

Night-time accidents

A scoping study

Report to The AA Motoring Trust and Rees Jeffreys Road Fund

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October 2005

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Executive Summary

Context

Only a quarter of all travel by car drivers is undertaken between the hours of 19.00 and 08.00, but it is in this period that 40 percent of fatal and serious injuries are sustained by drivers. This indicates that car travel at night carries a greater risk of being killed or seriously injured than does travel during the day.

The literature indicates that disproportionate numbers of young drivers, especially young men, are injured at night. But to be able to introduce measures targeted at this group more needs to be known about the purpose of their journeys, the types of roads they travel on, and how far they drive and at what times in the evening and at night.

Older drivers tend to have fewer accidents at night, but little is currently known about how much can be accounted for by exposure related to their driving patterns. People over the age of 60 years form about 20 percent of the population, yet they make up over a quarter of traffic fatalities.

These two groups of young and older drivers have been selected for study with the following aims:

- (a) to assess what information exists which relates to night-time exposure by activity and by group (young and older);
- (b) to assess what is known about exposure and risk to young and older drivers at night, in conjunction with an analysis of relevant accident data to provide a picture of the size of the potential problem areas, and gaps in current knowledge;
- (c) to identify people's concerns, attitudes and beliefs with regard to the problems of night-time driving; and
- (d) to provide the basis for decision on what measures might be brought to bear on the problem, and what further research would be needed in order to point to focused action.

This scoping study is in two parts and provides an assessment of the information available and hence the gaps in our knowledge on the nature and extent of night-time driving, and the risks involved at these times. The first part assesses the available data, and the second uses focus groups to gather the views of drivers themselves, together with their concerns, attitudes and beliefs with regard to the problems of night-time driving.

The measurement of exposure, or amount of travel by car, of drivers of different age and gender is central to the assessment of the risk of being killed or injured in a road traffic accident. In this study, the measure of exposure used is distance travelled per person per year. This has been combined with casualty data to make preliminary assessments of risk to people of different ages and gender of driving at during the daytime and at night.

Data available

The casualty data are extensive and allow investigation of how many drivers are killed or injured in built-up or non-built up areas and on main and minor roads in these two types of area. Motorways have been excluded from the analyses. The study focuses on drivers of cars and excludes riders of powered two wheeled vehicles and drivers of heavy vehicles and buses. At present the casualty data do not record the purpose of the journey/trip being undertaken at the time of the accident. This information should start to be collected in the next two to three years.

In contrast, routinely collected exposure information is rather sparse. There is good information on the distances driven per year (as car drivers) per person of different age and gender by time of day and the average number of stage trips per year per person. It is rather more difficult to extract information on whether these trips began or finished in built-up or non built-up areas because it has only recently started to be collected in the National Travel Survey. The amount of travel on roads of different types is not collected, but it is possible to estimate distances driven for different purposes, although the samples may be too small to use except at the general level of gender and age.

In light of availability of data, analyses were carried out to give an assessment of injury occurrence and risk to the target groups of young and older drivers at night-time.

Analysis of casualty data

The main points from the analysis of casualty data on its own are:

1. On *non built-up A roads* both male and female young drivers are killed or seriously injured in large numbers relative to other age groups. One in four of all male drivers killed or seriously injured on this road type are between the ages of 17 and 25 years. About twice as many young men under 25 years as young women are killed or seriously injured. The numbers of killed or seriously injured driver casualties declines sharply with age after about 25 years.
2. On the *built-up A roads*, the number of female drivers under 25 years killed or seriously injured is about half that on the non-built-up roads and for young males it is about two-thirds.

3. On the *non built-up B, C and unclassified roads*, the interesting feature is the very high incidence of young male casualties (17-20 years) in relation to drivers of all ages and gender.

4. On the *built-up B, C and unclassified roads*, for drivers of all ages the numbers killed or seriously injured are higher than on this group of roads in non built-up areas with the exception of young females (17-20 years). For young males the number for the 17-20 year olds is almost as high as on the non built-up A roads. Amongst the females it is the 21-25 year age group that has the highest number of casualties on these roads.

Casualty rates and risk

The addition of exposure data adds to the picture in that the casualty rate for the youngest group of males remains much higher than for other male drivers with a large increase in the early evening becoming larger again between 22.00 and 01.59. The addition of mileage driven tends to flatten out the differences between the remaining age groups except for the older males where the risk of death or serious injury is higher than might be assessed from the casualty figures alone.

Females in the oldest age group are more at risk than other age group, and especially so late at night (22.00-01.59). However, some of this effect may be due to the low mileage driven by this group together with the low numbers of casualties leading to uncertainty in the estimates. During the day, when about 68 percent of the driving is done by this age group, their casualty risk is still the highest and about twice that of men of a similar age. It is interesting to note that the difference is quite small between the 36-54, 55-64, and 65-74 age groups but the difference between these and the oldest group is very marked, except for the period 05.00 – 07.59 hours.

Other than for the oldest group discussed above, young females are more at risk than females aged 21-74 years of being killed or seriously injured at all times of day. The risk between 19.00 and 21.59 is about twice that during the day and between 22.00 and 01.59 it is about two and a half times as high.

Issues raised about driving at night by drivers of different ages

A wide range of issues were raised by the focus groups. The most striking point to come out of the discussions is how many young males like to test themselves and their cars to the limit and then joke about it afterwards when things go wrong. These young men tend to be driving older cars to which they may have made 'improvements', and they often have passengers with them at the time. The casualty figures show just how often things do go wrong for this group at night, with fatal or serious consequences. There appears to be little concept of risk yet the figures presented in this report indicate the risk is very

high for this group. Some of the comments indicate that they need to get their 'fingers burned' before the message will come home to them.

However, not all young drivers, and not all young men are out to test themselves and their cars. Some hold very mature attitudes. What the differences in casualty rates are between these two groups is not known, but inexperience in driving at night when distinguishing features merge into the background is a factor that is acknowledged by many of the young drivers.

Deaths of young male drivers in drink-driving accidents is receiving increased attention as a road safety issue. The young men in our sample were cagey about admitting to drink-driving, but it became apparent by their comments that some did despite being designated drivers. It emerged that often there was little support for abstinence from passengers of the designated driver.

By contrast, none of the young women in our sample drove home from nightclubs late at night mainly because they tended to be passengers in male driven cars. Whilst initially being adamant that they do not accept lifts with drink-drivers, when pressed they admitted they did especially if they lived in rural areas to which taxis are infrequent, expensive, and queues for them long.

The main area absent from discussions with young and old alike was driving at night in built-up areas. Most of the concern centred on how difficult it was to see on unlit non built-up roads and what a relief it was to enter the town with its streetlights. Some young drivers said they tried to keep off the main roads later in the evening as this is where the police and speed cameras are. The accident risks are clearly not appreciated.

An illustration of the mismatch between perceived risk and casualty numbers is the call from many drivers for higher speed limits at night when the roads are quiet. This study indicates that this would not be a productive policy option.

Gaps in our knowledge

Older drivers

The lifestyle of older drivers indicates that they undertake most of their social and business activities during the daytime. They have all the time in the world to do what they need to do and as driving at night is difficult, and sometimes threatening, they avoid it where there is an alternative. Having said this, there are those older drivers who still enjoy driving at night, and presumably there are those whose lifestyle means they have to drive at night. The data do not exist to enable us to identify these groups.

The casualty analysis indicates that older drivers have few accidents at night compared with the day. There are more male casualties than female at night,

and this reflects a difference in exposure as males tend to drive about twice as many miles per person at night than do females. On the other hand the risk of death or serious injury to older females is very marked and given the low exposure of this group in the evening and at night, there is cause for concern.

In contrast to the younger drivers where many studies have been undertaken, it has been difficult to assess the difficulties experienced by older drivers at night because of the paucity of studies that have looked at time of day effects for this group.

This study has identified the following recommendations for action in respect of filling gaps in our knowledge and practice for older drivers.

- An in-depth study of accident records would help understand where this group of drivers is most at risk of an accident at night when they do drive.
- When making a decision to purchase a new car, older drivers, especially older females who are in general more fragile than older males, should be made more aware of safety features that might help them survive an accident as well as other features of modern cars, or additions that can be made to them, that make the driving task easier. Discussions with motor manufacturers are warranted to advise them of the need to cater for in-car protection aimed more at older drivers.
- Local Authorities and motoring organisations both have a role to play in setting up schemes for older drivers where advice is given about how to drive in complex environments in a changing world. In addition, people can, on a voluntary basis, be taken on test drives with an advanced driving instructor to give guidance on how to change driving styles to cope with aspects they find difficult.
- Headlights of oncoming vehicles cause problems of glare, and whilst it is not clear how many accidents could be saved by better adjusted lights and better discipline in dipping for oncoming vehicles, these are obviously areas of concern for older drivers.
- The quality of the infrastructure is important to older drivers, especially with regard to signing and marking of the edge of carriageway. Local Authorities in their road maintenance plans should pay particular attention to roads in non built-up areas where edge of carriageway is indistinct and look for ways in which markings could be improved.

Young drivers

Good information on both accidents and exposure is needed to enable policy makers to assess different options for improving the safety of young drivers at all times of day but especially at night when the accident risk is high. This

information is also needed to enable young people themselves to be better informed as to the risks.

The greater numbers of people injured (all severities) on built-up roads can perhaps be partly explained by the attraction of towns with their clubs and nightlife. This focus for leisure activities results in the concentration of trip ends in town in the early evening and trip beginnings in the later evening.

The rural lanes hold a particular attraction for some young men to drive along, as they consider them a good test of their skills. They are often in smaller, older cars that are carrying the maximum number of passengers, sometimes more, which affects the handling. They also believe that if they cannot see headlights then nothing is coming, and they make mistakes.

This study has identified the following recommendations for action in respect of filling gaps in our knowledge and practice for younger drivers.

- Policies to increase the amount of experience a young driver accumulates before being allowed to drive alone have been demonstrated to increase the safety of this high accident involved group. The use of the learner driver log-book should be made mandatory as soon as possible. This should allow for a realistic level of experience to be gained driving at night-time which in turn will help increase the understanding and support of parents and young people for the need to gain experience in such a high risk driving environment. In general, improving driver education and training is seen as the way forward to safer driving by young people.
- A feature of driver training that needs more consideration is the risk of driving at night. Central and local government in partnership with the motoring organisations and insurance industry should give priority to developing risk awareness programmes that involve and are acceptable to young people.
- One way to reduce the numbers of young people being injured at night would be to reduce their exposure during the critical hours. Reducing exposure is usually not an option. In view of the high risks to the youngest groups of drivers, it is time to consider such a system for Britain, but the possible benefits in accident reduction would need to be fully assessed alongside the effects of such a restriction on employment and mobility of young people (Baughan and Simpson, 2002).
- Studies have shown that young drivers often carry several passengers and there is an association between passengers and accidents, especially late at night. Baughan and Simpson suggest that passenger restrictions for drivers when they first begin driving alone merit serious consideration. Their assessment of the possible unintended social effects include the possibility of young drivers transferring to less safe

forms of transport and making more car journeys as drivers rather than as passengers.

Finally, young drivers do not have much money for motoring given the need to tax and insure a vehicle as well as run it. They tend to buy or inherit smaller older cars that do not have the up to date crash protection or handling of newer models - two of the things needed by inexperienced young drivers with a tendency to carry passengers. In time the newer cars of today will be the old cars of tomorrow and the safety benefits will flow down in that way. However, given that cars will continue to improve, this young group is always going to be left behind. This highlights the need for extra driver education, training and practice before being permitted to drive solo, especially at night.

Data needed to fill gaps in our knowledge

This study has shown that there are unanswered questions about the travel patterns of drivers at night-time. The Table below outlines the main areas where data are lacking. Filling these gaps will allow the recommendations given above to be assessed and decisions made about which may be possible to take forward and implement.

Gap in our knowledge	Why it is important to fill
1. Km driven during night-time hours on major and minor roads in built-up and non built-up areas	Accident occurrence differs between area types. Interventions will differ for major and minor roads and by area type.
2. Km driven during night-time hours by males and females of different ages on major and minor roads in built-up and non built-up areas	Accident occurrence on major and minor roads differs between males and females and between people of different ages. Information will help to target interventions at particular groups, eg. more supervised driving at night on non built-up roads. Data needed for tracking changes in exposure for these groups over time and in response to policy interventions
3. Journey purpose by time of day, including night-time, and day of week for males and females of different ages	Need to know how many accidents are work or leisure related to assist development and targeting of interventions and for determining which categories of drivers are in high risk groups
4. Reporting rates in non-built up areas by age and road type	The accident risk of young drivers in particular may be under-estimated using STATS19 data alone. Do not have data on reporting rates on non built-up roads
5. Twilight (dawn/dusk)	Little is known about these times of day
6. Differences in exposure between light and dark evenings	STATS19 data allows casualty numbers to be calculated by time of day and light and dark. Need exposure data to calculate differences in risk between light and dark for a given time of day

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1. Introduction

1.1 Description of the problem

Only a quarter of all travel by car drivers is undertaken between the hours of 19.00 and 08.00, but it is in this period that 40 percent of fatal and serious injuries are sustained by drivers. This indicates that car travel at night carries a greater risk of being killed or seriously injured than does travel during the day.

Accident patterns for the young and older drivers differ by day and by night. There is a higher incidence of single vehicle (non-pedestrian) accidents and, on non built-up roads, there is evidence that more young males are involved at night than their proportion in the population would suggest. Crettenden *et al.* (1994) in an Australian study note that there is a lack of explanatory information for the riskiness of night-time driving. This is also the case in Great Britain. Some reports suggest that sleepiness is a major factor among young drivers at night, but Crettenden *et al.* have adjusted crash frequency for distances travelled by time of day and night and driver age/experience and still find that night-time driving is a risky activity, particularly for young/inexperienced drivers.

The study also hypothesised that young drivers could be divided into two sub-groups comprising those who drove a lot at night-time and those who drove mostly by day time. Differences between the groups were generally small, but indicated that the night-time drivers were rather freer from family ties such as a partner or children and were not buying their own home. They were also more likely than their day-time driving peers to be driving their own car – which was likely to be older and to have been modified and personalised, and to be carrying passengers.

Clarke *et al.* (2002) in their in-depth study of young drivers found that the predominant accident types included single vehicle accidents involving loss of control, excess speed for the conditions, and accidents during the hours of darkness. Loss of control on bends in darkness was found to be a particular problem for the 17-19 years age group while the 23-25 years age group had more accidents involving rear end shunts. Loss of control accidents in darkness showed a slow rate of improvement with experience compared with accidents of other types such as right-turn accidents. West and Hall (1998) and Maycock (2002) show that accident rates, controlling for mileage, were substantially lower in the second six months following the test than in the first six months.

One interesting feature of Clarke *et al.*'s study was a qualitative assessment of failures leading to accidents. It was hypothesised that it is not a lack of skill that leads to accidents among the young age group, but rather a 'failure of attitude' resulting in deliberate speeding and recklessness.

The literature indicates that disproportionate numbers of young drivers, especially young men, are injured at night. But to be able to introduce measures targeted at this group more needs to be known about the purpose of their journeys, the types of roads they travel on and how far they drive and at what times in the evening and at night.

Older drivers tend to have fewer accidents at night, but little is currently known about how much of this low accident experience can be accounted for by exposure related to their driving patterns. People over the age of 60 form about 20 percent of the population, yet they make up over a quarter of traffic fatalities. Hakamies-Blomqvist (1993) and Cooper (1990) both found that older drivers who were injured were more likely to have been at fault than younger drivers. Hakamies-Blomqvist indicates in her study that the risk of fatal accidents increases with age and in some cases an acute illness was found to have contributed to the accident, but as the sample size is small it is difficult to determine which sub-groups are more at risk. Mitchell (2002) describes the situation where older people are under-represented in road accidents of all severities, which suggests that they have fewer accidents than do other age groups but their over-representation in fatal accidents, especially as pedestrians, indicates their increased fragility.

1.2 Exposure and risk

The measurement of exposure, or amount of travel by car, of drivers of different age and gender is central to the assessment of the risk of being killed or injured in a road traffic accident. The European Transport Safety Council (ETSC, 1999) description of exposure is apt;

'The various ways of measuring the amount of travel are referred to collectively as exposure data because they measure traveller's exposure to the risk of death or injury'.

Exposure data are central to effective policy making and, in particular, to tracking of injury trends over time. If accident or casualty data alone are used it is not known whether a change in numbers over time is due to more, or fewer people undertaking an activity such as driving a car (ie. changes in exposure), or because the roads and cars are becoming safer.

