Submission No 4

FOLLOW UP OF THE AUDITOR-GENERAL'S PERFORMANCE AUDITS APRIL 2011 - SEPTEMBER 2011

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Submission to Public Accounts Committee

Follow up on the Auditor General's Report
Improving Road Safety: Speed Cameras

Michael Lane
[redacted]

Personal background.

First licensed in the UK in 1961 and in NSW in Jan 1967 I have over 50 years driving experience and approximately 2 million kilometres in Australia, the UK and most of Western Europe. In this time I have only once damaged a vehicle on the road being a collision with a Wallaby. As well as local trips I regularly travel the Pacific Highway between Sydney and the Gold Coast having property interests in Queensland and less regularly to Adelaide, the ACT and the Snowy Mountains. This northern summer I covered 7,000 kilometres in Belgium, France, Spain and Portugal.

Qualified as a Metallurgist much of my professional life was involved in the assessment of Industrial Research and Development for the Australian Government both for grant purposes and tax concessions. For grant purposes the assessments covered technological, commercial, management and financial issues while the tax concession was about compliance with the prevailing law.

These assessments have conceptual similarities with performance auditing.

I am also the spokesman for a small group calling itself the National Motorists Association of Australia. While the public face is often about speed cameras there is a much greater depth to this group which has a prime focus on positive road safety as opposed to negative i.e. heavy regulation. A self preservation attitude to daily matters such as road usage becomes second nature in all facets of life and undoubtedly has broader safety benefits. The instinct of self preservation is very strong and can be beneficial if properly exploited.

This submission is in my personal capacity and not on behalf of any group.

Auditor General's Report

It originated with a referral by the Premier accompanied by a public statement that cameras which were found to be ineffective would be removed. While the Auditor General is quite properly independent of political direction the request was clear and a matter of public interest. There was effort put into seeking the public's views on which cameras were "Revenue raisers" with no safety benefits and there is a subsequent dissertation on these with detailed crash records.

In the body of the report it is stated that the Auditor General believes that cameras are a vital safety device. In my experience a valid assessment should be made from a position of intelligent scepticism otherwise it is too easy to miss the anomalies that are presented or to accept a fervent statement from the organisation and project being assessed.

The Auditor General, correctly, sought external advice on safety issues. Unfortunately he selected Max Cameron who is, or was, with the Monash University Accident Research Centre and who is one of the most ardent supporters of cameras and is a prolific author of papers on cameras. His papers are quoted very frequently by the Centre for Road Safety of the RMS and it is inconceivable that his advice and interpretation of results would not favour cameras.

The ultimate report was that 38 cameras (not necessarily those nominated by the public) were found to be redundant or ineffective. A further 41 were found to be effective and the remaining 61 were unable to be assessed. The relatively even numbers of effective and ineffective cameras is strongly suggestive of a purely random outcome i.e. that all cameras are ineffective and the positive and negative outcomes at a particular site are a chance result. This possibility should have been explored.

Unfortunately the report did not publish the results on all the camera sites investigated. This left doubt in the minds of some local activists who demanded that certain cameras should be re-instated; the lack of information made it impossible for the local MP to defend a decision to switch off a particular camera and consequently the Premier went back on his promise to have ineffective cameras removed. Fortunately the RMS have now published the full range of figures relating to the number of crashes 3 years either side of the date of installation for which I commend them.

Recommendations

1) The Auditor General should undertake performance audits from an intelligent sceptic approach and have staff trained and screened for this approach.
2) Data leading to the conclusions of a report should be published.

The “Speeding” Problem

The RMS concentrates on “Speeding” as the dominant cause of crashes. This approach has been touted as part of “The war against speed” however this focus obscures other prime causes.

Crash cause analysis

In any activity a thorough investigation of the circumstances surrounding an untoward event is the prime key to preventing recurrence. The civil aviation industry is an exemplary example of this approach. Aircraft crashes tend to be more destructive than road crashes and the work is far more painstaking but the outcomes have made aircraft one of the safest means of travel. Examples of the process are shown on a TV program “Air crash investigation” and this should be compulsory viewing for anyone interested in any form of safety.

