 7,640 were slightly injured in road accidents in Britain[5]. Although the casualty trend for this age group is decreasing, it is decreasing more slowly than for other ages. The risk of being involved in a road accident increases after the age of 70 years, but up to that age, drivers are no more likely to cause a crash than to be the victim of another road user's mistake. However, drivers over 70 years, and especially over 80 years, are more likely to be at fault when they crash.

Underlying health conditions, and some types of medication taken to treat those problems, are a common factor in accidents involving older drivers. Indeed, a proportion of older driver fatalities occur when a driver dies of natural causes while driving, and their vehicle immediately crashes.

Older drivers are commonly involved in collisions at junctions, often because they misjudge the speed/distance of other vehicles or fail to see a hazard. Visual impairment may be a factor in this type of crash. Due to their more fragile health and physical condition, older drivers are more likely to suffer injuries when they crash and/or to take longer to recover from their injuries.

It is important to be able to accurately identify which drivers are significantly more likely to be involved in crashes, to help them to adapt when and where they drive to reduce the risk and ultimately to help them to give up driving and adapt to life without a car if this becomes necessary.

Many older drivers recognise that their driving ability is changing and consequently change when and where they drive (through self-regulation). However, not all older drivers do this, and more guidance for them or their relatives about when and how to regulate their driving is needed. A major deterrent to self-regulation or stopping driving is the lack, or perceived lack, of viable alternatives to the car. Research can help to provide a better understanding of the link between self-regulation and crash risk, and how to help drivers to match when and where they drive, and the type of vehicle they use, to their fitness to drive.

Drivers should be encouraged to undergo a formal medical check before renewing their licence when they reach 70 years of age, and again each time their licence is renewed, and encouraged to discuss health conditions and fitness to drive during consultations with health professionals, who may not always raise fitness to drive issues first. Families who are concerned about the driving ability of their relatives often struggle to find appropriate advice.

There are calls for UK law to be changed to require health professionals to report drivers who are no longer able to meet the required medical standards for driving to the DVLA so action can be taken to disqualify them from driving. GMC guidelines, "Confidentiality: reporting concerns about patients to the DVLA or the DVA" advise health professionals that they have an obligation to report patients who are medically unfit to drive if the patient ignores their advice to stop driving and report their condition to the DVLA. There is a need for more education for health professionals about using the guidance and the measures they can take to help their patients who are, or are becoming, unfit to drive.

Driver education programmes specifically tailored for older drivers are also important, although it can be hard to make sure that the programme reaches the right people. Information, education and publicity are needed to help to raise awareness of the effects of ageing, and of the possible effects of medicines on driving performance. Assessment and training courses should be tailored to the needs of older drivers, and some do exist.

A key question is how and when drivers should be re-licensed. In the UK, this occurs at 70 years and then every three years thereafter and only requires the driver to self-certify that they are fit to drive. Drivers who develop certain health conditions may be issued with a restricted licence that is only valid for one, two or three years.

RoSPA does not believe there should be a maximum driving age beyond which drivers automatically lose their driving licence. Research does not suggest that a mandatory driving test at licence renewal would be effective. We are not aware of research evidence to indicate that there is an age at which drivers become unable to drive safely. Setting an arbitrary age limit would inevitably be unfair to some drivers.

Transport planners should cater for older road users who may be considering giving up driving. It is unlikely that people will consider giving up the freedom and convenience of driving their own car unless there are suitable, safe, clean, attractive, convenient and affordable alternatives.

Vehicle adaptation can help to optimise a vehicle for a driver, and tailor it specifically to a driver's requirement. Mobility centres around the country offer advice on vehicle adaptation https://www.drivingmobility.org.uk/.

General fitness underpins many strands of injury prevention. Some evidence shows that exercise programmes can add value to other road safety interventions.

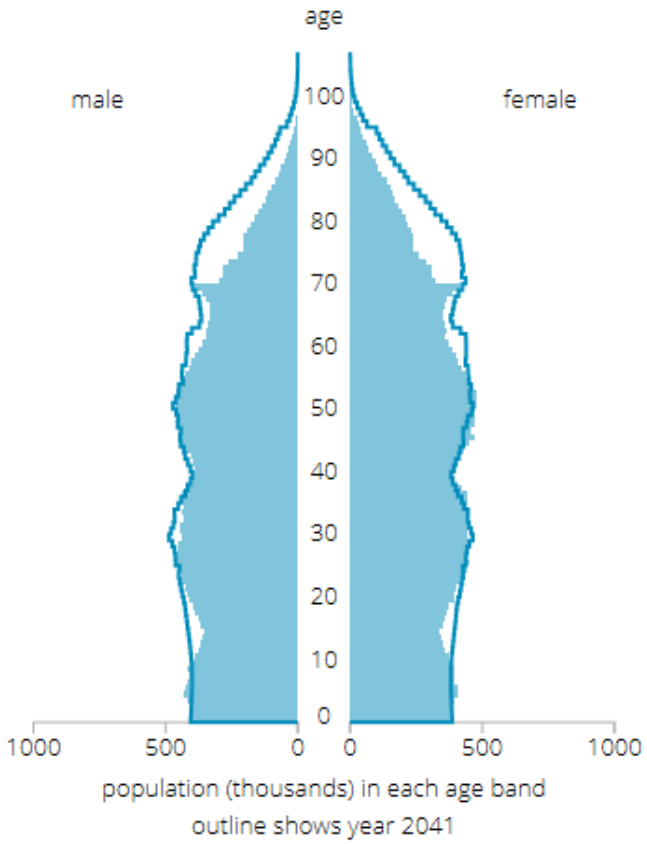
Introduction

This paper discusses the main factors that can increase crash risk with age, as well as ways to help older drivers sustain a good level of safe mobility. The paper primarily considers education, training and publicity measures rather than road or vehicle design. Many research papers examine how different health conditions affect driving, but in the main are not included here. "Assessing Fitness to Drive: A Guide for Medical Professionals"[1] is the most comprehensive document which explores these issues in the UK. Further information is available at https://olderdrivers.org.uk.

For many older people, driving promotes independence and connection with others, giving them the freedom to go where they want to go, at a time of their choosing[2]. Road safety activities can help drivers maintain a good level of safety by helping to drivers to improve their driving or adjust it to compensate for any reduced driving ability.

For the purpose of this policy paper, older drivers are defined as drivers over the age of 60 years. However, this does not mean that accident risk increases from the age of 60 years; in fact, the data indicates that crash risk only increases in age groups over 70 years. Older drivers do not form a homogenous group; wide variations in their characteristics and driving abilities exist.

Older people are a large and increasing proportion of the population. Mobility is vital for people to maintain a full and independent life, and therefore, transport policy, vehicle design and the transport environment should reflect, and provide for, their needs. National Statistics predict that the average age of the UK population will increase. In mid-2016 there were 1.6 million people aged 85 and over; by mid-2041, this is projected to double to 3.2 million[3].



As people get older, it is inevitable that general health and fitness, eyesight, hearing, reaction time and physical mobility will begin to deteriorate, all of which can affect the ability to drive safely. However, these changes occur at different rates and ages for different people. Since the changes are often gradual, they may not be apparent to the individual concerned or to members of their immediate family or circle of acquaintance.

The World Health Organisation defines health as a *"state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity"*[4]. This is an important consideration when designing policies and safety interventions to reduce older driver accidents, as it is important to ensure that they do not have adverse effects on other aspects of their health and wellbeing.

Policies that prematurely remove an elderly person's ability to drive can have negative consequences on their health and quality of life. These consequences can outweigh the reduction in crash risk to the driver and the rest of society.

Any safety measure must be proportionate to the risk, and a judgement must be made as to whether an individual measure finds the balance.

Inevitably, this will always be a difficult balance to get right, due to the difficulties in measuring the potential benefits and risks and deciding what an appropriate trade-off is between the two.

Whilst most road safety activities for older drivers seek to help them to drive safely, it may be that an activity may identify a driver who is no longer fit and healthy enough to be able to drive safely. In these cases, programmes need to be sensitive enough to help the driver, their family and friends and relevant health professionals to help the individual to give up driving, for their own sake and for the sake of all other road users.

Accident and Casualty Data

In 2019*, 203 drivers aged 60 and above were killed, 1,868 were seriously injured and 7,640 were slightly injured in road accidents in Britain[5]. Although the casualty trend for this age group is decreasing, it is decreasing more slowly than for other ages.

Older drivers and their passengers comprise a relatively small proportion of car occupant deaths and injuries. More 20-29 year old drivers are killed in crashes than any other age band. Table 1 shows the number of car occupant casualties by age group. Of course, the numbers depends on the number of people in each group and the amount of driving they do. Table 2 shows a more marked increase in the number of car drivers killed per one million of population over the age of 69 years. This may indicate that the injuries in older people are more likely to result in a more severe outcome.

Table 1: Reported car occupant casualties 2019, by age band and severity[6]*.

	16-19	20-29	30-39	40-49	50-59	60-69	70-79	80+
Car Drivers								
Killed	22	115	68	45	54	60	77	66
KSI	532	2,032	1,605	1,098	1,118	792	748	530
All severities	3,321	15,348	13,622	10,378	8,834	4,662	3,185	1,864
Passengers								
Killed	36	43	19	14	10	20	29	49
KSI	608	924	470	286	297	278	318	285
All severities	3,345	5,857	3,458	2,195	2,065	1,467	1,259	806

Table 2: Reported car occupant casualty rate in 2019, by age band and severity[7]*.

