A literature review of older driver training interventions: implications for the delivery programmes by 
Devon County Council and Devon Road Casualty Reduction Partnership

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1. Executive Summary

The aim of the research was to examine the evidence as to whether or not training interventions result in safer older drivers. Older driver training ultimately intends to increase awareness and knowledge of driving safely in order to reduce the risk of being involved in a collision. Crash involvement and severity are rarely used as a metric due to the difficulty of studying participation at training interventions and subsequent crash risk. Training interventions rest on the assumption that increasing safer driving knowledge and skills will reduce drivers risk. The use of collision data is the ultimate measure of effectiveness but is often complex to explore.

A number of recommendations for Devon County Council have been made from the evidence on older driver training interventions.

1. To ensure that older drivers participate in a combination of both in-class education and on-road training as this has shown to produce the highest increase in driver knowledge, awareness and safe skills specific to driving.
2. Criteria for the effectiveness of older driver training interventions need to be established.
3. Gender differences have been identified in terms of the compensatory strategies of driving and driving cessation. Information given to women needs to focus on driving skills and increased confidence for difficult driving situations (women are more inclined to stop driving unnecessarily early). In comparison men (who tend to delay driving cessation) need information on age-related declines influencing their driving and support about driving cessation.
4. Despite evidence of the need for practical training, it has been shown that self-assessment tools can be useful in providing older drivers an opportunity to examine their skills. It can also be used as a discussion point for addressing age-related declines with their family.
5. In order to increase learning transfer during in-class education an interactive lecture style should be adopted and key aspects of workshop material should be repeated to ensure it is retained by older people. Material to read following the workshop allows individuals to learn at their own speed and reduces the amount of information being presented in the workshop.
6. In the future it may be useful to follow the three-step approach used in this report in the decision making and reasoning processes for interventions. The target audience needs and
perspectives identified, relevant crash data examined and existing intelligence review to identify best practice.

In addition, there are several areas that have potential to benefit older drivers, but are, as yet, under explored. These include;

- Many training intervention studies use a methodology that compares an intervention and no intervention. There is a lack of information on the content of the intervention and which aspects of the content are effective at increasing safer driving knowledge and skills. The content of interventions could be explored further.
- Cognitive training includes tasks where older adults performance of memory, attention and motor skills are increased. These skills are used when driving; therefore this type of training intervention may increase older drivers safety.
- Establishing the relative frequency of the older driver as victim or perpetrator in collisions. This will inform decisions as to the content of interventions, should they be skills based (perpetrator) or train drivers in defensive strategies (victim).
- Mechanisms to increase the participation of older drivers in training interventions so that they reach a larger and more varied sample of the target population.
- Whether on-road training sessions should take a coaching or didactic approach.
2. Background to recommendations and consideration for Devon County Council in relation to the evidence found on older driver training interventions

2.1 Overview

In order to make evidence based recommendations with respect to older driver interventions clarity is required as to what driving-related issues are important for older drivers. The research literature was reviewed and issues that were considered included; what interventions have been used previously, how their success is measured and also how practical and budget constraints interact with the suitability of different interventions. The research relating to each of these themes is briefly summarised below. A full review of research is located in the supplementary information.

2.1.1 Ageing and driving

A number of characteristics are associated with older drivers including physical, cognitive and sensory functioning that may influence driving ability.¹ Ageing can result in psychological and physiological effects that negatively affect driving and may lead to involvement in collisions. For example, limitation of movement of the spine, reduced sensory ability and loss of confidence.² It is important to consider that there are individual differences in the ageing process, however even the healthiest older adults experience a decline in basic functioning.³

An ageing population and increases in longevity owing to advances in healthcare both mean that the proportion of older drivers in the UK is likely to increase.⁴ For older adults being able to continue to drive is considered vital for maintaining independence, health and a high quality of life.⁵ It is considered important that society support older drivers to continue to driver until they become a threat to themselves or to others.⁶

Older drivers have been shown to use coping strategies, such as self-regulating their driving behaviour in order to reduce their risk of being involved in a collision. For example, reducing their exposure on the roads by not driving in adverse weather conditions.⁷ There have been gender differences found in self-regulation patterns and attitudes towards driving.⁸ Women were found to express lower levels of driving confidence and be more willing to accept changes in their driving ability
compared to men. Women tended to stop or reduce driving earlier than they needed, whereas males tended to leave it too long.9

2.1.2 Existing intelligence and best practice for older driver training interventions

The main issue in evaluating older driver training is establishing the effectiveness of the intervention measured. Training is often seen as successful when objectives of the course are met and assessments passed. However, older driver training should show benefits for road safety but this is difficult to show due to a variety of contributing factors involved in a collision and gathering data.10 There is a difficulty of demonstrating casualty reduction but it is imperative that there is a rationale for claiming an intervention is successful, such as increased safe skills and knowledge.

Training interventions have focused on addressing the needs of older drivers, for example identifying particular impairments11, changing driver behaviour and knowledge12 and promoting behavioural strategies to compensate for age decline.13 Increasing knowledge and behaviours that will lead to safe driving is assumed to lead to a reduction in collisions. Research has shown that the combination of on-road training and in-class education results in increased awareness, driver knowledge and skills specific to driving.14 Older drivers have been shown to be good candidates for in-class education training due to their motivation to continue driving, time to attend class and ability to acquire information in an interactive environment.

In the United States training interventions mainly include education courses due to mandatory-age based assessments. The main aims of the courses are to increase awareness and knowledge as some individuals may not be able to recognise their declining abilities. Cognitive training has begun to emerge as it is believed that improving cognitive abilities may increase older driver safety.15 Within the United Kingdom local authority road safety units are the main sources of information and training for older drivers. There are a variety of training programs available in the UK with some authorities having very little support available for older drivers, whereas others offer educational interventions and assessments on the road. Suffolk authority suggests that older driver education interventions are not always effective and due to older drivers being resistant to change and over-confidence after the course.16
There are number of limitations to the evidence with respect to older driver interventions, including the extent to which study findings can be implemented in other situations, the differences found in the definitions of effective training and increased driver safety. Self-report methods have been used to evaluate training interventions which may bias the results found. Since there are no standardised programs for older driver training interventions it is difficult to generalise overall positive outcomes (see Supplementary Information, Section 2).

2.1.3 Devon County Council Statistical Data, Budget and Decision making

The STATs19 collision data was examined for Devon to quantify and describe the involvement of older drivers in collisions in Devon and thus tailor recommendations about interventions. The data showed that between 1992 and 2009 collisions caused by older drivers (aged 55 and above) constituted 20% of collisions. In Devon 36% of the population in 2008 was aged 55 and above.\textsuperscript{17} When older drivers were involved in a collision there tended to be increased injury severity compared to other age groups. In addition, older pedestrian or passenger casualties experienced greater injury severity compared to older driver casualties. As driver age increased, reversing and turning right were more likely to be recorded as the blameworthy driver manoeuvre. These manoeuvres require physical and sensory functioning that generally declines with age (e.g. flexibility in neck and upper arms) which may provide an explanation to why these manoeuvres are problematic. The majority of casualties caused by drivers aged 55+ occurred between 9:00-16:00. However, data has not been examined to whether this age group is significantly different to other age groups in the time of causing casualties. It may be because there are a higher number of older drivers are on the road during these times due to avoidance of driving in darkness but this is not clear. Environmental conditions in which the percentage of casualties caused by blameworthy drivers 55+ is high includes “fine with high winds”, “fine without winds” and “dry road surface conditions”. This implies that generally weather conditions are good when casualties are caused by drivers 55+, however many casualties are also caused when conditions are wet and damp.

