Older Car Drivers Road Safety Profile

Version 1.0

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Contents

Aim

This document provides an analysis of collisions involving older drivers in the Eastern Region. It uses STATS19, road traffic offences and demographic data to identify the nature and scale of driver safety issues affecting the older driving population in the Eastern Region.

This analysis is restricted to car drivers, as initial scoping of Eastern Region data for 2017 showed that 89% of drivers aged 70+ involved in collisions were driving cars, as opposed to other vehicle types. Restricting the analysis to a single vehicle type enables a meaningful comparison with other age groups, as a comparison including drivers of all vehicles would be skewed by the different mix of vehicle types within each age group[1].

Executive Summary

Key findings and inferences

- The risk-per-mile-driven of being involved in a collision for drivers aged 70+ is 32% higher than that of drivers aged 40-69, but 75% lower than that of drivers under 30.
- The age when drivers are least likely to be at fault *if they are involved in a collision* is 52, there is a concerted increase in the likelihood of being at fault in the event of a collision from the age of 70, with drivers in collisions aged 81 and above more likely to be at-fault than drivers aged 18.
- Older drivers tend to be sensitive to the effects of ageing on driving performance and learn to adjust their driving patterns to limit their exposure to risky situations.
- The severity ratio (proportion of all casualties who were killed or seriously injured) for car occupants aged 70+ is 17.5%, compared to 8.5% for car occupants aged 40-59. The severity ratio at each year of age is fairly static up to the age of 60 before steadily increasing with age.
- The high severity ratio for older people is linked to age related fragility, and this is an important reason why older drivers are over-represented in KSI collisions.

Key Inference: Most drivers aged 70+ are relatively safe, and self-policing by this group helps them avoid collisions. However there are some drivers who pose a very high risk, meaning that for those collisions where older drivers are involved, it is very likely they will be primarily at fault. They also have a high risk of being killed or seriously injured in the event of a collision.

- Between 2008 and 2017 there was a 13% reduction in collisions per 10k population of drivers aged 70+. This reduction was the smallest of all driver age groups, with 17-20 year olds seeing a 54% reduction and 60-69 year olds seeing a 23% reduction.
- Academic research has shown a roughly linear relationship between minor speeding offences and collision risk, but collision data for the Eastern Region shows this only applies to drivers aged 35 to 75, although this age range does account for 80% of miles driven.
- Older drivers have a higher collision rate than drivers aged 40-59 *despite* having a lower offence rate.
- Offence types committed by older drivers are consistent with unintended risk taking due to cognitive and sensory impairments

[1] For example, only 71% of 40-59 year old drivers involved in collisions were driving cars.

- 72% of the variation over time in collision involvements for drivers aged 70+ can be predicted by changes in the population. The proportion of the Eastern Region population aged 70+ is predicted to grow from 12.3% in 2008 to 17.0% in 2030.

Key inference: Older drivers have not enjoyed the same reduction in collision risk that younger and working aged drivers have over the last 10 years. Models of risk based on traffic law compliance and inexperience apply with reasonable precision to younger and working aged drivers, but these do not apply so well to older drivers. Interventions based on these risk models have proved successful for most drivers over the last 10 years but have not had the desired effect on older drivers. Demographic trends mean that the number of collisions involving older drivers is likely to increase.

- When population size is controlled for, there are only very slight differences between Police force areas in the Eastern Region in terms of resident older driver risk. However Bedfordshire has a slightly lower risk than the other force areas.
- Differences between force areas in the total size of population aged 70+ mean that Norfolk and Essex account for 48% of older driver collisions between them.
- 6 of the 8 highest ranked district/unitary authorities by contribution to older driver collisions (in terms of both where drivers live and where collisions occur), are coastal authorities, and comprise 60% of all coastal authorities in the region. Academic research has demonstrated that there is a measurable trend for people moving to the coast when they retire.

Key inference: Coastal authorities in Norfolk, Suffolk and Essex are where localised interventions are likely to have the most benefit.

- The contributory factors in collisions most associated with older drivers are Defective eyesight, Illness or disability, Nervous/uncertain/panic and Failed to look properly. Other factors seen frequently may also be related to eyesight issues.
- Over half of older driver collisions occur on 30 mph roads and 42% occur at T-junctions or cross roads.
- Older drivers are most over represented in collisions at T-junctions on faster roads.
- Older driver car journeys are, on average, 40% shorter than those made by drivers aged 40-59 and are likely to involve local travel for socialising, personal business and shopping.
- Observation and compliance with junction priority when turning right at T-junctions is the collision scenario issue most characteristic of older drivers.
- The peak time for number of older drivers in collisions coincides with the period when they are also most over-represented compared to drivers aged 40-59. This period is 10:00 to 15:00 on weekdays. Older drivers are also consistently over represented throughout the daytime on Sundays.

Key inference: Older drivers tend to make more local urban journeys during the middle of the day than drivers aged 40-59, so this is where and when they have most of their collisions. However they are most at risk when using junctions on faster roads as age related cognitive and sensory impairments make accurate judgement of other traffic more challenging.

Conclusions

In conducting an older-driver specific road safety initiative it is important not to give the incorrect impression that older drivers, as a group, have a high risk of causing or being involved in collisions. Experience, and a cautious approach to driving are hugely beneficial to safety, and these are qualities that many older-drivers have in abundance. Most older-drivers make sensible adjustments to their risk exposure as the aging process begins to put limitations on their driving capabilities.

However there are a small subset of older drivers who, for one reason or another, do not make sufficient adjustments. Reasons for this may include concerns around how they would manage without independent travel, and being unaware of how much their driving has been impaired by age related processes. These drivers pose a very high risk of collision and are highly likely to be regarded as primarily at fault in the event of a collision. Consequently the nature of these collisions differ from those involving drivers under the age of 70.

Right-turns at junctions are the highest risk situations for older drivers, with sensory and cognitive limitations being a commonly identified root-cause. The prevalence of these causes may be underestimated given the potential interchangeability of other contributory factors applied in the same scenarios. Older drivers do a disproportionate amount of their total driving on urban roads, so have most of their collisions in urban areas, but they are at highest risk in faster traffic where judging speed and distance is most challenging.

The other issue facing older-drivers, and all older road users, is physical frailty. The imperative to avoid collisions completely is greatest among people most physically vulnerable to injury. Many collision types that usually result in minor injuries or no injury at all, become serious or fatal simply because one of the people involved was physically vulnerable to injury due to age-related frailty.

Any intervention aimed at reducing the risk of older drivers contributing to collisions should focus on mitigating risks that arise from the ageing process and cognitive and sensory decline. Reducing the risk older-drivers face at high speed junctions and those with complex traffic flows should be a priority. Easing the transition to a post-driving lifestyle may also be of benefit for some people who are no longer capable of safe driving but are daunted by the risk of losing independent travel.

Long Term Trends

Risk

The chart below shows number of collision involvements, and the number and proportion where the car driver was primarily at fault[2], by single year of age for the Eastern Region. This data is for the 5 year period 2013-2017. Using *proportion of collisions where primarily at fault* as a measure of risk, gives an approximate control for exposure; i.e. it allows for differences in population size and miles driven for each age. It gives an indication of how the relative risk per driver mile changes with age. This is only an approximation as it relies on contributory factors which are subjective. It should also be noted that this does not show where variations in the level of experience, attitude, skill and physical/cognitive/sensory factors mean that drivers either fail or succeed in avoiding a collision altogether. Notwithstanding these issues, it is anticipated that most errors cancel each other out over the large sample size used, making this chart a useful, albeit indicative proxy measure of risk for the subset of drivers who were involved in a collision.

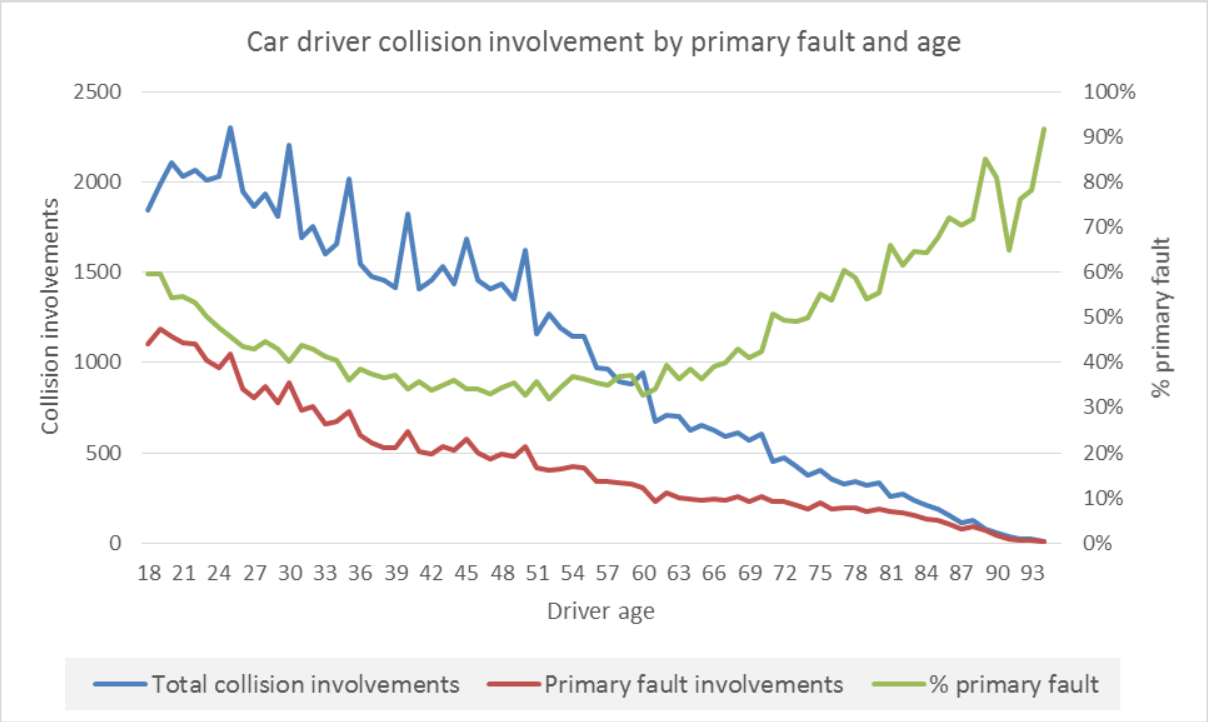


Figure 1: Car driver collision involvement by single year of age (ages 18-94)