The RMS currently claims that 42% of fatal crashes are speed related (usually expressed as “caused by speeding”). While this appears to be a sound reason for its emphasis on speed control as a safety measure comparison with the UK shows that 13.9% of fatal crashes have speed in excess of the speed limit as a contributory cause (i.e. not necessarily a prime cause). This latter figure is taken from a study by the Institute of Advanced Motorists of UK Government statistics for the 5 years from 2005 to 2009 inclusive. (Attached see Table 1 page 4).

The difference is enormous, the NSW figure being 3 times that of the UK, and is a result of different methodologies rather than different causation. Differences in causation may account for minor variation between the statistics but not such a large difference.

The NSW methodology is a desk analysis of crash reports and witness statements which searches for words which the RMS associates with speed such as skid, jackknife, run off road etc as well as including cases where a driver was charged with exceeding the speed limit. Clearly this includes a wide range of causes which do not involve speed in excess of the speed limit e.g. skids on loose surfaces, oil, ice, aquaplaning etc. Running off the road or failing to take a corner is most likely to be an error of inattention than excessive speed.

It seems strange that this approach is taken when serious crashes are investigated by the police crash investigation unit who take detailed measurements and calculate the speeds involved.

The UK statistics are drawn from a standardized format (STATS 19) for reporting crashes. This lists a wide range of contributory factors and the format allows for up to six factors to be noted, clearly some are more important than others. Serious crashes are investigated by qualified officers who take appropriate measurements and determine what happened (including the speeds involved). (I

am grateful to my nephew who was a traffic officer in the West Yorkshire Police and was qualified to this level of investigation as well as advanced pursuit techniques including “Tee-pack” for much pragmatic information.)

These investigations are thorough and go to such lengths as confirming the co-efficient of friction between tyres and road surface by carrying out braking tests. A new technique is using computers to give interpretations from the observed damage to vehicles compared with the known effects from laboratory crash testing of the same vehicles. This gives a very good estimate of impact speeds. The combination of these techniques gives a very good reconstruction of what happened in the crash.

The investigation is then passed to a team of officers who have qualified in the Accident Investigation course held by the UK City and Guilds institution who determine why the events happened. E.g. if someone runs off the road or fails to take a bend they seek to find out why without assuming that excessive speed is the cause i.e. if a normal driver could comfortably do this why did the crashing driver fail. They have investigative powers and may, for example, check if a crash could have been suicide, examine phone records etc.

Unfortunately the outcomes of the second level are not published (or I cannot find them). There will be differences as more information comes to light e.g. the figure for mobile phone use may increase as a result of forensic investigations, the cause of the drivers speed may downgrade the relative importance of this contributory factor.

Neither of these groups is involved, other than as expert witnesses, in any subsequent prosecution. A decision to prosecute is made by senior officers based on the reports and other factors.

This level of investigation by professionally qualified persons acting with an open mind generates a solid credibility over the NSW methodology.

It should be noted that the UK system has a category for “travelling too fast for the conditions”. This covers cases below the speed limit as well as some overlap with “exceeding the speed limit” and would apply in situations such as fog, ice, storms etc. Even adding the two figures gives a total of 29.8% - almost one third less than the NSW figure.

The difference between the figures and the methodology used by the RMS are of great concern – the gross overstatement is used as the justification for the high level of speed enforcement particularly by cameras. The figures used by the RMS have little credibility among those with significant road experience and are misleading to both public and Parliament.

Recommendations

1) The NSW police should conduct all crash cause analysis as they have the requisite investigative powers.
2) The investigations are carried out in a manner similar to, and to standards consistent with, the UK system outlined above.
3) The RMS discontinues its version of crash cause analysis.
4) Crash cause analysis is used as the fundamental driver for road safety policy and research.

Research

Sound research, prompted by the outcomes of crash cause analysis, is fundamental to effective safety programs. The engineering side of crash prevention and effects minimisation is well documented and demonstrably effective. Seatbelts, airbags, crumple zones, anti-lock brakes, stability controls etc are the product of scientifically correct research and development backed by solid appraisals of the costs/benefits.