The current budget for Devon Road Casualty Reduction Partnership allocated to older drivers is £25,000 from an overall £200,000 budget. This suggests that compared to other projects a small proportion of the whole budget is spent on older driver training interventions. However, the...
interventions are run through Devon Drivers’ Centre by a small project team and so the costs and overheads associated with the program delivery are small. In the future, there will probably be a reduced amount of budget available but the importance of the training for older drivers will remain high due to evidence of an aging population. The reason for the current Driving Safer For Longer (DSFL) program being established was due to a police officer attending a collision involving an older driver, research being carried out into the demographic profile of Devon and this leading to concerns being expressed. A reduced budget is anticipated in the future which will lead to a change in investment from product, resource development and delivery to concentrating mainly on delivery.

3. Recommendations for Devon County Council

Outline of successful interventions and the evidence to support them;

1. A combination of in-class education and on-road training has been shown to produce the highest increase in of driver knowledge, awareness and safe skills specific to driving.\(^1,14,18\).

Therefore it is vital to emphasise the importance in the current DSFL workshop of also attending the on-road practical driving skills to increase safe driving. The success of this could be monitored by identifying the number of individuals that attend the workshop and then those who continue onto the practical driving skills session.

2. The criterion for the effectiveness of any intervention needs to be established. The project team for older drivers at Devon County Council have already identified the need to evaluate the current DSFL program. The first step towards evaluating the program should be establishing what is meant by the intervention being effective. In the Devon Road Casualty Reduction Partnership delivery plan success criteria is defined as a reduction in the number and severity of incidents involving older drivers. This may be difficult to address without undertaking controlled trials and longitudinal studies which may not be viable with the resources available at Devon County Council. However, if the resources were available studies could be designed to link attendance at driving safer for longer workshops and on-road assessments to collision risk. Instead it may be beneficial to identify increased knowledge and safer driving specific skills resulting from the current training intervention as being effective. Individual’s knowledge of safe driving could be measured pre and post the in-class education workshop and on-road practical driving skills
Knowledge in-class could be measured by a questionnaire and an evaluation of driving could be carried out in the practical driving skills session.\textsuperscript{19}

3. **The information given to men and women in training interventions should be tailored to their needs.** Gender differences have been identified in terms of the compensatory strategies of driving and driving cessation in older drivers. Women need information about driving skills and increased confidence for difficult driving situations because this may prevent premature driving cessation. Men need information that highlights health and age-related declines because men tend to have a strong link to driving, therefore driving cessation transition may be more difficult to accept. In addition, support should be given to men about driving cessation and the depressive factors relating to this, such as social isolation.\textsuperscript{8,9} This suggests that the information in the DSFL leaflets and workshop presentations should be adapted so that both the needs of men and women are met.

4. **Self-assessment workbooks designed specifically for older drivers have shown to increase knowledge and self-awareness.\textsuperscript{12}** Self-assessments provide individuals the opportunity to respond to a set of questions to order to examine their abilities and skills.\textsuperscript{21} A self-assessment instrument could be designed to use alongside the existing in-class education workshop to increase older driver safety by incorporating cognitive skills, knowledge and perceptual skills. This could also be used as part of the evaluation as older drivers would complete the self-assessment before and after the workshop. This also provides older drivers with a discussion point for addressing age-related declines with their family.\textsuperscript{22} The self-assessment instrument could also be carried out on a computer and publicised online. This is a low-cost method of older drivers being provided with an instrument to make a self-assessment of their driving.

5. **There are a number of practical suggestions that could be integrated into the current in-class education workshop to increase learning transfer.**
• Adults prefer an interactive style compared to traditional lecture format. The current DSFL workshop integrates a lecture format with discussion. It is important that interaction is emphasised and lecture style is kept to a minimum.\textsuperscript{23}

• Material to read reduces the amount of information that needs to be covered in the workshop and allows individuals to learn at their own speed. Therefore some of the information in the workshop presentation could be put into an information pack for individuals to read afterwards.\textsuperscript{24}

• It is important for key aspects of the workshop material to be repeated in a variety of ways to ensure it is retained by older people.\textsuperscript{25} Training should also be based on pre-existing knowledge, as this is more effective than learning new tasks.\textsuperscript{15} This should be considered in the information and guidance given in the on-road assessment by making links between what older drivers already know and new safer methods that should be adopted. For example, when older drivers passed their tests roundabouts were rare and basic. This means they may have had little tuition on roundabouts but have been using them for a long time on a regular basis. Therefore, formalised training can be built on what they have already been doing.

6. In the decision making and reasoning process for implementing interventions it may be useful in the future to follow a three step approach to incorporate an evidence based approach. Firstly the target audience needs and perspectives should be understood and the criteria for an effective training intervention defined. Secondly, relevant crash data needs to be considered to understand the issues involved with the target user group. Finally, existing intelligence needs to be reviewed to identify best practice in relation to the proposed training interventions. The approach is beneficial because it covers the relevant evidence in a logical way to produce recommendations.
4. Other Considerations and Caveats to the recommendations

Areas to follow up and uncertainties;

- Promoting behavioural strategies to compensate for age declines increases individuals awareness of risky driving behaviour and older drivers tend to self-regulate their driving to reduce their involvement in a crash. Research however is unclear how self-regulation and safety are related.

- Cognitive training for the older driver is a relatively new area of research, but has shown to be potentially promising for increasing driver safety. This type of training aims to reduce and prevent declining cognitive performance by targeting specific skills. Cognitive tasks may help with increasing older adults performance of memory, attention and motor control tasks which are used when driving. Cognitive training should be investigated further to ensure any new research or publications are considered and the relationship between cognitive skills and safe driving is established.

- Within the STATs19 data the only area that has been covered currently is identifying older drivers as the blameworthy driver in collisions resulting in casualties. It is also important that comparative data is examined which focuses on older drivers being the victim. The outcome of this will influence the way information is presented in the in-class education workshops and practical driving skills session. For example, if older drivers are victims then in the practical driving skills session more of a focus should be on defensive driving skills.

- The number of individuals in Devon that are aged over 55 and currently hold a driving licence needs to be established. This will enable information to be gathered about the percentage of older drivers that have attended the current training intervention and may present an opportunity to evaluate the effectiveness of the current intervention against collision involvement.

- Research needs to identify whether 55+ is a suitable definition of older drivers. This could be explored looking at the STATs19 data in more depth to investigate the differences in age
bands. However, the specific age when individuals are defined as an ‘older driver’ is never presented to the public. Age parameters are only used internally as a reference for the target group and important when examining the STATs19 data. It would be important to determine when psychological and physiological declines start to occur.

- Devon County Council needs to establish a clear Road Traffic Collision cost metric for different driver types. This will enable decisions to be made about where to attribute resources due to an investigation of those at risk and more likely to be involved in a collision. In addition, the costs of different types of drivers being involved in a collision would need to be examined. This should also take into consideration demographic intelligence and projections of specific behaviour. The future direction of budget allocation in Devon County Council can then be based on evidence of where to assign resources. Baseline data of numbers of drivers on the road is required to understand the percentage involved in collision.

- There may be a self-selection problem with attending the older driver training intervention in Devon and small numbers of participation. Barriers to non-participation and non-cessation should be established. Instead of trying to encourage participation, it might be useful to remove barriers, for example fear of loss of mobility by selling the benefits of public transport and not having car costs.