This indicates the age when drivers are least likely to be at fault if they are involved in a collision is 52, with just 32% of 52 year olds being primarily at fault for their collision. It shows a concerted increase in risk from the age of 70, with drivers aged 81 and above more likely to be at fault for their collision than 18 year old drivers. However, the number of collisions involving drivers over the age of 70 is much lower than for younger drivers, so the total number of older drivers at fault is relatively low. The national travel survey indicates this is due to a lower exposure rate for older drivers, i.e. fewer drivers travelling fewer miles.

Essentially this shows the risk of being at-fault for a subset of the driving population who have already been involved in a collision. As it does not account for the ability to avoid a collision altogether, the alternative measure on the following page should be used in conjunction with the above to give a balanced appreciation of older driver risk.

[2] Defined as being the party in the collision to whom contributory factor #1 was attributed, from STATS19 data.

The chart below uses national travel survey data to give an estimate of collision involvements per million vehicle miles for car drivers of different age groups. This paints a slightly different picture to figure 1; it shows that while risk is 32% higher for the over 70s compared to middle-aged adults, it is 75% lower than the risk posed by drivers under 30. Unfortunately it is not possible to provide any more detailed breakdown by age due to age boundaries built into the National Travel Survey data.

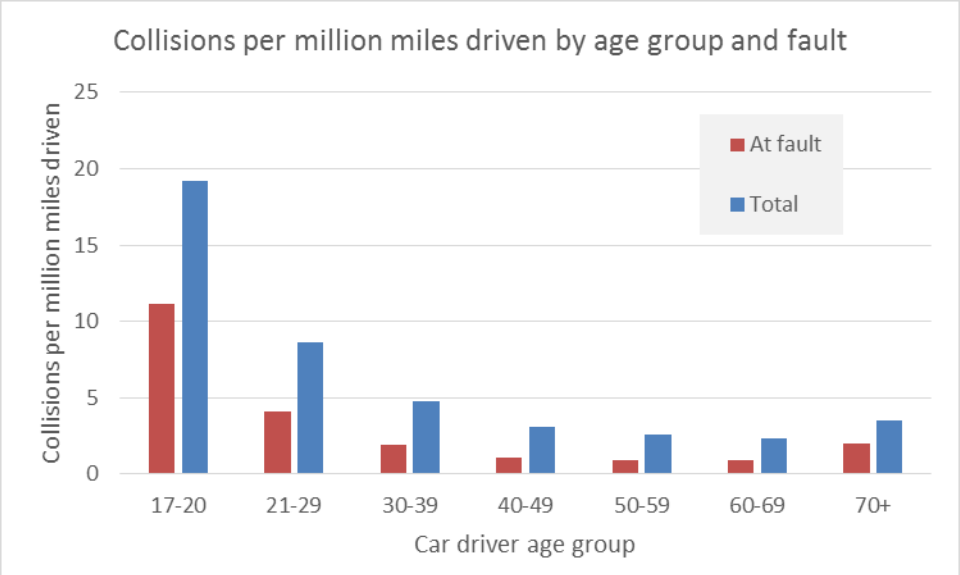


Figure 2: Car driver collision risk per million miles driven, by age group

The reason for this apparent discrepancy between the risk indicated in figures 1 and 2 is because of the nature of the measures themselves. Figure 1 shows the likelihood of being primarily at fault for those drivers who were involved in a collision. Figure 2 shows the likelihood of being involved in a collision in the first place and so takes into account those drivers who avoided a collision all together. The discrepancy between the two measures suggests that within the 70+ age group there are two distinct groups:

1) Safe drivers who are very unlikely to be involved in collisions as they do not contribute to collisions and are good at avoiding potential collisions when other people make mistakes or drive poorly.
2) Unsafe drivers who make mistakes or drive poorly, contributing to collisions.

The two types above describe two ends of a driver-safety spectrum, with most drivers being at some point between the two extremes. However, the data above indicates drivers aged 70 and over tend to be clustered fairly close to either end of this spectrum.

A literature review[3] of research on older drivers showed evidence that older drivers tend to be sensitive to the effects of aging on driving performance and learn to adjust their driving patterns to limit their exposure to risky situations. It also identified research that indicated the age related risk only becomes pronounced in the 80+ age group, but still only measuring a 20% increase in risk.

[3] Road Safety Observatory Older driver review https://www.roadsafetyobservatory.com/Review/10045

Changes over time

Drawing on the indicators of risk from figures 1 and 2, for the purpose of this analysis we will examine 'older drivers' as being car drivers aged 70+. The chart below shows how collision involvements for this and other age groups have changed over time.

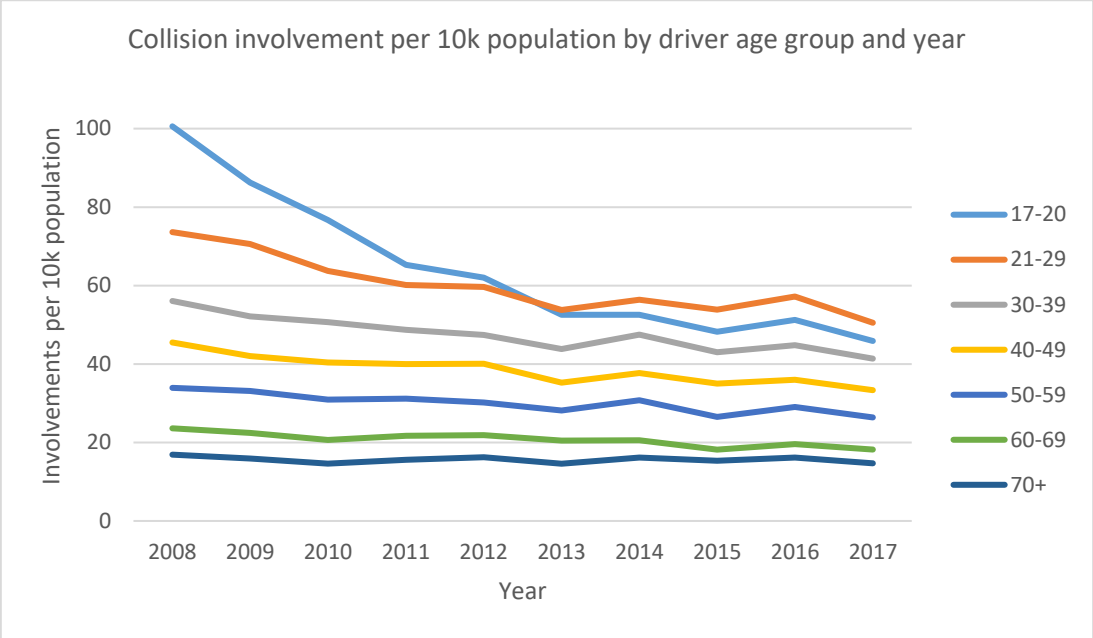


Figure 3: Collision involvements per 10k population by age group and year

This is not a measure of risk (rates per population do not allow for variations in miles driven), however it does show a general trend of reducing collision involvement rates being most pronounced for younger age groups. Comparing the percentage reduction for each age group shows:

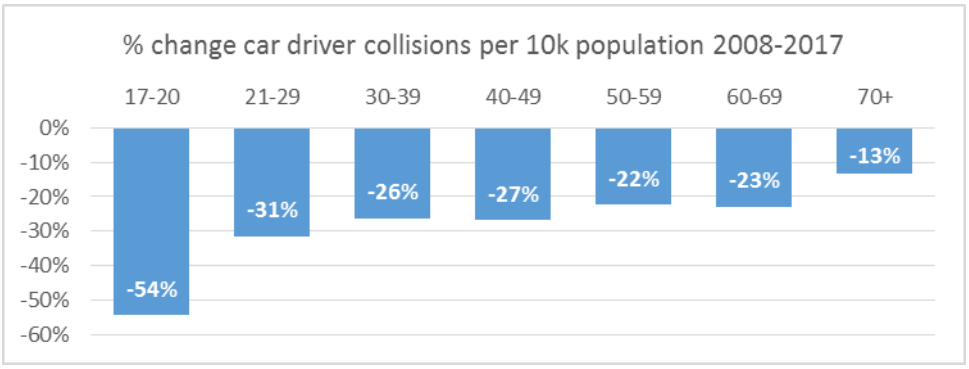


Figure 4: Change in car driver collisions per 10k population by ager group 2008 to 2017

This suggests improvements in overall safety have been most effective for younger drivers, with older drivers missing out on much of the improvements. This may be the case if the safety issues facing older drivers are different to those for younger and working-aged drivers and therefore would not be addressed by mainstream or young-driver-focussed initiatives such as safety cameras, NDORS courses and telematics insurance, which appear to have been effective for the younger and middle aged driving population.