Regrettably research into behavioural patterns is less rigorous. The nature of behaviour patterns is subject to a range of variability and other inputs which can affect the results.

One of the most vaunted (in Australia) of these was conducted by the then Road Accident Research Unit of the University of Adelaide in 1997. The methodology was to compare the calculated speed of a car/car derivative involved in a crash in 60 kph Adelaide roads with cars/derivatives at the same spot but measured by radar. Superficially this would give a connection, if any, between accident speeds and normal speeds. It was claimed that steps were taken to avoid the tested drivers being aware of the measures taken but on the confined streets of Adelaide it is obvious to most that someone with a two way radio device etc is an indication of some untoward occurrence and drivers slow either to see what is happening or to avoid what may be unpleasant for them. The low numbers involved – a minimum of four test vehicles – render this comparison farcical. The same group conducted a similar exercise on rural roads but the same issues remain. To my knowledge no other researcher has repeated this exercise.

It is noteworthy that no part of this study addressed which party was responsible for causing the crash. By its nature the faster vehicle would almost always be on a major road and the other party would have driven (or run) into their path. Given the normal pattern of allowing sufficient space before driving into the path of another vehicle it is clear that the crossing vehicle driver has made a gross error of judgment and, unless the main road driver was at a grossly excessive speed, a crash or desperate evasive action would result even at lower speeds.

A review of this work suggested that the conclusion that exceeding the speed limit even by 5 kph was likely to double the crash rate should have related to the normal speed rather than the posted limit.

A substantial part of this report is denigration of a finding by Solomon and others (1964) (since repeated at least twice by other researchers) that the safest travel speed is that selected by the 85th percentile of drivers who are not inhibited in any way i.e. are not affected by other traffic or visible/perceived enforcement. The denigration was centred around the finding of crash potential at low speeds but the most interesting part of Solomon's study is around the higher speeds and the minimal crash potential at the 85th percentile (The 85th percentile is the speed at which 85% of the population drive below and 15% are above). Solomon's work involved 100s of thousands of readings and is regarded as robust. Solomon's results have been replicated by others which supports his veracity.

At the time of Solomon's work there was far less speed enforcement and remote, e.g. radar, was in its infancy and as such drivers were not actively looking for speed measuring exercises.

A frequent argument by the proponents of lower speed limits and greater enforcement is that there is a rapid increase in crashes above their favoured limit. This does not gel with on-road observations, higher speed roads do not appear to have higher crash rates; the prima facie (usually called unrestricted) sections of German Autobahns appear to be some of the world's safest roads.

Recommendations

1) Behavioural studies should be critically examined to ensure that there are no errors in procedures by persons independent from influence of road safety organisations.
2) Such studies should be consistent with crash cause analysis

Overarching policy on placement of speed cameras

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The RMS has produced an overarching policy for the placement of cameras. Unfortunately it appears to be so open ended that it may as well be random. A new policy is to seek suggestions from the public. Superficially this is a sound action – responding to the community – but the usual criteria relating to crash history are abandoned in favour of pandering to local hysteria. These are frequently on roads which are under limited i.e. where the limit is less than an experienced motorist would regard as reasonable. Regrettably there is a section of the public who are opposed to motor vehicles and/or wish to impose restrictions for the benefit of their particular lifestyle. They usually want drastically lower limits below reasonable levels.

The introduction of this policy negates the express intent of the Premier, Deputy Premier, Minister for Roads and the Auditor General that cameras should only be placed where there are distinct safety benefits.

Another criterion that is questionable is where the 85th percentile is 10% over the speed limit or the median speed is in excess of the limit. Where this is the case the first reaction should be to review the speed limit; the driving population have declared that the limit is too low at this point and this view should be respected.

The crash rate criteria seems to be very low and is not related to speed caused crashes. As cameras can only detect speed and no other offence it would seem logical that camera sites should only be chosen where the crash cause analysis (as outlined elsewhere) shows that speed in excess of the speed limit is a primary cause i.e. where speed is not induced by alcohol etc. (Examples of multi-factors have been reported in the Victorian Courts in early November. In three cases young males had been at parties, drinking heavily and involved in altercations. Two left at high speed, including a learner with a BAC of .153 and crashed causing multiple fatalities. The third took over driving, returned to the scene of the party and drove at high speed deliberately at people on the roadside. While speed was a factor in these cases the dominant causes were the combination of anger and intoxication which caused the speed.)