Exposure may be measured in terms of distance travelled, time spent travelling, or number of trips. Hakkert and Braimaister (2002) have compared the risk of travel by different age groups by distance and time travelled and have found that the picture does not change drastically between measures. Of interest to

this study, however, is their observation that by both measures of exposure it is the young (15-24) and the old (65+) who have the higher risks. When looking at risk per hour of exposure, the risk of the young group increases somewhat and the risk of the old group decreases, seeming to indicate that the young are exposed to the risk of injury at higher speeds.

When exposure data are compared with casualty data a measure of risk can be obtained which is usually expressed as a casualty rate or the number of casualties per unit of travel. It provides a way of comparing casualty risk to different groups of people travelling on different types of road, or indeed by different modes of transport. Not all drivers are equally likely to be involved in an injury accident and risk is the probability of an accident happening.

Exposure data may be used to compare different levels of risk to road users such as pedestrians, cyclists and car drivers. Exposure of car drivers is much higher than the other two groups because of the distances covered but the risks of injury are much higher (by some 8-9 times) for pedestrians and cyclists. The fatality risks estimated by the ETSC are 7.5 per 10^8 kilometre travelled or 30 per 10^8 person hours for pedestrians, 6.3 and 90 for cyclists and 0.8 and 30 respectively, for car occupants. Thus policies to improve the safety of car travel should be designed so as not make the situation worse for pedestrians and cyclists, and the collection of good exposure data is critical to monitoring policy making and priority setting in this context.

Barker *et al.* (1998), in their study of rural single-carriageway roads, show that most accidents on these types of road occur on the rural A roads and just under 30 percent occurred at night. If amounts and risk of travel on main A roads are to be distinguished from B and unclassified roads in towns and in rural areas, information is needed about travel on these roads. In general, assessments of risk to different groups of people under different circumstances can be used to indicate where safety improvements can be made either through changes to the road environment or through education, training, and enforcement of traffic laws.

This study sets out to assess what data are available and what is necessary for such an assessment to be made of exposure to risk for young and older drivers driving on different types of roads at night-time.

Exposure as used in this report is a measure of exposure to the risk of being injured in a road traffic accident as a driver of a car or taxi. The measure of exposure used is distance travelled, because data on time are not available.

1.3 Objectives of the study

The AA Foundation for Road Safety Research and the Rees Jeffreys Road Fund wish to gain a better insight to:

- (a) what information exists which relates to night-time exposure by activity and by group (young and older);
- (b) what is known about exposure and risk to young and older drivers at night, in conjunction with an analysis of relevant accident data to provide a picture of the size of the potential problem areas, and gaps in current knowledge;
- (c) people's concerns, attitudes and beliefs with regard to the problems of night-time driving; and
- (d) provide the basis for decision on what measures might be brought to bear on the problem, and what further research would be needed in order to point to focused action.

1.4 Method of working

The study is in two parts:

- A quantitative risk based approach. Casualty data were requested from the Department for Transport (DfT) and analysed to provide a picture of casualty occurrence on different roads at different times of day for drivers of all ages to provide a baseline against which to compare casualty occurrence of young and older drivers. Exposure data by time of day were also requested from the DfT.
- A qualitative approach using focus groups to elicit younger and older drivers' concerns, attitudes and beliefs with regard to the issues and problems of night-time driving

1.5 Structure of the report

In Section 2 the problem is outlined in more detail and analyses of casualty data are presented in order to provide a picture of the size of the potential problem areas. The exposure data that are available are described, and where feasible are related to the casualty data to give estimates of risk under different circumstances, thus highlighting the gaps in our knowledge which would need to be filled to give a more complete picture of risk to drivers, especially the young and the old, at night.

Section 3 provides a commentary on the issues from sets of focus groups held in built-up and non built-up areas, involving older and younger drivers. These issues are related where possible to the literature.

In Section 4 what has been learned, what gaps have been identified by the study and what is needed to fill them are discussed.

2. Night-time exposure and risk– what is known?

Not all driving after 7pm is in the dark. Depending on the time of year and part of the country it can be light or dark between about 05.00 and 09.00 hours and in the evening between 16.00 and 21.00 hours. Dawn and dusk moves between these hours, with the twilight period lasting for about 20 minutes in the winter months to nearly an hour in the summer months. Previous studies have shown that the accident rate in darkness is higher than in daylight, and that the effect is greater for pedestrians than for vehicle occupants, and greater for fatal casualties than for non-fatal casualties (Broughton and Stone, 1998).

In the study reported here the differing light levels in different seasons were not explicitly taken into account, partly because this was a study of night-time driving and not just a study of driving in darkness, and partly because the level of detail required in the data and analyses would have been too large for a scoping study. Any subsequent study might wish to look in more detail at such daylight/darkness/twilight issues.

Deaths of young male drivers in drink-driving accidents is receiving increased attention as a road safety issue. Since 1999 there has been a steady rise in the number of drink-drive related accidents and casualties (Department for Transport, 2004). The peak rate in driver deaths on built-up A roads now occurs between 18.00 and 03.00 hours at the weekends when over 60 per cent of drivers who died, did so in drink-drive related accidents.

Whilst the number of drivers who died in drink-drive accidents in each age band is relatively small, the proportion of all male driver deaths occurring in drink-drive accidents is about 27 percent, but it is highest for male drivers between the ages of 20 and 39 years where it ranges from 37–41 percent of all driver deaths. The proportion is lower among both younger and older drivers and falls to 8 percent for male drivers over 60 years of age. For female drivers the highest proportion is for those aged 20-29 year. The overall proportion for female drivers is about half the proportion for males at about 13 percent of all female fatalities (Broughton 2004, in press).

Whilst acknowledging the link between drink driving and younger drivers, especially at night-time, the casualty data are not explicitly explored in this study.

The following sections describe what is known about exposure and risk to younger and older drivers at night.

2.1 Who is injured, when and where

The main focus of this study is on drivers rather than car occupants, which include passengers as well as drivers. Riders of powered two-wheeled vehicles are not included, but in the preliminary analyses drivers of light and heavy good vehicles, buses and coaches were included.

The data analysed were:

- the number of people who were killed or seriously injured as drivers, and
- all casualties who were drivers.

Special extractions for the years 2000 and 2001 were requested from the Statistics Division of the Department for Transport. These two years have been combined in the tables and analyses that follow.

2.1.1 Time of day

Data were requested for 24 hours then broken down into six different times of day to provide a baseline against which to assess the night-time accidents. The time periods used were:

- morning to mid-afternoon (08.00-14.59) when the majority of day-time driving is done;
- mid-afternoon to early evening (15.00-18.59) covers the return from school and work, and in the winter months some of the driving during this period will be in darkness;
- evening covered 19.00-21.59 when most people are home from work and are starting to go out for the evening, plus those whose jobs require driving during these hours. In the winter these hours are dark and in the spring and autumn they include twilight, but in the mid-summer they are light;
- night-time (22.00-01.59) is always dark (except for the early part of the period which is twilight in the north of Britain in the summer) and represents the time when people are returning from their evening out or finishing work for those on late shifts;
- the middle of the night can be thought of as being 02.00-04.59 and although there is little traffic around during these hours, they are generally recognised as being the peak hours for fatigue or sleepiness accidents; and
- the very early morning is light during the late spring and summer, and dark during the winter months (05.00-07.59). People tend to be starting rather than finishing journeys during these hours.

These times were chosen so that comparisons could be made between the number of casualties at different times of day as well as at night so as to put the night-time driving issues in context of the overall picture.

2.1.2 Age and gender

It is well recorded that males are involved in more traffic accidents than females, and the data presented in Table 1 show that males make up 60 percent of those killed or seriously injured as drivers. The gender groups enable the different accident patterns on different roads to be explored and assessments made of relative severities of injuries between males and females of different ages.

The casualty data were divided in to male and female drivers and then the following age groups: 17-20; 21-25; 26-35; 36-54; 55-64; 65-74; and 75 years and over.

The age groups were chosen on the basis of previous studies of younger and older drivers.

- 17-20 age group captures those younger drivers who have been shown by many studies to be most at risk;
- 21-25 age group is still more at risk than the average;
- 26-35 and 36-54 years age groups were chosen to represent adults of working age against which the casualty rates of the younger and older groups could be compared; and
- age groups for drivers over 55 years were chosen on the basis of previous studies to represent those who were newly retired, and at various ages through retirement and changing lifestyles to those who are starting to give up driving.

Table 1: For each time period: percentage of killed or seriously injured driver casualties by gender and vehicle type.

Time	Bus, LGV HGV Driver		Car and Taxi Driver		Total
	Female	Male	Female	Male	
08.00-14.59	0.6	9.8	37.8	51.9	100.0
15.00-18.59	0.3	6.3	35.0	58.4	100.0
19.00-21.59	0.3	4.6	27.0	68.1	100.0
22.00-01.59	0.1	5.2	17.3	77.4	100.0
02.00-04.59	0.2	11.4	11.5	76.9	100.0
05.00-07.59	0.2	14.4	21.1	64.2	100.0
All	0.4	8.1	30.4	61.2	

2.1.3 Built-up and non built-up roads, and vehicle type

Data were requested for A, B, C, and unclassified roads in built-up areas, A, B, C and unclassified non built-up roads, and Motorways. Built-up roads have speed limits of 20, 30, or 40 miles/h, whilst non built-up roads have speed limits of 50, 60, or 70 miles/h. It is known from previous studies that casualty rates differ across types of road and between the same class of road in built-up compared with non built-up areas.

Analysis of data by road type and by built-up and non built-up area will help to identify where the casualty numbers are greatest at different periods of the day.

The data were broken down into two categories: car and taxi drivers, and bus, coach, light and heavy goods vehicle drivers. This enabled the night-time professional drivers of heavy vehicles to be separated out from car drivers. There were very few casualties amongst drivers of heavy goods vehicles and buses, with 0.4 percent of the total female and 8.1 percent of the male killed or seriously injured drivers in these categories (see Table 1). As a result only car and taxi drivers have been used in the subsequent analyses.

2.2 Killed or seriously injured casualties on built-up and non built-up roads

Figure 1 shows, for the whole 24 hour period, the number of killed or seriously injured females and males by age group on A non built-up roads (A nbu), B, C and unclassified non built-up roads (BCandU nbu), A built-up roads (A bu), and B, C and unclassified built-up roads (BCandU bu). Because the age bands contain different numbers of years, the y axis is the number of killed or seriously injured casualties divided by the number of years in each age band.

1 On *non built-up A roads*, both male and female young drivers are killed or seriously injured in large numbers relative to other age groups. One in four of all male drivers killed or seriously injured on this road type are between the ages of 17 and 25 years. About twice as many young men under 25 years as young women are killed or seriously injured. The numbers of killed or seriously injured driver casualties decline steadily with age after about 25 years.

2. On the *built-up A roads*, the number of female drivers under 25 years killed or seriously injured is about half that on the non-built-up roads and for young males it is about two-thirds.

3. On the *non built-up B, C and unclassified roads*, the interesting feature is the very high incidence of young male casualties (17-20 years) in relation to drivers of all ages and gender.

4. On the *built-up B, C and unclassified roads*, for drivers of all ages the numbers killed or seriously injured are higher than on this group of roads in non built-up areas with the exception of young females (17-20 years). For young males the number for the 17-20 year olds is almost as high as on the non built-up A roads. Amongst the females it is the 21-25 year age group that has the highest number of casualties on these roads.

The discussion so far has been about all casualties at all times of day but this report focuses mainly on what happens at night-time. Figures 2 and 3 show the number of killed or seriously injured driver casualties on A roads and on B, C and U roads for the time periods 19.00-21.59 and 22.00-01.59, while Figures 4 and 5 show the figures for *all* casualties analysed in the same way. To make all graphs comparable they show the number of casualties in an age group divided by the number of years in the age group (as above in Figure 1). The casualties have further been divided by the number of hours in the time period (the first having three hours and the second four hours). Table 2 summarises the main points of interest from the following Figures.

Figure1: Numbers of female and male drivers killed or seriously injured on different road types at all times of day

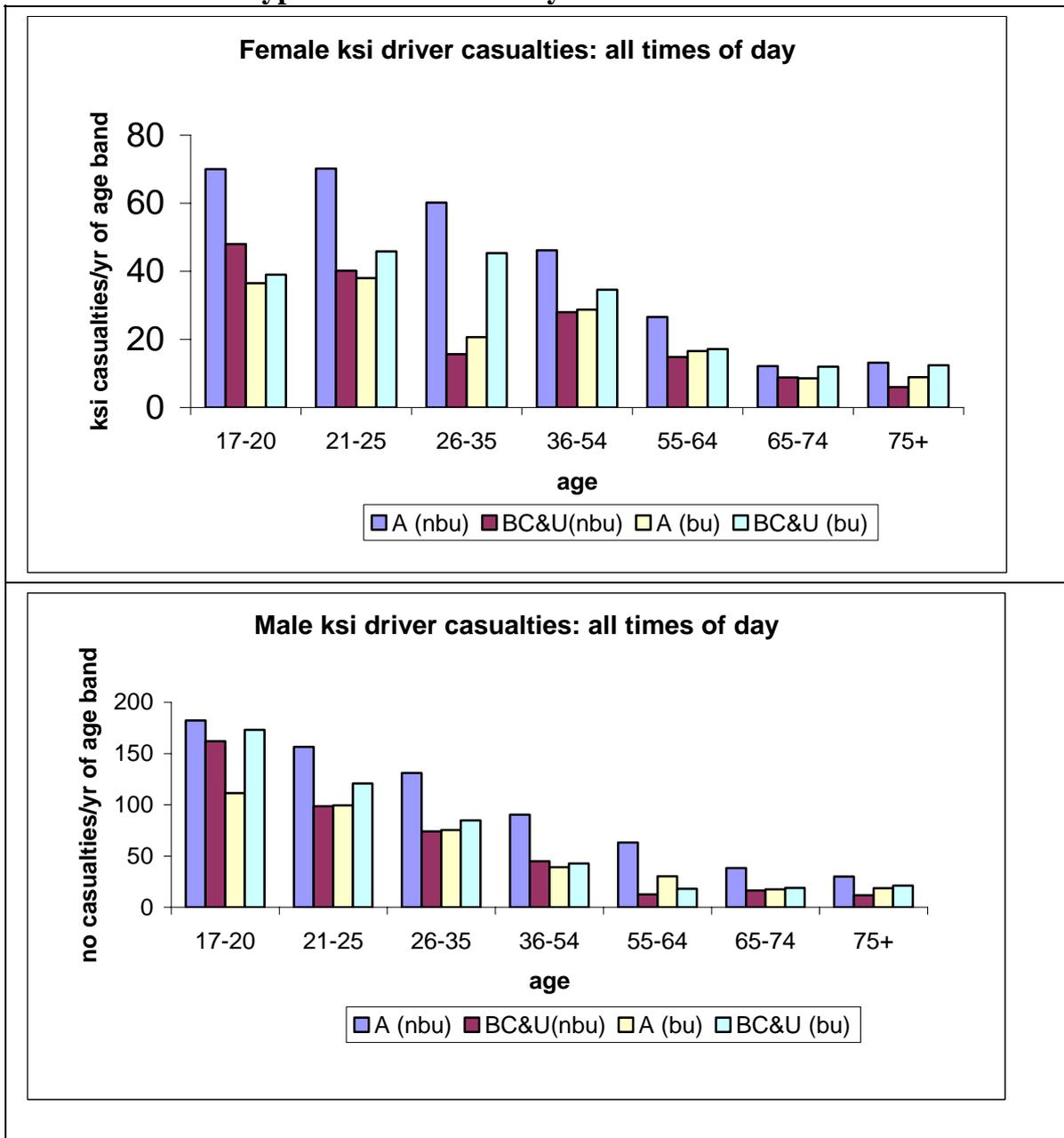


Figure 2: Number of killed or seriously injured casualties of different ages and gender on A roads during the two periods 19.00-21.59 and 22.00-01.59 hours