- It may be useful to establish the influence of the wider family on older adults driving behaviour. Older adults with a wider family may rely on family members to transport them in difficult driving conditions. If family members can influence older adults about their driving then this could be considered when marketing older driver training interventions through Devon County Council. For example, advertisements for older driver training and education could be targeted at family members. This has previously shown to be successful by targeting parents for young driver safety.
• Research should be undertaken to examine the most effective way of transferring safe driving knowledge during on-road sessions. This includes whether the on-road training sessions should focus on a coaching or didactic approach.
5. References


Supplementary Information

Review of evidence that training interventions make older drivers safer.

1. The needs and perspectives of older drivers: A literature review

1.1 Ageing and driving

Due to an ageing population and increases in longevity owing to advances in healthcare the proportion of older drivers in the UK is likely to continue to expand. Currently, 20% of the population is over 60, but by 2031 this is estimated to rise to 30%. In Devon, an estimated 36% of the population in 2008 was aged 55+, of the population aged 55+, 46% were male and 54% female. Increased car ownership and driving careers especially in the case of women has been predicted to result in an increase in active licence holders within older adults. These individuals will have developed lifestyles over the years that may depend heavily on driving. In addition, the amount of older adults holding driving licenses in particular females has increased over the years and is anticipated to continue. Increasingly, older adults are driving more miles per licence holder and keeping their licences for longer.

For older adults being able to drive is perceived as vital for continuing to be mobile. Mobility is crucial for maintaining independence, health and a high quality of life. It is important that society supports older drivers to continue driving until they are a threat either to themselves or others in order to reduce the negative outcomes of driving cessation.

Musselwhite and Haddad showed that older driver needs can be split into three different categories. This includes practical (travelling to doctor), social (visiting family) and aesthetic (control over life) needs. This suggests a wide range of activities associated with driving. The lack of public transportation is also an issue to older people to consider. Older adults often view public transport as limited and even non-existent which emphasises the importance of driving.

1.2 What defines an ‘older driver?’

There are a variety of age range parameters identified when defining the older driver. The UK Royal Society for the Prevention of Accidents (ROSPA) outline that “older drivers are defined as drivers over the age of 60 years” and they “do not form a homogenous group and there are wide variations in their
characteristics and driving abilities exist within this general category. The current parameter for ‘older drivers’ within Devon County Council is those aged 56 and over.

There are a certain number of characteristics that tend to be associated with older drivers. This includes a declining in physical, cognitive and sensory functions that may influence driving. In addition, ageing can have psychological and physiological effects, illness becomes more frequent and medicines may be prescribed that influence driving ability. However, there are individual differences in the ageing process, although even the healthiest older adults will experience a decline in basic functioning.

Due to these age-related changes, it is expected that driving may be negatively affected and more often lead to involvement in collisions. For example, Bull and Raffle outline that physical limitations of older drivers that may reduce movement making it difficult to look to check junctions are clear.

There are also medical conditions that affect driving including the level of an individual’s consciousness (epilepsy) and their body control (dementia). Older adults may also have poorer vision suffering from reduced night time vision, be sensitive to glare and due to this reaction times will be slower. However, it is important to consider that impairments affecting driving may be present in all age groups of drivers. These impairments can be analysed on an individual basis therefore stereotypes are not required. Furthermore, individuals can use methods in order to compensate for their deterioration in driving ability and continue to drive without risk.

Despite often suffering from a decline in basic functioning older adults often continue driving creating risk for themselves and others. When older drivers are involved in a crash there is a higher likelihood of increased injury severity and fatality compared to other age groups. However, some research suggests that self-selection takes place among older drivers with those continuing to drive having generally high levels of mental and physical functioning.
1.3 Older driver coping strategies

1.3.1 Self-regulation

There has been research that has identified that older drivers tend to ‘self-regulate’ their driving in order to reduce their risk of being involved in a collision.\(^7\) Self-regulation is an adjustment of driving behaviour due to age-related declines in ability and health.\(^{37}\)

When older drivers adjust their driving behaviour to compensate for their declining abilities it often results in them only taking local journeys. This may mean older drivers are exposing themselves to roads where collisions are more likely to occur. For example, a collision involving personal injury is nine times as likely to happen on an urban road compared to a motorway in terms of collisions per distance travelled.\(^{30}\) Older drivers may avoid driving in difficult conditions such as adverse weather.

Gender differences have been found in self-regulation patterns and attitudes towards driving.\(^8,38\) Overall, women were found to express lower levels of confidence in their driving and be more willing to accept changes in their driving ability as they aged compared to males. However, there are a few limitations of the study; the measures were self-reports so participants may have answered in a way that was socially desirable. Furthermore, the participants were volunteers so may have been more confident and interested in driving issues, not representing the whole of the population.

Household structure influences the amount older drivers self-regulate and determines alternatives for mobility. Individuals that live alone or were the primary driver were less likely to self-regulate\(^{31}\); this may be due to lack of options.

Self-efficacy includes the beliefs and expectations individuals have about their ability to perform in certain situations.\(^{13}\) This may be linked to the decision making involved in determining whether to adopt self-regulatory behaviour.

1.4 Driving reduction and cessation

Driving characterises an individual’s independence\(^{39}\) and is essential for many individuals to carry out daily activities.\(^{38}\) Losing the ability to drive is seen as a great loss by many individuals since it reduces
independence, social inclusion and control.\textsuperscript{5} It can also result in depressive symptoms, a decline in social activities and mobility.\textsuperscript{39}

Brayne et al.,\textsuperscript{26} found that self selection tends to occur in older drivers of when to give up driving. Older drivers over 85 tend to maintain physical fitness and mental functioning to a high level. However, some of the older drivers did experience sensory loss. Women do more to begin to restrict their driving voluntarily before giving up by engaging in self-regulatory behaviour.\textsuperscript{38}

Reasons why older drivers may stop driving tend to differ between males and females.\textsuperscript{40} Males perceived the use of their automobile a necessity more frequently than females. Deteriorating health was the most common reason for males to stop driving. Older females tend to stop or reduce driving earlier than they need to, whereas males tend to leave it too long.\textsuperscript{9,20} Sufficient advice needs to be readily available for older drivers about preparing to give up driving and other forms of transport to continue their mobility.\textsuperscript{30}
2. Review of existing intelligence and best practice of current older driver training interventions

2.1 United States

In 2008, people aged 65 and older consisted of ‘15% of all traffic fatalities, 14% of all vehicle occupant fatalities, and 18% of all pedestrian fatalities’. During 2008, traffic fatalities concerning older drivers took place on a weekday (72%), in daytime (80%) and involved other vehicles (69%).

The US uses a mandatory-age based assessment to attempt to distinguish older drivers at risk. However, the validity of these screening methods is debatable. Langford concludes that these assessments often lead to early cessation of driving. Therefore, policies should be adapted to keep older drivers on the roads for longer. There has been research over several years on screening tests, but there are still no screening tests that can identify accurately individuals that will crash or not. The National Motorists Association suggests that due to an ageing population there should be more focus on programs to enhance elderly mobility instead of mandating driving tests for older drivers.

The American Association of Retired Persons (AARP) is a non-government organisation focusing on increasing quality of life for individuals ageing. Their Driver Safety Program Course consists of educating older drivers about effects of driving, driving strategies to take into account changes in age, identifying common crash situations, updating individuals knowledge of roads, vehicles and other road users and finally identifying when it may no longer be safe to drive.