It is clearly a waste of time and resources to site a camera where speed is not the cause; worse by neglecting the true causes further crashes will occur.

Similarly low crash frequency sites are a waste of resources.

Of particular concern is in overtaking zones both where there are overtaking lanes and where there are suitable opportunities on two lane roads. Any experienced driver knows that overtaking should be done as swiftly as possible in order to minimise time and distance on the wrong side of the road or running out of space on an overtaking lane. This involves exceeding the posted limit often by a considerable amount but is far safer than attempting to overtake at a low differential speed. On a normal highway overtaking a B-double from two seconds behind to two seconds in front with only a 10 kph speed differential means driving on the wrong side of the road for some two kilometres and thus a sight line of four kilometres. Clearly no sensible person does this but accelerates hard from behind and may reach over 130 kph for a short distance; notwithstanding its illegality it is much safer as it can be achieved in 350 to 400 metres and requires a sight line of less than a kilometre. Unfortunately some senior police and RMS personnel do not understand this and insist that it be punished. I believe that a number of crashes have occurred when drivers fearful of being booked brake hard when returning to their own side of the road destabilizing the car as it crosses the crest and, on old and poorly maintained cars, this can precipitate a loss of control by those whose skills are inadequate.

The standard advice of remaining behind the slower vehicle is risible; no one wishes to remain behind a truck for the next 100 kilometres. Some allowance should be made for this situation; as that cannot be done by a camera they should not be placed in safe overtaking areas.

Inappropriate locations are readily perceived by experienced drivers and give rise to the “Revenue raising” complaint and contempt for the regulations.

Recommendations

1) The criteria for locating cameras be reviewed with an emphasis on crashes where exceeding the speed limit is assessed as being a significant causal factor.
2) The criteria relating to speeds being over the limit cause a review of the limit before any decision to use a camera at that spot. If the speeds are not unreasonable at that location the camera should not be installed.
3) The criteria relating to frequency of crashes be reviewed. Frequency as low as one crash in two years is inappropriate.
4) Locations on overtaking lanes or where overtaking is generally safe should not be considered.
5) Locations should be readily identified by experienced drivers as being worthy of a camera to minimise opposition.

Speed limits

The RMS is charged with setting limits but the criteria used are extremely conservative. The now default urban limit was touted as being for residential streets but is steadily being extended onto major roads. Drivers are visual animals and interpret the road more than the posted limit. 50 kph may be suitable for residential streets in daylight but at times when there are no children, pets or adults about drivers may well exceed this. Similarly an urban road which is heavily trafficked (e.g. a collector road) wide enough for or having a centre line would generally be regarded as 60 kph notwithstanding the default limit applying. The 85th percentile on these roads is often 60 kph and thus the limit should be adjusted to reality.

The standard limit for tunnels appears to be 80 kph. I am advised that the design optimum speed for the Harbour Tunnel was 90 kph so it is under limited. Observations in Europe show much higher limits on newer tunnels of similar length to those in NSW e.g. 100 or 110 kph from roads limited to 120 or 130 kph.

Non urban limits seem excessively low compared with other countries particularly when we have long distances and very low population densities. Although criteria of sight lines and stopping distances have been laid down it is not clear what these are. Reaction times seem to have blown out from .7 second in the UK Highway Code of the 1960s to, in some circles, 2.5 seconds. Braking distances

are alleged to have increased since then despite improvements in brakes, suspensions and tyres!!

A review of the criteria including practical testing would seem appropriate.

The default non-urban limit of 100 kph is still the same as it was in the 1960's when speed zoning (at 60 mph) was introduced in NSW and the freeway standard of 110 kph is little different from the 65 mph of that time. The legislation restricting the maximum speed limit in NSW to110 kph is out of date and should be reviewed.