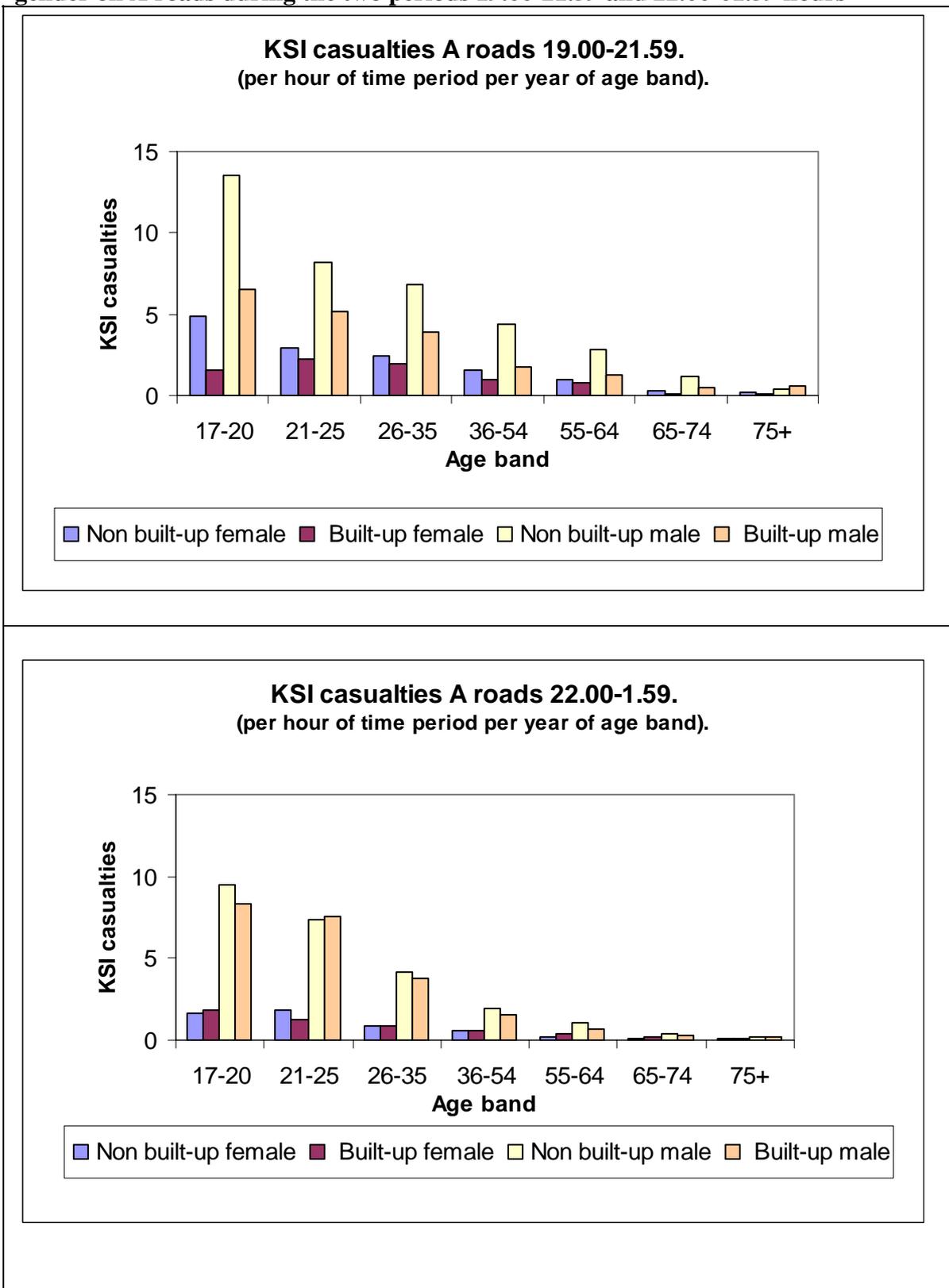
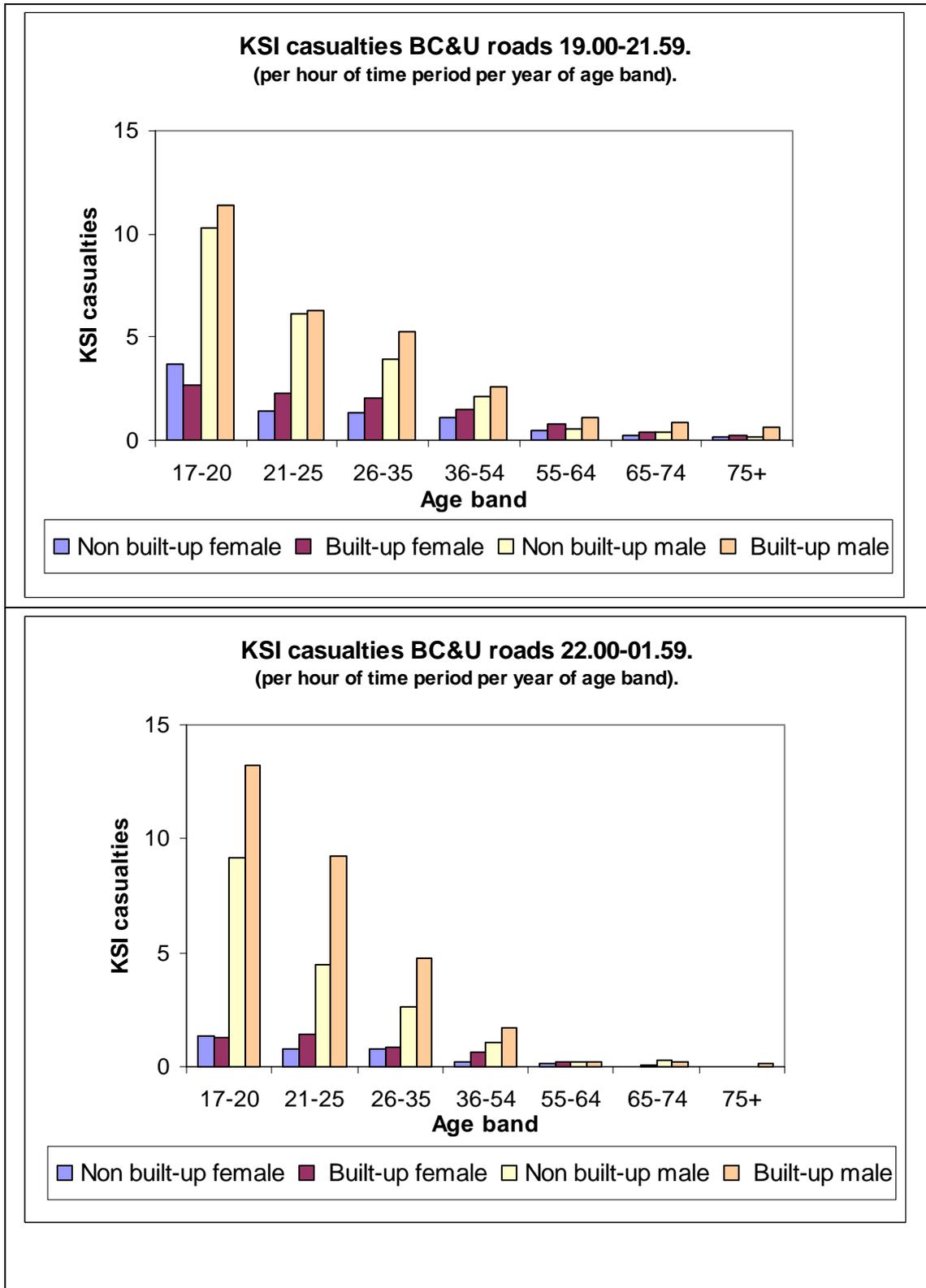


Figure 3: Number of killed or seriously injured casualties of different ages and gender on B,C and unclassified roads during the two periods 19.00-21.59 and 22.00-01.59 hours



2.3 Casualties of all severities on built-up and non built-up roads

Figure 4: Number of casualties of different ages and gender on A roads during the two periods 19.00-21.59 and 22.00-01.59 hours

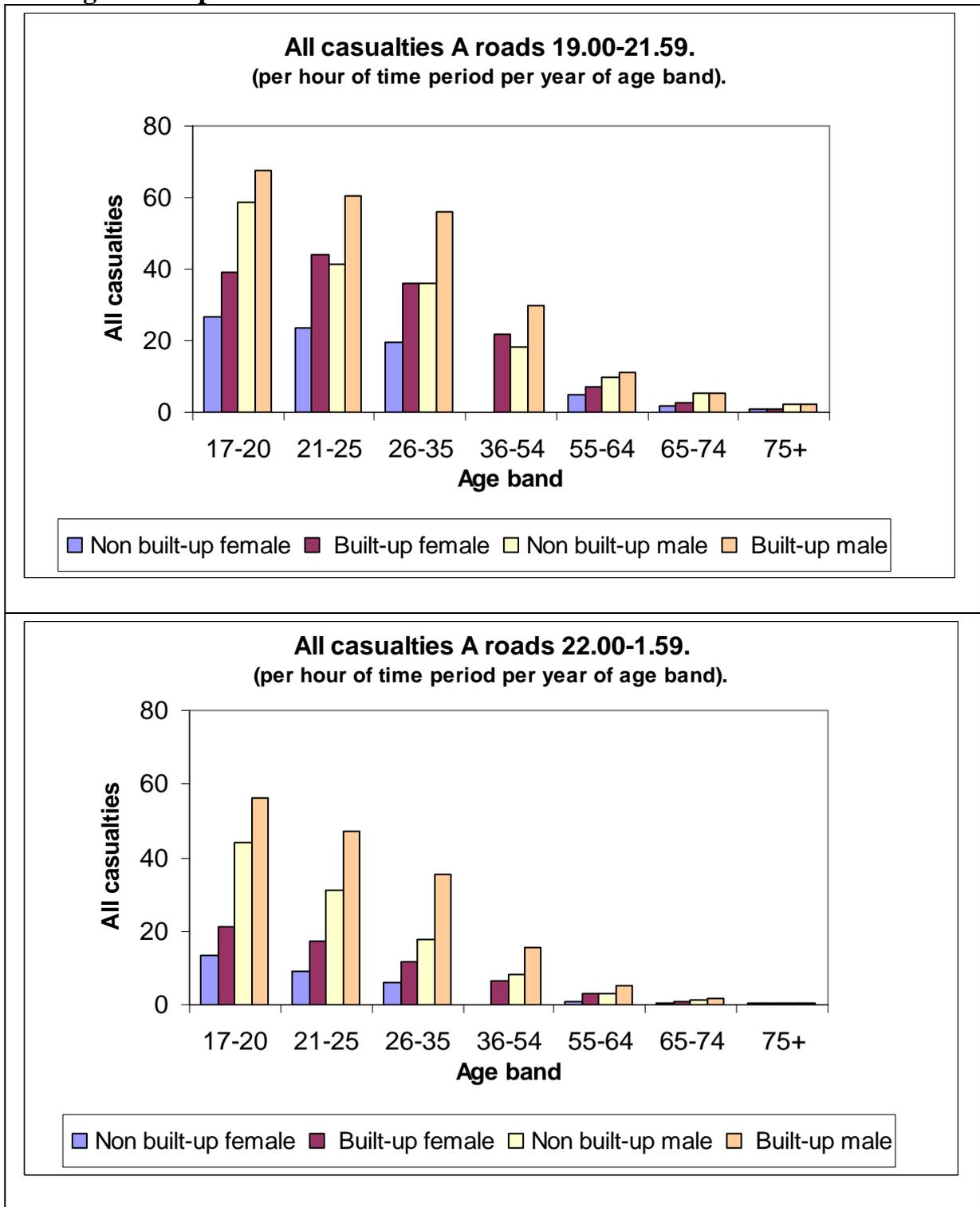


Figure 5: Number of casualties of different ages and gender on B,C and unclassified roads during the two periods 19.00-21.59 and 22.00-01.59 hours

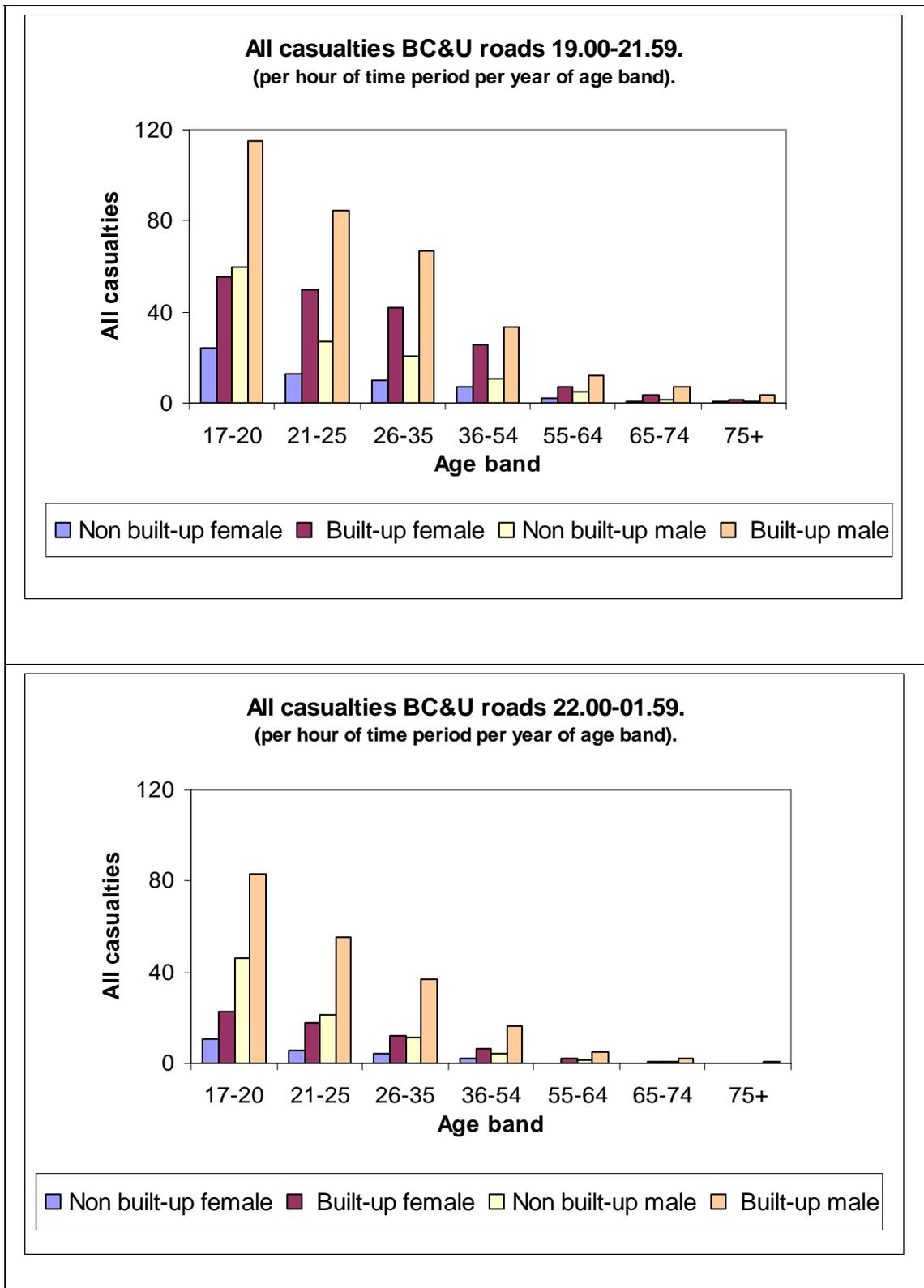


Table 2: Summary of casualty experience of drivers of different ages and gender who drive at night between 19.00 and 01.59 hours.