Molnar, Eby and Miller outline education courses available in the US for increasing older driver safety. One of the main aims of education courses is to increase awareness and knowledge as some individuals may not be able to recognise their abilities declining. In addition, some education courses combine education with other training elements to help compensate for ageing. Refresher courses tend to educate older drivers on defensive driving and new laws, whilst covering driving skills and knowledge. Examples of these programs nationally include 55 Alive/Mature Driving (AARP), Coaching Mature Drivers (National Safety Council) and Safe Driving for Mature Operators (American Automobile Association). The report highlights that the impact of these programs on crash risk is generally unknown and studies are needed to measure this objectively. However, the programs will at least be increasing older driver’s knowledge and maintaining mobility. This report provides detailed descriptions of education programs.
Research into cognitive training for increasing older driver safety has begun to emerge in the U.S. Generally, cognitive training has been shown to improve abilities in older adults which may increase older drivers safety. Belchior produced a dissertation on cognitive training with video games aimed at improving driving skills and safer in older adults. Visual attention is a vital skill required for driving and a common way of developing this skill is Useful Field of Vision training. The study did not show that visual attention gains from the training were transferred to simulated driving performance. This is a relatively new area so more research needs to undertaken to establish the potential of cognitive training.

2.2 United Kingdom

The UK Department for Transport claimed there were an estimated two million drivers aged 70 and over, by 2015 this is expected to rise to over 4 million. The current system in the UK requires older drivers to renew their driving licence at 70. This includes individuals to carry out a self-report of medical aspects that may influence their driving. The Road Traffic Act states that if driver has a disability they must notify the Driving Vehicle Licensing Authority (DVLA). Therefore driving cessation occurs mainly on a voluntary basis.

Within the UK local authority road safety units are the main sources of information and training for older drivers. These are often carried out in isolation, reflecting the resources and current approaches of particular road safety officers. This has resulted in a variety of training programs for older drivers being available; some authorities have very little support available for older drivers, whereas others have extensive training interventions and assessments on the road.

The Driving Standards Agency (DSA) acknowledges that the number of older driver on UK roads is increasing. The older driver is seen to have experience and knowledge of driving, but aging results in inevitable negative effects that influence driving. The DSA launched a scheme in 2003 entitled Arrive Alive Classic which aimed to provide presentations to people aged 50 and over. The presentation includes topics on complex road systems, rising traffic volumes, effects of medication, eyesight and licensing requirements at 70 years old. In addition, advice on safe driving behaviour and changes in
relevant legislation are discussed. Presentations are advertised and can be booked by members of groups in the community via the website. Overall, the presentation is aimed at facilitating older people to be able to drive safer for longer.

The AA Road Safety Foundation carried out research in the form of a survey during 1987 and 1988 to establish the issues associated with older drivers.³⁵ Questionnaires were completed by roughly 1000 drivers aged 55 and over. The key findings included that cars were important for older drivers in order to maintain lifestyles. The self-reported frequency of over-taking and exceeding speed limits decreased with age. In terms of training interventions the main area of importance is to provide information on how to change driving behaviour in order to compensate for declining abilities and prepare for driving cessation.

2.2.1 Local Authorities
Suffolk produced a literature review of older driver risk and a collision analysis of older drivers in the area during 2005 to 2007.¹⁶ The review suggests that the areas that seem to result in problems for older drivers include physiological, behavioural, social and environmental situations. It is implied to be important to focus on programs that aim to adapt behaviours of those that are resistant to change, for example by increasing awareness of declining driving skills due to age-related issues and compensatory strategies that may need to be adopted. Therefore, by adapting information in education interventions to the needs of older drivers this will develop knowledge and encourage safe practices. In the future it is suggested that ‘design, delivery and evaluation’ of educational interventions should be developed so that programs are appropriate for particular driver groups.

GOLD (Guidance for the Older Driver) is a scheme from Norfolk County Council which is partnered with the Department for Transport.⁴⁹ The scheme is aimed at older drivers to give guidance on how to maintain safe driving to reduce risk to themselves and others. Due to the current licensing renewals older drivers need to complete a self reported medical questionnaire. It may be that drivers fail to report medical conditions they should. In addition, doctors may be reluctant to suggest driving cessation as they take into account social factors, such as their quality of life. When creating this
scheme other interventions by other authorities were identified, in particular the Sage Scheme in Gloucestershire.

The Drive 55 Plus refresher car driving training program is designed to increase older drivers skills and knowledge, reduce their risk of being involved in a collision and help them deal with conditions on the road. Older driver training is a priority within road safety in Dorset County Council due to an aging population and during 2008, ‘25% of Dorset’s killed and seriously injured casualties were aged 55 years and over, of these over half were car users’. The program consists of two elements:

- The Driver Refresher Course concentrates on increasing drivers skills and knowledge, lasting half a day (3 hours). A driving instructor registered by the driving standards agency presents information on topics including changes in law and highway code, driving techniques, road layouts and fitness to drive.
- The Practical Refresher Course includes driving with a driving instructor on a local route which lasts 90 minutes. Driving skills and knowledge are aimed to improve within drivers familiarity of their car and local area.

Evaluation carried out on the program mainly contained subjective opinions which means that information has not been established whether the course actually results in safer drivers. However, it does provide areas about how to generally improve the course. Over 400 attended 21 courses delivered, with over 400 evaluation forms completed for both the theory and practical course. The most effective ways of promoting the course was through local home watch scheme, papers, magazines and leaflets. The majority of driver attending the course were 65-74 and female. Nearly all the attendees rated the course as ‘useful’ or ‘very useful’ and all said they would recommend the course to others. Dorset County Council intends to run a pre, post and follow up questionnaire using the ‘Grand Driver Assessment’ to establish whether the course influences driving behaviours and attitudes. Negotiations are currently in place for obtaining this assessment.

SAGE (Safer Driving with Age) is a program developed by Gloucester County Council (GCC) to improve older driver safety. It is understood as people age they may undergo physical changes and a deterioration of mobility and health. The aim of the program is to support older drivers and guide
them to continue to driving safely as long as possible. A medical review provides information on medicines that may be influencing driving. A field visual test must be taken less than a year before attending the driving assessment. The driving assessment is carried out by a driving instructor and involves driving round familiar local routes with a confidential report being completed at the end. It is also emphasised that the DVLA has a legal responsibility to decide whether individuals should continue to drive. Therefore doctors need to make sure their patients understand when their condition influences their driving. The patient has a legal responsibility to inform the DVLA.

Buckinghamshire have modelled their older driver program on the SAGE program developed by GCC 53. The program understands that it is not only general practitioners that have concerns over older drivers safety there are also family, friends and professionals. Therefore referrals to the program can be made through any of these individuals. The program follows a similar structure to the GCC SAGE program with the assessed drive feedback being given to the older driver and general practitioner. Outlines are given if a driver is advised to no longer drive with support from their general practitioner and road safety contact.

2.2.2 Devon Practitioners

The interest in safety for older adults whilst driving initially begun in Devon with a police sergeant attending a fatal collision involving an older driver. Following this, the sergeant was personally motivated to carry out research into the issue of older drivers in Devon. This included looking at figures from the Office of National Statistics of the life expectance of the population over 55 from 1967 to expectations in 2047. This showed an increase from 14% (1967) to 19% (2047) of the UK population being 55 and over. Also the driving licence gender gap showed that the amount of women holding driving licences is increasing. From the research it was concluded that older drivers are going to be an increasing issue in the future.