The length of road that a particular limit is applied to gives rise to significant anomalies where quite long stretches have been reduced to well below a reasonable limit. The standards in RMS documentation do have some validity in reducing the number of speed limit variations over short distances which has been a complaint of many people however this complaint is only valid when there is no apparent reason for the change. A road that goes from residential to a bushland valley and then back to residential is a case where short variations in a limit would be acceptable and indeed, by observation, is what drivers do naturally.

The minimum length of 10 kilometres for a 110 kph limit is absurd. A rural divided road should have a default limit of at least 110 kph – most drivers would treat it as such. Much of European practice is to have default limits and thus a rural type section in an overall urban area would default to the general rural limit and a divided rural road to the normal limit even for relatively short distances.

It is noted that external input was involved in these criteria however these were staid people not prepared to argue with the status quo or less. The NRMA is a venerable organization but its demographics are old and many of its policy/advocacy staff are ex RTA and are too close to the authority. The Pedestrian Council is dedicated to more cameras and lower limits but any focus on pedestrian activity is anathema to it and the NSW Police are dedicated to simplistic enforcement.

A much broader spectrum of advisors should be used with a focus on those who would challenge the orthodox view in an intelligent fashion. Good policy and criteria for applying it comes from hard examination. Devil's advocacy is likely to come from representatives of heavy vehicles, motor cyclists, legal practitioners in the field of motor vehicle accident compensation and a harder advocate for the motorist especially with experience in policy and research analysis.

It is a world wide observation that speed limits which are deemed to be reasonable by the affected population are broadly obeyed naturally. Surveys of attitudes should be conducted carefully to ensure that the responses are typical of those who are subjected to the measures. There is no point in getting the

viewpoint of the proverbial little old lady who drives to Church once a week on the limits on the whole of the Pacific Highway as she would have negligible exposure to those circumstances. Equally any survey of public opinion should present the questions in a neutral way. A classic example of how not to do it was conducted recently in Victoria, principally through the Sun-Herald newspaper, on traffic safety proposals. Each question was preceded by a paragraph on how good the proposal was and the questions were loaded. The results may have gratified the Government Department but in reality were grossly distorted.

Recommendations

1) Remove the legislated maximum of 110 kph for speed limits.
2) Review the criteria for reaction and braking distances
3) Establish an advisory panel from a broader spectrum especially including intelligent sceptics.
4) Consider changes in road appearance to justify short lengths of different limits.
5) Ensure that surveys are representative of the demographic which is critical and that the questions and presentations are not biased.

The Westminster Principle

The principle of the separation of powers is well established in political systems that follow the UK Parliamentary pattern. The purpose of the Westminster system is to create checks and balances by separating the legislators from the enforcers and the judiciary.

This is not the case in the administration of speed (and red light) cameras. The RMS is responsible for making the regulations, enforcing them and administering the punishment. Outsourcing the enforcement to a camera company is fraught with potential problems. Even if they are not paid per infringement there is an understanding that they will have a high rate of infringements otherwise they would not have their contracts renewed. This encourages them to go to “easy” (productive) sites rather than the more useful danger sites. As they are not direct employees discipline is harder to enforce.

The argument that private or RMS enforcement frees up police for other enforcement work is not justifiable as the cost of this comes out of Government funds whether it is Police, Departmental officers or contractors. More police could be employed.

Police are subject to strict internal disciplinary standards that ensures that they perform as directed.

Contractors in the US are notorious for conduct little removed from bribery in order to win business. Attached is a report which shows some impacts on the Australian Company Redflex which has been barred from tendering in Chicago.

There is no excuse for operating a system apprehending people for moving infringements using other than sworn police officers.

Although there is a façade of being able to take an accusation before a Court in reality the regulations are such that the accusation is effectively unchallengeable. Further until recently a charge which was dismissed under Section 10 still carried demerit points. An accumulation of points still carries a licence suspension which is not subject to judicial discretion. (A recent case in South Australia about automatic impounding of cars may affect this practice). There appears to be an attitude that the RMS is above the law and can set its own standards. This is inappropriate.

As previously noted there is a need for external counter balancing supervision of its regulatory activities.