	16-19	20-29	30-39	40-49	50-59	60-69	70-79	80+
Car Drivers								
Killed	5.1	13.8	7.9	5.5	6.1	8.7	14.0	20.1
KSI	144.8	241.7	185.8	134.2	126.9	114.4	136.0	161.7
All severities	911.8	1,822.1	1,576.4	1,268.8	1,002.7	672.9	579.0	568.1
Passengers								
Killed	13.1	5.1	2.2	1.7	1.1	2.9	5.3	14.9
KSI	204.9	110.7	54.5	35.0	33.7	40.1	57.9	86.8
All severities	1,145.3	700.3	400.2	268.3	234.4	211.8	228.9	245.7

Note: KSI = killed or seriously injured

Age alone is not a reliable indicator of driving ability. In fact, accident involvement is at its lowest rate for drivers aged 60-79[8]. However, older drivers, and older passengers, are more likely to die or sustain a severe injury than a younger adult in an accident of the same impact[9].

The risk of a driver aged over 70 killing a pedestrian is less than that of middle-aged drivers and half that of drivers aged up to age 25, although “catastrophic claims” data from an insurance company active in the older drivers market found that some older drivers, possibly those in the over-80 age group, may be disproportionately involved in crashes leading to very serious third party injuries.[10]

As we get older, we may experience changes in our physical condition, such as deteriorating eyesight, slower reaction times, a declining ability to judge approaching-vehicle speeds[11] or dementia, which could impact on our driving. A dementia diagnosis, for example, does not mean that someone should give up driving immediately – what matters is whether they are able to drive safely.[12]

Increasing life expectancy will mean more older drivers, which in turn could lead to an increase in older driver fatalities.

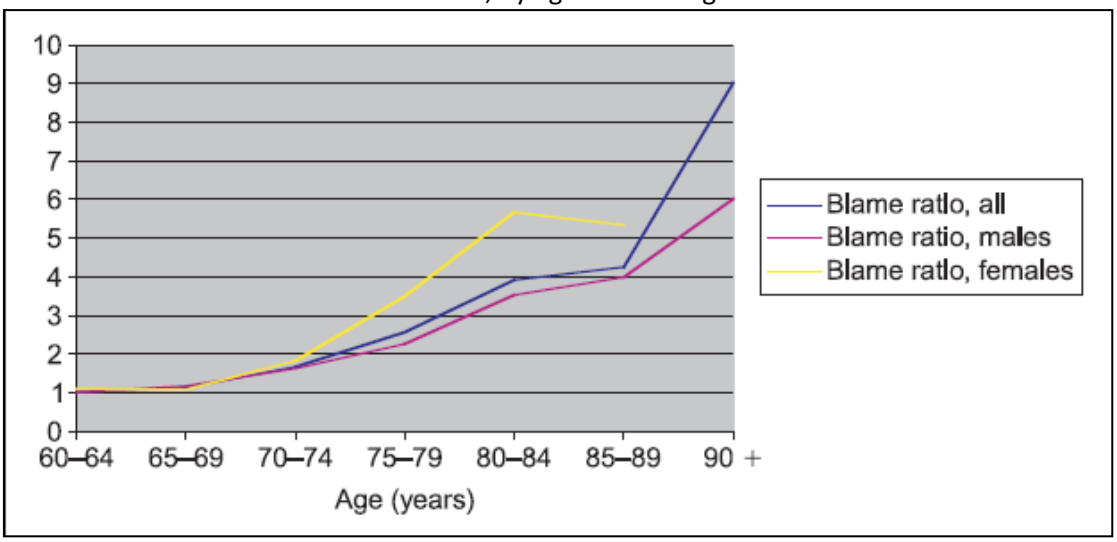
Table 3: Number of car driver fatalities between 2016 and 2019, by age band[13]

	2016	2017	2018	2019
16-19	28	37	29	22
20-29	144	134	126	115
30-39	93	97	97	68
40-49	65	57	60	45
50-59	55	64	54	54
60-69	44	60	46	60
70-79	53	55	65	77
80+	70	50	69	66

Causes of Older Driver Accidents and Injuries

Drivers between 60 to 69 years appear to be no more likely to cause an accident as they are to be the victim of one caused by another person. However, over this age, the blameworthiness ratio increases for both genders – meaning that they are more likely to be the party that causes the crash rather than the one innocently involved in it.[14] Older drivers between 80 and 89 years appear to be four times more likely to have caused a crash than to have been involved in one (the authors of the report stress caution when looking at the 90 years + figure due to the small sample).

Graph 1: Blameworthiness ratios of drivers over 60, by age band and gender



Type of collision

The types of crash that drivers are involved in vary by age and gender. A study of 1,185 fatal car accidents in 2007 showed that older drivers were less likely to be involved in crashes in which speed was a cause, less likely to be involved in crashes involving loss of control and less likely to be impaired by alcohol. However, they were more likely than younger drivers are to be involved in a crash caused by a right of way violation.[15]

A comparison[16] (using data on 19,782 drivers in the US Fatality Analysis Reporting System, FARS) between older (65 years+) and younger (35 – 54 years) drivers found specific risk factors for the older groups. The point of impact in a collision had an influence on the risk of fatality, with the 1 - 3 o'clock angle (front passenger side as the study was of US vehicles) and the 7 - 9 o'clock angle (passenger door behind the driver) being linked to an increased risk of fatality. Both of these are oblique side impacts and it is argued that improved crashworthiness and side impact protection may mitigate this risk.

The paper found that driving with one passenger was associated with an increased risk of injury for older drivers, although the presence of a passenger meant there was a decreased risk of fatal injury in both age groups. It may be that the situations in which a passenger is present, such as the time of the day (which it also found to be a risk factor for older drivers) or the gender of the passenger and driver influences this finding.

Junctions

Older drivers have greater involvement in accidents at junctions. Junctions can be complex and require high levels of attention and information processing. Junctions are the most common road accident environment for all driver groups; and for older drivers who sometimes have less effective visual scanning and checking procedures, the dangers of being involved in a collision at a junction are exaggerated.[17]

USA studies show that a high proportion of fatal crashes involving older drivers occur at intersections. A study conducted in 2011 showed that for drivers aged 60-69, 40% of fatal crashes occurred at intersections, a figure which rose to 60% for those aged 80 and over.[18]

An analysis of car drivers killed or injured in Britain during 2012-14 showed that the percentage of call car crashes at or within 20m of a junction is 55-65% and hardly changes with driver age. However, for fatal crashes, the percentage at or near a junction is close to 30% for all ages up to 65, increasing to 50% for those over 75.[19]

In several US analyses[20,21] of accidents involving older drivers, turning left across a lane of traffic (equivalent to turning right in the UK) was identified as the most dangerous manoeuvre at an intersection. In this type of accident, the older driver was more likely to be at fault.

A Norwegian study of over 200,000 drivers discovered similar results. Collisions resulting from turning across traffic rose from 10% for all collisions at age 50 to 20% for drivers aged over 80.[22] The percentage of killed or seriously injured crashes involving turning right across traffic increases from 10% of all crashes involving drivers aged up to 50 to 30% for drivers aged over 80.[23]

The majority of crashes at junctions are at 3-way T-junctions with no traffic control device or a 'Give Way' sign only. For fatal crashes, these increase from 15% for all ages up to 65 to 30% for those aged 75 and over. Traffic signals reduce the percentage of crashes at intersections with increasing age. For crossroads, traffic signals reduce the percentage of serious crashes for drivers aged over 65, while the percentage of crashes at crossroads with yield signs increases with driver age.[24] The reasons behind this high crash risk were failure to follow the traffic law, such as failure to give way to traffic that had the priority or disregarding a traffic signal.

There is some evidence that the main reason for failing to follow the law at an intersection changes with age. One USA study compared older drivers with a control group of drivers aged 35 – 54 years. It found that drivers aged 70 – 79 years made more mistakes where they identified the hazard but misjudged the time available to complete the manoeuvre, whereas drivers 80 years and older predominantly failed to see or detect the other vehicle in the first place.

A British study which used a driving simulator to test participants of various ages in response to hazards and visual scanning found that older drivers tended to place themselves in a poor position at junctions (too far from the give way line) and spent less time looking for approaching hazards. This suggests that changes in behaviour that could place older drivers at an increased risk of being involved in a collision at a junction.[25]

Avoiding a collision requires drivers to identify the hazard, judge whether it will cause a collision, know the correct course of action and then undertake that course of action. Given that the percentage of serious accidents at T-junctions increases significantly with age after 65 years and this does not happen at roundabouts, it could be worth studying the value of installing mini-roundabouts at busy T-junctions. The Older Driver's Taskforce report recommended that the UK develops similar guidance on designing roads for older road users, to that already in place in the USA, Australia and New Zealand.[26]

Visual scanning

An underpinning requirement to interpret and respond to a situation on the road is good visual observation and hazard perception. This is reliant on visual scanning, and many research papers have studied the observations made by older drivers, and typically compare them against those of younger or middle aged drivers. Simulator studies have also compared the visual scanning of older drivers to younger drivers.

An Australian study[27] found that older drivers were slower to identify and respond to potential hazards. Another study considered why older drivers are over-represented in 'failed to look' collisions, a failure in situational awareness where typically the older driver turns against oncoming traffic with right of way on the main road. The study tested the performance of participants of different ages 'driving' on various routes in a car simulator. As expected, visual acuity worsened with age, with younger participants having better visual acuity than those in other groups. Neck flexibility and reaction times also declined with age.

Similar results were found for contrast sensitivity. However, despite having slower reaction times, the older drivers tended to select a lower speed, meaning they often performed best in terms of safety margins between themselves and the hazard. This suggested that the older participants were aware of their slower reactions or difficulty in detecting hazards due to poorer contrast sensitivity and adapted their driving style so that they were able to make timely responses to unexpected hazards. On the other hand, at junctions, older drivers spent less time than younger drivers looking to the left and to the right, which could explain their over-representation in failed to look accidents[28].

An on-road study in the USA[29] compared the visual scanning of younger drivers (18 – 25 years), middle-aged (35 – 55 years), and older (65 – 80 years) drivers at intersections by measuring the proportion of time they spent looking towards the left, right and in the rear view mirror. It found that compared with the middle-aged drivers, the older and younger driver groups made less use of their full scanning range before driving through an intersection. Similarly, the older and younger driver groups also checked their rear view mirror less often than the middle-aged group. The older drivers made significantly fewer observations left and right whilst negotiating junctions.