It is also worth noting that from 2013, the collision rate per population for 17-20 year olds went below that of 21-29 year olds for the first time. Figure 2 shows that this youngest age group still have by far the highest risk per mile travelled. Therefore this observation from figure 3 is consistent with there simply being fewer 17-20 year olds driving than there used to be – with the cost of driving being a factor likely to force many young people to delay learning to drive.

The graph below shows the trend in the Eastern Region older population[4] and car-driver collision involvements.

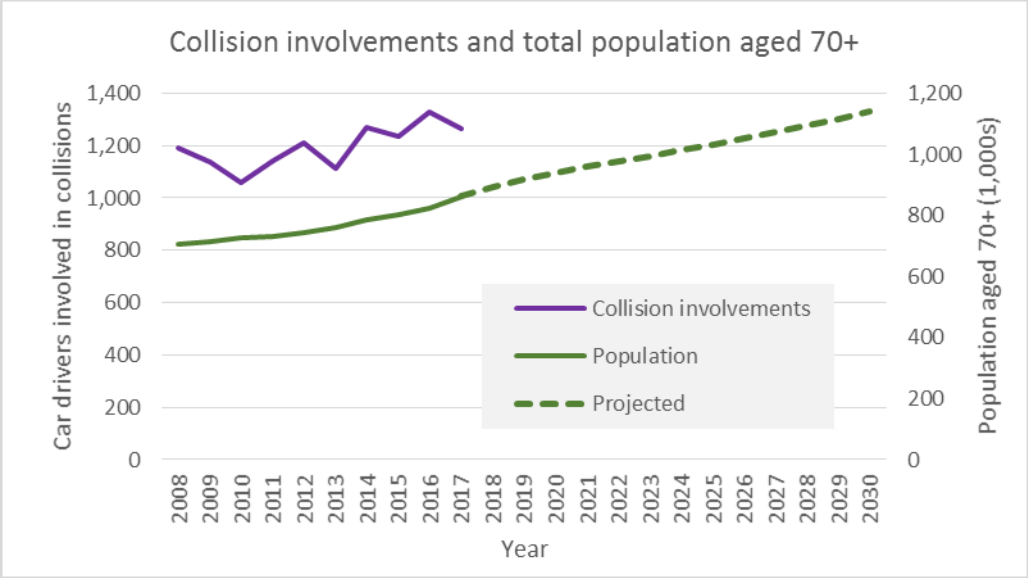


Figure 5: Car driver collision involvements and estimated population aged 70+; Essex 2008-2027

Given the graph in figure 3 shows a fairly static rate of collision involvement per 10k population for the 70+ age group, the projected increase in population shown in figure 5 means we can expect to see an increase in the total number of drivers aged 70+ being involved in collisions.

For the 2008 to 2017 period there is a 72% correlation between the size of the 70+ population and the number of collision involvements. Roughly speaking this means that 72% of the variation in collision involvements could be predicted by changes in the population.

In future, collisions involving older drivers are likely to become a larger proportion of the total, as the percentage of the Eastern Region population aged 70+ is predicted to grow from 12.3% in 2008 to 17.0% in 2030.

[4] Mid-year population estimates and population projections from https://www.nomisweb.co.uk/

Severity ratio

Severity ratio is the proportion of all casualties who were either killed or seriously injured. It is a rough measure of how vulnerable a group of road users are in the event of a collision. It is *not* a measure of how likely they are to be involved in a collision in the first place. A severity ratio of 10% would mean that 10% of all people injured, suffered a serious or fatal injury.

- Car occupants aged 40-59: Severity ratio = 8.5%
- Car occupants aged 70+: Severity ratio = 17.5%

The graph below shows fairly a consistent severity ratio for adult car occupants of around 8-12%, up to the age of 60. From the age of 60 the proportion of car occupants who suffer serious or fatal injuries in the event of a collision steadily increases with age.

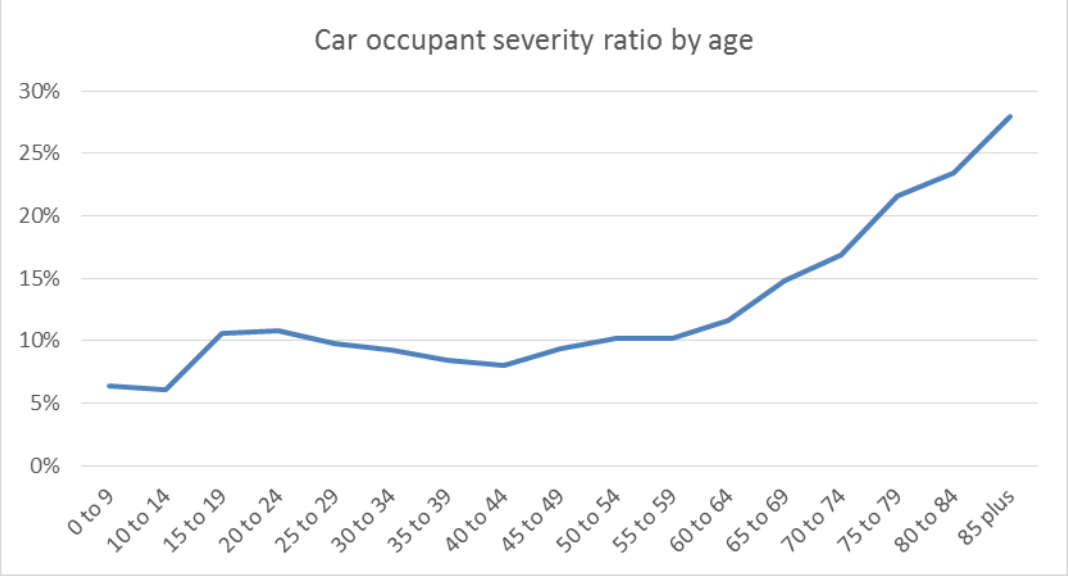


Figure 6: Severity ratio by age of casualty - car drivers and passengers

The pattern in severity ratio being static to the age of 60 and then increasing steadily with age is consistent with car occupants' severity ratio being strongly linked to age-related physical frailty.

This means that simply by virtue of an older driver being present, a collision involving an older driver is more likely to be a KSI collision than a collision not involving any older people.

A literature review[5] of research into older drivers identifies evidence to support this, highlighting age-related fragility as an important factor in the over representation of older drivers in KSI collisions.

[5] Road Safety Observatory Older driver review https://www.roadsafetyobservatory.com/Review/10045

Regional comparison

Car drivers involved in collisions

The charts in this section give comparisons between the six Police Force areas in the Eastern Region.

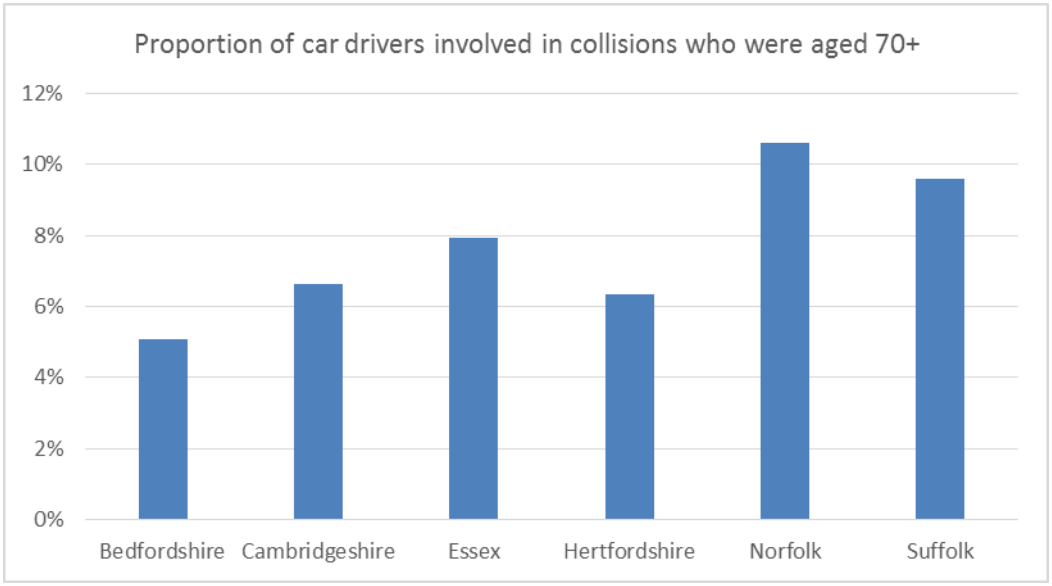


Figure 7: Proportion of car drivers in collisions who were aged 70+ by Police Force area

The chart above shows a fair amount of variation between Police Force areas, with Norfolk seeing more than double the rate of older driver involvement than Bedfordshire. However, there are also differences in the age structure of the resident population between these areas, as shown in the next chart.