Recommendations

1) That enforcement of moving infringements be confined to sworn police. (This would include such current activities by Council Rangers.)
2) That all suspensions of licences be done in an open Court with the judicial officers having discretion
3) That a supervisory board be appointed to monitor the regulatory activities of the RMS.

Evaluation of program benefits

The RMS has claimed immense benefits from the speed camera program but the evaluations do not give credence to the myriad of other inputs. Over the years there have been improvements in roads, cars and drivers all of which have made substantial improvements to road safety. The Pacific and Hume Highways are examples of engineering improvements which have substantially reduced crashes. Minor improvements in alignments and surfaces also have significant benefits.

Improvements in cars have been remarkable in both primary and secondary safety measures. It is salutary to drive a vehicle from the 1960's and compare it with current models. Geoff Brabham, Chief Instructor of the BMW Advanced Driving School points out that with ABS, Stability Controls, improved steering and brakes it is very difficult to crash a modern car unless you are doing something incredibly stupid.

Even drivers have improved despite the woefully inadequate standards of training and testing. One of the biggest inputs into this was the demise of the "Give way to the right" rule which created a mindset that you had rights but the

other drivers had a responsibility not to hit you. Today's more rational major/minor system makes the driver more responsible for their own safety.

It defies credibility when claims are made for the efficacy of cameras that do not acknowledge the impact of other mechanisms. The worst case is the claim for mobile cameras. Clearly the high level of fatalities in the year prior to the trial re-introduction of mobile cameras was a statistical aberration i.e. outside the normal trend line and the following year was affected by economic factors (as an owner of holiday units business in that year was poor). To claim that a 19% variation in fatalities was wholly or mostly due to the use of 6 mobile speed cameras on the grounds that their presence made people slow down because of the probability of being caught by these hidden devices was ridiculous. By comparison on my regular drive between Sydney and the Gold Coast (4 to 6 times per year) as well as the fixed cameras I would have my speed checked by two to four mobile police cars (almost impossible to see before they are in range) and often by a static radar/lidar unit as well. Why would having a mobile speed camera make any difference?

There should be a totally independent evaluation of the speed camera program conducted by people outside the close world of the road safety industry. The "Intelligent sceptic" that I have mentioned before would be a good operator. Ideally this would be done under the auspices of the Auditor General. Such a group would, of course, be able to conduct assessments in other areas of government. It is a highly specialized skill set and may take some time to achieve but would be an invaluable tool.

Recommendation

That the Auditor General set up a specialized group to undertake performance audits independent of advice from connected parties.

Some other effects of camera enforcement

One of the major issues of camera enforcement is that of identity of the accused. There is a photo of the vehicle but infrequently is there a picture of the driver although it may be possible to define the size and bulk of the person. This tempts many to "Point shift" i.e. get someone else to accept the blame. This happens across all walks of life. Some of those who have been caught are respectable people including a Judge and a MP. In the UK a former Minister of the Crown has an accusation against him.

Cameras can only detect the one offence. They cannot detect drunks or thieves or the unroadworthy. They cannot suspect that the driver or passengers may be involved in some other crime. There is no apprehension at the time and the infringement notice arrives days, perhaps weeks later.

A real police officer stops the vehicle and identifies the driver, checks licence, registration and sobriety. Surprisingly often the body language of the occupants leads to a suspicion of other illegal activity and its detection.

A wide scope relative evaluation of the benefits and disbenefits of cameras vs police is needed,

Recommendation

The Auditor General's "Special Group" recommended above should do a comparative benefits study.

Tolerances

There are differing views on tolerances. Proponents of limits and strict enforcement advocate zero tolerance; more pragmatic people suggest reasonable tolerances. These are not usually published but the UK Association of Chief Police Officers recommends 10% plus 2 mph (3 kph). This minimises complaints of zealotry and revenue raising. Real police on the road have discretion (or should have) and this generally has a much bigger impact than unthinking punishment – a stern word is a very useful tool. The speed limiters on trucks have a tolerance somewhere in the range of 2 to 4 kph.

It is politically astute to have a tolerance and the Deputy Premier on coming to office directed that the tolerance by speed camera operators be returned to previous levels against an intent to minimise tolerances.