Older driver’s market research was also gathered by a survey from three sites in Devon (Budleigh, Sidmouth and Exmouth). The questionnaire included basic information on demographics and topics around driving. The average age of participants in the survey was 76 for males, 71 for females and the overall number of participants was 96. The majority of participants believed that retesting should be
carried out at 70 (62%) and insurance premiums should be linked to assessments (80%). The main period of day that that older drivers avoided was rush hour, school runs and darkness. Females in particular stated that they did not drive in the dark due to security reasons such as breaking down. Situations and environments older drivers claimed they avoided included motorways, large town centres and roundabouts. Distractions from driving included speed limits, weather, advertising, signs, cyclists, low sun and lights from other vehicles. This led to a discussion with the Devon County Council Drivers Centre about the possibility of forming a training intervention to increase older driver safety on the basis of these research findings.

The Driving Safer For Longer (DSFL) program was designed with three sections and launched in June 2007 as a partnership between Devon County Council and Devon and Cornwall Constabulary. The programme is now delivered as part of Devon road Casualty Reduction Partnership. The name of the program was particularly important as it wanted to emphasise help to continue driving rather than taking away older drivers licenses. The information pack and website provides information on a variety of topics including mobility, fitness, drugs and medications, driving tips and other travel options. The pack also contains details on how to access workshop and practical driving skills assessments. A workshop was also developed that lasts two hours and covers the same topics as the information pack. The intervention was created so that it would be available to all older drivers in the county, including individuals and groups. In order to advertise the program, information packs were distributed at libraries and doctors surgeries throughout Devon. Response to the information packs showed that people perceived they had enough information to book assessment drives without necessarily first attending the workshops 68.

The workshops have been promoted successfully through local social groups that mainly consist of older people (e.g. age concern). This provides an opportunity to gather a relatively large audience at a time arranged by the group where they have a visiting lecturer on of a variety of topics. This means that the social group arranges the time and location so organisation from DCC is kept to a minimum. The presentation given in the workshop is non-threatening so that participation is encouraged about other areas of concerns not mentioned in the information. The information is presented by a credible source and during the workshop the driving practical driving skills assessments are promoted.
Previously workshops were set up by local media inviting individuals to attend. This was found to be unsuccessful at attracting sufficient numbers of older drivers.

The driving assessment is an hour long one-to-one session with an instructor. This can be carried out usually in the older drivers car and occurs in familiar surroundings on usual routes.

From an instructor point of view one of the major issues of driving for older people is coping with glare on the roads and failing to see. The main time when this is an issue includes low and bright sunlight driving conditions and this is often avoided. Older drivers often become defensive when any reference is made to taking away their licence. This is seen to be because there are large implications on older drivers for losing their licence, for example losing their lifestyle choices. During the practical driving skills assessment clients are given a critique which is carried out in a supportive manner with hints and tips to improve particular areas. Women older drivers tend to be frailer than men and due to the increase in active older women license holders this is a concern. This is because when frail individuals are involved in a crash they are more likely to be injured.

A DVD has been constructed that covers areas that have shown to be an issue from older drivers attending the workshops, this is being launched the beginning of 2010. This includes gyratory and roundabouts, motorways, automatic, night driving, right turns at junctions, speed limits, tailgating and young drivers.

During 2009, 43 DSFL workshops were carried out which equates to approximately 516 people compared to 22 workshops and roughly 264 people in 2008. In addition, 77 practical driving assessments were undertaken in 2009 compared to 45 in 2008, with the majority being booked after attending the workshop.

Feedback from the program has been positive with many people attending finding the sections of the program useful and informative. The next step identified by the project team for the program will be to evaluate the success of whether the training is making older drivers safer.
2.3 Academic literature review

One of the main issues in evaluating older driver training is establishing how the effectiveness of an intervention is measured. Education is often seen as successful if objectives of the course are met and assessments are passed. However, with older driver training benefits for road safety ideally should be seen. This would suggest measuring crash risk and involvement before and after an intervention. However, it is difficult to show associations and many contributing factors may be involved.10

Safe driving is a multi-factorial concept, so it is useful to distinguish certain frameworks of driving that training interventions can be developed from. Michon’s model of capacity for driving safely includes three components; strategic, tactical and operational.19 Driving plan decisions are made at a strategic level, decision about vehicle handling are made at a tactical level. Driving actions that may influence crashing, such as braking and steering are made at an operational level.

There have been a number of systematic reviews that have focused on the evidence of whether older driver re-training is effective. Kua et al., 14 studied a range of interventions including education, visual perception and physical retraining. Evidence was rated on the Sackett’s Level of evidence14. For example, two randomized controlled trials of high quality which found an intervention to be effective would receive a score of 1. Whereas one or more fair quality randomised controlled trials would receive a score of 2 and no experimental studies exploring a question would receive 5. The findings indicated that there was limited evidence from studies that physical and visual re-training improved older driver’s skills. However, educational interventions were shown to increase driving awareness and behaviour, but not reduce crashes in older drivers.

Korner-Bitensky et al. 1 identified the importance of updating the previous review due to the interest surrounding older driver re-training courses. Interventions were rated for effectiveness and levels of evidence were produced including pre and post 2004 findings. The results showed that strong evidence that combining both on-road training and education increased driving performance and moderately improved older driver’s knowledge. However, no studies have yet shown whether both these interventions reduce crash risk. Physical re-training evidence was shown to moderately improve driving performance. In addition, educational intervention evidence indicated that this intervention alone is not effective at reducing crashes. The study highlights evidence-based recommendations for
older driver retraining firstly; physical training should focus on flexibility, coordination, and speed of movement. Secondly, educational interventions ought to be taught alongside on-road training to develop driver knowledge and skills specific to driving.

The National Blueprint for Injury Prevention in Older Drivers 67 (funded by the population health fund and public health agency of Canada) claims that their current findings on the effectiveness of older driver training interventions found in a systematic review, are sufficient for implementing the programs. In addition, a focus group involving older drivers found that older drivers were interested in programs that would enhance their driving skills and knowledge. 14

A Cochrane Collaboration systematic review of randomised controlled trials between 1962 and 1999 identified the effectiveness of post-licence driver education. 54 The findings showed that there was no evidence that driver education programmes are effective at preventing crashes. However, this may be due to publication and trial bias threatening the validity of the study. Many of the studies used in the review are dated so may be irrelevant to current driver training interventions. Implications from this study include that unrealistic expectations of driver education outcomes should be managed. It may be that driver training may even increase collision rates therefore reducing safety. 3

Nasvadi and Vavrik (55) studied 884 older drivers who attended the 55 Alive/Mature driving program which was carried out in three phases. Phase one included investigating the self-selection bias of individuals participating in the driver education program. The second phases looked into changes in crash rate after attending the program. Finally, phase three examined the selection, compensation and optimization strategies used by older male drivers attending the program through focus groups. The findings suggest that there was self-selection bias for those attending the program. In addition, participating in the program was linked to increased number of crashes for men aged seventy-five and older. However, there was no effect on crashes of younger men and women of all ages studied. Older men not involved in crashes after attending the 55 Alive/Mature Driving adopted more selection and compensation strategies than those having continued problems on the road.
Research has focused on the specific needs of older driver, such as identifying particular impairments that have led to increased crash risk. Owsley, Stalvey & Phillips 56 studied an educational intervention aimed at changing older driver perceptions about visual impairment. This included how visual impairment can impact road safety and promotion of self-regulatory behaviours to reduce driving risk. The study incorporated an intervention and control group with pre and post-test perceptions of vision and driving. The results show that drivers in the intervention group were more likely to accept their vision may be impaired, avoid challenging driving situations and perform self-regulatory behaviour than the control group. This implies that educational interventions may be beneficial for visually impaired older drivers by increasing awareness and avoidance of challenging driving situations. In the future, it would be important to establish whether this educational intervention can be related to increasing safety of older drivers by reducing their crash involvement.