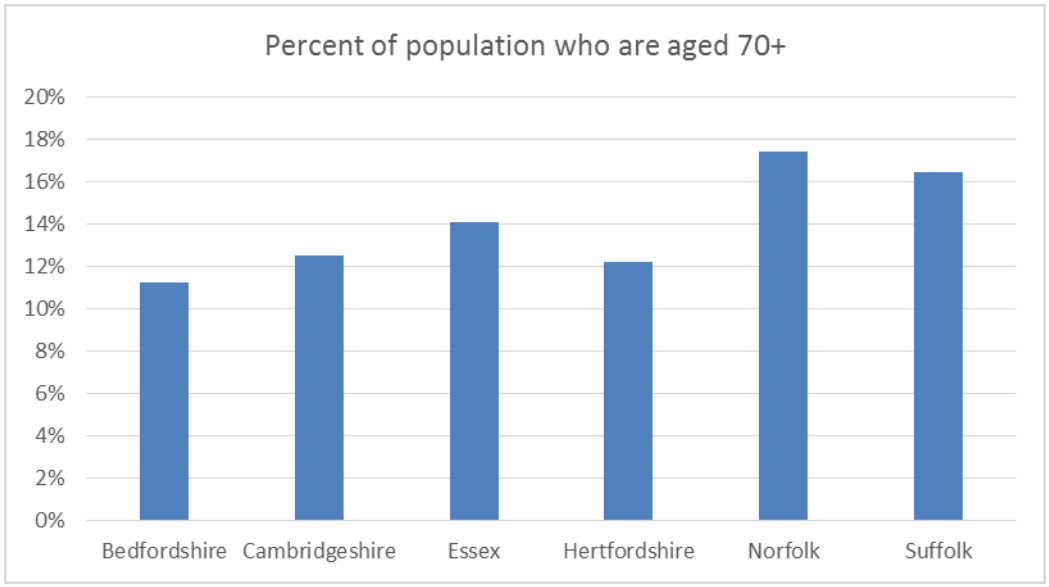


Figure 8: Proportion of resident population aged 70+ by Police force area

These two charts show quite similar patterns indicating much of the difference in the rate shown in Figure 7 is due to the differences in the age structure of the resident population. The next chart shows older driver collision involvements as a rate per population.

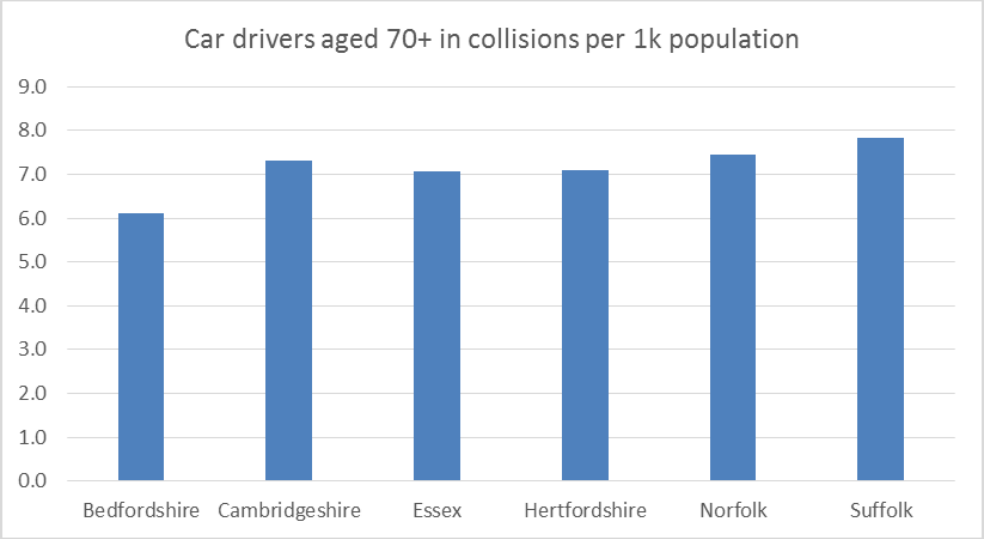


Figure 9: Car drivers aged 70+ in collisions per 1k population by Police Force area

Now we have controlled for variations in population age structure, there are much smaller differences between Police Forces. However, Bedfordshire is still has a notably lower rate than the rest of the Eastern Region.

There are some substantial differences in the size of the 70+ population between Police Force areas in the Eastern Region. These result in differences between Police Force areas in the number of older drivers in collisions, shown in the chart below.

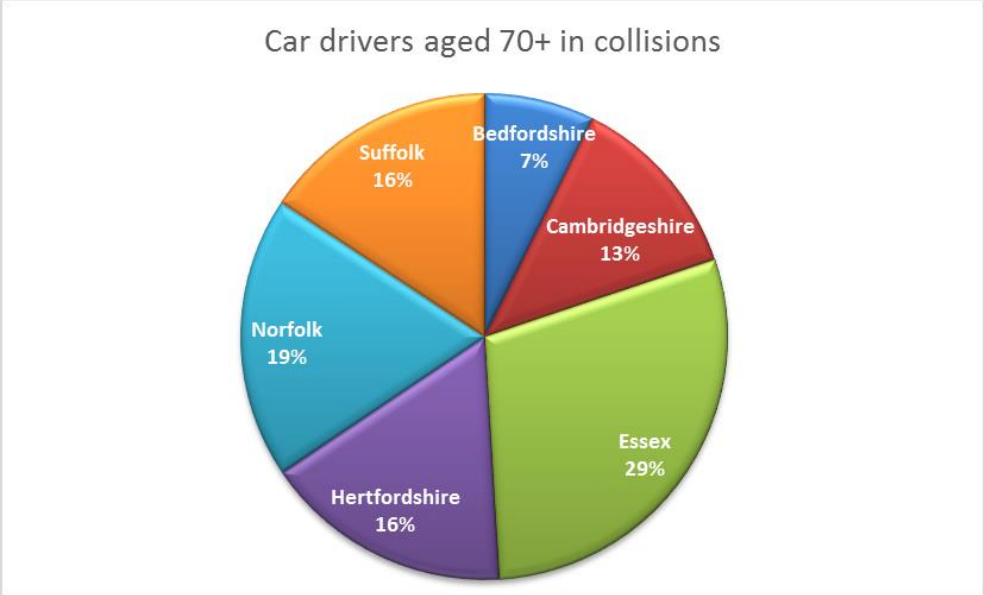


Figure 10: Proportion of Eastern Region older drivers in collisions, by Police Force area

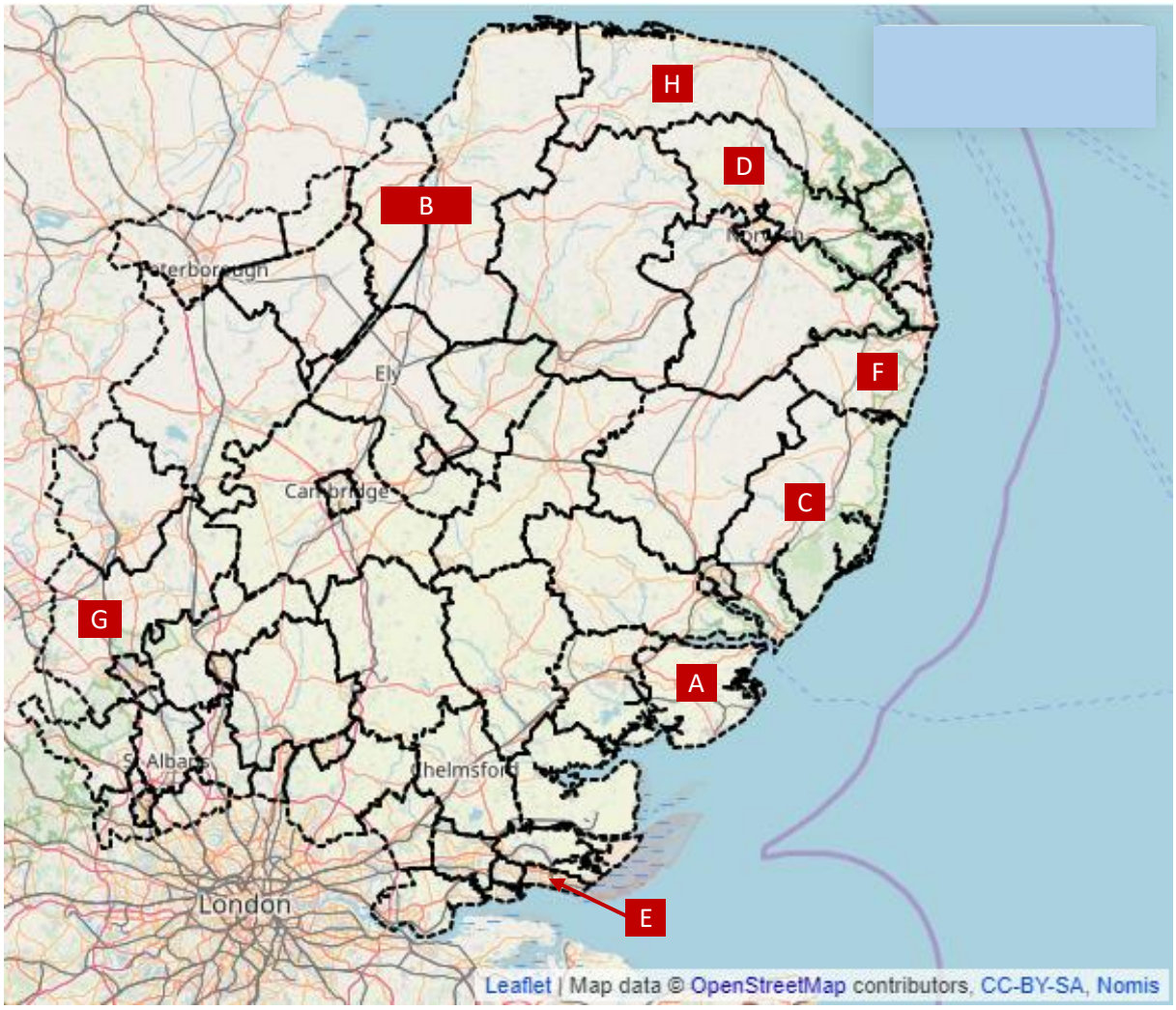
Although the risk per head of population is roughly equal across the region (with Bedfordshire being slightly lower than the rest), Essex and Norfolk account of nearly half (48%) of elderly driver collisions by virtue of having the largest populations[6] of people aged 70+.