Recommendation

Tolerances be maintained at a reasonable level by all methods of speed enforcement to minimise opposition to speed enforcement.

General

It is often said that road safety is "not rocket science". This is true; rocket science is relatively simple. A controlled explosion at one end, a guidance system at the other and all the inputs are known. Road safety is more complex with confounding inputs and interacting variables all with temporal anomalies.

Equally HL Menken's dictum about every complex problem having a simple solution proposed which is wrong also applies.

Michael Lane
16 November 2011
As well as the attached documents the RMS/Centre for Road Safety website was explored.

Licensed to skill

contributory factors in road accidents

Great Britain 2005 - 2009

IAM
DRIVING ROAD SAFETY

Foreword

In recent years, most of the big leaps forward in road safety have come as a result of vehicle and road design. Looking forward there are very few new technological advances on the horizon to help maintain the downward trend in road casualties.

Five-star cars on five-star roads need five-star drivers. To make the final push towards minimising death, injury and emotional pain on our roads we must tackle the common denominator – human behaviour. Errors – unintentional or intentional, and lapses – momentary or through lack of experience – are behind the vast majority of crashes in the UK today. Our new report looks at hundreds of thousands of police crash reports to pick out the top ten crash contributory factors for a range of road, vehicle and driver types.

For many the results will come as no surprise although they do question the focus on speeding which has for so long underpinned many road safety campaigns. **For the IAM the key issue is what we do next with this information.** For too long technological fixes have been sought when improving the quality of our drivers and riders was clearly the key issue.

The IAM, with its track record of success in delivering advanced drivers and riders, is well placed to help improve the skills of British road users. 'Failure to look' is by far the most common factor recorded along with 'failed to judge another person's path or speed' and 'loss of control'. Advanced driving provides the best solution to these problems through its principles of anticipation, positioning and awareness of hazards. Taking an IAM test and adopting a more measured style of driving would also reduce factors such as 'careless, reckless or in a hurry' and 'travelling too fast for the conditions'.

However, we cannot tackle driver behaviour alone and we are calling for the government to undertake a fundamental review of driver training and link it firmly to continuous post-test learning with real incentives to reward the best drivers.

Alistair Cheyne OBE, IAM Chairman
Simon Best, Chief Executive

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Licensed to skill: contributory factors in road accidents: Great Britain 2005 - 2009

Executive summary

Since 2005, official accident records have included additional information on contributory factors which are designed to provide insights into why and how road crashes happen and to help develop measures aimed at preventing them. A total of 77 categories of contributory factor are available. These provide information on the factors which the police officer attending the scene considers may have contributed to the cause of the accident. They are intended to identify the key actions and failures which led directly to the impact. This report looks at over 700,000 items of official crash data to pick out common themes.

- Driver and rider error or reaction' factors are recorded more frequently than other types – 68% of all crashes
- The next most common are 'injudicious action' factors – 26% of all crashes
- This is closely followed by 'behaviour or inexperience' factors – 25% of all crashes

Many of the issues which receive the most media coverage are not actually among the most common contributory factors. Speeding, drink driving, mobile phone use, tailgating, road rage and bad weather are all important but are not as frequently reported as driver errors;

- 'Exceeding the speed limit' (13.9% of fatal, 7.2% of serious and less for slight)
- 'impaired by alcohol' (10% of fatal and 7% of serious accidents, less slight accidents)
- 'aggressive driving' (8% of fatal accidents, less serious and slight accidents)
- 'slippery road - due to weather' (11% of slight and 8% of serious accidents but less frequently reported in fatal accidents)
- 'sudden braking' and 'following too close' (8% of slight accidents each, but less frequently reported in fatal and serious accidents)
- 'Driver using mobile phone' (0.8% of fatal crashes, but only 0.2% of all injury crashes)
- Vehicle defects are recorded in very few cases (2%).