Age and gender group driving between 19.00 and 01.59 hours	Main points from Figures 2-5
Young male drivers aged 17-20 years	<ul style="list-style-type: none"> • More casualties than any other age or gender group on every road type • Fatal and serious casualties greatest in number per hour on non built-up A roads in the early evening (19.00-21.00) followed by built-up B, C and unclassified roads between 22.00 and 01.59 hours. • For casualties of all severities more occur on the built-up than on the non built-up network • Road types that stand out are the built-up B,C and unclassified roads between 19.00 and 21.59 followed by built-up A roads at all times after 19.00
Young female drivers aged 17-20 years	<ul style="list-style-type: none"> • Fatal or serious casualties on all road types between one-third and half the number of male casualties of same age • Fatal and serious casualties per hour greatest on non built-up A roads between 19.00 and 21.59 followed by non built-up B,C and unclassified roads during the same times • Casualties of all severities: highest numbers occur on built-up A roads at all times after 19.00 and on built-up B,C and unclassified roads between 19.00 and 21.59. • The non built-up B,C and unclassified roads have a high number of casualties after 22.00 where the number exceeds that of young males.
Young male drivers aged 21-25 years	<ul style="list-style-type: none"> • Number of fatal and serious casualties on all road types between 19.00 and 21.59 about half that for youngest group • Between 22.00 and 01.59 the rate per hour is about two-thirds that of young group with high numbers on both built-up and non built-up A roads and on built-up B,C and unclassified roads • The difference is less marked for all casualties on A roads with all built-up roads having higher numbers of casualties than non built-up roads.
Young female drivers aged 21-25 years	<ul style="list-style-type: none"> • Very few fatal and serious casualties after 22.00 • Casualties of all severities higher than young female group on built-up A roads but slightly lower on built-up B,C and unclassified roads
Older male and female drivers aged 55 and over	<ul style="list-style-type: none"> • More 55-64 year old males killed or seriously injured on non built-up A roads between 19.00 and 21.59 than females of any age except youngest group • Very few males or females of any age killed or seriously injured after 22.00 on any road type

2.4 How much people travel at different times of day

Figures 2-5 raise some important questions. For example, the extent to which the elevated casualty numbers of young people at night can be explained by the amount of driving they do at night, or whether they are still more at risk after exposure has been taken into account.

In terms of estimating exposure, there are different:

- distances driven per year by male and female younger and older drivers;
- distances driven on the different types of road;
- distances driven for different purposes; and
- numbers of people in each age band who actually drive.

How much of this information is available is explored in the following sections.

2.4.1 Distances driven by people of different ages and gender

Data on distance travelled per person per year by age, gender and time of day for 1996/2001 were provided from the National Travel Survey database by the Transport Statistics: Personal Travel Division of the DfT. Table 3 shows distances in miles per person for a given time at which trips started.

It can be seen from Table 3 that over 70 percent of the mileage driven by males starts between the hours of 08.00 and 18.59. For females the corresponding figure is 80 percent. For young males aged 17-20 years only two-thirds of their mileage is driven during the day with 15 and 8 percent respectively driven between 19.00-21.59 and 22.00-01.59. This compares with the figure for all males of 9 and 3 percent respectively. So young males do proportionately more of their driving in the evening, even though the actual miles driven are lower than for men in age groups encompassing 21-54 years. The amount of driving at night tails off when men reach retirement age.

For young females aged 17-20 years, 72 percent of their driving is done during the day but whilst their night-time mileage is about half that of young males, the distances driven between the hours of 19.00-21.59 and 22.00-01.59 still represent 13 and 6 percent of their total mileage. Older females drive very little at night with those older than 75 years doing over 90 percent of their mileage in the day time.

Table 3: Distance travelled per person per year by age, gender and time of day: 1996/2001

Car driver stage trips

	Miles						All times
	Trip start time						
	0500-0759	0800-1459	1500-1859	1900-2159	2200-0159	0200-0459	
Male							
17-20 years	214	784	734	356	181	13	2,283
21-25 years	890	1,813	1,713	620	290	52	5,378
26-35 years	1,425	3,010	2,590	719	249	83	8,076
36-54 years	1,454	3,651	2,777	784	233	80	8,979
55-64 years	827	3,142	2,005	538	160	59	6,731
65-74 years	131	2,567	1,010	249	92	14	4,063
75 years or older	47	1,172	445	117	33	1	1,814
All ages 17+	981	2,858	2,051	584	193	58	6,725
Female							
17-20 years	118	628	503	199	97	9	1,553
21-25 years	338	1,231	1,062	338	123	15	3,108
26-35 years	365	1,762	1,190	306	104	6	3,734
36-54 years	268	1,803	1,173	312	96	8	3,660
55-64 years	132	1,073	584	152	59	1	2,002
65-74 years	15	617	263	62	22	-	978
75 years or older	4	161	58	9	2	-	235
All ages 17+	204	1,274	821	221	75	6	2,601
All ages 17+							
17-20 years	165	705	616	276	138	11	1,911
21-25 years	590	1,497	1,359	467	200	32	4,145
26-35 years	866	2,352	1,852	501	173	43	5,787
36-54 years	844	2,700	1,952	541	162	43	6,241
55-64 years	471	2,080	1,275	340	108	29	4,303
65-74 years	69	1,522	609	149	55	6	2,410
75 years or older	21	560	211	52	14	1	858
All ages 17+	570	2,019	1,400	392	131	30	4,542

Source: National Travel Survey, DfT

2.4.2 Distance driven on different types of road

Distance driven on different types of road cannot be extracted from the NTS data as it is not collected. A broad estimate of trips that start and/or finish in a built-up or non-built-up area could be extracted but it is not straightforward and its usefulness in the context of night-time driving is questionable.

Information does exist on road lengths and Table 4 shows road lengths in the year 2000 for built-up and non built-up roads of different types. It can be seen that major roads (trunk and principal A roads) make up about 7.4 percent of the total road length in built-up areas and about 16.1 percent in non built-up areas (excluding Motorways). The minor roads include B,C and unclassified roads. By contrast the proportion of KSI casualties on the built up A (major) roads is about 47 percent of the urban total compared with 64 percent of the rural total on the non-built up A roads.

Table 4 Road lengths and KSI casualties

Road type	Road length (thousand km)	Percentage of road length	Number of KSI casualties	Percentage KSI casualties
A built-up	13.8	7.4	4776	46.8
BCU built-up	172	92.6	5435	53.2
A non built-up	22.3	16.1	8479	64.2
BCU non built-up	169.7	83.9	4727	35.8

2.4.3 Distances driven for different purposes

The National Travel Survey contains information on distance travelled per person per year, and the number of trips per person per year by journey purpose by all modes. Table 5 shows an extract of this data. Corresponding numbers could be derived for car drivers at the aggregate level, but probably not for all journey purposes, nor by time of day as the numbers in the NTS sample would be too small.

In terms of distance travelled commuting and visiting friends at home have the highest mileage, but shopping has the highest number of trips.

Table 5: Distance travelled per person per year (miles) and trips per person per year (all modes) by journey purpose

	Miles per person per year	Trips per person per year
Commuting	1350	161
Business	695	36
Education	198	68
Escort Education	96	48
Shopping	898	216
Other escort	413	80
Other personal business	468	103
Visiting friends at private home	1164	134
Visiting friends elsewhere	255	46
Entertainment	293	38
Sport participate	149	24
Holiday base	471	11
Day trip	341	19
Other including just walk	51	46
All purposes	6843	1030

Source NTS, DfT

Breakdowns by age and gender exist in the NTS for trips although not for distances, and these are expressed as percentages of trips per person per year by age and gender. Again these are for all modes and cannot be broken down further by time of day. An extract is shown in Table 6.

In the context of this report on night-time accidents, journey purpose by time of day would be very valuable to use in the estimation of risk for drivers undertaking different activities. However, it can be seen in Table 6 that males and females aged 17-20 years make 17-20 percent of their trips to visit friends at home, and a further 8 percent visiting friends elsewhere. It would be interesting to know how many of these trips were as car drivers and when these visits took place.

Table 6: Percentage of trips per person per year by age sex and purpose

Males	<17	17--20	21-29	30-39	40-49	50-59	60-69	70+	All trips
Commuting	2	25	32	29	27	24	11	2	191
Business	-	1	5	8	10	8	4	1	54
Education	28	14	2	-	-	-	-	-	69
Escort Education	6	-	1	3	3	1	1	1	27
Shopping	12	12	15	17	17	19	28	36	195
Other escort	10	4	5	8	8	8	8	6	80
Other personal business	7	6	8	8	10	11	12	18	102
Visiting friends at private home	16	17	14	10	8	9	12	12	123
Visiting friends elsewhere	3	8	8	5	5	5	5	6	53
Sport and entertainment	9	8	6	6	5	5	6	7	68
Holiday/day trip	3	2	2	2	2	3	5	4	31
Other incl just walk	3	2	3	3	4	5	9	9	47
All purposes	100	100	100	100	100	100	100	100	1041
Females	<17	17--20	21-29	30-39	40-49	50-59	60-69	70+	All trips
Commuting	1	21	21	16	21	20	5	1	134
Business	-	1	2	3	4	3	1	-	19
Education	28	12	2	1	1	-	-	-	67
Escort Education	5	2	9	15	8	2	1	1	68
Shopping	13	17	21	21	23	27	35	39	236
Other escort	11	3	6	10	10	6	4	2	79
Other personal business	8	6	8	9	10	11	14	19	104
Visiting friends at private home	18	20	17	12	10	13	16	14	145
Visiting friends elsewhere	3	8	5	3	3	4	4	6	40
Sport and entertainment	7	5	4	5	4	5	7	8	56
Holiday/day trip	3	2	2	2	2	3	5	4	28
Other incl just walk	4	3	3	3	4	7	7	7	44
All purposes		100	100	100	100	100	100	100	1020

As noted above, the largest number of trips per person was for shopping. In Table 6 it can be seen that both male and female older people, are the biggest

shoppers in terms of the number of trips they make. Table 5 indicates that the shopping trips (for all ages) are quite short (about 4 miles per trip on average), and again knowing more about time of day would be interesting in the context of older people's injury patterns.

2.4.4 Numbers of people in each age band who actually drive

The data contained within the NTS is expressed as per person per year. This means that to be able to estimate exposure for groups of people we need to multiply by the number in each group. The most common multiplier is the population of each group, whether it be by age or gender. For the purposes of this study the estimates of casualty rates could be refined by using the number of people who drive cars and thus the mileage each drives per year. It is not known how many people actually drive but the number of people holding a full driving licence is known. This is not the same as the number of people of that age who actually drive because there are those holding a licence who do not drive and it is not known how many.

Table 7 gives estimates in the age bands used in this study of numbers of full driving licence holders by age band and gender. It can be seen that across all age groups females hold fewer driving licences than do males. Whilst this information is interesting and is presented for information, it has not been used in this study because it is felt that it does not improve upon using the population figures alone.

Table 7: Estimates of numbers of full driving licence holders (millions) by age band and gender (based on NTS data)

Age band	Male	Female
17-20	0.6	0.4
21-25	1.6	1.2
26-35	4.0	3.3
36-54	7.0	5.8
55-64	2.5	1.9
65-74	1.8	1.1
75+	1.1	0.7
All	18.5	14.4

2.5 Groups of drivers most at risk of being killed or seriously injured

The upper halves of Figures 6 and 7 show for the males and females separately the numbers of killed or seriously injured casualties, while the lower halves show how the addition of information about the annual amount driven can alter the picture. The casualty numbers are not adjusted for the different numbers of years in each age group.

From Figure 6 it can be seen that the casualty rate for the youngest group of males remains much higher than the others with a large increase in the early evening and larger again between 22.00 and 01.59. The addition of mileage driven tends to flatten out the differences between the remaining age groups except for the older males where the risk of death or serious injury is higher than might be assessed from the casualty figures alone.

Figure 7 shows corresponding information for females and it can be seen that, with the exception of very early in the morning, those in the oldest age group are more at risk than the other age groups, and are very much more so late at night (22.00-01.59). However, some of this effect may be due to the low mileage driven by this group and the consequent uncertainty in the estimates. During the day, when about 68 percent of the driving is done by this age group, their casualty risk is still the highest and about twice that of men of a similar age. It is interesting to note that the difference is quite small between the 36-54, 55-64, and 65-74 age groups but the difference between these and the oldest group is very marked, except for the period 05.00 to 07.59 hours.

Figure 6: Casualty numbers and casualty rates (per million miles) for killed or seriously injured male car drivers by age at different times of day

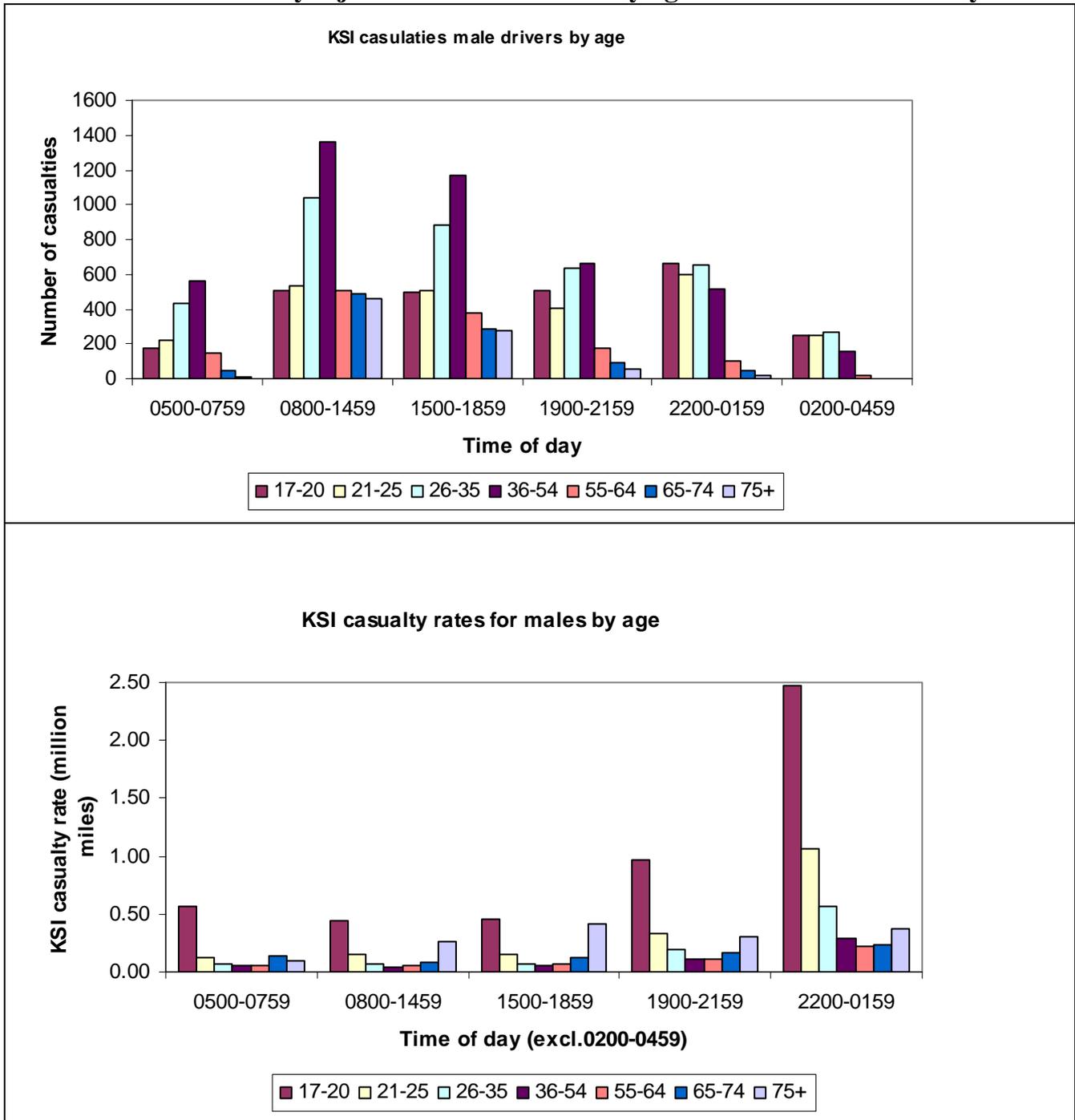


Figure 7: Casualty numbers and casualty rates (per million miles) for killed or seriously injured female car drivers by age at different times of day.