There is some evidence that age itself does not influence a driver's visual scanning process. One UK study compared groups of older and younger drivers who had no acuity and visual field problems, and found little evidence of an age-related decline in the search of the scene when detecting hazards.[30] The implications may be that visual impairment is chiefly responsible for the decline in visual scanning techniques.

Motion extrapolation

The ability to judge and extrapolate objects in motion decreases with age and may influence a driver's ability to judge whether a collision would occur. One paper[31] reported that although older drivers were more cautious at judging time to collision (i.e. *when* a collision would occur) than younger drivers, they were less accurate at judging *whether* a collision would happen. Another paper[32] also found that older participants were less sensitive at detecting whether collisions would occur and identified that this effect was particularly evident at higher speeds.

Ill health

This study also found that older drivers with heart disease or stroke were more likely to be involved in at-fault automobile crashes and that arthritis was associated with an increased risk among female older drivers, implying that poor health is an issue.

Other age-related impairments can also affect older drivers. The age-related impairments suffered by older drivers fall into three key categories:

- Physical- restricted mobility and joint movements. Problems with moving the head and neck can prevent drivers from being able to scan the road and issues with the mobility of arms, hands and wrists can mean that drivers struggle to turn their steering wheel.
- Cognitive- this can mean that a driver could find it more difficult to process information. This is because it often takes longer to gather the information required to make a decision, which can place drivers at risk of making poor decisions.
- Visual- age-related sight problems can make it difficult for older drivers to identify signage and road markings.[33]

Alcohol and drugs

A USA study[34] found that speeding and non-use of restraint were the two most important common factors in determining injury severity for young and old age groups. It also found that alcohol and drug related factors were not a common factor in collisions between older and younger drivers.

Another paper, however, did find that the use of some legal drugs to treat conditions that become more common with age were associated with crash risk[35]. Non-steroidal anti-inflammatory drugs, angiotensin converting enzyme inhibitors, and anticoagulants were associated with an increased risk of at-fault involvement in crashes. Benzodiazepine use was also associated with an increased risk of a crash although not necessarily at-fault. Calcium channel blockers and vasodilators were associated with a reduced risk of crash involvement.

Motoring convictions

There is some evidence[36] that previous driving convictions are significantly associated with reduced risk of injury for older drivers. Although given the methodology used in the study it was not possible to explain this relationship, it may be that self-regulation or family involvement are likely to follow a conviction, which may then influence crash risk thereafter. This was supported by other studies[37, 38] which identified that prior convictions were associated with a reduction in crash risk. Prior involvement in crashes was a good indicator of future involvement.

Increasing life expectancy and healthiness at older age may also influence the average age of drivers involved in accidents, and the age at which interventions are targeted. A study[39] of several cohorts of older drivers involved in intersection accidents in Finland between 1987 and 1995 found that this accident type decreased for male drivers aged between 60 and 79 years in the later cohorts, which also saw a corresponding rise in this accident type for drivers over 80 years. The authors concluded that while intersection accidents are an age-related phenomenon that will occur, the age that it will occur at varies.

Finally, many older driver accidents may involve natural deaths before a collision. One in-depth study of Swedish accident data found that of the 152 drivers over the age of 65 years who died in road crashes between 2002 and 2004, 30 (20%) had occurred due to the driver dying of natural causes immediately before the accident.[40] These accidents were primarily single vehicle crashes.

Low-mileage bias

An important consideration when looking at the accident risk of older drivers is the low-mileage bias, where drivers of any age who drive less and cover shorter distances are more at risk of being involved in accidents per mile driven. As older drivers may typically drive much less or for shorter distances than younger drivers or drivers using the road for work, some of their increased risk may be to do with the relatively low distances they drive rather than age. This point that older drivers are at no greater risk than other age groups once different levels of driving activity are taken into account is argued in several papers.[41, 42]

A study of travel data from the Netherlands[43] found that drivers over 75 years were generally *safer* than other drivers were when taking low-mileage bias into account. It divided drivers into groups who annually covered less than 3,000km, between 3,000km and 14,000km, and over 14,000km. It found that only drivers who travelled less than 3,000km per year (one in ten of the older drivers in the study) had elevated crash rates.

A limitation to this study is that it was based on self-reported mileage data, a technique that has been questioned[44], as it may not always be the most accurate indicator of actual mileage.

One study[45] based on odometer data concluded*, "The low-mileage bias remains evident, albeit at a reduced level".* Modern GPS and Black Box technology could be used to get a more accurate understanding of not just the mileage driven by older drivers, but the roads used and times of the day they are driving.

Injury risk

As people get older, physiological changes also occur, which increase frailty and the risk of injury in a crash. This fact that older drivers are more at risk of severe injury in a crash is well noted in the literature. One study performed in the 1980s found that 70 year olds were three times more likely to die than 20 year olds were in identical crash conditions were.[46] Similarly, an Australian study[47] of police reported crashes between 1998 and 2003 found that drivers over the age of 70 years sustained serious injury rates more than twice as high as those of the 30 – 59 year old drivers.

One US study suggested that between fragility was a made a greater contribution[48] towards the higher death rates per vehicle mile travelled of older drivers than any increased likelihood of crashing.

Summary

There are differences between the types of road accidents and their severity between drivers of different age groups. Drivers do not have a higher accident risk, until the age of 70, and up to this age, they are no more likely to cause a crash than to be the victim of another road user's mistake. However, drivers over 70 and especially over 80 years are more likely to be at fault when they crash.

Older drivers are commonly involved in collisions at junctions, often because they misjudge the speed/distance of other vehicles or fail to see a hazard. Visual impairment may be a factor in this type of crash.

Underlying health conditions, and some types of medication taken to treat those problems, are a more common factor in accidents involving older drivers. Indeed, a proportion of older driver fatalities occur when a driver dies of natural causes while driving, and their vehicle immediately crashes.

Due to the more fragile health and physical condition, older drivers are more likely to suffer injuries when they crash.

Preventing accidents and injuries

Assessing fitness to drive and identifying crash risk

Predicting the drivers who would be at increased risk of being involved in a crash due to age related factors is an important area of study. Good predictors of future crash involvement can have applications for medical professionals and families to help identify older drivers who are most at risk, and offer appropriate advice. Good indicators would also not wrongly identify 'safe' drivers as risky, as this can have implications for restricted mobility.

In addressing the safety of older drivers, the benefits of driving to many older people must be acknowledged, with the aim being to help people to drive safely for longer. Changes to the road environment (such as offset turn lanes, internally lit street signs, and advanced street name signs), in-vehicle technologies (such as navigation systems, park assistance and vehicle stability control) and driver training are potential interventions.

There are a large number of tests, which have been developed and could be used to screen older drivers for crash risk and fitness to drive. Given the range of requirements for driving and that it remains a complex activity; it is likely that no single test will be appropriate for identifying dangerous conditions.

However, an examination method that uses a combined approach may be the strongest way of identifying drivers who are at an increased risk and need more help to drive safely, and drivers whose condition means they are unable to use the road safely. The timing of the intervention and its acceptability to older drivers are also essential.

The potential indicators that can be used to assess crash risk are mainly in-vehicle, cognitive and visual, although there are also other indicators. Given that drivers age at different rates, age is almost certainly not a suitable indicator on its own.

Research into driver training has been varied and it has been difficult to identify the specific parts of training interventions that are most successful. Training and new technologies may suffer low uptake, whether because of time requirements, lack of self-awareness or the expense of taking part in training or fitting a car with new technology. In this case, education and self-evaluation (through self-assessment tools such as questionnaires or profiling tools) are likely to become useful in helping older drivers develop a healthier awareness of changes to their own driving abilities. They can help empower drivers and their families to make decisions about driving limitations and, ultimately, driving cessation.

Good information and advice about alternative means of travel and lifestyle adaptations should be provided for those older drivers who reach a point where giving up driving may be the right thing to do. Alternative means of transport should be supported and promoted wherever possible, in order to enable older people who do not drive to maintain their independence.

Cognitive tests

Several tests can be used to understand the level of cognitive impairment. They are typically designed to detect specific cognitive conditions rather than for general use. These tests include:

- Mini-Mental State Exam (MMSE), which consists of a short series of questions
- Clock Drawing Test, in which candidates are asked to draw the full face of a clock
- Trailmaking Part A and B, which is join the dots style activity
- Memory test

Although most cognitive tests do not define scores to determine whether someone is a safe driver, they do provide the assessor with information about the driver's cognitive functions that can be further assessed during an on-road assessment[49].There is also evidence that cognitive performance can be used to predict future crash involvement.[50]

In a large USA study of older licensed drivers without dementia, poor cognitive function was associated with a greater risk of being involved in a vehicle crash taking account of age, sex, alcohol use, co-morbidities (diseases and disorders) and medication use. Depression was also linked with a higher risk of being involved in a collision[51].

Vision tests

A range of different vision tests are used in different countries. The most commonly used is the Useful Field of Vision test. Studies[52] of the licensing criteria for visual fitness to drive for older drivers in several western countries have only found an inconclusive link between the tests and their ability to predict poor driving performance.

A review of vision and driving showed that the only non-standard eye test linked to driver safety is one of slowed processing speed, such as the useful field of vision test. Older drivers with a slowed visual processing speed were twice as likely to be involved in a collision as those without it. Despite this, there is currently little to no evidence that visual acuity tests are good screening tools to identify drivers who are likely to be involved in a collision in the next few years[53].