[6] 256,798 aged 70+ in Essex and 156,690 in Norfolk, with the next largest being Hertfordshire at 144,420.

Appendix A contains a table showing each district/unitary in the Eastern Region by the following three measures:

- Proportion of older driver collisions in the Eastern Region that took place in the local authority area.
- Percentage share of car drivers aged 70+ who were involved in collisions in the Eastern Region, who live in the local authority area.
- Proportion of all local resident car drivers involved Eastern Region collisions who are aged 70+.

This highlights the following areas as being where a local intervention has the most potential for reduction in the number of older driver collisions:



Map Ref	District/unitary	% of collisions involving car drivers aged 70+ in the Eastern Region, that took place in local authority area	% of car drivers aged 70+ in collisions in the Eastern Region who were resident in authority area	% of car drivers in collisions, of all ages resident in authority area, who were aged 70+
A	Tendring	3.4%	4.1%	13.4%
B	Kings Lynn and West Norfolk	3.6%	3.4%	12.1%
C	Suffolk Coastal	3.3%	3.1%	11.1%
D	Broadland	2.7%	3.1%	12.8%
E	Southend	3.0%	3.0%	8.9%
F	Waveney	2.4%	3.0%	11.6%
G	Central Bedfordshire	3.8%	2.8%	6.1%
H	North Norfolk	2.4%	2.4%	13.7%

Figure 11: Thematic map - local authority areas where older driver interventions would have the greatest potential impact

The colour scale in the table above indicates the relative size of each measure for the local authority area, compared to all local authorities in the Eastern Region.

It is notable that most of these areas are coastal, seeming to confirm the cliché of people moving to the seaside on retirement. This is backed up by academic research which shows a demographic ageing trend among British coastal communities[7].

NOTE: The list of authorities in figure 11 differ slightly from those listed in figure 15 as the map above uses authority boundaries applicable when the collisions were recorded, whereas figure 15 uses authority boundaries for current population estimates.

[7] Atterton, J. 'Ageing and Coastal Communities' page 3. *University of Newcastle-Upon-Tyne* 2006. https://www.coastalcommunities.co.uk/wp-content/uploads/2015/07/Ageing_Communities_Report.pdf (accessed 17th May 2019)

Driver Behaviour

Journey profile

Data from the National Travel Survey gives total miles driven by car and total number of car trips by age group. This allows a crude calculation of average trip distance by age group to be made:

- Drivers aged 40-49: 8.5 miles
- Drivers aged 50-59: 9.1 miles
- Drivers aged 70+: 6.3 miles

This shows drivers from the 40-59 year old comparison group driving around 40% further per trip than older drivers.

The National Travel Survey gives data on journey purpose, but where this is shown by age group it is not broken down by vehicle type. However, 78% of miles travelled by people aged 70+ are by car as driver or passenger. Therefore the proportions below are likely to be a reasonable indication of those that apply to car drivers. Total distance travelled by journey purpose shows that compared to 40-59 year olds, people aged 70+ did:

- 98% fewer commuting miles
- 96% fewer business miles
- Only 5% fewer miles for personal business (e.g. banks, hairdressers, medical appointments)
- 3% *more* miles visiting friends not at a private house
- 8% *more* miles for day trips
- 18% *more* miles for shopping

The main journey types undertaken by people aged 70+ were:

- Shopping (23% by total miles)
- Visiting friends at a private house (17%), with a further 7% visiting friends not at a private house
- Personal business (13%)
- Day trips (11%) and a further 10% for travel to a holiday base[8]

Other than day trips and holidays, it is conceivable that these highest-total-mileage journey types for older people tend to take place in and around their nearest large or medium sized town – although there may be a large range of distances in the visiting friends category.

Older driver annual mileage is lower than the comparator group, and this difference is mostly down to reduced commuting. Therefore, most car journeys by older people are likely to involve local travel for socialising, personal business and shopping.

Distance to collision

Home address postcode centroids can be used with collision grid references to calculate the distance "as the crow flies" from home address to collision location. However, this requires the full postcode and the available dataset for the Eastern Region does not include full postcodes.

Full postcode data for Essex is available, and previous work with this dataset showed:

"….the average straight-line distance from home postcode centroid to collision location for older drivers was **6.9 miles**, compared to **9.6 miles** for drivers aged 40-59. Approximately **73%** of older car drivers lived within 5 miles of their collision location."[9]

[8] Total distance for a UK holiday, or return travel to UK port of departure for overseas holidays.

Peak times

The charts below show peak times for older car driver collision involvement, and peak times relative to the 40-59 year old car driver comparison group.

Hour	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
0000-0059	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%
0100-0159	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%
0200-0259	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
0300-0359	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
0400-0459	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
0500-0559	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%
0600-0659	0.2%	0.1%	0.0%	0.0%	0.2%	0.1%	0.0%
0700-0759	0.2%	0.3%	0.2%	0.3%	0.3%	0.2%	0.2%
0800-0859	0.7%	0.9%	0.7%	0.6%	0.8%	0.3%	0.2%
0900-0959	1.0%	1.2%	0.9%	1.0%	1.0%	0.6%	0.6%
1000-1059	1.2%	1.1%	1.5%	1.3%	1.5%	1.0%	1.0%
1100-1159	1.5%	1.5%	1.1%	1.3%	1.6%	1.5%	1.0%
1200-1259	1.7%	1.5%	1.6%	1.8%	1.8%	1.2%	1.2%
1300-1359	1.2%	1.1%	1.3%	1.5%	1.6%	1.2%	0.8%
1400-1459	1.3%	1.5%	1.5%	1.5%	1.5%	0.9%	1.2%
1500-1559	1.5%	1.8%	1.8%	1.4%	1.5%	0.9%	1.0%
1600-1659	1.2%	1.6%	1.6%	1.5%	1.7%	0.9%	0.9%
1700-1759	0.9%	1.1%	1.2%	1.4%	1.4%	0.8%	0.7%
1800-1859	0.7%	0.8%	0.7%	0.8%	0.8%	0.8%	0.6%
1900-1959	0.4%	0.5%	0.5%	0.6%	0.5%	0.5%	0.4%
2000-2059	0.1%	0.2%	0.3%	0.3%	0.3%	0.3%	0.4%
2100-2159	0.2%	0.2%	0.2%	0.2%	0.2%	0.1%	0.1%
2200-2259	0.1%	0.1%	0.2%	0.2%	0.2%	0.2%	0.2%
2300-2359	0.1%	0.0%	0.0%	0.0%	0.1%	0.1%	0.1%

Figure 12: Absolute Collision Peak Times - Car drivers aged 70+

This table shows peak times for older driver collisions are on weekdays during normal office/retail working hours. Previous work shows peak times for most other road users tend to be either side of this older–driver peak, i.e. during weekday commuting times.

The next chart shows how the proportion of older driver collisions in each hour of the week compares to the proportion for the 40-59 year old comparison group. Factors over 1 indicate older driver collisions are over represented at that hour, and factors below 1 show they are under-represented.

[9] Cubbin, W. 'Road Traffic Collision Analysis; Older Drivers' page 12. *Safer Essex Roads Partnership* 2018.

Hour	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
0000-0059	0.15	0.22	0.32	0.72	0.21	0.10	0.14
0100-0159	0.95	0.00	0.00	0.29	0.47	0.00	0.26
0200-0259	0.00	0.00	0.00	0.00	0.32	0.36	0.13
0300-0359	0.63	0.00	0.00	0.00	1.26	0.00	0.21
0400-0459	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0500-0559	0.14	0.22	0.47	0.00	0.33	0.16	0.00
0600-0659	0.36	0.27	0.07	0.08	0.50	0.38	0.22
0700-0759	0.26	0.31	0.22	0.23	0.27	0.76	1.02
0800-0859	0.43	0.53	0.40	0.36	0.46	0.58	0.74
0900-0959	1.15	1.28	1.00	1.40	1.37	0.95	1.11
1000-1059	1.60	1.95	2.41	1.76	2.17	1.23	1.37
1100-1159	1.98	2.34	1.95	1.92	2.31	1.48	1.26
1200-1259	2.15	2.24	2.21	2.69	1.92	1.04	1.26
1300-1359	1.51	1.44	1.73	1.74	1.74	1.07	1.08
1400-1459	1.49	1.58	2.06	1.95	1.48	0.93	1.51
1500-1559	1.33	1.70	1.56	1.40	1.09	0.89	1.43
1600-1659	0.95	1.19	1.10	1.09	1.01	1.07	1.21
1700-1759	0.59	0.58	0.65	0.80	0.70	0.86	1.04
1800-1859	0.66	0.64	0.60	0.62	0.69	1.06	1.16
1900-1959	0.79	0.65	0.67	0.90	0.60	0.76	0.83
2000-2059	0.34	0.52	0.78	0.64	0.45	0.65	0.91
2100-2159	0.68	0.56	0.71	0.65	0.45	0.40	0.46
2200-2259	0.66	0.62	0.72	1.02	0.56	0.53	0.85
2300-2359	0.49	0.32	0.25	0.11	0.43	0.58	0.58

Figure 13: Collision Peak Times - Car drivers aged 70+ relative to car drivers aged 40-59

Looking at both peak time tables together shows that the daytime peak for number of older drivers includes their period of greatest over-representation in collisions, this being from 10:00 to 15:00 on weekdays. Older drivers are also consistently over represented throughout the daytime on Sundays.