Methods to improve driver safety have begun to concentrate directly on changing driver behaviour and knowledge. Nasvadi 23 examined changes in self-reported driving behaviour after attending the 55 Alive/Mature Driving education program. Through a telephone survey of 367 driver aged 55-94 on the program, 75% of participants said a year to four years later that they had increased awareness and visual skills, improved speed and space margins and improved vehicle maneuvers. Tuokko et al., investigated 86 older drivers attending an educational intervention, identifying their attitudes, beliefs and perception of risk. The key findings included that individuals participating in the sessions were mainly interested in maintaining their mobility rather than their driving or safety. There were gender differences found with men being more resistant to changing their driving habits and reporting driving under the influence of alcohol than women. Women were more likely to involve their family in decision making about driving cessation than men. This suggests that training interventions may need to be targeting men and women differently in order to increase older driver safety.

Gender differences in older adult drivers in regards to self-regulation and cessation have been examined. Morgan et al., 20 have produced a number of evidence-based recommendations for training interventions from their literature review on differences between older men and women drivers. In regards to women, interventions should include driving skills and confidence in difficult driving situations. Furthermore, consideration needs to be given individually about the services available,
such as mobility counselling when discussing driving cessation. For men, interventions need to look at an individual basis focusing on health and age-related declines. Mobility counselling is also important for males but needs to identify depressive risk factors relating to driving cessation, such as social isolation.

Training interventions that promote behavioural strategies to compensate for age decline, such as adopting self-regulation may increase safety of risky older drivers and enable mobility to be maintained. Stalvey & Owsley 13 studied 402 participants aged from 60 to 91 with visual impairments to establish their self-perceptions and behaviour. Within the sample, over half did not accept that their vision was likely to result in a crash. However, 80% acknowledged that by avoiding difficult driving situations they were less likely to be involved in a crash.

Individual studies of training intervention programs that have looked into combining both in-class education and on-road training. Bedard et al., 19 used a randomised controlled trial approach where participants in the intervention group had in-class and on-road education. The control group were offered the training after the study. Individual’s knowledge of safe driving was measured pre and post the in-class education and on-road driving skills pre and post the program. The results showed that participant’s knowledge increased from 61% to 81% correct answers before and after the in-class education. The on-road evaluation showed improvements in some areas of safe driving, such as positioning in the road, but not others.

Marottoli, Van Ness, Araujo, Iannone, Acampora, Charpentier and Peduzzi 18 studied a randomised trial of an educational intervention aimed to increase older driver performance. Individuals allocated to the intervention had two 4-hour classroom sessions based on the AAA Driver Improvement Program and two 1-hour on-road sessions which focused on literature and common errors linked to older drivers. In comparison, the controls undertook modules covering home, vehicle and environmental safety. The results suggest that an educational program including classroom and on-road elements focusing on common problems of older drivers increased general driving knowledge and scores in on-road driving tests. This illustrates that the combination of education in a classroom setting and on-road training can lead to individuals being able to drive safer and maintain their mobility.
The Canadian Safety Council adaptation of the 55Alive program originally developed by the AARP has been evaluated. The program includes two half-day sessions of three hours based on individuals acquiring knowledge and developing skills in order to make older drivers safer. Topics covered during the sessions included: overview, self-assessment, vision/hearing, normal driving situations, hazardous driving environment, driver guidance, the vehicle, alcohol and medication and driver decision. Participants were required to have on-road evaluations which was followed by being allocated to training (intervention) or waiting (control) groups. The study was unable to show a statistically significant difference between the intervention and control group. However this may have been due to the initial driving evaluation underestimating older driver’s ability. Older drivers were also able to improve on their on-road evaluation scores which shows safety benefits of this program. There are several suggestions from this study on areas that may result in training interventions making older drivers safer. Firstly, data should be examined to outline where older drivers make errors and how these can be reduced. Secondly, increasing the intensity and duration of the intervention may lead to increasing safety in older drivers. Thirdly, instructors need to be trained to a high-level consistently in order to increase the quality of training interventions.

An evaluation has also been carried out on an older driver training intervention using the 55 Alive program and instructor sessions on the road. The drivers in the study were 65 years and above and were categorised by their gender, age and their score on a standard government licensing evaluation. The participants were then split into a control group which were on a waiting list or intervention group. The intervention group had two half day sessions focused on road safety and two 40 minute on-road training sessions in the participants vehicle with a qualified instructor. A quiz was also completed by the intervention group pre and post the education sessions on driving issues. All of the participants then took a on-road evaluation were lower scores are better. The intervention group had a reduction of 40.5 points and control group had 17.5 on the on-road evaluation. Individuals participating in the education sessions had a mean score of 66% before the sessions and 86% after. This suggests that combining education sessions in the classroom and on-road increases older drivers knowledge of safe driving and skills. It was emphasised that further research needs to identify whether an increase in driving skills through the program results in a reduction of crash risk.
There are a variety of types of training interventions that can be used in increasing safety in older drivers. The effect of cognitive training interventions on older adults has been shown to improve targeted cognitive abilities. Simoes identifies the cognitive training needs of older drivers. Cognitive training and behavioural interventions have been shown to reduce and prevent the declining cognitive performance in adult. Cassavaugh and Kramer suggest that participating in simple and dual computer-based tasks supported with training were linked to improvements in performance on a driving simulator. This implies that cognitive tasks may help to increase older adults performance of memory, attention and motor control tasks which are used when driving. Studies in this area are relatively sparse where the training transfer from computer-based tasks to simulated driving is identified. This study provides initial findings which could lead to a computer-based tool being used as a training device within interventions.

Self-assessment instruments have also been constructed as a method to increase older driver safety. This provides an opportunity for individuals to respond to a set of questions in order to self-assess their abilities and skills. The Driving Decisions Workbook developed by Eby, Molnar and Shope provides feedback for making driver decisions based on self-awareness and knowledge. It also increases individual’s awareness of age-related declines which may lead to discussions with others, such as family members. The aim of the workbook was to improve on existing products produced by the AAA and AARP. The topics covered were expanded to cover medication and medical conditions. The pen and pencil basis for the workbook enabled immediate feedback to be gained on individual sections rather than scores being calculated for everything.

Eby et al., examined whether the Driving Decisions Workbook a self-assessment instrument for older drivers increased knowledge and self-awareness. A convenience sample of ninety-nine Michigan drivers aged sixty-five and were administered the driving decisions workbook with a questionnaire and on-road test. Completing the workbook resulted in 75% of participants reporting having increased awareness to age related changes that could affect their driving. All of the participants reported finding the workbook at least ‘a little useful’ and though it would be useful providing a discussion for families. Responses on the workbook were positively correlated to on-road test scores. This suggests that the
workbook could be used as an assessment instrument and educational tool to encourage older driver safety.

An important aspect of older driver retraining is encouraging uptake onto particular interventions. Parker, McDonald, Rabbitt & Sutcliffe 61 carried out a survey questionnaire of 1932 UK drivers looking at the acceptability of interventions designed to promote safety in older drivers. The findings showed that there was limited consensus about which interventions would be the most effective and acceptable. Individual measures that emerged for combining perceived effectiveness included re-testing after a driving ban, police power to assess those displaying risky driving behaviour and opticians required to report drivers with visual problems that would affect driving.

Research has indicated when developing intervention program those most at risk need to identified in order to help increase driver safety. Marottoli and Richardson 37 examined older driver (age 77 years and older) confidence and self-rating of their driving. Confidence of driving was linked to frequency and mileage of driving but not education or age. All of the participants gave themselves a rating of being average or above others in their age group.