An assessment of mandatory vision tests for the relicensing of drivers over the age of 80 in Florida found that older drivers did not see the tests as a deterrent to seeking renewal. [54]

In-vehicle tests

In most countries, a practical driving test is the basis on which drivers initially gain their licence. However, it is much less common for drivers to be required to retake a driving test in order to retain their driving licence at a certain age. In the UK, drivers' licences expire at the age of 70 years (or sooner if they develop certain health conditions). In order to renew the licence, and be able to continue to drive, drivers must complete a form and certify that they are fit to drive. They must then repeat this every three years.

One issue with driving tests is that often they may use vehicles with dual controls or a different vehicle to the one that the older driver commonly uses. Research has found[55] that for older drivers with some cognitive deterioration, using and adapting to an unfamiliar vehicle can contribute to the cognitive load that they have to deal with, and this may have an impact on a their ability to drive to their usual standard.

Other indicators

As well as various methods of assessing fitness-to-drive through testing or examination, there may be other indicators that a driver is at a higher risk of being involved in a collision.

One paper[56] reported that several psychological, medication-related, visual attention and function related factors had an impact on crash involvement. This study found that people who had difficulties performing some physical tasks, such as light housework or yard work, or opening a jar, were more likely to have an increased risk of being involved in road accidents when driving.

A history of falls was also associated with a higher reported difficulty of driving. [57]

Another paper[58] also found that older drivers who had reported a prior history of falls were 50% more likely to be involved in crashes. It also found other indicators of increasing crash risk, such as reported difficulty in walking over 1/2 a mile, moving outdoors, and the number of other activity limitations.

These findings were supported by a further paper, which found that a self-reported fall[59] in the previous year was also a marginally significant predictor of crash risk, although other physical difficulties such as walking one quarter of a mile and moving outdoors were also significant predictors.

The role of professionals in assessing fitness to drive

A large study[60] of over 110,000 older drivers found a weak, but statistically significant, link between being involved in a road accident and having had contact with a physician in the month beforehand. Involving medical practitioners and ensuring they are equipped with the information required to judge fitness to drive is, therefore, an important issue. The UK's current guidance (updated March 2021) for medical practitioners is "Assessing Fitness to Drive: A Guide for Medical Professionals".

One study[61] explored health professionals' knowledge regarding medical aspects of fitness to drive; investigated the attitudes and other factors that influence their decisions on whether to discuss fitness to drive during routine clinical contacts, explored the organisational barriers to passing on their knowledge in this field, and the obstacles to including advice on fitness to drive as a routine part of consultations. It also aimed to suggest ways of improving medical and other health care personnel's knowledge and their willingness to give advice to their patients, and indicate how these aims may best be achieved within the organisational context of these professional groups.

The research explored how fitness to drive issues were taught in medical schools in the UK. Out of the thirty-two medical schools, twenty-two (69%) reported teaching medical aspects of fitness to drive within their curriculum, five of whom reported that they taught the topic in depth. However, only four of the twenty-two could quantify the extent that fitness to drive was taught, which was either one lecture or tutorial. Fitness to Drive issues were taught in different sections of the curriculum – such as medical ethics, or on specific health conditions such as epilepsy or cardio-vascular medicine.

A survey of 630 health professionals from many different professional groups, such as GPs, nurses, optometrists and occupational therapists amongst others, found that almost all (87%) were aware of the DVLA Guidelines and 80% said that they had consulted them over the previous two years. The guidelines are most commonly used in relation to patients with epilepsy, visual impairment, diabetes and those who have suffered a stroke.[62]

Respondents reported that they were most likely to advise patients about fitness to drive issues if they had epilepsy, fits or black outs, or a stroke. The majority of hospital consultants and GPs reported that they had advised patients to stop driving within the last three months. The respondents felt that discussing fitness to drive issues with patients was very important; most believed that they had a 'duty of care' to do this with their patients and that it was part of their role. However, knowledge was variable about whose role it was to advise patients and who had the legal responsibility to do so. Most also identified a need for better training or clearer guidelines about giving advice. Two in five respondents agreed that they did not have sufficient knowledge about fitness to drive issues.

The study also tested the knowledge of health professionals and how they would react when confronted with situations that would require them to advise a patient about their fitness to drive. The 413 health professionals who participated in this part of the study were shown either a paper or video vignette - a scenario in which a patient had a medical condition which affected or might affect their fitness to drive, and in which the health professional would need to decide whether the patient was fit to drive, unfit to drive, or borderline between the two.

Only 31 (7.5%) of the health professionals scored all of the paper vignettes correctly, although two thirds scored one or two correctly. GPs and medical specialists tended to achieve more answers that are correct. The most common mistake was a bias towards rating patients who should have been told they were unfit to drive as borderline or fit to drive.

Three video vignettes simulated typical settings in which clinicians would be likely to have to give a patient advice about their fitness to drive. In the videos, pseudo-patients described a health condition that would render them unfit to drive, as well as a lifestyle that involved driving. A set of car keys were placed beside the pseudo-patients. The videos were shown to a cross section of 101 clinicians in primary and secondary care. Several clinicians were shown more than one and 200 vignettes were shown in total. Clinicians were asked what advice they would give the patients; they were not informed that the purpose of the study was to investigate clinicians' advice on fitness to drive.

Concerns about fitness to drive were expressed unprompted in one quarter (51/200) of the vignettes. In the 149 situations where driving was not mentioned by the clinician as a main concern, 60% of the clinicians mentioned it after ten minutes. However, this is generally a longer time than a standard consultation, and therefore, in reality, the topic of driving would not be raised. Most driving advice given by the clinicians was non-specific. Several GP's mentioned that driving is not relevant to most of their consultations which focus on medical issues.

Barriers to giving advice on fitness to drive were:

- remembering to do it
- covering all of the medical issues in the short period of time
- assuming older patients did not drive
- lack of knowledge
- the complexity of the guidelines
- uncertainty over whose responsibility it is to give the patient advice about fitness to drive
- patient resistance or denial
- risk of negative consequences to the patient, such as loss of well-being or livelihood, and
- the risk of jeopardising the doctor-patient relationship.

The General Medical Council have published guidelines on patients' fitness to drive and reporting these concerns to the DVLA or DVA: http://www.gmc-uk.org/guidance/ethical_guidance/30652.asp.

Some papers have gathered self-reported attitudes from physicians to examine their views and practices. One Canadian[63] study used a mailed questionnaire to carry out a cross sectional survey of physicians to find out their attitudes and practices when assessing fitness to drive. Most of the physicians in the survey felt that the assessment of fitness to drive in their medical practice was important, but just under half (45.8%) did not feel confident in doing so. Almost half (46.7%) did not feel that physicians are the most qualified professionals to identify unsafe drivers.

Physicians were asked about a publication called *Determining Medical Fitness to Drive: A Guide for Physicians*, which is published by the Canadian Medical Association and has several sections on different conditions that can affect driving. Nearly one quarter of those surveyed (23.5%) were not aware of it and one-third (31.2%) of those who were aware of it, rarely used it.

The vast majority of physicians (88.6%) felt they required more education in the subject of assessing fitness-to-drive, and 72.4% agreed that physicians should be legally responsible for identifying unsafe driving practices.

One major barrier to reporting a patient as unfit to drive to the licensing authority, cited by 75% of physicians, was that it would threaten the established doctor-patient relationship, and with it the trust that had been built up. Damaging this relationship could lead to patients failing to report other health issues. However, other similar Canadian studies have found that the vast majority of physicians believe that the interests of the public should prevail over those of individual drivers.

Although the paper highlights that its findings match research done in some Scandinavian countries, a note of caution must be attached to transposing these results to the UK, where there may be several differences between physician training, views, attitudes, as well as the clinical decisions that physicians make. However, in lieu of similar surveys in the UK these results indicate an area of future investigation.

Some research has also examined the use of education workshops for physicians and medical professionals to help develop their ability to assess the standards of driving and to encourage driving retirement or self-regulation.

One workshop[64] focussed on educating health professionals about assessing and identifying the fitness to drive of older drivers with dementia, and how to encourage driving retirement amongst those individuals. A clearly focussed curriculum for the workshop was developed as part of a project run by the American Medical Association. The evaluation of the workshop found that the focussed curriculum with clear and immediate applications increased the knowledge and confidence of health professionals on the topic were more likely to use driving-related behaviours in assessments and were more likely to encourage patients with dementia to retire from driving.

Self-regulation

An important aspect of older driver safety is self-regulation. As driving in particular conditions can become more difficult due to poorer vision or cognitive abilities, drivers may begin to restrict their driving to those times and conditions in which they feel safe[65]. This takes many forms, from completely avoiding driving, to planning journeys to avoid specific routes, times of day, or conditions.

Self-regulation is widely regarded as common by road safety professionals, and research evidence supports the belief that drivers self-regulate in response to their health, and difficulties they perceive when they are driving. It has also been suggested as a means of avoiding a range of negative outcomes that have been associated with giving up driving, such as social isolation and depression[66], although self-regulation can extend the mobility of these drivers to an extent.

It is important to identify the characteristics of drivers who would self-regulate their driving. One study[67] found that the drivers who are most likely to self-regulate their driving:

- are female
- are 75 years and older
- are not the principal driver in the household
- had been involved in a crash in the last 2 years
- are experiencing vision problems
- report lower confidence ratings

There was also a strong association between drivers avoidance of a specific condition if they reported deterioration in functional physical ability for those conditions. The situations that drivers reported they avoided most were driving at night (25%), on wet nights (26%) and in busy traffic (22%).

One Swedish questionnaire study[68] of older drivers and found similar results: older drivers were less likely to drive in taxing conditions, such as at night or bad weather, and female drivers were more likely to limit their driving. It also asked drivers whether they had any problems with daily activities (tying shoe laces, getting dressed, climbing stairs, walking over an open field, crossing a street, riding with public transport, stepping in or out of a car, using the seatbelt in a car, engaging in social activities, gardening or hobbies) but found that problems with these types of activity were only marginally associated with self-regulation.