Collision involvement frequency for any population or group is often closely correlated with exposure, i.e. when and where that group do most of their driving. The temporal collision patterns for older drivers are what we might expect from people who are retired and can avoid traffic congestion by choosing to drive outside of peak commuter and school travel times. It also shows the expected pattern of very little travel late at night – the over 70s *not* comprising a core demographic for the night time entertainment industry!

Hotspot Map

The heat-map below shows areas with the greatest geographic concentrations of collisions involving car drivers aged 70+.

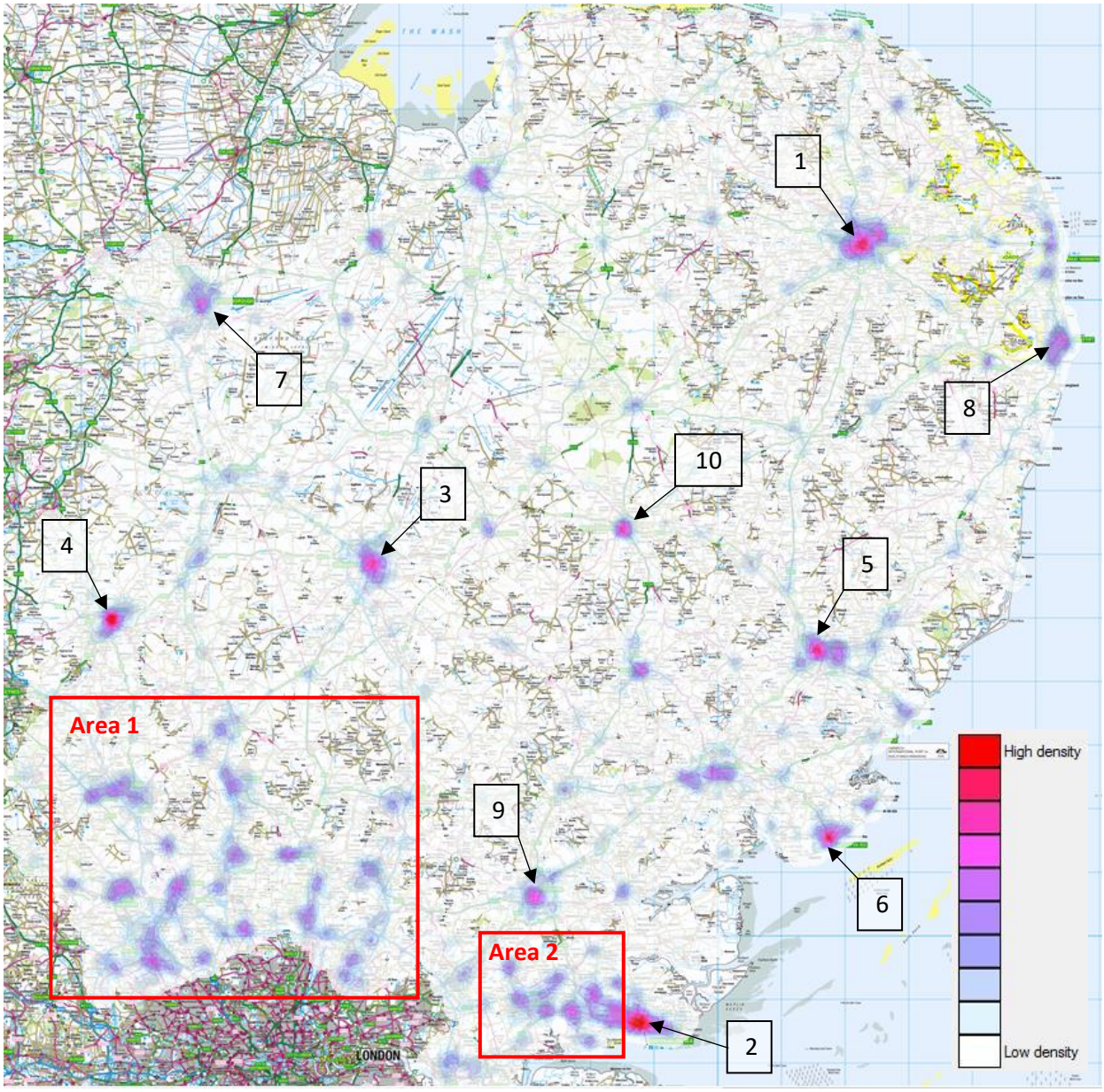


Figure 14: Hotspot map; older driver collision location

This shows the greatest geographic concentrations of older driver collisions are in the following towns:

1. Norwich
2. Southend
3. Cambridge
4. Bedford
5. Ipswich
6. Clacton
7. Peterborough
8. Lowestoft
9. Chelmsford
10. Bury St. Edmonds

Area 1 – Hertfordshire and Luton

Area 2 – South Essex

The two areas highlighted in Hertfordshire and South Essex have been included as there are no single large or intense hotspots, but a high incidence of smaller hotspots, reflecting the size and distribution of towns in these areas.

The finding on page 15 under Journey Profile, that most car journeys by older people are likely to involve local travel for socialising, personal business and shopping, combined with the over-representation of older driver collisions on urban roads, indicates it is likely that most older-drivers live in or near the town where their collision occurred.

Local Authority	People aged 70+	% aged 70+
East Suffolk (Lowestoft)	48,061	19%
Central Bedfordshire	34,629	12%
Tendring (Clacton)	31,304	22%
King's Lynn and West Norfolk	28,109	18%
West Suffolk (Bury St. Edmunds)	26,738	15%
Southend-on-Sea	25,166	14%
North Norfolk	24,651	24%
Breckland	24,563	18%
Huntingdonshire	24,268	14%
Chelmsford	24,012	14%
Broadland	23,793	19%
South Norfolk	23,485	17%
Colchester	23,006	12%
Basildon	22,679	12%
South Cambridgeshire	21,461	14%
Braintree	21,118	14%
Bedford	21,070	12%
Peterborough	20,363	10%
Luton	18,958	9%
Epping Forest	18,683	14%
East Hertfordshire	18,673	13%
Dacorum	18,623	12%
North Hertfordshire	18,167	14%
St Albans	17,964	12%
Mid Suffolk	17,129	17%
Great Yarmouth	17,068	17%
Babergh	16,707	18%
Castle Point	16,232	18%
Fenland	16,136	16%
Thurrock	16,060	9%
Ipswich	15,938	12%
Norwich	15,021	11%
Rochford	14,337	17%
Welwyn Hatfield	13,805	11%
Hertsmere	13,695	13%
Broxbourne	12,702	13%
East Cambridgeshire	12,475	14%
Three Rivers	12,201	13%
Uttlesford	12,105	14%
Brentwood	11,561	15%
Cambridge	11,446	9%
Maldon	11,005	17%
Stevenage	9,597	11%
Harlow	9,530	11%
Watford	8,993	9%

The heat-map in figure 14 reflects this expected pattern, with hotspots around larger towns, especially those with larger populations of older people in terms of absolute number and percent of total population. This is illustrated by the clustering of hotspot authorities (highlighted blue) towards the top of the table on the left.

The average population aged 70+ for authorities in the Eastern region is 19,184 people and 14% of the population.

This suggests hotspot areas from Peterborough and above on the table feature as hotspots due largely to local resident population.

Resident demographics on their own indicate Ipswich, Norwich and Cambridge should not be hotspots – although they are all geographically small authority areas so the collisions they do have will be concentrated in a small area, showing as a higher intensity in the analysis colour scale. These locations may be also attracting older drivers from neighbouring areas or further afield. Authorities with large and high percentage older populations that are close to Ipswich, Norwich and Cambridge comprise:

- Ipswich
  - East Suffolk
- Norwich
  - Broadland
  - Breckland
  - South Norfolk
- Cambridge
  - South Cambridgeshire

These towns may therefore be attracting older drivers in the daytrip and shopping categories identified previously.

Figure 15: Population aged 70+ by local authority

Contributory factors

The table below shows the contributory factors which are most representative of older car driver specific issues. These are the factors which appear most frequently[10] for car drivers aged 70+ compared to car drivers aged 40-59. Factors recorded on fewer than 100 occasions are excluded, this means the results show recurring factors which distinguish older driver specific issues from the general issues affecting all drivers.

Contributory Factor	% of all factors for age group		Over representation in 70+ age group
	40-59	70+	
Uncorrected, defective eyesight	0%	2%	19.39
Illness or disability, mental or physical	1%	7%	4.65
Nervous/Uncertain/Panic	1%	3%	3.78
Dazzling sun	2%	3%	1.82
Junction overshoot	1%	1%	1.57
Disobeyed Give Way or Stop sign or markings	1%	2%	1.46
Failed to look properly	23%	25%	1.12
Misjudged other persons path or speed	11%	12%	1.04

Figure 16: Contributory factors most characteristic of drivers aged 70+

The nature of these over represented factors are what we may expect to see for drivers with age related cognitive, sensory and physical impairments.