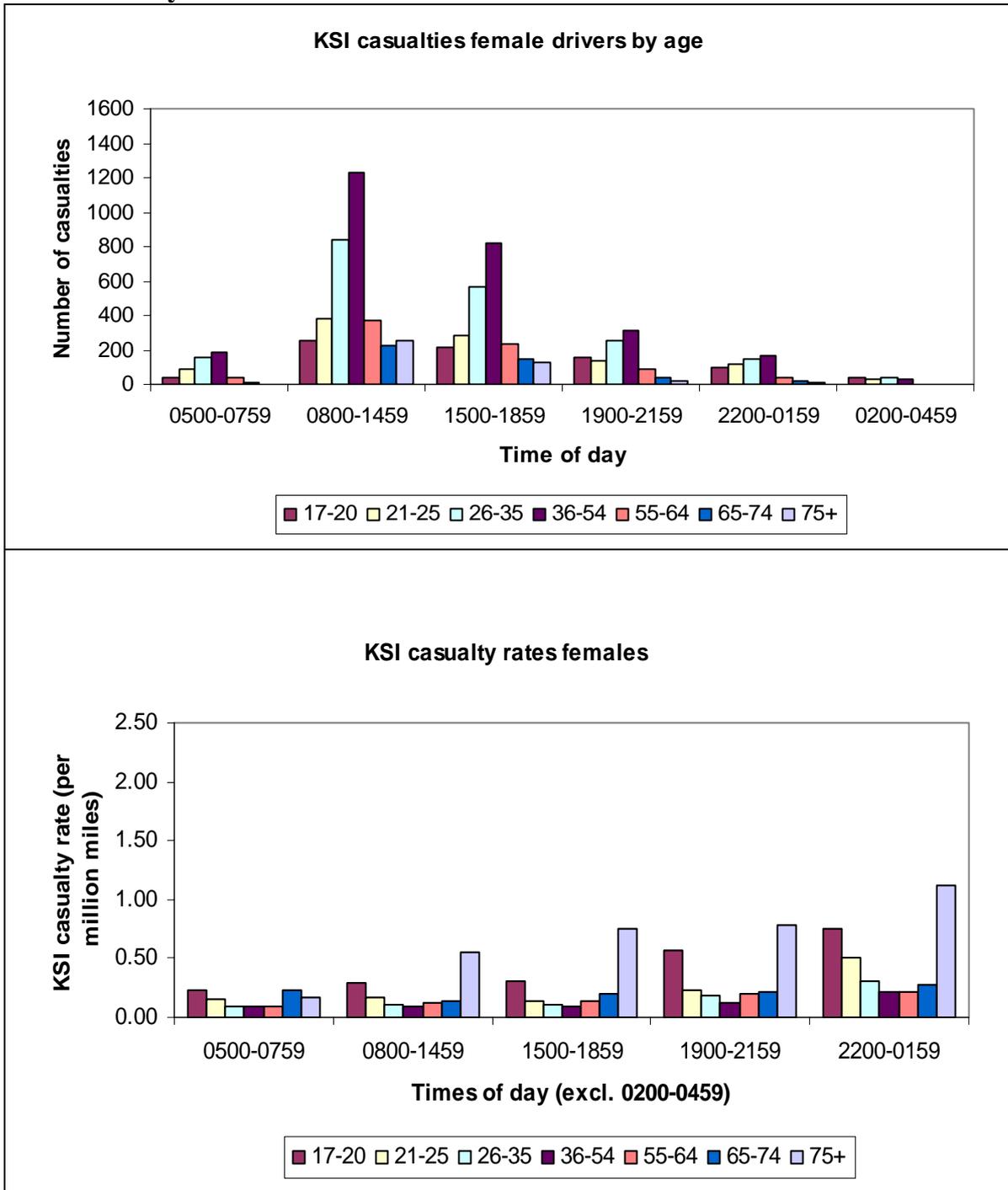


Table 8 shows the relative risk for males and for females of being killed or seriously injured at different times of day. Relative risk has been calculated by dividing the casualty rate (ksi casualties per age and gender group by the total mileage for that group) for each group by the ‘All’ figure for males or females. Those shaded red indicate a relative risk greater than 2 and those in blue indicate a relative risk greater than 1.

Table 8 Relative risk of death or serious injury for male and female drivers at different times of day

Time of day	0500-0759	0800-1459	1500-1859	1900-2159	2200-0159	0200-0459	All times
Male							
17-20	7.91	5.76	5.35	5.03	4.13	17.57	7.08
21-25	1.81	1.98	1.75	1.74	1.77	3.36	2.20
26-35	0.90	0.97	0.84	0.98	0.94	0.95	0.95
36-54	0.69	0.64	0.63	0.57	0.48	0.35	0.59
55-64	0.84	0.73	0.75	0.59	0.36	0.12	0.62
65-74	1.94	1.08	1.40	0.87	0.39	0.13	0.94
75+	1.35	3.38	4.74	1.57	0.63	1.25	2.71
All	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Time of day							
Female							
17-20	2.16	2.50	2.49	2.99	2.31	2.75	2.81
21-25	1.38	1.41	1.18	1.18	1.56	1.03	1.37
26-35	0.88	0.91	0.87	0.96	0.94	1.32	0.90
36-54	0.85	0.76	0.75	0.68	0.68	0.40	0.74
55-64	0.93	1.00	1.11	1.05	0.69	1.10	0.99
65-74	2.15	1.15	1.68	1.12	0.83	No data	1.24
75+	1.62	4.75	6.23	4.10	3.47	No data	4.66
All	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Time of day							
Male and female							
17-20	5.75	4.18	4.10	4.33	3.65	11.50	5.29
21-25	1.77	1.77	1.55	1.58	1.79	2.93	1.92
26-35	0.93	0.97	0.87	0.99	0.96	1.01	0.95
36-54	0.72	0.69	0.68	0.60	0.52	0.36	0.64
55-64	0.83	0.80	0.83	0.69	0.42	0.14	0.71
65-74	1.87	1.04	1.43	0.91	0.46	0.17	0.98
75+	1.23	3.25	4.47	1.70	0.80	1.04	2.80
All	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Figures 6 and 7, and Table 8 are complementary. However, the calculation of risk of an age group at a particular time of day shows that for young males the actual risk is highest at night (2200-0159) and in the early hours (Figure 6), but the risk relative to all male drivers (Table 8), whilst over four times that of all

males in that time period appears lower than might be expected. This is partly because the casualty rate rises about eightfold for all drivers after 22.00 compared with during the day. The interesting feature of this Table is that young males, whilst over five times more at risk than all males during the entire 24 hour period, are not as substantially more at risk relative to others during the 22.00-01.59 period, unlike the subsequent period 02.00-04.59 and the early morning.

Table 8 also shows that young males, both 17-20 and 21-25 year olds. are more at risk of being killed or seriously injured than all males at all times of day. The relative risk for males remains fairly low for the age groups encompassing 26-65 years but it starts to rise again after 65 years but mainly in the day time when older males (75 and over) have a relative risk about four times that of all males during the daytime.

Table 8 and Figures 6 and 7 all indicate that older females (75+) are substantially more at risk of death or serious injury as a driver than even the young females at all times of day except early in the morning. On average their casualty rates are about twice those of men of the same age. Whilst older females do have a high relative risk driving at night, it is not as high as during the day, when most of their driving is done.

Other than for the oldest group discussed above, young females are more at risk of being killed or seriously injured at all times of day than are females aged 21-74 years. The casualty rate (Figure 6) between 19.00 and 21.59 is about twice that during the day, and between 22.00 and 01.59 it is about two and a half times as high. However, at each time of day the relative risk is over twice that of all females.

In summary, the young males and females aged 17-20 years are much more at risk of being killed or seriously injured at all times of day than their older counterparts, and this risk increases sharply after 19.00 hours. For the older drivers, it is the 75+ age group that is particularly vulnerable, with older females in particular being more at risk than even young females. However, how much of this effect is the result of very small sample sizes needs further investigation. Older males are more at risk than their casualty numbers alone would indicate.

In the absence of exposure data for different roads it has not been possible to extend the analyses to roads of different types. However, in general for all roads, there is enough evidence to indicate that there is an elevated fatal and serious casualty risk, especially to young males and females, but also to older females, from about 19.00 onwards. From the literature we might anticipate that younger drivers take more risks at night (Clarke *et al.*, 2002). In terms of risk-taking the comments from young drivers themselves discussed in Section

3 shed some light on this. It is likely that the increased risk of death of injury to the older females is in part due to their increased fragility rather than to increased risk-taking or other failures.

From the work of Crettenden *et al.*, it might be hypothesised that there are two groups of drivers, those who drive more than average during the day, and those who drive more than average at night. The casualty patterns for young females are consistently lower than for young males. It could be that young females are more often passengers than drivers late at night and this may be contributing to their reduced exposure and accident involvement as drivers. Exposure data of a more detailed kind is needed to answer these questions.

We have good information on the following:

- injury accidents and casualties on different types or classes of road in built-up and non built-up areas by age and gender of driver, severity of injury and time of day
- lengths of road of different classes in non built-up and built-up areas
- number of miles driven at different times of day each year by age and gender
- number of licence holders by age and gender
- numbers of people of each age and gender in the population

There is little or no information about the following aspects of night-time driving:

- journey purpose (activity) throughout the 24 hours by age and gender
- distances driven throughout the 24 hours on built-up and non built-up main and minor roads by age and gender

Ways in which these gaps may be filled are discussed in Section 4.4.

3. Who drives at night and for what purpose, what issues do they perceive as affecting them?

This section draws upon the insights of people who attended the focus groups.

3.1 Older Drivers

3.1.1 Driving context, experience and attitudes towards driving at night

Older drivers have fewer accidents at night than other age groups. The purpose of this study is to try to disentangle whether this is because older drivers are a safe group of drivers at night or because they limit their exposure. This Section explores their experiences and attitudes towards driving at night.

The focus groups brought together drivers covering a wide age range from mid fifties to mid seventies. Their driving experiences go back, in many cases, to the 1940s, 1950s and 1960s. For the most part they have enjoyed, and continue to enjoy driving, at least under good driving conditions. Older people are living more actively than previous generations of retired people. More older women are driving than before and they, like the men, expect to be able to drive into old age.

These older drivers hold a broad diversity of attitudes and drive a wide range of cars/vehicles:

I have been driving a car since 1952 ... Alpha Romeo Sportswagon

I've been driving since approximately 1955, I drive a small van

1947, A Mondeo

I've been driving since 1950, I've a Peugeot 306

A number of the drivers we spoke to had cut back on driving for a number of reasons related to their changing transport needs, their own perceptions of their physical and mental capabilities as well as the wider driving environment.

*At one time my husband and I used to do a lot (of night driving)
but not now, but I don't mind driving*

*I used to do a lot all over the country ... but not so much
now since I retired. Night driving is beginning to bother me*

This is not, however, a universal picture; it is important to avoid the stereotypical picture of the older driver. For example, it was apparent from the discussions that there is not a linear relationship between age and a reduction in driving:

I'm sort of a semi-retired farmer, so I drive all sorts

If I can, I do my journeys after 10.00 at night

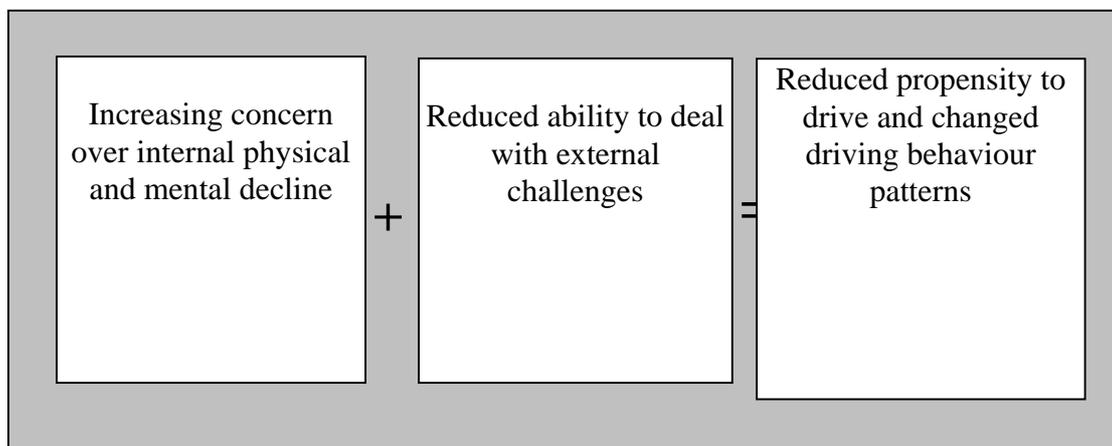
More relaxing at night

I always enjoy driving at night

Despite the comments above, which represent a significant minority, it is clear from this research that there are deep-rooted concerns related to driving, both in the day and at night. These concerns relate primarily to a recognition by many that their own faculties are in decline, but also in response to the road conditions that they are likely to face and the behaviour of other (for the most part, younger) drivers.

There is therefore a dynamic between internal and external factors that leads to changed driving behaviour:

Figure 7: Internal and external factors leading to changes in driving behaviour



Many older drivers drive less than before and, when they do so, are confining themselves to journeys that they perceive to be within their competence. This reduction in driving is evident from the declining proportion of driving (see Table 3) done by older people. Older drivers compensate by driving more cautiously, more slowly and attempt to exert more control (Holland, 2001). This means that given a choice, and in many cases there does appear to be a choice, they will choose not to drive:

- in adverse driving conditions;
- on long journeys; or
- at night (particularly outside their local area).

This self-limiting behaviour is associated with retirement and changing lifestyles, and to some extent reduced tolerance of others:

I am not so much in a hurry as I used to be when I had a job, and that might apply to other people who are retired. So we find people who are in a hurry very irritating.

3.1.2 Perceptions of own cognitive abilities

For older drivers much of the driving task is routine and non-taxing and they can hold conversations with passengers, listen to the radio etc., but as the task becomes more demanding these secondary tasks are ignored as cognitive resources are required for the main task of driving (Holland, 2001).

This group of drivers are well aware of their own limitations and this affects their confidence.

I am starting not to like (driving) ... I must admit I try to avoid it now

Night driving is beginning to bother me ... it never used to bother me in the past

The main areas the respondents focused on were:

- eyesight;
- tiredness; and
- concentration.

Eyesight

Older people need a greater intensity of light to be able to see than do younger people. For every decade after 25 years of age, drivers need twice the brightness at night to receive visual information so by 75 years some drivers may need 32 times the brightness they did at 25 years (Holland, 2001). This obviously affects older drivers' ability to see objects at night.

The second factor that affects all drivers, but older ones in particular, is the ability to adapt to levels of darkness. This particularly affects people who are short sighted (myopic) and for drivers over the age of 40 years there are those

who could read a number plate at 20.5 m in daylight but not at night. Older drivers are usually aware of this difficulty and voluntarily restrict their driving at night.

I think a lot of that (steps to avoid driving) is because people's eyesight does deteriorate as you get older

And you can't see so well at night you know

*People don't realise that their eyesight is going.....
It should be compulsory .. to get an eye test*

The decline in eyesight comes across as the single most significant change affecting behaviour.

Glare

Glare from oncoming headlights causes significant problems for this group of drivers, and increasingly so because of the increasing opacity of the lens of the eye with age. It is particularly acute as a result of poorly adjusted headlights, undipped headlights, and inappropriate use of fog lights (Holland, 2001). This is because in an older driver the eye takes around 9 seconds to adapt compared with a teenager where it is nearer to two seconds. The effect of glare is even worse on wet roads where it can be difficult to see the road markings. Staplin (in Holland, 2001) examined the effect of glare on older drivers in different road layouts and found the effect was greatest on perception of road markings and was at its worst on single-carriageway roads.

*Oncoming traffic that don't damned well dip their headlights
(particularly in country lanes)*

*I have had two occasions recently where I have been blinded
and I have just gone past not knowing
where I was and where he was*

A recent development that may be exacerbating matters is the introduction of the new high intensity 'blue' lights

*The trouble with modern cars is
they have these little blue lights and the strength
of them, unless they dip them ... you're absolutely blinded*

*If you catch them at a certain angle they are bright blue and
they are very disconcerting. It's very distracting, I believe they*

give people migraines

*The worst thing is these blue lights on new cars.
They are terrors because you can't see through them*

The use of glasses also would appear to be a significant contributor to the problem of dazzle.

*The thing that frightens me on the night is the lights
they are blinding all the time most of them and
wearing glasses I get a lot of glare*

*Each pair of glasses I get seems to be worse at
splitting up the lights and sending them
off in shooting stars*

A number of other factors that are issues in this context were also mentioned including cars headlights not being aligned properly, headlights car weight adjustments being incorrectly set, dazzle from rear view and wing mirrors.

In summary, the key issue is that for many people eyesight is causing problems with regard to night-time driving especially in relation to glare from other vehicles.

The other lighting issue is lighting in villages. This is a very divisive matter and relates to lifestyle choices. This subject is covered in detail later in this report.

Tiredness

Tiredness affects all drivers. However there was a consensus that older drivers are possibly more likely to suffer its effects.

Given the self-awareness that we have already seen, this group of drivers are conscious of the dangers that tiredness poses for them.