A US study[69] also identified daytime-only driving as one of the most common self-restrictions, along with limiting driving distance and time. Out of the sample of 108 drivers in the study, who were collected via referral for a clinical driving examination, eight respondents identified each of the three categories listed. This study also found that drivers who performed worse in driving evaluation tests, which included the clock drawing test (CDT), mini-mental status exam (MMSE), Trailmaking, geriatric depression scale (GDS), and simulated driving, were less likely to self-regulate their driving.

Interestingly, this result contrasts with another US study[70] in which the role of reported impairments on self-regulation was examined. In this study, telephone interviews with older drivers were used to gather data on their driving compared with five years earlier. It found that drivers who reported increased difficulty from physical impairments were the most likely to self-regulate their driving, and the chance of them doing so increased by 32% with each physical impairment. Drivers with visual impairments or memory impairments were 19% more likely to self-regulate and drivers with diagnosed medical conditions were 13% more likely.

A potential explanation for this contradictory evidence is that in the second study the drivers themselves were able to describe their medical condition, whereas in the first study, it was measured clinically. This clinical approach may be more sensitive to identifying potential impairments that would have an impact on safety before the older drivers were able to identify the impairments themselves. In support of this, Holland and Rabbitt[71] (1992) demonstrated that older drivers who noticed deterioration in their abilities were more likely to practice self-regulation than those who were less self-aware.

Vision problems were also found to be a predictor of how a driver self-regulates their driving[72]. One paper found that poor scores in acuity, contrast sensitivity, and central and lower peripheral visual fields each predicted that drivers were more likely to have reduced their mileage two years later.

Certain worsening visual functions were also associated with giving up driving in different conditions two years later. Contrast sensitivity and central and lower peripheral visual fields were individually associated with a greater

likelihood of giving up night driving and participants with worse baseline acuity scores were more likely to have given up driving in unfamiliar areas.

One study[73] compared the self-reported health of older drivers with whether they had given up driving within the following two years. Self-reported health was collected from drivers and rated on a scale (poor, fair, good, very good, or excellent). It found that 17% of the drivers who self-reported poor to fair health in the original survey had given up driving two years later. Only 8% of drivers with good to excellent self-reported health had stopped driving within the same period. Overall, 36% of drivers reported poor to fair health at the start of the study, and 11% had stopped driving after two years.

Studies[74] have also examined the relationship between driving ability and self-regulation, which compared a questionnaire on driving habits with an on-road driving test to determine a driver's fitness to drive. It found that a poorer performance on the driving test was not related to overall avoidance of difficult situations. Importantly, this study did identify that there was a relationship between driving ability and avoidance of *specific* difficult driving situations – driving in the rain, driving at night, and driving in the rain at night. Drivers with a high level of confidence in their driving abilities were less likely to self-regulate their behaviour and avoid these specific situations.

This study also identified several barriers to self-regulation. Almost three-quarters (70%) of participants said that they would not be able to maintain their present lifestyle if they stopped driving. Almost half (42%) said that their family and friends would be unavailable to provide transport when required and 44% said that they would be unwilling to ask for such help. One quarter (25%) of participants perceived there was a lack of public transport.

A focus group[75] study to explore older driver opinions to self-regulation found that older drivers were aware that ageing could influence their driving and that they used self-regulation in response to this. Another major theme was that transportation alternatives were not viewed as an option, as they were felt to be non-existent or limited.

The availability of alternative transportation is an important pre-requisite for encouraging older drivers to consider the option of stopping driving.

One paper[76] examined how the provision of public-transport training (referred to as 'transit training' in the paper) and free bus passes changed transportation use in the following year. The groups of older drivers who were given public-transport training reported that they used the bus more frequently than those that did not receive the training. However, the free bus pass did not have any further effect. Between the groups, there were no differences in self-reported miles or days driven per week after the intervention.

There does not appear to be any research that has explored the role of friends and relatives in helping older drivers to self-regulate, and what support could help them. It is a difficult area to evaluate with the role being less formalised than the relationship between a health practitioner and patient, but helping family members deal with the problem may also be an effective way of encouraging effective self-regulation.

Research that helps to develop better understanding of the link between self-regulation and crash risk, and how to help drivers to match the environments that they drive in to their condition would also be a valuable contribution.

Physical activity

Physical health can also influence crash risk and some programmes have tried to address this amongst older drivers by physical training programmes. An evaluated programme in Portugal[77] involved 32 older drivers between the ages of 60 and 80 years participating in an exercise programme designed to address several physical attributes linked with driving performance. Before taking part in the programme, the older drivers had several tests that, for example, looked at reaction time when performing single and dual tasks, or their useful field of vision.

The exercise programme itself consisted of 60 minute supervised sessions taken 3 times a week over a 12-week period comprising of activities designed to be both physically and cognitively stimulating. After 12 weeks, the tests were performed again and researchers found improvements in reaction times, visual attention, and lower limb mobility. However, there was no evidence that the programme affected speed perception. Other programmes addressed some of the physical issues that older drivers have by running an exercise programme over the course of a 3-month period and used in-vehicle assessment to evaluate the programme's effectiveness[78] .

The programme compared a group of 90 drivers (who did not take the exercise programme) with an intervention group of 88 drivers (who did take the programme). Drivers were recruited from clinics and the general community. They were not recruited because there was any suspicion of driving difficulties. The instructors did not know which of the older drivers were in which group. The course was a graduated programme aimed at physical activities required for driving including movements of the shoulders, spine, hip knee and ankle as well as hand strength and upper extremity co-ordination. The course was delivered by two physical therapists who were trained in the course delivery to ensure consistency. Both the control group and intervention group were given monthly in-home education, which covered home safety, falls and vehicle maintenance.

Three months after the intervention, the study group were found to have committed fewer critical errors, compared with the control group, whose driving performance had deteriorated. Although there was a significant difference between the driving evaluator's assessments of the two groups, it is not necessarily clear how this would translate into crash risk - although the authors predicted from previous research that it would lead to an 8% to 16% reduction in crash risk. Larger studies that use crash risk as an outcome measure could help to establish whether physical activity programmes help to reduce the number of older driver accidents.

Driver education

Research[79] has shown that older drivers approve of education programmes for older drivers, which means that there is the potential for high take up of such schemes. One evaluated driver education scheme, the 55 Alive/Mature Driver Education Programme in Canada[80], was designed to provide information on the rules of the road, hazard recognition and changes that affect driving. The programme also encourages drivers to reduce exposure to risky environments and to plan for the time when they will have to give up driving.

The evaluation had three phases[81] – firstly to look at the self-selection bias of drivers enrolling on the study, secondly to examine crash rates, and thirdly to run focus group sessions with men who had attended the programme.

It found that there was a self-selection bias on the programme with drivers who had been involved in an at-fault collision being more likely to attend the course. Perhaps surprisingly the study found that attendance on the programme was associated with higher crash risk for those over the age of 75 years, although there was no change in the crashes amongst younger mature drivers. It was unclear from crash records which of the strategies did influence crash involvement, or whether it was a further factor such as reduced exposure to crash risk.

The focus groups invited drivers to talk about their driving habits and attitudes. The main finding was that the men who had not been involved in a collision following the programme (whether or not they had been in one before the course) used many more of the strategies presented in the programme to self-regulate their driving.

Many older male drivers raised the role of their wives, and individuals in many of the focus groups said that their wives had initially found out about the course and encouraged them to attend. In the group of drivers who had an accident after attending the course it was suggested that their motivation for attending the course was to appease their spouse rather than to learn about strategies to cope with age. This was supported by the inability of this group to recall information presented in the course.

One study[82] expanded upon this approach and explored both classroom and vehicle based older driver education and training programmes. The on-road driver evaluation consisted of two sessions, both of which lasted for around 35 minutes and were conducted on a range of different classes of roads with different speed limits. Whilst on the drive, drivers were expected to perform a number of left and right turns. The second on-road session was conducted 4 - 8 weeks after the completion of the initial intervention.

Driving was evaluated by an instructor in the vehicle and constructive feedback on driving habits was given at the time. It found that classroom sessions could improve a driver's knowledge of safe driving practices, and that the in-vehicle assessment could improve some aspects of safe driving, but did not link these to other variables such as driver confidence or accident rate.

Driver education case study: Guidance for the OLder Driver (GOLD), Norfolk County Council

Norfolk County Council ran the Guidance for the OLder Driver (GOLD) Scheme with funding from a Department for Transport Partnership Grant. An evaluation of GOLD was published in 2009[83].

There were four main steps to the programme. Firstly, older drivers became aware of the programme (which did not define an age range for older drivers, it was left to the drivers themselves to decide whether they were an 'older driver'). Drivers who felt they could benefit from the scheme could contact GOLD and undertake a Pre-drive screening with the GOLD Road Safety Officer, to assess their suitability to participate and establish a supportive atmosphere. Participants believed that this step made the driving assessment more relaxed.

If needed, an ADI would then contact the driver to arrange a driving assessment, following which the GOLD Road Safety Officer would contact the driver to get feedback and find out if they were satisfied with the assessment. If an ADI expressed concern about the person's drive, an additional assessment would be arranged with the GOLD Road Safety Officer accompanying.

A participant would only be advised to give up driving if it was within their best interest and advice on alternative forms of transport would be given along with further assistance. However, the key principle of the scheme was to provide drivers support rather than to stop them from driving. This aspect was particularly appreciated by participants, who also frequently reported that they had picked up some good advice following the drives.

The project aimed to link in with medical practices and the local Primary Care Trust (PCT). Involvement with the PCT at a strategic level was difficult due to internal restructuring and staff movement during the period when the project was running. Similarly, it was difficult to recruit local medical practices via letters and publicity material within the pilot area.

Of the 96 participants in GOLD, it was estimated that only 20% had come via medical referrals. The bulk of participants contacted Norfolk County Council after having seen advertisements or articles in local publications. The Approved Driving Instructors (ADIs) who took the older drivers on the in-car assessments were initially invited to an unpaid information day, which included a presentation from the local mobility centre[84] as well as a seminar on medical conditions that can affect driving.