A combination of a high percentage in the 70+ column and a high factor in the 'over representation' column indicates the most important factors. The following factors may therefore be selected to form the basis of an intervention:

- Defective eyesight
- Illness or disability
- Nervous/uncertain/panic
- Failed to look properly

It is possible that some of the "Failed to look properly" collisions represent unidentified cases of defective eyesight, but this is speculation. Dazzling sun and misjudging path and speed could also be related to eyesight and cognitive processing issues.

[10] The number in the last column shows the proportion by which the 70+ group are over represented compared to the 40-59 group. A figure of 1.0 would mean the 70+ group has the same proportion of that factor as the 40-59 group, a figure of 2 would mean the 70+ group has that factor twice as frequently.

Road environment and location

The table below gives a breakdown of junction type and speed limit for collisions involving car drivers aged 70+. This shows over half of the collisions occur on 30mph roads, with T-junctions/cross roads accounting for 42% of all collisions.

Collisions involving car drivers aged 70+

Speed Limit	No junction	T/staggered /x-road/ pri-drive	Roundabout	Slip road	Other
20	0.98%	0.5%	0.1%	0.0%	0.1%
30	18.5%	26.2%	6.3%	0.1%	1.8%
40	3.7%	4.1%	2.0%	0.1%	0.3%
50	1.9%	2.0%	0.5%	0.1%	0.2%
60	11.3%	8.8%	1.8%	0.1%	0.4%
70	5.6%	0.6%	1.1%	0.9%	0.1%

Figure 17: Speed limit and junctions for collisions involving car drivers aged 70+

The next table shows the *differences* in the proportions above, compared to those for the 40-59 year old car driver comparison group. This uses the same indexed comparison method as figure 16, so numbers above 1.0 in the table below show that combination of road type and speed limit is over represented among the 70+ driver group.

Over representation in collisions involving drivers aged 70+ compared to those aged 40-59 (types representing less than 1% of 70+ drivers excluded)

Speed Limit	No junction	T/staggered /x-road/ pri-drive	Roundabout	Slip road	Other
20					
30	1.20	1.09	1.01		1.12
40	0.96	1.08	0.82		
50	0.91	1.21			
60	0.98	1.37	0.83		
70	0.50		0.69		

Figure 18: Speed limit and junctions for collisions involving car drivers aged 70+; percentage difference to comparison group

This shows that older drivers are slightly over represented on all types of 30mph road. However they are most over represented on faster roads at T-junctions/cross roads etc.

This suggests older driver specific issues are most acute at junctions, particularly when traffic speeds are higher. This is consistent with the contributory factor analysis which showed observational errors and sensory/cognitive limitations to be the most characteristic factors for older drivers. Difficulty judging speed[11] and making accurate observations are likely to create particular hazards at junctions, especially those with higher traffic speeds.

[11] Scialfa CT, Guzy LT, Leibowitz HW, Garvey PM, Tyrrell RA. 'Age differences in estimating vehicle velocity' *Psychology and Aging*. 1991. https://www.ncbi.nlm.nih.gov/pubmed/2029369 (accessed 20th May 2019)

Collision type

Manoeuvres

The following table summarises the main manoeuvres and junction types for collisions involving car drivers aged 70+.

Manoeuvre	No junction	T/staggered /x-road/ pri-drive	Roundabout
Reversing or U-turn	2%	1%	0%
Left bend	2%	1%	0%
Right bend	2%	1%	0%
Going ahead	26%	18%	6%
Held up	2%	1%	1%
Stopping	4%	2%	1%
Starting	2%	3%	2%
Left turn	0%	3%	1%
Right turn	1%	14%	1%
Overtaking	2%	1%	0%
Lane change	1%	0%	0%

Figure 19: Manoeuvres and junction types; collisions involving car drivers aged 70+

This shows that other than manoeuvres simply recorded as "Going ahead", the most common type was turning right at a junction, accounting for 15% of collisions.

Data quality limitations with the STATS19 dataset mean that sometimes the manoeuvre recorded does not give a clear indication of the actual collision mechanics. For example we can see that 1% of collisions at 'no junction' were recorded as involving a right turn. This should not be possible as a right turn (as defined by STATS19) has to involve some form of junction.

In order to control for these data quality issues, the ratios above were compared with the 40-59 year old age group to identify the collision types where older drivers were most over or under represented, excluding 'rare' collision types:

- Over represented
  - Reversing or U-turn (64-83% over represented)
  - Starting i.e. pulling away (55-59%)
  - Right turns at T junctions (35%)
  - Going ahead (10-17%)
- Under represented
  - Held up and stopping, i.e. commonly results in nose-to-tail collisions; (30-70% under represented)

Combining the measures of overall proportion (figure 19) and over representation (bullet points above), highlights ***turning right at T-junctions*** as the scenario where older driver specific issues have the greatest impact on road safety.

The most common contributory factors for these right-turn older driver collisions are:

- Failed to look properly (39% of older driver contributory factors in this scenario)
- Misjudged path/speed (16%)
- Poor manoeuvre (12%)
- Careless/reckless/in a hurry (5%)
- Dazzling sun (4%)
- Disobeyed sign or markings (3%)

This shows that observation and compliance with junction priority are the main causes of these collisions. It is possible that in some cases the compliance issue is itself caused by cognitive or sensory impairments.

Other road users

The following table gives a breakdown of the most common road user types that older car drivers and the comparison group of 40-59 year old car drivers were involved with.

Other road user involved	Car Driver aged 70+	Car driver aged 40-59
P2W	6.8%	8.5%
Pedal cycle	9.2%	9.2%
Pedestrian	10.6%	8.2%
Single vehicle collision	12.2%	8.4%

Figure 20: Other road users involved in collisions with older car drivers

There are small differences in the rates of involvement with P2Ws and pedestrians between older drivers and the comparison group. These are likely to reflect the more urban nature of older driver journeys, making interactions with pedestrians more likely and reducing exposure to the subset of P2W journeys that occur on rural and trunk roads. The greatest difference between the two groups is that older drivers' involvement in single vehicle collisions is nearly 4% higher than the comparison group. In most situations single vehicle collisions represent unforced errors; a loss of control not prompted by an unexpected manoeuvre by another vehicle. These unforced errors can result from a variety of root-causes such as:

- Failure to anticipate hazards
- **Confusion**
- Deliberate risk taking or risky manoeuvres
- **Slow reaction times**
- **Poor eyesight**
- Excess speed
- **Physical impairment hampering proper control of the vehicle**
- **Fatigue**
- **Medical episodes and side effects from medication**

The causes highlighted in bold are the ones that can be most easily associated with old-age. However, being an older person isn't always a barrier to making mistakes more associated with youthful recklessness or inexperience.

Driver offences

A sample of regional data for minor driving offences was obtained from a query on the Police PentiP system. These are minor offences in that they can be disposed of by way of a driver retraining course or a conditional offer (points and a fine), as opposed to arrestable offences such as drink/drug driving, or high end speeding offences which go to automatic prosecution. This is only a sample of offence data for the region as PentiP is used differently by different forces, so not all offences are included and useful comparisons between force areas is not possible. However the sample can give a useful overview of regional trends.

The offences included here are all *endorsable*, meaning they can result in penalty points on a driver's licence. Most notably this excludes seatbelt offences which are not endorsable.

Offence rate

There were 13,991 endorsable offences committed by drivers aged 70+ in 2018, and 92,699 for the 40-59 year old comparison group. However these numbers alone do not mean much until we compare them to the collision involvement and miles driven by these two age groups.

The link between motoring offences and increased collision risk is well established. For example, research carried out on Dutch and Canadian data showed that there was a roughly linear relationship between minor speeding offences and collision risk[12]. The graph below shows collision involvement per traffic offence for each individual year of age for car drivers aged 18 to 89 in the Eastern Region.

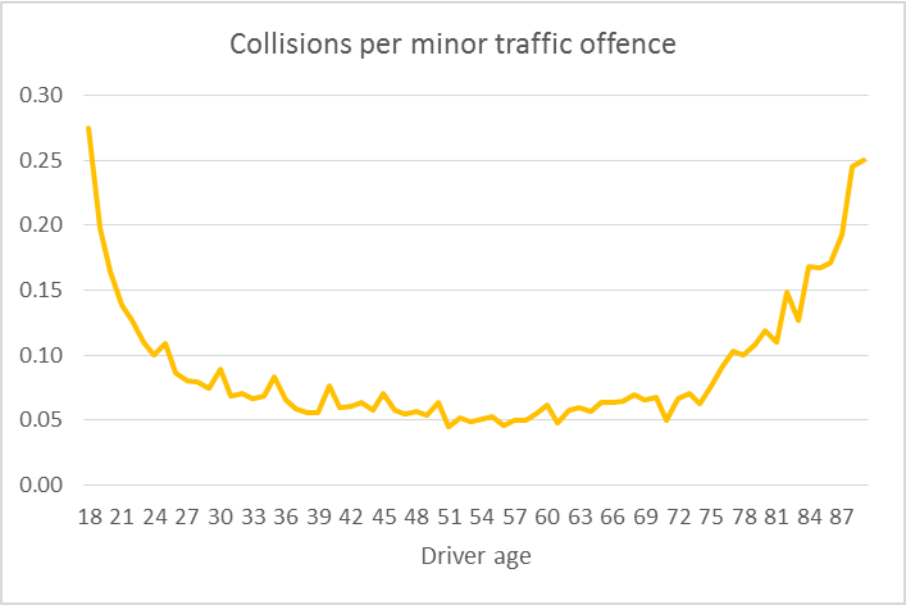


Figure 21: Collisions per traffic offence, car drivers in the Eastern Region

This shows that between the ages of 35 to 75 there is a fairly consistent ratio of collisions to offences. This corroborates the research indicating a linear relationship between the two. Drivers in this age range account for around 80% of all miles driven, so the trend for this group effectively determines the trend for the entire driving population.