(accidents) it's mostly fatigue, mostly fatigue

*Well I would think that it is one of the most dangerous
things there is*

A number of instances were quoted of people having seen an accident, come close to one, or even had an accident due to falling asleep:

It's very easy to find your head nodding off

Well if it is a long journey and motorway driving I have definitely fallen asleep and woken with a shock. I dare anyone to say it hasn't happened to them

I see people are tired 'cos I fell asleep and ended up in a field

A number of those participating in the study were clearly aware that they should stop the car and walk around, but the discussions indicated that when people are tired they are not always thinking as clearly as they would normally. It also appears that there are conflicting interests and sometimes people place a higher priority on getting home (or to wherever they are going).

Concentration

It was commented that at night it is easier for drivers to lose their concentration. This loss is frequently due to a combination of internal factors and the external driving environment.

Internal factors can be reminiscing on the evening just gone, or looking forward to getting home. The external factors are diverse but a major group appear to be the lack of sensory inputs (due to darkness) and the comfortable travelling environment provided by modern cars.

You've had a really good time and your concentration level is pretty down as well

Whilst not always causing accidents, the effects can be salutary:

I missed the junction by 30 miles before I even realised I had missed it

Judgement

The groups commented that driving at night required separate/additional skills that are not required or not so important during the day:

It's a different judgement sense you've got to use for night-time driving

I think it is a lot easier in the day

The judgement relates particularly to distances and the size/width of both their own vehicle and others on the road.

And there's an awful lot of people that do not

*know the width of their own vehicle at night.
They bump against the kerb , they are way over the
half way line*

The Effect of Alcohol

This research cannot fail to comment on the impact alcohol has on drivers. Two sets of factors appear to emerge from this group of drivers. The first point is that most of our participants claimed not to put themselves in a position where they will need to drive. The second is that a number believe that the official limits are arbitrary and do not reflect personal circumstances:

*It has nothing to do with the official limit
it's what it does to each individual person and we are all
very different*

Whilst on one level this could be viewed as reflecting complacency it is in the context of a very self-aware group of drivers. The negative side to this finding is that members of this age group are likely to be drinking, to some extent at least, and driving.

Speeding

Speeding is clearly a major issue, and cause of accidents, particularly along unlit country lanes. A number of respondents commented that they were aware of a number of accidents where it was apparent that no other drivers were involved:

On the country road it's got to be down to speeding (accidents)

Congestion is clearly disliked, but the respondents did note that it reduces speed. When there is not congestion, for instance late at night, the tendency is to drive relatively fast, leading to their view that there is at least the potential for accidents:

*I think you probably drive quicker at night
because there's not so much traffic*

3.1.3 Irritation with other behaviour and attitudes of other drivers

Older drivers tend to feel quite vulnerable when they are on the road and tend to blame increases in traffic, speed and poor driving or manners of others. It is evident that there is a significant degree of frustration with the behaviour and

attitudes of other drivers. This is most marked in the non built-up locations and relates to young, relatively inexperienced drivers.

*People just don't believe that there is anybody on the road
but them – farmers sons coming home from the pub*

Whilst this may be a prejudice/caricature, it does relate to people's deeply held beliefs

*There are also a lot of not so good road users
and they seem to be in the younger age category*

But concern does not relate only to younger drivers, HGVs are seen as threatening and hence come in for criticism:

*I got shunted by a big lorry and I was quite frightened.
I think they drive too close to you and especially on a wet evening.
Terrible, frightening in fact*

Another concern relates to cyclists. The perceived problem appears to be a combination of road craft and a lack of lights. This is particularly an issue in villages, where people are likely to be out and about, and along country roads, where there is no lighting. The problem is not only at night, early winter morning are also an issue, particularly with paper boys/girls:

*I come in the early morning so I see cyclists
with no lights – Paper boys*

3.1.4 The driving environment

Two major areas of concern to older drivers emerged strongly from the research, and these were weather and lighting.

Weather

The weather conditions are important and poor conditions deter most of those we spoke to from driving, if they have a choice.

I mean on a clear dry night its almost as safe as day

Heavy rain, snow, ice, and fog were all mentioned. Fog, however, is seen to be the worst and caused the most concern/fear. As the focus groups were held in the winter months there had been quite a few foggy nights prior to the discussions.

Lighting in villages

Street lighting in villages was the subject of considerable comment. There is a conflict between the need for safety on the roads and the desire to maintain a non built-up environment without the lighting that many see to pervade our towns and cities.

This divide was also present in the drivers who contributed to this research:

I would like them all well lit

Well you might as well live in suburbia

This is clearly a major issue that contributes to difficulties experienced by drivers in non built-up areas and villages.

3.1.5 Recommendations suggested by the older drivers

Those participating in the study were asked to make suggestions on how safety and the driving experience at night might be improved. Suggestions from the groups fall into three categories, those that relate to themselves, those that relate to vehicles, and those that relate to the external environment:

Self

Suggestions were in two areas, sight and tiredness. With regard to sight, it was commented that glare was a major problem for people with glasses and that it was possible to have anti-glare glasses. Concerning tiredness, it was suggested that people be encouraged/educated to stop and take a walk if they were feeling tired. Several people suggested that older drivers should have eyesight tests.

*It shouldn't just be the car that has an MOT
but the driver has an MOT as well*

Vehicle

Relating to glare, it was suggested that door/wing mirrors should be able to be dipped in the same way as rear view mirrors can be.

It was also suggested that headlight alignment should be checked more frequently or thoroughly.

External Environment

Lighting in villages raised a mixed response.

On country lanes the greater use of road marking to define the centre of the road and vertical posts to define the edge of carriageway were suggested. The greater use of cats' eyes was also mentioned. These suggestions for the external environment reinforce the findings that it is failing eyesight that is of greatest concern to older drivers and they adjust their driving habits to minimise these problems.

3.2 Young Drivers

The analysis of casualty data in Figures 1 to 5 indicates that young drivers are involved in more accidents than any other age group with this difference becoming more pronounced at night. They are more likely to be killed or seriously injured than drivers even just a few years older. This is generally accepted to be at least in part due to lack of experience and to the faster speeds driven, especially by young males. This section explores the attitudes of young drivers to driving, to their cars, and to fellow road users.

3.2.1 Method

The first round of groups was broad based, searching for clues to the behavioural patterns that are leading to young people having so many accidents, particularly at night. Key findings from this first stage may be summarised under the following headings:

- Confidence and experience
- Mood/mindset/confidence
- The night-time driving experience
- Driving occasions/types of journey
- Distractions/passengers activity

It was clear that the driving occasions, distractions and passenger activity (what was going on inside the drivers head and their car), were potentially the most significant factors leading to accidents at night.

Because of their high accident rate, the focus of the second round of four discussion groups was on very young male drivers (17 – 21) in both built-up and non built-up locations.

This research 'hot-house' approach has enabled us to focus on this discreet group of drivers and gain a detailed understanding of the factors contributing to what are clearly very high levels of accidents with associated injury and loss of life.

3.2.2 Cars and driving

In Clarke *et al.*'s analysis of accident reports involving drivers aged 17-25 years they found that amongst their sample, these drivers had about half of their accidents during hours of darkness. They also found that aggressive recklessness peaked during the hours of darkness, particularly for males in the younger group (17-19 years). There was also a higher incidence of driving above the alcohol limit at night especially for males in the 23-25 years age group. Speeding showed an increase at night. One important conclusion for this study is that Clarke *et al.* propose that there is little evidence to suggest that the problem of increased young driver involvement during the hours of darkness is **caused by darkness per se but rather the purposes for which young drivers are on the road during these hours.**

This finding is supported in many ways by the results of this study as outlined in the following sections.

This research was undertaken with drivers aged between 17, the minimum age permissible for driving a car/van, and 21 years. By definition, none of these people could have more than four years experience and most of them had between one and two years. Clarke *et al.* (2002) in their in-depth study of accident causation of young drivers found that about 66 percent of 17-19 year old drivers owned the car they drove and this rose to 70 percent for 23-25 year olds. In contrast, driving cars owned by parents decreased with age from 20 percent to 5 percent. Most young drivers in our sample had their own car, which were mostly small, cheap to run, relatively old, and relatively poorly equipped with safety features.

I drive a Fiat Punto and I've been driving it for about 10 months now

Escort Van

Its not very fast, it's a diesel

Peugeot 306, nothing special in safety features

These points having been made, these vehicles are a treasured possession by many we spoke to and the centre of large amounts of attention by some:

*I own a Volkswagen Polo Coupe . Its J reg and you know
Volkswagens are quite reliable solid cars.
There's no real safety features on it, no airbags ...
I've got plans though to make it more safer
I suppose, like increase the handling*

questioned on safety or performance: *Depends on how you look at it*

These vehicles consume a relatively high proportion of this group's income, this comes in the purchase price and maintenance, however assistance often is given and there were a number of examples of cars being 'handed down' from family or relatives, either as gifts or for a relatively modest sum, or assistance in purchasing by a parent:

I paid for half and get the rest of it for my birthday

The key point that emerges from this work is that for many young men these cars appear to play a central role in the development and formation of 'self identity'. They are of course status symbols, but for many they represent the attainment of real independence, possibly for the first time in their life.

Several of the younger women in the groups, whilst having passed their tests still relied on friends and family to give them lifts. One of the young women had reversed into a wall in supermarket in her parent's car and was no longer allowed to drive it. None of the young men admitted to asking for a lift except in the case where they had been drinking and did not have their car with them.

Attitude to cars

For some, the car represents a 'treasured possession', it is theirs and they can have it exactly how they want.

*Every time I get in my car I know that's how I want it .
That is the set up. Radio station plugged in .
CDs in seats there – everything done.*

When this order is upset or challenged, even by a 'mate', there is almost discernable anguish:

*I've got this friend Lee. I left him there for five minutes while
I went in the house ...I came back and had re-tuned my radio.*

*The air conditioning is blasting on the heating blasting on.
And the mirrors round the wrong way*

However, whilst cars are central to their self-development, this needs to be seen within the context of young male culture:

*We young lads we've got money in our pockets.
Haven't got no responsibilities and we've got a nice car*

Attitudes to accidents

And accidents, whilst not an objective, are almost seen as a 'rights of passage' by some:

*I drive a Citroen AX, I've only been driving since
November I've had one accident so far*

The research was undertaken in the following February (four months since passing the test).

Clarke *et al.* (2002) in their analysis of accidents that took place identify the following accident types:

- accidents occurring on non built-up roads involving loss of control on a bend;
- right turns either onto or from a more major road;
- rear end shunts; and
- accidents occurring in darkness, with or without street lights.

*..... there was a driver in front of me and something (an animal)
jumped out from the hedge and they did an emergency stop in front
of me and I just didn't see him and went into the back of him.
I got done for dangerous driving*

It was interesting to note how eager many of the participants were to describe the accidents they had been in – and survived.

*I did forty and then slowing down for the corner, but even that was too fast
for this corner, because it hadn't been labelled up and then I came
into contact with a Renault Espace head on... and
I wasn't wearing a seat belt*

*I've been driving for two years coming up in March,
I drive a ford Escort four door, its an R Reg and I've had two accidents
The first accident took place at Rigby, right next to the cemetery,*

*we was going too fast for the corner, back end slid around and
I managed to pull it back, the steering snapped, we hit a tree.
We landed in a field upside down with the engine running and the radio on full
blast.*

*Oh by the way the whole time
I had been on the phone to a friend
Three people in the car*

Another description of what happened to the car, this time from one of the passengers adds another dimension – the possibly imaginary chase, the competitive instinct:

*And he thought he was getting chased by this car for some reason.
So he decided to try and increase speed, went to
70 miles an hour and he got to the bend, and didn't know
it was there and he did a turn. He turned too sharp and he
went flying into the field ... the whole front
of the car was smashed up, quite bad*

This description of the incident was rounded off by an implicit compliment on the drivers ability to survive:

*The police officer said he should have been dead
and so did the ambulance people*

There is however a revealing contradiction in relation to cars and their use. The above description relates to what may be described as 'normal' cars with relatively modest performance and handling characteristics (the introduction section to the groups made no reference to modifications/improvements). There are other types of young car owners who like to improve their vehicles. These are looked down on by those who prefer to push their vehicles and themselves to the limit, and occasionally beyond.

*You just have to stand there (outside night clubs) and you can see say a red
Nova and about 2 minutes later guarantee it will come back down the other
way. About 20 mph with an exhaust that sounds like it should be doing about
100. With all the windows down and the music blaring.*

*Its not actually the boy racer you are worried about, it's the cars they can't
handle*

One of these 'car improvers' was present in one of the groups; the quote is earlier in this section (Volkswagen Coupe).

It therefore appears that amongst this age range of young car driving males there are three main segments:

- The self testers
- The car improvers
- The drivers

As we have seen, the ‘self testers’ appear to see the vehicle as an extension of their personality whilst the ‘car improvers’ possibly see the vehicle as an extension to their body. The groups also contained a third group - ‘drivers’. This group fall into neither of the above categories, it appears that they differ from the previous two groups in that they are not trying to use a car to prove something to either themselves or others.

3.2.3 Where do young drivers go in their cars?

A wide range of late night journey types was described by all the groups. Whilst the purposes varied, they fell into three broad categories:

- Everyday journeys including those from work
- Journeys for the sake of driving
- The night out

Everyday Journeys

These types of journeys represent the ‘bread and butter’ of driving, and therefore constitute a significant proportion of journeys made. They are about getting from A to B. They could be for a number of reasons, coming back from work, friends, the gym, the cinema, a restaurant. Alcohol may have been consumed, if appropriate, but probably not in large quantities.

Amongst this age group are a number of young people who work in pubs, clubs, and in shops and service industries that close late at night.

Journeys for the sake of driving

These types of journey are primarily made by drivers who have recently passed their test. Whilst sometimes there may be a reason, such as driving ten miles to buy a box of matches, there are other times when the driver just drives around.

‘I just go driving round the M25 for fun’

These journeys can either be alone or with a ‘mate’. They can involve ‘testing’ both the vehicle and driver. Sometimes one or other can fail the test.

The night out

Whilst the previous two categories of journey can lead to accidents, this third category is seen by the respondents to be potentially the most hazardous.

Nights out can take a number of forms, and don't have to involve alcohol or other drugs; they do however represent the coming together of a wide range of factors that raise the potential for accidents.

3.2.4 Attitudes and driving styles of young drivers at night

Proving oneself

Many of the young men who took part in the research recognise that they have a lot to learn with regard to their own driving abilities and the capabilities of their cars. The key issue is that some (not a majority, but possibly a significant number) see the car as a means of testing themselves and their vehicles. On occasions this leads to failure, often with serious consequences.

Amongst this minority of young men there appear to be two complementary sets of factors at work operating at both an emotional and a logical level (often the logical level is used to justify or rationalise the emotional thrill).

Emotional level:

It's the adrenalin rush and you're pushing things to the limit.

You want to drive quickly, you want to be A Schumacher or a Colin MacCraey

(the buzz) that's what I drive for

Logical level:

But you haven't got the experience to judge the road, the road conditions, and what people around you are doing

Its pushing the limits of the car and the road and yourself as well

When hearing these comments, a number of respondents attempted to distance themselves from those making them

It's not what I drive for

(I've changed) *I suppose I have, but it's down to experience mainly and I'm used to my car.*

It therefore appears that taking risks, pushing the car to the limit, is something that some young men do as part of the 'growing up' process. The car is clearly seen as an extension of either/both the ego or the body, it is something that needs to be mastered, and pushing it to the limit is the way a number of young men see of doing it.

Clarke *et al* in their study sum up the attitude of young accident involved men in terms of 'exploring the envelope of safety'.

'They want to find to find and explore the envelope, or else to assume they know where it is and to operate on its edges. They talk and behave as if this envelope, the dividing line between accident free driving and collision, is visible, precise and stable. But they are prancing on the edge of a cliff, not a hard edge. If it gives way, it will do so without warning, without apparent cause and without the chance for recovery..... The only skill is to keep well away from the edge (of the envelope)' p30.

Alcohol and other intoxicating substances

Alcohol and other intoxicating substances are taken by a number of young men who then go on to drive. This is not always over the legal limit, and probably only occasionally, but it does happen. In one of the groups the participants were asked what proportion of those driving home from a nightclub, had drunk alcohol– they answered approximately 20 percent, one in five. This is of course an estimate should not be taken as anything more than broadly indicative that it does happen, and on a reasonably frequent basis.

Given that drinking does happen, and that 'designated drivers' usually have full complement of passengers (which appears to be the case), the research explored attitudes towards drivers who drink.

At a superficial level no one admits to travelling with a driver who has drunk alcohol or who is drunk. Young women are particularly adamant on this point. However, pressing the point, a very different picture emerges. Late at night, tired, no money, thin clothes, drunk themselves, many young people (both male and female) are unlikely to turn down the opportunity of a lift home.