The ADIs who gave assessments were chosen because of their location and ability to work with older drivers. The latter was important due to the difference in approaches needed between training younger, learner drivers and providing a supportive assessment for elderly drivers.

Example feedback forms were produced to help the ADIs pitch the advice right, following the assessment. As part of a more sensitive approach, the ADIs did not write their feedback report during the drive.

On a more practical note, the routes that the ADIs used were also adapted to encompass the types of road and conditions routinely encountered by the older drivers, rather than using typical learner routes, which would try to encompass a much wider range of conditions and roads. Many participants also commented on the length of the assessment drive, and so ADIs observed if a driver became fatigued during it.

One important challenge, which the GOLD project identified – and which is of relevance to any organisation running similar schemes, is how to promote the scheme so that it reaches and encourages people who would be less confident and comfortable with taking part in an assessment.

Good information and advice about alternative means of travel and lifestyle adaptations should be provided for those older drivers who reach a point where giving up driving may be the right thing to do. Alternative means of transport should be supported and promoted wherever possible, in order to enable older people who do not drive to maintain their independence.

Online Advice

A national Older Drivers website was produced by RoSPA in 2016 with support from the Department for Transport.

It is designed to help drivers to:

- Recognise whether and how their driving is changing
- Decide what they can do to cope with these changes and to find help, such as medical advice, driving assessments and training and vehicle adaptations
- Find a driving assessment or refresher training for your needs
- Understand your legal obligations, such as DVLA rules and procedures
- Plan for the need to change when and where you drive, and if it becomes necessary, to retire from driving.

One of its main functions is to help drivers to find a driving assessment in their local area. There are two main types of assessments:

- Detailed driving assessments provided by mobility centres for people with a medical condition or disability which affects their driving, or who are returning to driving after an accident or injury
- Simple driving assessments that do not include any medical assessment or advice., mostly provided by Local Authorities and organisations such as RoSPA, the IAM RoadSmart for people who just need a little help and advice on how to improve their driving.

Local initiatives include the Hampshire and Isle of Wight Older Drivers Forum, the Senior Road Safety – Kent Focus and the Older Drivers Forum – Dorset.

Re-licensing

Several countries and regions have a process of reapplying for a licence at a certain age. Successful reapplication is generally dependent upon the driver's fitness to drive, and this can either be through a mandatory or self-reported process.

In the UK, drivers' licences expire at the age of 70 years, and in order to renew the licence, and continue to drive; drivers must complete a form and certify that they are fit to drive. They must then repeat this every three years. This can be a helpful prompt to drivers to consider their health in relation to their driving as they get older. The licence holder must report any medical condition that could affect their ability to drive safely to the DVLA.

Several studies have looked at the potential effectiveness of re-licensing. Australian research[85] compared the accident rate of two sets of drivers, one from Victoria, where there was no re-licensing assessment, and one from New South Wales where drivers over 80 years have to provide annual medical certificates, and pass an on-road driving exam from the age of 85 years. This study used fatal accident data from Victoria and New South Wales, along with population and licensing data for both states.

As well as comparing the older driver fatalities in the two states, the 40 - 49 years age range was examined to look at any underlying road safety differences between the two states. Victorian drivers were associated with a slightly lower fatality rate, which was marginally statistically significant, and a significantly lower fatality rate for occupants not in the same vehicle.

Victorian drivers had a passenger fatality rate, which was two to three times higher than New South Wales drivers were, although the researchers stated that this could not logically be attributed to the differences in licensing procedure. The difference disappeared when accounting for passenger occupancy rates in Victoria.

Accounting for the higher passenger rate of Victorian vehicles, there were no statistically significant differences between the two groups, and the researchers suggested the results show that age-based mandatory assessment of older drivers about 80 years did not have any effect on the accident rates.

The authors stress that Victorian roads are around 7 % safer than roads in New South Wales and there may be other differences not examined in the study. A caution must be mentioned about extrapolating the findings of this study to the effectiveness of other re-licensing arrangements in different countries.

Studies on licence renewal procedures dated back to the 1980s and typically suggest that more rigorous tests for licence renewal do not have an impact on road safety. Rather, asking older drivers to complete an assessment to renew their driving licence reduces licence holding and the mobility of older people, as some drivers may fear needing to take a test. Therefore, an assessment may be counterproductive as it is likely to have limited road safety benefits and could reduce mobility of older people[86].

Licensing restrictions

A further approach is licensing restrictions, which only allow the holder to drive in certain conditions. This would work in a similar way to graduated licensing schemes, which are used in some countries to prevent young driver accidents. One Canadian paper[87] looked at older driver's attitudes to a similar approach and used interviews to determine the attitudes of older drivers towards several different restrictions, which all had varying influences on accident risk. It used a variation on a research method called the gamble technique to examine how favourable

drivers were to different restrictions. It found, perhaps unsurprisingly, that the greater the restriction on driving habits, the less favourable it was viewed by older drivers.

The results are shown in table 5 below.

Table 5, older driver acceptance of different licensing restrictions

Restriction	Acceptance
Permitted to drive only with corrective lenses (if prescribed by optometrist or physician)	0.98
Permitted to drive only if undergoes regular assessments specified by the provincial Ministry of Transportation	0.94
Permitted to drive only vehicles outfitted at the driver's own expense with special equipment to address specific needs	0.94
Permitted to drive only during daylight hours	0.93
Not permitted to drive on certain types of roads (i.e. Highways with four lanes or more, and a speed limit of 100km per hour)	0.89
Not permitted to drive during rush hour	0.87
Not permitted to take left turns	0.69
Permitted to drive only on roadways with a specific speed limit	0.50
Permitted to drive only within a 10-km radius of home	0.45
Permitted to drive only to specific destinations (e.g. grocery store, doctors office, work place)	0.45
Permitted to drive only if accompanied by a licensed driver	0.42

There was a high approval for Ministry of Transport assessments, which covered both on-road driving assessment and medical assessment.

Negative consequences of driving cessation

Driving provides mobility, independence and better access to social activities. For this reason, driving can greatly improve the quality of life.

The Centres for Disease Control in the US set out a chain of events that typify age-related changes in driving[88], which highlight the health consequences of reduced mobility:

1. Physical and mental changes lead to reduction in skills needed for safe driving
2. Age related physical and mental changes lead to a reduction in driving while also increasing the risk of crashes
3. Reductions in driving lead to a reduction in senior mobility
4. Reductions in mobility lead to quality of life consequences, including reduced activity levels

There is a strong association between limiting the ability to drive and the level of out-of-home activity level, and one paper[89] presents the evidence that limiting this affects many quality of life issues, mental and social wellbeing. Conversely, the paper presents evidence that an active lifestyle is protective against risk of stroke, heart disease, and fractures, amongst others. Research has also discovered that giving up driving is associated with several other negative health outcomes, such as isolation, depression, early entry into a long-term care facility and caregiver burden[90].

A literature review[91] of the issues associated with the transportation and mobility needs of older drivers found clear evidence that quality of life is reduced for older people when they stop driving. The paper modelled driving status

as part of a web of interactions, where it could have an impact on physical and psychological health, community mobility and use of health services.

The review also looked at the potential results of driving reduction and cessation, and found a range of detrimental consequences, which would affect the driver, such as a more negative outlook on the future quality of life. Some papers in the review found evidence that losing a licence was associated with increased depression, a loss of self-confidence, status, and some of the papers reviewed also suggested a risk of early death.

The review also found that some groups of older drivers, such as women and the financially disadvantaged were more likely to suffer greater consequences from driving cessation. This was reflected in studies from a wide range of different countries. One study included in the review[92] listed reasons why the cessation of driving would have a greater impact on older women than men did:

- Many older women live alone
- Women who will be 85 years old in 2 decades will have had fewer children and therefore fewer people to provide assistance
- Women who have children will still experience difficulty getting assistance as their children are likely to be busy raising their own families
- Women will be less likely to have the resources to be able to buy assistance or services they need as they face mobility problems.

Summary

An important aspect of older driver policy is being able to identify accurately which drivers are more likely to be involved in crashes and when this risk increases to the point when they are no longer fit to drive. It is crucial that interventions do not unfairly cause older drivers to lose their licence prematurely, as this often has devastating consequences their quality of life and mental and physical well-being.

Several cognitive and physical conditions affect the ability to drive safely, and therefore could act as indicators of increased risk. One question is how best to test for these conditions: by a medical practitioner and/or in-vehicle driving assessment.

It is clear that many older drivers recognise that their driving ability has changed and consequently change when and where they drive (through self-regulation). However, not all older drivers do this and there is little guidance for them about it. For example, there may be some simple indicators, (such as difficulty in tying shoelaces or walking a short distance) that may be a sign to consider one's driving ability.

A major deterrent to self-regulation or stopping driving is the lack of viable alternatives to the car. Public transport is not perceived as meeting the needs of people who do not drive.

Exercise programmes are one way of maintaining health and driving ability as people get older. Driver education programmes specifically tailored for older drivers are another important method, although it can be hard to make sure that the programme reaches the right people.

A key question is how and when drivers should be relicensed. In the UK, this occurs at 70 years (and every three years thereafter) and requires only the driver to self-certify that they are fit to drive. Research does not suggest that a mandatory driving test would be effective.

Recent research

A recent (January 2020) report[93], commissioned by the RAC foundation and designed to investigate age-related driving research, described a range of interesting findings. Firstly, it is difficult to come to a consensus on how increasing age affects crash risk. This is because of individual differences – the ageing process affects people in hugely different ways, meaning it is difficult to assess how declines affect driving on an individual basis.