[12] Goldenbeld C, Reurings M, Van Norden Y, Stipdonk H. 'Crash involvement of motor vehicles in relationship to the number and severity of traffic offenses. An exploratory analysis of Dutch traffic offenses and crash data' *Traffic Injury Prevention* 2013; 14(6). https://www.ncbi.nlm.nih.gov/pubmed/23859422 (accessed 16th May 2019)

However, this relationship breaks down for drivers at the farthest ends of the age spectrum. Research into young drivers[13] indicates their biggest risk is from inexperience, and it is this inexperience that explains why they are involved in more collisions than their offence rate alone would suggest.

Older drivers are also involved in more collisions than their offence rate alone would suggest. However, inexperience is not a sufficient explanation for this age group. This points towards factors unrelated to common motoring offences as being very important in determining older driver risk.

The diminished link between offending and collision risk for older drivers is also demonstrated by the fact that the 70+ group commit **7.9** offences per million vehicle miles and the 40-59 year old age group commit **10.1** offences per million vehicle miles. Despite committing fewer offences per mile driven than drivers aged 40-59, drivers aged 70+ are involved in **0.70** collisions per million vehicle miles compared to **0.58** for drivers aged 40-59. In other words **Older drivers have a higher collision rate than drivers aged 40-59 *despite* having a lower offence rate.**

[13] Vlakveld, Drs. W.P. 'Jonge beginnende automobilisten, hun ongevalsrisico en maatregelen om dit terug te dringen' page 4. *SWOV* 2005. English summary https://www.swov.nl/en/facts-figures/factsheet/18-24-year-olds-young-drivers (accessed 16th May 2019).

Offence type

The chart below compares motoring offence types recorded for older drivers compared to the 40-59 year old comparison group.

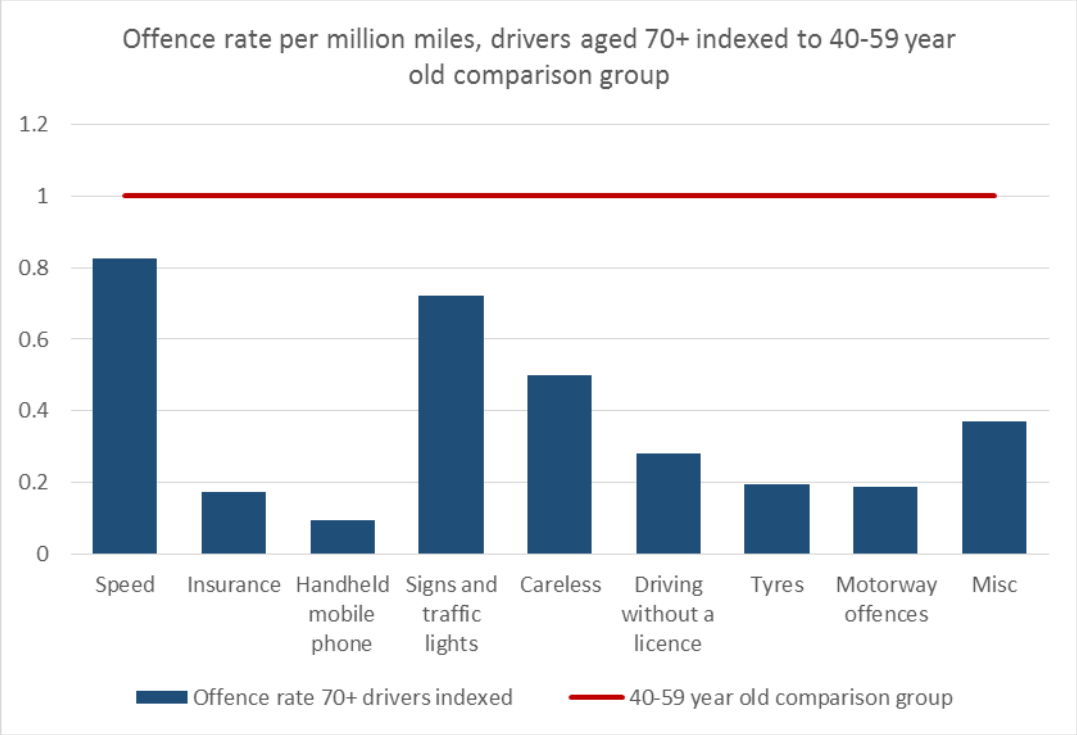


Figure 22: Offence rate for older drivers indexed to rate for drivers aged 40-59

This shows that across the board, older *drivers* commit fewer offences per mile travelled than the comparison group. The offence types most characteristic of older *offenders* are:

- Speed: 96% of older driver offences compared to 92% of 40-59 year old offenders.
- Signs and traffic light compliance: 45% of 70+ offender non-speeding offences compared to 21% for 40-59 year old offenders.

These offence types are consistent with the deliberate risk taking typically seen in younger drivers, but also consistent with unintended risk taking due to cognitive and sensory impairments.

Combing these observation with the lack of reduction in older driver collisions identified in figure 4 leads to the hypothesis that; **although identifying higher risk drivers through motoring offences, and reducing that risk through educational and punitive interventions has contributed to a reduction in collision rates for younger and working-aged drivers, this has not been the case for older drivers.**

This data leads us to conclude that a new older-driver specific intervention is required to reduce the risk posed by and posed to car drivers aged 70+, and that this intervention should be based around age related impairments rather than measures to reduce road traffic offences.

Appendix A – Car drivers aged 70+ in collisions, by local authority of collision and home address of driver

District/unitary	% of collisions involving car drivers aged 70+ in the Eastern Region, that took place in local authority area	% of car drivers aged 70+ in collisions in the Eastern Region who were resident in authority area	% of car drivers in collisions, of all ages resident in authority area, who were aged 70+
Tendring	3.4%	4.1%	13.4%
Kings Lynn and West Norfolk	3.6%	3.4%	12.1%
Suffolk Coastal	3.3%	3.1%	11.1%
Broadland	2.7%	3.1%	12.8%
Southend	3.0%	3.0%	8.9%
Waveney	2.4%	3.0%	11.6%
South Norfolk	2.9%	2.8%	10.6%
Central Bedfordshire	3.8%	2.8%	6.1%
Huntingdonshire	2.9%	2.7%	8.7%
Colchester	2.9%	2.7%	7.4%
Chelmsford	3.0%	2.5%	8.3%
Basildon	2.7%	2.4%	6.6%
North Norfolk	2.4%	2.4%	13.7%
Babergh	2.4%	2.4%	11.2%
Epping Forest	3.1%	2.3%	10.1%
South Cambridgeshire	2.8%	2.3%	8.8%
Braintree	2.0%	2.2%	7.2%
Mid Suffolk	1.9%	2.2%	9.8%
Bedford	2.6%	2.1%	6.8%
Breckland	2.3%	2.1%	7.6%
Saint Edmundsbury	1.9%	2.1%	10.0%
St. Albans	2.4%	2.1%	10.0%
East Hertfordshire	2.0%	2.0%	7.8%
Peterborough	2.6%	2.0%	4.6%
Castle Point	1.4%	2.0%	9.7%
Fenland	1.5%	1.7%	7.9%
Dacorum	1.8%	1.7%	7.8%
North Hertfordshire	2.1%	1.7%	7.5%
Rochford	1.6%	1.7%	9.4%
Ipswich	2.0%	1.6%	5.4%
Great Yarmouth	1.7%	1.6%	9.9%
Thurrock	1.9%	1.5%	5.4%
Welwyn Hatfield	1.9%	1.4%	7.3%
Maldon	1.1%	1.4%	9.7%
Luton	1.6%	1.4%	3.0%
Hertsmere	2.1%	1.4%	8.1%
Brentwood	1.4%	1.4%	12.0%
East Cambridgeshire	1.4%	1.4%	8.2%
Uttlesford	1.5%	1.3%	9.0%
Norwich	2.2%	1.2%	5.2%
Broxbourne	1.2%	1.2%	6.9%
Cambridge	1.7%	1.2%	8.2%
Three Rivers	1.4%	0.9%	7.4%
Forest Heath	1.1%	0.9%	6.9%
Stevenage	0.9%	0.8%	4.7%
Harlow	0.7%	0.6%	4.3%
Watford	1.0%	0.6%	4.5%

Appendix B – Car drivers aged 70+ in collisions, by year and Police Force of collision location

Police Force	2013	2014	2015	2016	2017	Total
Bedfordshire	78	97	100	81	100	456
Cambridgeshire	140	146	140	177	174	777
Essex	315	378	389	362	369	1,813
Hertfordshire	182	210	206	226	201	1,025
Norfolk	205	239	225	258	239	1,166
Suffolk	192	198	174	226	184	974
Eastern Region	***1,112***	***1,268***	***1,234***	***1,330***	***1,267***	***6,211***