(going with a drunk) *It's cheaper than a taxi*

If there dumb enough to do it, they don't have to do it anyway.

But if you're battered (drunk) and someone says there's a lift here if you're quick

It depends on how many they've had

Reviewing the comments made by drivers who had been drinking and driven, it becomes clear that there is a two way process going on. The potential passengers do appear not to be assisting the 'designated driver' not to drink:

(friends) they don't encourage you and they don't stop you either. I think they just take it for granted that you're not going to drink

Depends also on how drunk (you are) and all that.

But its different when you're drunk , you don't really care when you're driving, all they (passengers) care about is getting home and you're the one who has to focus. You're the one who has to baby sit them. And do your best to get home as well as the car.

Your mates only want to get home.

Driving whilst drunk can however be a salutary experience:

You never really feel (drunk) do you until you like test your reaction time and then you'll know whether you've gone too far. It's not actually even that you don't even realise what your reactions are doing, its when you get home and think 'cor blimey'.

I've done it the once (drinking). There's no point in drinking its not such a big deal

It is evident from the above that a significant proportion of young men do currently drive home from nightclubs in the early hours of the morning. Interestingly we didn't find any of the young women in our groups who drove back from nightclubs. Even if they were drivers they usually went with one, or a group of young men and were quite content to be passengers. The National Travel Survey data indicates that young women are more often passengers and travel more miles as passengers than young men of the same age. This may go some way to explaining a proportion of the large differences in accident numbers between young males and females.

Whilst this is not quantitative research, it would appear that this behaviour is more likely by those living in rural locations and travelling to the town for leisure rather than urban dwellers (although it clearly does happen in both).

The main direct reason appears to be because of a greater reliance on the car in non built-up areas and the relatively high cost of taxis out to villages.

3.2.5 Inside the car

What is going on inside the car can significantly influence the possibility of an accident. The factors may be categorised:

- In-car entertainment;
- mobile phones; and
- passengers

In car entertainment

Radio and CDs can influence drivers in two opposing ways. When slow and restful music is being played it can encourage drowsiness, when loud music is being played it can encourage a more aggressive mood. This quote from a young woman driver typifies this.

If you are listening to soppy music then you're just sauntering down the road but if it's like really pumping music and it's something you really like and it's really loud I just go for it

Mobile phones

Young people are big users of mobile phones and whilst many people are aware of the dangers of using a phone whilst driving, this research indicates that most young people will answer a call on most occasions. Equally, they will make calls when they judge it to be safe:

(who answers): We all do, you try to get them off as soon as possible. You keep your eyes out for a cop if you see one you just throw it (the phone) on the passenger seat

As soon as it rings you think – who's that

It's hard to do roundabouts (use phone and drive)

Ok in traffic (jams), on motorway, stopped at light

As we saw in one of the early quotes in this report, the phone may have been a contributory factor in the accident described.

Passengers

In McKenna *et al.*'s (1998) study of male and female drivers found that (at all times of day) the presence of young male passengers with a young male driver was associated with more dangerous driving such as speed choice and gap acceptance at junctions. Interestingly, for young women with young male passengers a similar pattern was observed. In our study we didn't come across young women driving at night with young male passengers.

Passengers are potentially the most significant distraction inside the car late at night. Their influence is manifested in two ways:

- Overloading (changing the handling characteristics of the car)
- Distracting behaviour

Overloading

Late night driving frequently involves acting as a 'designated driver'. Given that this involves not drinking (or at the least, drinking less) there is a propensity to carry as many passengers as the driver will allow. This may or may not exceed the car's designated carrying capacity, but it certainly will change the car's handling characteristics, which can cause problems for inexperienced drivers.

*I think that's how I caused my accident,
I had a full car so I thought I would be alright,
gradually my brakes got longer and longer*

*The cars don't react and you can't predict its
behaviours as well as your everyday conditions*

It wallows more as well

It don't respond the same does it

Distracting behaviour

In addition to the changed handling characteristics, the behaviour of many passengers late at night can also be a significant factor. Whilst related there are two sets of issues with regard to distracting behaviour by passengers relate to

- Fiddlers
- Intoxication

Fiddlers

Fiddlers, passengers who meddle with the car are a significant distraction, and annoyance to many drivers. For many, fiddling is associated with intoxication, for others it appears to be a state of mind.

*I have a friend who constantly mucks about with every dial in
the car and it actually gets to the point where you have to shout at him
At which point you lose your concentration*

Fiddlers are the worst ever

*His friend sticks his knee in front of the gear stick, you actually have to get
physical with them so he's interrupting my driving as well isn't he*

Intoxication

This research supports the contention that in our culture it is inevitable that a significant number of young people passengers, late at night, and in the early hours of the morning, are going to be intoxicated to some degree.

*Everyone in the car is pissed out of their ...
You're constantly looking over your shoulder to
make sure they're not being sick or anything*

*They start doing silly things like opening the window
and hanging out and stuff like that'*

*I've had to stop on the motorway because there
were so many passengers about to be sick.*

On the positive side, having passengers does bring out the best in many drivers:

*If you've got passengers you've got more to think about...It
is not just if you have a crash or an accident it's not
just your family you're going to affect
if you've got passengers you've got other families*

3.2.6 The outside environment

As we saw in the accident described in detail at the beginning of this report, bends on country roads can catch out young drivers. Clarke *et al.*'s 2002 study of actual accidents and McKenna *et al.*'s 1998 study both confirm this. Accidents on bends are a particular problem for young male drivers but they cause problems for young women too. McKenna *et al.* conclude that for both men and women the proportion of accidents on bends is highest for those who are youngest and least for those who are oldest.

This section will consider two groups of factors:

- country roads
- weather

Country Roads

For some young drivers, country roads present challenges away from the eyes of authority and (in their eyes) are relatively safe, at least for bystanders/other drivers.

The Playground:

They can be fun

You can take risks (nobody goes down them)

Bumps, you've got bumps everywhere

Time of your life – Corners – straights

We went down there about 80. It was our weekly thing it was like rally style when we were bored at school

Country roads, you have to actually think, you have to change gears

Risky

If you lose it a little bit then you can like get off.

Its like a challenge

Away from Authority:

There's not many coppers

Safe (for others):

You'd be able to see the lights as well so if you were coming up to a corner and you're going to crash around there there's nobody else coming the other way, you'd be able to see the lights.

A challenge:

Its like a challenge

If you do lose it like and you manage to get it back then you do laugh about it don't you.

Weather

Weather presents these young drivers with new challenges. A number of accidents and near accidents were described as being due in part to weather.

3.2.7 Suggested recommendations from the young drivers

It was clear that for many, having an accident, or a near accident was a salutary experience that did have the effect of changing behaviour or increasing responsibility. For many it is a hard way to learn and it is their attitudes that need to be changed rather than their skills that are usually good (Clarke *et al.* 2002). Despite most of the people in the groups recognising that most of the problems related to attitudinal and behavioural factors, very few suggestions were made about how these could be changed. In reality they do not see themselves as part of the problem and this is perhaps the most difficult part to overcome for those involved in trying to make them safer drivers.

The following comments summarise the views from the groups:

I was in a pretty severe car crash and because of that now I'm a better driver

I think the only way you're going to learn is to get yourself in that situation

Its like smoking isn't it. Until you lose a leg or limb you cant do anything about it

TV Advert: They're pretty rubbish PG films, what's the point

Yeh you can tell someone, a little kid that something is hot, but until they touch it, they burn themselves ... Bum, they don't do it again do they

You need to experience it yourself before you believe other peoples views

Additional lessons knocks 30% off your insurance, but costs a fortune

But you've got to make your own mistakes, otherwise you don't get any better

In short they felt it was part of growing up

Its part of growing up

4 Issues raised by this study

4.1 Mismatches between risk as measured by the data and perception of risk from the focus groups.

Many of the issues raised by the focus groups are already covered in the literature. What is interesting is what the participants did not consider to be important or mention as a perceived risk. The main area absent from discussions with young and old alike was driving at night in built-up areas.

An illustration of the mismatch between perceived risk and casualty numbers is the call from many drivers for higher speed limits at night when the roads are quiet. This study indicates that this would not be a productive policy option.

The casualty data presented in Section 2 shows clearly the numbers of drivers killed or seriously injured on built-up main and minor roads at night. However, most of the concern centred on how difficult it was to see on unlit non built-up roads and what a relief it was to enter the town with its streetlights. The casualty data show that for young males and females built-up main roads early in the evening hold unexpected dangers, with high numbers being killed or seriously injured. In the later period it is the B,C and unclassified roads that claim proportionately more casualties. Some young drivers said they tried to keep off the main roads later in the evening, as this is where the police and speed cameras are. The accident risks are clearly not appreciated.

There is some evidence that the actual numbers of young drivers injured at night might be higher than the STATS19 figures indicate. Several studies have demonstrated that young people are less likely to report their injuries to the police than other age groups. This is true for pedestrians (Ward *et al.* 1994) where both young males aged 16-19 years and young females only reported 59 percent and 67 percent respectively their injuries to the police compared with the average for all ages of 76 percent. In Gloucester a similar effect across all casualties was reported with the 20-24 year group only reporting 41 percent of their injuries to the police compared with 52 percent for all ages. For vehicle occupants of all ages, the level of reporting was about 50 percent (Robertson and Ward, 2002) compared with 59 percent for all modes. Older people on the other hand tend to have higher than average reporting rates at about 65 percent.

4.2 What are the gaps in our knowledge?

This study has shown that there are important gaps in our knowledge about how much younger and older people travel in built-up and non built-up areas and on roads of different types.

Exposure information of this type is an essential tool for policy makers in their task of making the roads safer for people of all ages and gender no matter what mode of travel they choose. Policy makers need this information to enable them to track over time the efficacy and equity of policies they have introduced. The number and severity of accidents alone is not sufficient for this purpose because they are sensitive to road safety and other interventions and policies, which affect the amount of and type of travel by different modes. An example of this is may be seen in the reduction in pedestrian injuries over the last decade. Some of this improvement has come about as a result of more people travelling in cars and fewer kilometres being walked. This reduction in exposure makes it more difficult to ascertain whether walking is becoming safer.

In policy terms interventions to improve road safety come from actions that work in one or more of three ways to reduce:

- exposure;
- the risk of having an accident; and,
- the risk of injury.

Most interventions are targeted at reducing the risk of having an accident and reducing the risk of injury when an accident happens. The following sections explore the options for both these types of interventions but also the option of changing people's exposure.

4.2.1 Older drivers

The casualty analysis indicates that older drivers have few accidents at night compared with the day (see Figures 1,2 and 3). There are more male casualties than female at night, and this reflects a difference in exposure as males tend to drive about twice as many miles per person at night than do females. In addition, we have not come across any studies which look at different driving styles and attitudes of older people and which are differentiated by gender. When the available data are combined to provide a casualty rate for older people, we find that the risk for older males (75+ years) is higher than for males aged 26 and older during the early evening and higher than for those aged 36 and older after about 22.00 hours. Whilst the risk is still quite small it is high enough for this age group to warrant further attention. On the other hand the risk of death or serious injury to older females is very marked and given the low exposure of this group in the evening and at night, there is cause for concern.

In contrast to the younger drivers where many studies have been undertaken, it has been difficult to assess the difficulties experienced by older drivers at night

because of the paucity of studies that have looked at time of day effects for this group.

From the analysis of discussions with older people during the focus groups it is clear that older drivers tend to choose not to drive much at night thus reducing their exposure. The NTS data confirms this with males aged 65 and over driving about half the average for all males after 19.00 hours with females aged over 65 years driving about one third the average for all females. In good weather many older drivers of all ages are quite happy to drive at night but choose not to venture out in poor weather unless the journey is really necessary. Studies of older people have indicated that making right turns is a risky manoeuvre and that junctions provide complex cognitive challenges to older drivers who need extra time to assess the traffic situation, make a decision to move off, and then execute the manoeuvre. It is not known whether driving in the dark exacerbates these problems or whether a different set of problems becomes apparent.

An in-depth study of accident records would help understand where this group of drivers is most at risk of an accident at night when they do drive.

Studies by Hakkert and Braimaister (2002) and Mitchell (2002) found that accident involvement of older drivers is not generally higher than the average but they propose that the risk of death is higher because older people are physically more vulnerable than other age groups. Both studies suggest that measures to improve the occupant protection for older people will be more effective than measures directed towards reducing their accident involvement. This study of night-time accidents indicates quite strongly the vulnerability of the oldest group, especially the females, and their increased fragility must be a contributing factor to this given their very low exposure during these hours.

When making a decision to purchase a new car, older drivers especially older females who are in general more fragile than older males, should be made more aware of safety features that might help them survive an accident as well as other features of modern cars, or additions that can be made to them, that make the driving task easier. Discussions with motor manufacturers are warranted to advise them of the need to cater for in car protection aimed more at older drivers.

Local Authorities and motoring organisations both have a role to play in setting up schemes for older drivers where tips are given about how to drive in complex environments in a changing world. In addition, people can, on a voluntary basis, be taken on test drives with an advanced driving instructor to give guidance on how to change driving styles to cope with aspects they find difficult.

Headlights of oncoming vehicles cause problems of glare and whilst it is not clear how many accidents could be saved by better adjusted lights and better discipline in dipping for oncoming vehicles, these are obviously areas of concern for older drivers.

In terms of making driving easier at night the greatest preference from the drivers themselves was for better street lighting. It was recognised that this was impractical in non built-up areas. What might help would be better edge delineation - marker posts were mentioned as one possible feature. Older drivers have difficulty in judging where the edge of the road is especially when there is an oncoming vehicle and they need to move over on narrow country lane.

The quality of the infrastructure is important to older drivers especially with regard to signing and marking of the edge of carriageway. Local Authorities in their road maintenance plans should pay particular attention to roads in non built-up areas where edge of carriageway is indistinct and look for ways in which markings could be improved.

The lifestyle of older drivers indicates that they undertake most of their social and business activities during the daytime. They have all the time in the world to do what they need to do and as driving at night is difficult, and sometimes threatening, they avoid it where there is an alternative. Having said this, there are those older drivers who still enjoy driving at night and presumably there are those whose lifestyle means they have to drive at night. The data do not exist to enable us to identify these groups unless they are involved in an accident.

4.2.2 Younger drivers

Good information on both accidents and exposure is needed to enable policy makers to assess different options for improving the safety of young drivers at all times of day but especially at night when the accident risk is high. This information is also needed to enable young people themselves to be better informed as to the risks.

Adjusting for numbers of years in each age band, more young male drivers aged 17 –20 are killed or seriously injured than any other age group. The second largest number is for the 21-25 year olds with the number approximately halving thereafter for each age group. More older males are injured than older females but the numbers in both cases are low. In their research, McKenna *et al.* propose that the explanation for men having a higher fatality risk than women relates to the fact that men adopt faster speeds,

commit more driving violations, are more inclined to drink and drive, take illegal drugs and drive, and are prepared to drive for longer periods.

Young females are injured in greater numbers than are females of other ages but not in the numbers that young males are injured. This is partly because they drive fewer miles in total, they tend to choose to drive at lower speeds and they are often a passenger in a male driven car when they do go out at night.

The most striking point to come out of the discussions is how many young males like to test themselves and their cars to the limit and then joke about it afterwards when things go wrong. These young men tend to be driving older cars to which they may have made 'improvements', and they often have passengers with them at the time. The casualty figures show just how often things do go wrong for this group at night, with fatal or serious consequences. There appears to be little concept of risk yet the figures presented in this report indicate the risk is very high for this group. Some of the comments indicate that they need to get their 'fingers burned' before the message will come home to them.

However, not all young drivers, and not all young men are out to test themselves and their cars. Some hold very mature attitudes. What the differences in casualty rates are between these two groups is not known but inexperience in driving at night when distinguishing features merge into the background is a factor that is acknowledged by many of the young drivers.

The greater numbers of people injured (all severities) on built up roads can perhaps be partly explained by the attraction of towns with their clubs and nightlife. This focus for leisure activities results in the concentration of trip ends in town in the early evening and trip beginnings in the later evening. However, at no time did any of our respondents mention aspects of driving on built-up roads except when pressed when they said they took care around the centre of town because of the obvious police presence there and they looked out for speed cameras so they didn't get 'done' for speeding.