Secondly, it was found that there is little need to re-engineer road infrastructure to support older drivers (a systems approach), as it is already sufficient in most developed countries, and if we try to engineer it further to accommodate, we could induce behavioural changes in other road users, which would actually serve to make the situation worse for older drivers.

The report continues by stating that we should focus on changing the behaviour of older drivers to improve how they interact with traffic, as well as encouraging self-regulation. Crucially, the report also states that older driver stereotypes must be targeted in order for individuals to feel more at ease with self-regulating their driving, in the knowledge that this does not mean they must stop driving completely.[93]

At an Older Drivers Forum[94] meeting in February 2019, statistics from 354 Wessex Driveability Fitness to Drive assessments[95] were discussed: it was found that the percentage of older individuals determined to be unsafe drivers after taking refresher training dropped dramatically (from around 55% to around 22%) for both men and women from the age of around 82 onwards. This shows that encouraging behavioural change through methods such as refresher training can be incredibly effective, particularly for drivers over the age 80.

Conclusion

Older people are an increasing proportion of the population. Mobility is vital to maintaining a full and independent life, but as we grow older, it is inevitable that our general health and fitness begins to deteriorate. This often causes concern that older drivers may be at a higher risk of being involved in road crashes. Therefore, we need to help people maintain safe mobility as they get older.

Ultimately, age related conditions may eventually mean that individual drivers reach a point when they must give up driving. However, policies that prematurely remove an elderly person's entitlement to drive can have negative consequences for their health and quality of life. These consequences can outweigh the reduction in crash risk to the driver and the rest of society. Therefore, interventions must be proportionate to the risk, and a judgement must be made as to whether an individual intervention gets the balance right.

Engineering measures, such as road or vehicle design, help to prevent accidents and injuries to older road users, but they are not covered within the scope of this paper, which primarily considers education, training and publicity measures. However, they are fundamental to helping drivers maintain a good level of safe mobility.

RoSPA does not believe there should be a maximum driving age beyond which drivers automatically lose their driving licence. Research does not suggest that a mandatory driving test at licence renewal would be effective. We are not aware of research evidence to indicate that there is an age at which drivers become unable to drive safely. Setting an arbitrary age limit would inevitably be unfair to some drivers.

Ceasing driving can have significant negative consequences on the health of older drivers. This is only recommended if the safety of the driver or other road users cannot be secured by any other means. It is important that tools used to assess the impact of health conditions on driving standards are accurate.

Transport planners should cater for older road users who may be considering giving up driving. It is unlikely that people will consider giving up the freedom and convenience of driving their own car unless there are suitable, safe, clean, attractive, convenient and affordable alternatives.

References

[1] Assessing fitness to Drive: A Guide for Medical Professionals, DVSA, 2017 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/652720/assessing-fitness-to-drive-a-guide-for-medical-professionals.pdf
[2] Independent Age. 2017. Behind the wheel: tips for safe and confident driving in later life. Available at: https://www.independentage.org/sites/default/files/2017-09/Advice-Guide-Behind-the-wheel_0.pdf (accessed March 2018).
[3] National Population Projections: 2016-based statistical bulletin, Office for National Statistics, 2017 https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationprojections/bulletins/nationalpopulationprojections/2016basedstatisticalbulletin
[4] WHO. Preamble to the Constitution of the World Health Organization as adopted by the International Health Conference, New York, 19-22 June 1946, and entered into force on 7 April 1948.
[5] Table RAS30024: Reported casualties by age band, road user type and severity, DfT, 2020 https://www.gov.uk/government/statistical-data-sets/ras30-reported-casualties-in-road-accidents
[6] Table RAS30024: Reported casualties by age band, road user type and severity, DfT, 2020 https://www.gov.uk/government/statistical-data-sets/ras30-reported-casualties-in-road-accidents
[7] Table RAS30025: Reported casualty rates by age band, road user type and severity, DfT, 2020 https://www.gov.uk/government/statistical-data-sets/ras30-reported-casualties-in-road-accidents
[8] Road Safety Observatory. 2017. Older drivers review. http://www.roadsafetyobservatory.com/Review/10045 (accessed March 2018).
[9] Department for Transport. 2015. Working together to build a safer road system: British Road Safety Statement. (accessed March 2018).
[10] Supporting safe driving into old age, Older Drivers Task Force, 2016, http://roadsafetyfoundation.org/making-older-drivers-safer-longer/
[11] Poulter DR, Wann JP. 2013. Errors in motion processing amongst older drivers may increase accident risk. Accident Analysis & Prevention. 2013:57(150-156). Available at: https://www.sciencedirect.com/science/article/pii/S0001457513001292 (accessed March 2018).
[12] Alzheimer's Society. No date cited. Driving. Available at: https://www.alzheimers.org.uk/info/20030/staying_independent/27/driving (accessed March 2018).
[13] Table RAS30024: Reported casualties by age band, road user type and severity, DfT, 2020 https://www.gov.uk/government/statistical-data-sets/ras30-reported-casualties-in-road-accidents
[14] Road Safety Research Report 109 Collisions Involving Older Drivers: An In-depth Study. Clarke et al. Department for Transport: London. September 2009
[15] Supporting Safe Driving Into Old Age: A National Older Driver Strategy. Clarke et al, 2007, cited in Older Drivers Task Force, 2016.
[16] Predictors of injury among younger and older adults in fatal motor vehicle crashes. Awadzi KD, Classen S, Hall A, Duncan RP, Garvan CW. Accid Anal Prev 2008; 40(6): 1804-10.
[17] Maintaining safe mobility for the ageing population: the role of the private car. RAC Foundation, 2010.
[18] Intersection Crashes Among Drivers in Their 60s, 70s, and 80s Sifrit, K. J. Martell, C. and Staplin, L. 2011. Paper DOT HS 811 495, NHTSA, US Department of Transportation, Washington DC.
[19] Supporting Safe Driving Into Old Age: A National Older Driver Strategy. Older Drivers Task Force, 2016.
[20] Collisions involving senior drivers: high-risk conditions and locations. Mayhew DR, Simpson HM, Ferguson SA. Traffic Injury Prev 2006; 7(2): 117-24.
[21] Factors Affecting Common Vehicle-to-Vehicle Collision Types: Road Safety Priorities in an Aging Society. Ulfarsson GF, Kim S, Lentz ET. Transp Res Rec 2006; 2006(1980): 70-78.
[22] Supporting Safe Driving Into Old Age: A National Older Driver Strategy. Levin et al, 2009, cited in Older Drivers Task Force, 2016.
[23] Supporting Safe Driving Into Old Age: A National Older Driver Strategy. Older Drivers Task Force, 2016.
[24] Supporting Safe Driving Into Old Age: A National Older Driver Strategy. Older Drivers Task Force, 2016.

[25] Why do drivers have more 'failed to look' crashes? A simulator based study. TRL, 2012.
[26] Supporting Safe Driving Into Old Age: A National Older Driver Strategy. Older Drivers Task Force, 2016.
[27] Driving responses of older and younger drivers in a driving simulator. Fildes BN, Charlton J, Muir C, Koppel S. Annu Proc Assoc Adv Automot Med 2007; 51: 559-72.
[28] Why do drivers have more 'failed to look' crashes? A simulator based study. TRL, 2012.
[29] Age-related differences in visual scanning at median-divided highway intersections in rural areas. Bao S, Boyle LN. Accid Anal Prev 2009; 41(1): 146-52.
[30] Eye fixation scanpaths of younger and older drivers in a hazard perception task. Underwood G, Phelps N, Wright C, Van Loon E, Galpin A. Ophthalmic Physiol Opt 2005; 25(4): 346-56.
[31] Judgments about collision in younger and older drivers. DeLucia PR, Kathryn Bleckley M, Meyer LE, Bush JM. Transp Res F Traffic Psychol Behav 2003; 6(1): 63-80.
[32] Age-related differences in collision detection during deceleration. Andersen GJ, Cisneros J, Saidpour A, Atchley P. Psychol Aging 2000; 15(2): 241-52
[33] Maintaining safe mobility for the ageing population: the role of the private car. RAC Foundation, 2010.
[34] Comparison of severity affecting factors between young and older drivers involved in single vehicle crashes. Dissanayake S. IATSS Res 2004; 28(2): 48-54.
[35] Relations among chronic medical conditions, medications, and automobile crashes in the elderly: a population-based case-control study. McGwin G, Sims RV, Pulley L, Roseman JM. Am J Epidemiol 2000; 152(5): 424-31.
[36] Collisions involving senior drivers: high-risk conditions and locations. Mayhew DR, Simpson HM, Ferguson SA. Traffic Injury Prev 2006; 7(2): 117-24.
[37] Previous convictions or accidents and the risk of subsequent accidents of older drivers. Daigneault G, Joly P, Frigon JY. Accid Anal Prev 2002; 34(2): 257-61.
[38] Passengers and other factors affecting the safety of young and older drivers. Padlo P, ultman-Hall L, Stamatiadis N. Transp Res Rec 2005; 2005(1937): 7-13.
[39] Cohort effects in older drivers' accident type distribution: are older drivers as old as they used to be? Hakamies-Blomqvist L, Henriksson P. Transp Res F Traffic Psychol Behav 1999; 2(3): 131-138.
[40] A pattern analysis of traffic crashes fatal to older drivers. Skyving M, Berg H, Laflamme L. Accid Anal Prev 2009; 41(2) 253-8.
[41] A re-assessment of older drivers as a road safety risk. Langford J, Koppel S, Charlton J, Fildes BN, Newstead S. IATSS Res 2006; 30(1): 27-37.
[42] Driver ageing does not cause higher accident rates per km. Hakamies-Blomqvist L, Raitanen T, O'neill D. Transp Res F Traffic Psychol Behav 2002; 5(4): 271-274.
[43] Older drivers do not have a high crash risk-A replication of low mileage bias.
Langford J, Methorst R, Hakamies-Blomqvist L. Accid Anal Prev 2006; 38(3): 574-578.
[44] 'Low mileage bias' and related policy implications: A cautionary note. Staplin L, Gish KW, Joyce J. Accid Anal Prev 2008; 40(3): 1249-52.
[45] In defence of the 'low-mileage bias'. Langford J, Koppel S, McCarthy D, Srinivasan S. Accid Anal Prev 2008; 40(6): 1996-9.
[46] Risk of fatality from physical trauma versus sex and age; J Trauma 28: 368-378, 1988
[47] Fragility and crash over-representation among older drivers in Western Australia. Meuleners LB, Harding A, Lee AH, Legge M. Accid Anal Prev 2006; 38(5): 1006-1010.
[48] Fragility versus excessive crash involvement as determinants of high death rates per vehicle-mile of travel among older drivers. Li G, Braver ER, Chen LH. Accid Anal Prev 2003; 35(2): 227-35
[49] Older drivers: On-road and off-road test results. Selander et al. (2011). Accident Analysis and Prevention, 43(1):1348-1354.
[50] Can high-risk older drivers be identified through performance-based measures in a department of motor vehicles setting? Ball KK, Roenker DL, Wadley VG, Edwards JD, Roth DL, McGwin G, Raleigh R, Joyce JJ, Cissell GM, Dube T. J Am Geriatr Soc 2006; 54(1): 77-84.
[51] Cognitive Decline and Older Crash Risk. Fraade-Blanar et al, *American Geriatrics Society*, 2018; DOI: 10.1111/jgs.15378
[52] Implications of vision testing for older driver licensing. Bohensky M, Charlton J, Odell M, Keeffe J. Traffic Injury Prev 2008; 9(4): 304-13.
[53] Vision and driving. Owsley, M. and McGwin, G. Vision Res 2010, 50(23): 2348-2361.
[54] Survey of older drivers' experiences with Florida's mandatory vision re-screening law for licensure. McGwin G, McCartt AT, Braitman KA, Owsley C. Ophthalmic Epidemiol 2008; 15(2): 121-7.
[55] Driving tests with older patients: effect of unfamiliar versus familiar vehicle. Lundberg C, Hakamies-Blomqvist L. Transp Res F Traffic Psychol Behav 2003; 6(3): 163-173.