Ball, Wadley and Edwards 62 have identified advances in technology that have been used in educational interventions for older drivers. The continuing increase in older adults using the internet may mean courses could be run online or more information displayed. Assessments could be provided online to establish areas of concern before attending education in class. Cognitive interventions such as speed of processing training have begun to look at driving outcomes. This training involves ten sessions on a computer-based program aimed at increasing the useful field of view. This is where information is obtained with a brief glance and without additional eye or head movements. Basak, Boot, Voss and Kramer 63 outline how cognitive training can slow or reverse age-related declines by increasing working memory, visual short-term memory and reasoning.

2.4 Practical issues of implementing training interventions to older drivers

The delivery of training interventions is important as it will influence the amount of knowledge acquired by older drivers. McKnight 24 outlines particular methods for presenting information to older drivers.
using adult learning principles. Adults prefer an interaction style compared to a traditional lecture format. Material that can be read outside the classroom reduces the amount of information that needs to be covered in training interventions and allows individuals to learn at their own speed. Information given should be locally relevant using examples that the older drivers find familiar. The learning equipment and environment should take into consideration potential impairments of older adults. Older drivers are extremely good candidates for classroom instruction due to their motivation to continue driving, time to attend class and ability to acquire information in an interactive environment.

Molnar, Eby and Miller 25 suggest a number of recommendations for ensuring that education is effective. Room size and layout should take into consideration individuals with potential visual and hearing problems. In addition, key aspects from the course material should be repeated in a variety of ways to ensure it is retained by older people. Henderson 64 outlines some characteristics of education programs that will increase the likelihood of behaviour change occurring. Firstly, specific recommendations for safe behaviour need to be established and information given on how to achieve it. Course content should to be perceived as coming from a credible source. There needs to be a balanced argument for the behaviour change and conclusions need to be drawn clearly for the audience.

Research on cognitive training suggests some aspects that should be considered when designing training programmes for older drivers 15. Individual differences should be taken into consideration when developing material and identifying learning strategies. Training should be based on pre-existing knowledge as this will be more effective than learning new tasks. Links should be made between new information and the knowledge older drivers already have. There should be a variety of stimuli, materials and learning skills to increase transfer of learning.

The way that older driver training is marketed is vital to ensure that a wide range of people are informed about programs available. Nasvadi 23 conducted a telephone survey of 367 drivers aged 55-94 who had attended 55 Alive/Mature Driving program. This is a classroom based session and covers information on reducing driving risk, effects of aging and road rules. The majority of the older drivers found out about the course through advertisements, printed material or were encouraged to attend by
individuals who had already been on the course. The instructor characteristics that were important included being approachable, knowledgeable and clear delivery. Informal interactive styles of learning such as role playing and ‘hands-one’ learning were received well.

Reasons for individuals attending training has been shown to be linked to their motivation to learn and their expectations of the values gained. This implies that the way older driver training is advertised should emphasise the benefits of attending, such as the increased knowledge and awareness of their driving. The marketing of training programs should take into consideration individual and situational factors. For example, whether motivation to attend training is higher for women compared to men.

There are several theoretical models that explain how individuals perceive risk that can be used when designing older driver training interventions. The health belief model outlines how perceived risk can influence individuals behaviour by perceived vulnerability and severity. Vulnerability includes individual's perception that negative outcomes will result from the behaviour. Severity involves how serious the individual perceives the outcome to be. In addition perception of risk may be influenced by locus of control where people believe that their behaviour is their own internal control, externally controlled by other situations and people or occurs by chance.

2.5 Limitations to evidence

- One of the main limitations to the evidence is the extent to which individual study findings can be generalised to the whole population. The research identified has been carried out in a variety of countries and locations. Therefore there may be cultural differences between older drivers. For example, drivers in rural locations may feel more strongly the importance of continuing to drive compared to those in urban environments.

- There are differences between the evidence found to the definition of an effective training intervention and increasing older driver safety. Some studies have linked increased older driver safety to training increasing knowledge and awareness. Whereas other studies have tried to illustrate road safety benefits of reduced crash rate.

- Self report methods have been used within the evidence which may influence the results of particular studies. Social desirability may have determined individual’s answers to certain questions. For example, Nasvadi looked at self reported driving behaviour before and after
attending a driver education program. Individuals may have thought they should report their behaviour in a certain way after attending the program as they may have determined the answers the practitioners were looking for.

- When identifying other training interventions for older drivers it is importance to consider that these programs may not have been developed through best practice. In addition, there may be limitations to the evaluation carried out on the intervention, for example, only subjective opinions being measured (Dorset County Council).
- There are no standardised programs for older driver training interventions therefore it is difficult to generalise overall positive outcomes. For example, within different educational interventions content and delivery may be produced in a variety of ways.\textsuperscript{25}
- Many of the current older driver training interventions have not been evaluated. This may be due to time constraints or a lack of knowledge and resources of implementing evaluation. This makes it difficult to establish whether there are any safety benefits from participating in specific programs of older driver training.

3. Exploratory analysis of STATS19 data relating to older driver casualties

STATS19 collision data was examined from the Devon area excluding Plymouth and Torbay from 1992-2009 unless otherwise stated.

A number of data areas were extracted to investigate older drivers, including:

- Number of collisions
- Number of casualties
- Severity of casualties
- Driving manoeuvres
- Time of day
- Light conditions
- Weather
- Road Surface condition
The first approach to investigating the STATs19 data was to look at older drivers in terms of being the blameworthy drivers (vehicle 1, vehicle that causes the collision).

The first area identified was establishing the numbers of collisions that are caused by older drivers in comparison to other car driver age groups (see Figure 1). Between 1992 and 2009 older drivers (aged 55 and above) constituted for just over 20% of collisions. Roughly 50% of collisions were caused by individuals aged 25-54 and 30% by those aged 16-24. The average number of collisions caused by older drivers between 1992 and 2009 was 383 collisions. In Devon, during 2008 36% of the population was aged 55 and above. This gives an indication of the proportion of older adults; however it needs to be considered that not all of these individuals will have driving licenses.

The number of casualties in Devon from collisions was examined in terms of severity (fatal and seriously injured/slight) and age (see Figure 2). For slight casualties roughly 30% of casualties are caused by those aged 16-24, 50% are caused by 25-54 year olds and 20% by those aged 55 or older. This trend has remained relatively the same since 1992. For serious injuries, the figures are relatively the same except in 2008 nearly 30% of casualties were caused by those aged 55 and above and just over 20% of casualties were caused by 16-24 age bands. From 1992 to 2009 there is much more fluctuation in age of blameworthy driver causing fatal casualties. Fatal casualties caused by those aged 16-24 ranged from just below 20% (2007) to just below 40% (1992). 50% (2007) to just over 20% (2000) of fatal casualties were caused by those aged 25-54. Fatal casualties caused by those aged 55 and above ranged from just under 40% (1998) to under 20% (1992). This shows that generally the number of slight and serious casualties caused by older drivers is relatively low compared to other age groups (roughly 20%).

The severity of casualties was divided into driver, pedestrian and vehicle and pillion passenger (see Figure 3) by age from 2003 to 2009. The driver severity was greatest for those aged 70-79 (0.14) and 80-89 (0.18). The pedestrian severity was greatest for those aged 90-99 (0.20), 70-79 (0.21), and 80-89 (0.22). For vehicle or pillion passenger the severity for 90-99 (0.26) is much greater than any other age band. This implies that for older people being a pedestrian or passenger results in greater injury.
severity compared to those driving. Generally older people involved in a crash have a higher likelihood of fatality compared to other age groups.