The rural lanes hold a particular attraction for some young men to drive along as they consider them a good test of their skills. They are often in smaller, older cars that are carrying the maximum number of passengers, sometimes more, which affects the handling. They also believe that if they cannot see headlights that nothing is coming, and they make mistakes. This can be seen very clearly especially in Figures 2 and 3.

Policies to increase the amount of experience a young driver accumulates before being allowed to drive alone have been demonstrated to increase the safety of this high accident involved group. **The use of the learner driver logbook should be made mandatory as soon as possible. This should allow**

for a realistic level of experience to be gained driving at night-time, which in turn will help increase the understanding and support of parents and young people for the need to gain experience in such a high risk driving environment. In general, improving driver education and training is seen as the way forward to safer driving by young people.

Clarke *et al.*'s study indicates that young drivers do not lack skill but lack judgement. **A feature of driver training that needs more consideration is the risk of driving at night.** Drivers in the focus groups said that they did drive at night when they were supervised. However, from these groups it was obvious that for some drivers at least, and we do not know how many, once the supervision stops, youthful exuberance takes over and the real risks of driving at night are not fully understood. **Central and local government in partnership with the motoring organisations and insurance industry should give priority to developing risk awareness programmes that involve and are acceptable to young people.** It was noted in the focus groups that "...TV adverts are pretty rubbish..." Better ways of communication with these high risk groups need to be sought.

One way to reduce the numbers of young people being injured at night would be to **reduce their exposure during the critical hours.** Reducing exposure is usually not an option. However, some states of the USA have done just this by introducing a graduated licence system that has been effective in reducing casualties. One feature of this licence is to restrict the amount of driving after certain hours of the day for a set length of time after being able to drive solo. Baughan and Simpson (2002) in their review of graduated licensing systems note that they are very effective at reducing night-time accidents, at least during the months they are in force. **In view of the high risks to the youngest groups of drivers, it is time to consider such a system for Britain, but the possible benefits in accident reduction would need to be fully assessed alongside the effects of such a restriction on employment and mobility of young people** (Baughan and Simpson, 2002).

Studies have shown that young drivers often carry several passengers and there is an association between passengers and accidents, especially late at night. The focus groups in this study have indicated that this is fairly common practice amongst those who party or go to clubs. Because taxi fares to rural areas are expensive and queues long many young people said they accepted any lift going their way. Baughan and Simpson suggest that **passenger restrictions for drivers when they first begin driving alone merit serious consideration.** Their assessment of the possible unintended social effects include the possibility of young drivers transferring to less safe forms of transport and making more car journeys as drivers rather than as passengers.

Finally, young drivers do not have much money for motoring given the need to tax and insure a vehicle as well as run it. They tend to buy or inherit smaller older cars that do not have the up to date crash protection or handling of newer models; two of the things needed by inexperienced young drivers with a tendency to carry passengers. In time the newer cars of today will be the old cars of tomorrow and the safety benefits will flow down in that way. However, given that cars will continue to improve, this young group is always going to be left behind. This highlights the need for extra driver education, training and practice before being permitted to drive solo especially at night.

This extract from a New Zealand press release sums up the issues facing society regarding young drivers. "The deadly combination of too much speed and too little driving experience has claimed a dozen teenage lives on New Zealand roads already this year.

"Scores of young lives will continue to be lost in road crashes every year unless there is a wholesale change in society's attitudes towards the dangers of inexperienced drivers and high speed.

"When New Zealanders hear about a drink-driving crash, we get angry and we condemn that behaviour. But when young people - often unlicensed or breaching their licence conditions - lose control and crash at high speed, too many of us will merely shrug our shoulders and say 'bad luck' or 'boys will be boys'. Until driving too fast and driving without the proper licence is treated as seriously as driving drunk this tragic waste of young lives will continue.

"We must spend more time and energy as parents and as a society teaching our young people to take driving seriously and making sure they are properly licensed before letting them behind the wheel. We must teach them to respect the dangers of speed and alcohol, and to accept responsibility for their own safety and the safety of their friends, family and other road users".

4.3 What needs to be done to fill the gaps in our knowledge

This study has shown that there are unanswered questions about the travel patterns of drivers at night-time. There are gaps relating to:

- amount of travel at night on built-up and non built-up roads, and on roads of different classification within these areas
- purpose of journeys at night, how many are for work and how many for leisure
- social effects of implementing measures found to be effective elsewhere
- better estimates than STATS19 alone of numbers of drivers injured especially in rural areas

The Table below outlines the main areas where data is lacking and suggests reasons why the gap is important to fill.

Gap in our knowledge	Why it is important to fill
1. Km driven during night-time hours on major and minor roads in built-up and non built-up areas	Accident occurrence differs between area types. Interventions will differ for major and minor roads and by area type.
2. Km driven during night-time hours by males and females of different ages on major and minor roads in built-up and non built-up areas	Accident occurrence on major and minor roads differs between males and females and between people of different ages Information will help to target interventions at particular groups, e.g. more supervised driving at night on non built-up roads Data needed for tracking changes in exposure for these groups over time and in response to policy interventions
3. Journey purpose by time of day, including night-time, and day of week for males and females of different ages	Need to know how many accidents are work or leisure related to assist development and targeting of interventions and for determining which categories of drivers are in high risk groups
4. Reporting rates in non-built up areas by age and road type	The accident risk of young drivers in particular may be under-estimated using STATS19 data alone. Do not have data on reporting rates on non built-up roads
5. Twilight (dawn/dusk)	Little is known about these times of day
6. Differences in exposure between light and dark evenings	STATS19 data allows casualty numbers to be calculated by time of day and light and dark. Need exposure data to calculate differences in risk between light and dark for a given time of day

4.3.1 Distance travelled at night on built-up and non built-up roads, and on roads of different classification within these areas

Since the year 2000 the NTS does have some data on urban and rural coding of origins and destinations, but the samples for two years would not be large enough to support an analysis. In later years this would be possible, but would not give the type of road travelled on, just an origin and destination.

When users were consulted in 2000 about possible changes to the NTS as part of the National Statistics Quality Review, it was asked that type of road (especially motorways) be identified in the diary. It is the view of the team running the NTS that it would be totally impractical to try to get respondents to split their journeys in this way and would pose too great a burden on them.

Comprehensive data collection is expensive but special studies undertaken on samples of drivers at intervals of 5 years should provide baseline and some trend data to augment official Department for Transport data collected in the

National Travel Survey. One way of collecting this information would be to select a sample of drivers and provide GPS equipment with which to monitor their journeys. This would provide detailed information but the cost of collection would still be high given the low exposure at night-time. The sampled drivers would need to record their journeys over an appreciable length of time, say one month, for the information when aggregated across all drivers to be useful. There do not appear to be precedents for this kind of monitoring but the data it would provide would make an important addition to knowledge of differences in risk to drivers on the various types of road and thus lead to targeted strategies for education and training, engineering, and enforcement.

4.3.2 Purpose of journeys at night

To assist development and targeting of interventions information is needed about how many accidents are work or leisure related which in turn helps identify which categories of drivers are in high risk groups. From 2005 information will be collected in the STATS19 on journey purpose but it will take a couple of years or so for there to be sufficient data to enable analyses to be made. More problematic is the collection of journey purpose by age, gender and time of day. Here the numbers of people driving at night are small and as the NTS is based on sampling, the sample sizes in each cell would be too small for analysis.

In New Zealand data on travel across the board is routinely collected including number of trips per year by trip purpose by urban and rural residents. The report of the New Zealand Travel Survey 1997/98 shows that rural resident drive about 75 km further each week than do urban resident, and those in urban areas spend about half an hour a week longer driving. Even with the relatively large coverage of over 7000 addresses in the survey, data about night-time travel is sparse given the low numbers of people out and about and detailed breakdowns of data are not possible. The New Zealand Travel Survey 1997/98 with examples of data collected may be found at http://www.ltsa.govt.nz/research/travel-survey/documents/Travel_01.pdf.

For capture of this information a special study is needed. It could be tied in with the suggested study of how much is driven on roads of different type.

4.3.3 Social effects of implementing measures found to be effective elsewhere

In Section 4.2.2 it was suggested that it may be time to consider restricting the amount of driving after certain hours of the day for a set length of time after being able to drive solo. However, the possible benefits in accident reduction would need to be fully assessed alongside the effects of such a restriction on employment and mobility of young people.

With the information that is available on distance travelled and on accidents, broad estimates of risk reduction could be obtained. However, it would be more difficult to assess the effect on employment and mobility in general. This is because the relevant sample sizes are too small in the NTS data for journey purpose by time of day for this age group. The new information on journey purpose to be collected as part of the accident record should help provide additional information about the type of journey the casualty was undertaking and if the proposed study outlined in Section 4.3.2 were to be carried out it would provide the necessary information on exposure by journey purpose.

If passenger restrictions for drivers when they first begin driving alone are given serious consideration an assessment will be required of the possible unintended social effects including the possibility of young drivers transferring to less safe forms of transport and making more car journeys as drivers rather than as passengers. The collection of information to answer this research area is similar to that required to investigate restricting the amount of driving after certain hours of the day.

By their nature and complexity, these investigations are best suited to Central Government sponsorship where one possibility might be to set up a special study to enhance the NTS data to increase sample sizes to allow analysis by time of day. The casualty data exists but without the exposure data the assessment would not be feasible.

4.3.4 Better estimates than STATS19 alone of numbers of drivers injured especially in rural areas

A different type of study would need to be undertaken to assess reporting rates to the police and whether they differ by age and gender, day and night, and by built-up and non built-up roads. This is essentially a desk-based study that requires identification of casualties (name and address information are not used) in the data sets of police and hospitals and estimation of numbers and types of casualties known only to the hospital and not to the police. A sample of hospitals would be required that covered built-up and non-built-up areas.

If the data described above were to be collected then sufficient information would exist to enable a more comprehensive insight to be gained into ways to reduce the numbers of people killed or injured when they are driving at night.

5. Acknowledgements

The authors would like to thank the drivers from around the country who took part in the focus groups and gave their views on driving at night. We would

also like to acknowledge the contribution to the analyses of the casualty data of Navid Golshan of FaberMaunsell.

We would also like to acknowledge the contribution of Graham Grayson, the Project Manager. His insights and comments have helped shape this report.

6. References

Barker, J., Farmer, S. and Nicholls, D. 1998, *Injury accidents on rural single-carriageway roads, 1994-95: an analysis of STATS19 data*. Transport Research Laboratory, Crowthorne, TRL Report 304.

Baughan, C. and Simpson, H. 2002, *Graduated driver licensing - a review of some current systems*, TRL Ltd, Crowthorne, TRL 529.

Broughton, J. 2004 in press, *Car occupant and motorcyclist deaths, 1994-2002*. TRL Limited, Crowthorne, TRL Report in press.

Broughton, J. and Stone, M. 1998, *A new assessment of the likely effects on road accidents of adopting SDST*, Transport Research Laboratory, Crowthorne, TRL Report 368.

Clarke, D. D., Ward, P., and Truman, W. 2002, *In-depth accident causation study of young drivers*, TRL Limited, Crowthorne, TRL Report TRL542.

Cooper, P. J. 1990, "Differences in accident characteristics among elderly drivers and between elderly and middle-aged drivers", *Accid. Anal and Prev.*, vol. 22, no. 5, pp. 499-508.

Crettenden, A. V., Yeo, E.-Y., and Drummond, A. E. 1994, *Qualitative dimensions of young driver driving exposure as a function of time of day*, Federal Office of Road Safety, Canberra, Contract Report 148.

Department for Transport 2004, *Tomorrow's roads –safer for everyone. The first three year review*. DfT April 2004.

European Transport Safety Council 1999, *Exposure data for travel risk assessment: Current practice and future needs in the EU*, ETSC, Brussels.

Hakamies-Blomqvist, L. E. 1993, "Fatal accidents of older drivers", *Accid. Anal and Prev.*, vol. 25, no. 1, pp. 19-27.

Hakkert A.S. and Braimaister, L. 2002, *The uses of exposure and risk in road safety studies*, SWOV Institute for Road Safety Research, Leidschendam, R-2002-12.

Holland, C. A. 2001, *Older drivers: a review* , Department of Transport Local Government and the Regions, London, 25.

Maycock, G. 2000., "Estimating the effects of age and experience on accident liability using STATS19 data", Department for Transport, London, pp. 1-15.

McKenna, F. P., Waylen, A. E., and Burkes, M. E. 1998, *Male and female drivers: how different are they?*, The University of Reading and the AA Foundation for Road Safety Research, Basingstoke.

Mitchell, K. 2002, Older people and road safety: Dispelling the myths. *World Transport Policy and Practice* 8[2], 17-26. 2002.

Robertson, S. A. and Ward, H. 2002, *Levels of reporting to the police of road traffic accident casualties 1996-2000* Unpublished report to TRL Ltd.

Ward, H., Cave, J., Allsop, R., Evans, A., Kuiper, C., and Willumsen, L. 1994, *Pedestrian activity and accident risk*, AA Foundation for Road Safety Research, Basingstoke.

West, R. and Hall, J. 1998, *Accident liability of novice drivers*, Transport Research Laboratory, Crowthorne, TRL Report 295.

Appendix 1: The importance for effective policy making of collecting exposure data

This study reflects on the importance of collecting data to enable the risk of driving at night to be assessed. The conclusions are that good casualty data exists but data on exposure do not. This is a problem recognised throughout the industrialised world and is the subject of two important reports whose main conclusions will be summarised here.

The first is *Exposure data for travel risk assessment: current practice and future needs in the EU* published by the European Transport Safety Council in 1999 and the second is a study by Hakkert and Braimaister in 2002 titled *The uses of exposure and risk in road safety studies*, published by SWOV in the Netherlands.

A1.1 Exposure data for travel risk assessment: current practice and future needs in the EU

The report highlights the importance of exposure information for policy making across all modes of travel. However despite this, few European countries collect adequate information and many do not collect any at all but try to rely on intermediate indicators such as fuel consumption.

It is from the very few studies that have been undertaken that an understanding is being developed of the relative risks of travelling by different modes of transport such as air, train, ship and road. This not only allows transparency as to where effort and resource should be expended to improve safety and reduce occurrence of accidents of all types and their severity but provides valuable levers for policy development. One example of this given in the report is the decision to whether to invest in new rail or new roads.

Exposure information can be collected as time or distance. The importance of measuring exposure in terms of time is that travel risks may be directly compared with risks of other everyday activities such as employment such as mining or construction, or sport or those that take place in the home. Even high risk occupations such as construction have a lower fatality risk per hour than passenger transport. These are important findings for advocating better resource allocation to transport safety.

The more commonly collected travel data is in terms of distance. Whilst this makes it more difficult to compare pedestrian activity with car driving for example, it is usually more readily available from surveys that do exist or may be estimated from other indicators such as fuel consumption.

The ETSC report contains twelve recommendations. They include:

- the need for recognising that there are large differences between risks of different transport modes and policies need to be developed which reduce these gaps.

- Data on fatal injuries are not consistently documented either between modes or between countries and this makes it difficult to assess the fatality risks and the assessments are only approximate. The report recommends standards should be established at the EU level for the collection of exposure information for the different transport domains.
- The detailed annual exposure information for each country needs to be based on traveller surveys for randomly selected households over the whole year with people of all ages reporting a week's travel. Random traffic counts should be undertaken of all vehicles including pedal cycles and of pedestrians.

A1.2 The uses of exposure and risk in road safety studies

Hakkert and Braimaister explore the theoretical possibilities for defining exposure and risk and discuss the problems associated with the use of exposure and risk.

The study defines accident, exposure and risk and discusses the accuracy of measurement and reporting. Interestingly the definition of exposure used is that of the ETSC.... *'The various ways of measuring the amount of travel are collectively referred to as exposure data because they measure traveller's exposure to the risk of death or injury'*

Risk is defined as the probability of an accident occurring. However the authors note that popular perception associates risk with both the probability of a hazardous event for someone involved with a certain event and with the severity of the outcome. If an accident occurs then there are difficulties when one tries to compare situations with both different probabilities and different consequences. It is suggested it is preferable to talk about accident or casualty rates rather than risk. Here it may be assumed that the severity of the outcomes are similar when comparing situations.

Hakkert and Braimaister also use exposure information to compare risks between different parts of the transport system, different modes or with activities outside the field of transport. By making such comparisons policies may be developed which can contribute to equalising the risks and thus establish a fairer distribution of risks amongst society. However, they conclude that this equalisation is not practical and it is more useful to search for ways to make each segment of the transport system as safe as possible taking cost-effectiveness considerations into account.