[56] Exploratory study of incident vehicle crashes among older drivers. Sims RV, McGwin G, Allman RM, Ball K, Owsley C. J Gerontol A Biol Sci Med Sci 2000; 55(1): M22-7.
[57] Factors related to driving difficulty and habits in older drivers. Lyman JM, McGwin G, Sims RV. Accid Anal Prev 2001; 33(3): 413-21.
[58] Mobility Impairments in Crash-Involved Older Drivers. Sims RV, McGwin G, Pulley L, Roseman JM, Owsley C. Annu Proc Assoc Adv Automot Med 1999; 43: 203-212.
[59] Mobility impairments in crash-involved older drivers. Sims RV, McGwin G, Pulley LV, Roseman JM. J Aging Health 2001; 13(3): 430-8.
[60] Association between road vehicle collisions and recent medical contact in older drivers: a case-crossover study. Leproust S, Lagarde E, Suissa S, Salmi LR. Inj Prev 2007; 13(6): 382-7.
[61] The Attitudes of Health Professionals to Giving Advice on Fitness to Drive, Road Safety Research Report No. 91, Jan 2010, DfT
[62] Maintaining safe mobility for the ageing population: the role of the private car. RAC Foundation, 2010.
[63] Family physicians' attitudes and practices regarding assessments of medical fitness to drive in older persons. Jang RW, Man-Son-Hing M, Molnar FJ, Hogan DB, Marshall SC, Auger J, Graham ID, Korner-Bitensky N, Tomlinson G, Kowgier ME, Naglie G. J Gen Intern Med 2007; 22(4): 531-43.
[64] Driving and dementia in older adults: Implementation and evaluation of a continuing education project. Meuser TM, Carr DB, Berg-Weger M, Niewoehner P, Morris JC. Gerontologist 2006; 46(5): 680-7.
[65] The relationship between cognitive ability, insight and self-regulatory behaviors: Findings from the older driver population. Wong et al (2012). Accident Analysis and Prevention 2012; 49: 316-321.
[66] The relationship between cognitive ability, insight and self-regulatory behaviors: Findings from the older driver population. Fonda et al (2001) cited in Wong et al (2012). Accident Analysis and Prevention 2012; 49: 316-321.
[67] Characteristics of older drivers who adopt self-regulatory driving behaviours. Charlton JL, Oxley J, Fildes BN, Oxley P, Newstead S, Koppel S, O'Hare M. Transp Res F Traffic Psychol Behav 2006; 9(5): 363-373.
[68] Older drivers' aberrant driving behaviour, impaired activity, and health as reasons for self-imposed driving limitations. Rimmo PA, Hakamies-Blomqvist L. Transp Res F Traffic Psychol Behav 2002; 5(1): 47-62.
[69] Error specific restrictions for older drivers: Promoting continued independence and public safety. Freund B, Colgrove LA. Accid Anal Prev 2008; 40(1): 97-103.
[70] Characteristics of older drivers who self-limit their driving. Braitman KA, McCartt AT. Ann Adv Automotive Med 2008; 52: 245-54.
[71] The relationship between cognitive ability, insight and self-regulatory behaviors: Findings from the older driver population. Holland and Rabbitt (2001) cited in Wong et al (2012). Accident Analysis and Prevention 2012; 49: 316-321.
[72] Measures of visual function and their association with driving modification in older adults. Freeman EE, Muñoz B, Turano KA, West SK. Invest Ophthalmol Vis Sci 2006; 47(2): 514-20.
[73] Self-reported health and driving cessation in community-dwelling older drivers. Sims RV, Ahmed A, Sawyer P, Allman RM. J Gerontol A Biol Sci Med Sci 2007; 62(7): 789-93.
[74] Self-regulation of driving and its relationship to driving ability among older adults. Baldock MR, Mathias JL, McLean AJ, Berndt A. Accid Anal Prev 2006; 38(5): 1038-1045.
[75] A qualitative exploration of self-regulation behaviors among older drivers. Donorfio LK, Mohyde M, Coughlin J, D'Ambrosio L. J Aging Soc Policy 2008; 20(3): 323-39.
[76] Impact of transit training and free bus pass on public transportation use by older drivers. Stepaniuk JA, Tuokko H, McGee P, Garrett DD, Benner EL. Prev Med 2008; 47(3): 335-337.
[77] The Effects of an Exercise Programme on Several Abilities Associated With Driving Performace In Older Adults. Jose F Marmeleira, Mario B Godinho and Orlando M Fernandes. Accid Anal Prev 2009; 41(1): 90-97
[78] A randomized trial of a physical conditioning programme to enhance the driving performance of older persons. Marottoli RA, Allore H, Araujo KL, Iannone LP, Acampora D, Gottschalk M, Charpentier P, Kasl S, Peduzzi P. J Gen Intern Med 2007; 22(5): 590-7.
[79] Older Individuals' Perceptions Regarding Driving: Focus Group Findings. Kua A, Korner-Bitensky N, Desrosiers J. Phys Occup Ther Geriatrics 2007; 25(4): 21-40.
[80] http://www.safety-council.org/training/55alive/55alive.htm
[81] Crash risk of older drivers after attending a mature driver education programme. Nasvadi GE, Vavrik J. Accid Anal Prev 2007; 39(6): 1073-9.
[82] The combination of two training approaches to improve older adults' driving safety. Bedard M, Porter MM, Marshall S, Isherwood I, Riendeau J, Weaver B, Tuokko H, Molnar F, Miller-Polgar J. Traffic Injury Prev 2008; 9(1): 70-6.
[83] An Evaluation of the GOLD Pilot Scheme, RSN Associates, March 2009

[84] East Anglian DriveAbility - http://www.mobility-centres.org.uk/
[85] Do age-based mandatory assessments reduce older drivers' risk to other road users? Langford J, Bohensky M, Koppel S, Newstead S. Accid Anal Prev 2008; 40(6): 1913-8.
[86] Maintaining safe mobility for the ageing population: the role of the private car. RAC Foundation, 2010.
[87] The acceptability to older drivers of different types of licensing restriction. Marshall SC, Man-Son-Hing M, Molnar F, Wilson KG, Blair R. Accid Anal Prev 2007; 39(4): 776-793.
[88] Older Adults, Transportation and Longevity, Centres for Disease Control and Prevention. (2000) Atlanta, GA.
[89] Consequences of driving cessation: Decreased out-of-home activity levels. Marottoli RA, de Leon CFM, Glass TA, Williams CS, Cooney LM, Berkman LF. J Gerontol B Psychol Sci Soc Sci 2000; 55(6): S334-40.
[90] Cognitive Decline and Older Crash Risk. Fraade-Blanar et al, *American Geriatrics Society*, 2018; DOI: 10.1111/jgs.15378
[91] It cannot be all about safety: the benefits of prolonged mobility. Oxley J, Whelan M. Traffic Injury Prev 2008; 9(4): 367-78
[92] Asking the Right Question. Understanding the Travel Needs of Women Who Do Not Drive. Rosenbloom S and Winsten-Bartlett C. Transportation Research Record, 2002 Vol 1818 pp. 78-82
[93] Supporting Older Driver Mobility. RAC Foundation, 2020.
[94] Older Drivers Forum, 'About us', https://olderdriversforum.com/about/, Date Accessed: 09/06/2020
[95] Wessex Driveability, 'Driving and Transfer Assessments', https://www.wessexdriveability.org.uk/assessments/, Date Accessed: 09/06/2020

***Due to changes in severity reporting across some police forces since 2016, newer statistics are not comparable to earlier years. Therefore, the DfT provides both adjusted and unadjusted casualty figures in their statistical data tables. RoSPA uses adjusted figures as the DfT states that they are recommended for "the analysis of trends over time".**