Severity was also split into percentage of casualties by gender and blameworthy car driver age (see Figure 4). The findings showed that a higher percentage of all casualties’ types (slight, serious, and fatal) are caused by men. Fatal casualties caused by those aged 90-99 were all carried out by men.

The driving manoeuvres of the blameworthy driver were examined by age group from 1992 -2009 (see Figure 5). The collision data showed as age increased that reversing and turning right being the blameworthy driver manoeuvre also increased. Within the age band 90-99 blameworthy manoeuvre of turning right reduced again, but this may be due to the small number of collision data in this age group. Going ahead right hand band decreased as a blameworthy manoeuvre age increased. Research shows that physical and sensory functioning tends to be reduced in older drivers therefore manoeuvres such as reversing and turning right may be problematic.

The percentage of causalities caused by blameworthy driver age and time of day was analysed (see Figure 6) from 1992 to 2009. The findings showed that the majority of casualties caused by drivers aged 55 and above occurred during 9:00-16:00. This included 20%-30% of all the casualties by hour. This may be because driving exposure may increase during the daytime. The highest percentage of casualties caused by those aged 55 and above in relation to other age groups occurred at 10:00 (883 casualties) and 11:00 (1065 casualties). This may be because older drivers avoid the morning rush and therefore leave slightly later to carry out their needs. In addition, outside 9:00-16:00 there are less casualties caused by older drivers, this may be because there are a reduced amount of older drivers on the road. Looking at those aged 55 and above the highest number of casualties is caused at 16:00 (1179 casualties) In comparison, casualties caused by those aged 16-24 occurred mainly between 20:00-4:00. However, this data has not been tested for significant differences between age groups.

The percentage of casualties caused by blameworthy driver age group and lighting condition was examined (see Figure 7). From the research it would be expected that older drivers cause more casualties during periods of increased sensory functioning being required, for example darkness.
However, the data showed that the majority of casualties caused by those aged 55 and above occur during daylight (street lights present). This may be a result of more individuals aged 55 and above driving in daylight compared to darkness.

The collision data was examined to establish casualties caused from blameworthy driver age and weather conditions (see Figure 8). The percentage of casualties caused by drivers aged 55 and above was highest in conditions when it was snowing with high winds (35%, 22 casualties). This was due to the small amount of casualties occurring in conditions of snowing with high winds (62 total). Other conditions where the percentage of casualties from blameworthy drivers aged 55 and above is high compared to other conditions and age groups is fine (without high winds, 20%, 9111 casualties) and fine (with high winds, 19%, 193 casualties). This suggests that weather conditions are generally good when the blameworthy driver is aged 55 and above. However, this does not provide sufficient evidence that older drivers are self-regulating their behaviour and avoiding difficult driving conditions. During environmental conditions where it was raining with high winds, 245 casualties were caused by blameworthy drivers aged 55 and above.

The road surface condition (see Figure 9) that results in the highest percentage of casualties due to drivers aged 55 and above is dry conditions (21%, 7333 casualties). In addition, 4005 casualties were caused by drivers aged 55 and above during wet and damp surface conditions. This suggests that older drivers are driving and causing casualties in a variety of conditions.

4. Review of current budget for Devon Road Casualty Reduction Partnership

Devon County Council is the responsible authority for the Devon Local Area Agreement and in the partnership will make available funding from the annual Area based Grant for Road Safety. During 2009-2010 the main section of this grant (65%) will be used to support Devon and Cornwall Safety Camera Partnership/. The current Devon Road Casualty Reduction Budget consists of the remaining unallocated budget of £200,000. This budget is allocated by the board to certain Partnership activities. There may also be opportunities to make bids for other external funding or external sponsorship. This can be carried out by individuals when the Programme Manager and Treasurer have signed this off and notified the Chair of the partnership Board.
The Delivery Plan for 2009 – 2010 outlines the budget allocated to the outward facing Partnership objectives. Below is the allocation of the budget for the target user groups:

- Young and emerging drivers (16-25 years old) £50,000
- Older drivers (56 years old and above) £25,000
- Motorcyclist £50,000
- At-work drivers £25,000

There is £50,000 of the budget that is used as a float for particular innovative projects. Individuals can suggest projects for this part of the budget to be allocated to:

- £7,500 Risk Assessment for younger drivers
- £10,000 MR Viral
- £5000 Drink/Drive Christmas Campaign
- £23,000 Safety Camera Partnership County Show
- £5-10,000 Fire and Rescue initiative

For those aged 26 to 55 years old the Country Mile Project has been set up which is funded by the Department for Transport Rural Demonstration Project grant of £1.5 million.

For the older driver intervention the budget is allocated to the Driving Safer For Longer program. The resources required to undertake this intervention are established within the Devon Drivers’ Centre and are run by a small project team. There is a certain amount of administrative work for marketing the workshops, setting them up and managing their delivery. The budget is also required to ensure that the services are free or subsidised. Approved Driving Instructors are supported through Devon Drivers’ Centre for undertaking the personal driving assessments. It is important that there is expenditure for the older driver training intervention due to the increasing numbers of older drivers on the road.

The main concern for 2009 was to develop products, whereas in the current year the focus will move to organising resources and continuing in the run training. The current delivery plan shows high expenditure for younger/emerging drivers and motorcyclists. In the future, more of the budget may be
used to focus on at-work drivers. Due to the older driver intervention being set up, the budget for this target user group may be reduced; however the importance of this group will still remain high.

Politically, it is important to maintain visual programs during the recession from Devon Road Casualty Reduction Partnership. This has been managed by directing the float to projects that are highly visual and increasing the publics awareness of what is being undertaken to increase road safety.

5. Decision making and reasoning budget holders use to implement interventions

The current approach for the Devon Road Casualty Reduction Partnership to establishing priorities is to consider collision injury data and trends, evidence of effectiveness of available countermeasures and available resources. When considering interventions they address three categories of safety including; primary safety (elimination of the hazards of the source) secondary safety (reduction in the consequences or severity of injury) and tertiary safety (access to emergency medical services and information). One common method of investigating interventions may be to look at what other practitioner are doing. However, this may be a risk if the other practitioners are not following best practice methods.

In terms of the older driver target group the reason for interventions being established was due to findings that the demographic profile of Devon was shifting to an aging population. This will result in a higher proportion of older drivers who may want to maintain their independence of driving as long as possible. Due to this demographic profile the objective of the older driver intervention was to ensure that sufficient information and support was given to older drivers in order for them to remain as safe for as long as possible. The need for an intervention for older drivers was established by a sergeant attending a fatal collision involving an older driver and who carried out his own research and expressed his concerns through personal motivation.
7. References


42. Langford, J. (n.d.) For many older drivers, mobility may be more important than safety. Monash University Accident Research Centre.


6. Figures from the exploratory analysis of STATs19 data

Figure 1. Number of collisions segmented by age group of blameworthy car driver
Figure 2. Number of casualties resulting from collisions by severity and age of blameworthy driver 2004 - 2008
Figure 3. Severity ratio by casualty age group and class 2003-2009
Figure 4. Percentage of casualties caused by gender and blameworthy car driver age.
Figure 5. Blameworthy driver manoeuvre segmented by age group 1992-2009

- 51 -
Figure 6. Percentage of casualties by blameworthy age group and hour of day.
Figure 7. Percentage of casualties by blameworthy car driver age and lighting conditions
Figure 8. Percentage of casualties by blameworthy car driver age and weather conditions
Figure 9. Percentage of casualties by blameworthy car driver age and road surface condition