The report shows the top ten factors for different crash severities, driver age, road types and other issues such as weather and time of crash. These 'top tens' show key variations which the IAM believe can be useful in the design of future interventions. Accidents involving younger and older drivers show different contributory factors and these can be used to tailor training and assessment solutions. For example, 'Learner or inexperienced' is recorded as a contributory factor more frequently on rural roads, minor roads and 60 mph roads than elsewhere confirming the IAM's view that the driving test does little to prepare new drivers for the highest risk activities.

- Younger and older drivers and riders (under 30 and over 70) have 'error or reaction' factors recorded in a larger proportion of cases than among those between 30 and 70
- Older drivers have 'failed to look properly' recorded more frequently than younger drivers and factors associated with ageing and difficulty coping with the traffic environment, which are less frequently recorded for younger drivers.
- Car drivers under 25 have 'exceeding the speed limit' 'travelling too fast for the conditions' and 'learner/ inexperienced' recorded more frequently than drivers over 25
- 'Exceeding the speed limit' features in the top ten factors for motorcyclists in the under 30 and 30 – 59 age groups
- Alcohol features in the top ten factors for drivers aged 25 – 69 and ranks eleventh for drivers under 25, but is less frequently recorded for motorcyclists
- Comparisons between men and women car drivers show many similarities in the contributory factors reported, but 'careless, reckless or in a hurry', 'travelling too fast for the conditions' and 'impaired by alcohol' are recorded more frequently for men than for women, while 'learner or inexperienced driver' is recorded more frequently for women
- In fatal accidents on motorways, alcohol, fatigue and vehicle defects (mainly tyres and brakes) are more frequently reported than in other accidents suggesting the continued need for motorway campaigns and enforcement to focus on these areas.

Using contributory factors to improve road safety

This report provides a subjective indication of the causes of accidents, not a definitive view. Factors which are more obvious to the police officer attending will tend to be recorded more than those which are less obvious or require more in-depth reconstruction. However, the results can still be used to highlight areas for further investigation or to suggest what the priority areas for road safety should be.

It is clear that driver and rider errors, particularly 'failure to look properly' and 'failure to judge the path or speed of other road users correctly' remain significant contributory factors in road accidents. Factors such as 'careless, reckless or in a hurry', 'loss of control' and 'travelling too fast for the conditions' together make up another significant group which could be addressed by a more measured style of driving, taking greater account of the traffic and road conditions prevailing. These human factors are attributed to drivers of all ages, although some factors are more frequently assigned to young drivers and others to older drivers, which points to the value of post-test driver training for improving the quality and safety of drivers.

Some factors are reported in relatively few accidents in total, but are more prominent in specific situations. Analysing these specific groups of accidents can provide insights into their causes which may help to develop measures for reducing the number of injuries.

The IAM believe that this report delivers important insights into what is actually happening on our roads. We should be ensuring that the police are encouraged to view the completion of this information as a high priority and that quality control measures are in place to ensure researchers and policy makers can continue to rely on this rich source of road safety data.

Glossary and definitions

Definitions of accidents and casualties

Accident	Involves personal injury occurring on the public highway (including footways) involving at least one road vehicle or a vehicle in collision with a pedestrian and which becomes known to the police within 30 days.
Fatal injury/ casualty	Injury causes death within 30 days of the accident
Serious injury/ casualty	Injury does not cause death within 30 days of the accident and either results in the casualty being detained in hospital as an in-patient, or any of the following injuries: fractures, concussion, internal injuries, crushings, severe cuts and lacerations, severe general shock requiring treatment, or any injury which causes death more than 30 days after the accident
Slight injury/ casualty	Injury of a minor character such as a sprain (including whiplash neck injury), bruise or cut which are not judged to be severe, or slight shock requiring roadside attention. Injuries not requiring medical treatment are included
Fatal accident	Accident involving at least one fatal casualty
Serious accident	Accident in which no one is fatally injured, but at least one casualty received serious injuries
Slight accident	Accident in which at least one casualty receives slight injuries but no fatal or serious injuries

Other definitions

Car	Taxis and private hire cars are included with private cars
Motorcycle	Includes moped
Rural roads	Roads which are either outside towns, or in towns with less than 10,000 population.
Season	Spring: March – May, Summer: June – August, Autumn, September – November, Winter: December - February

1 Introduction

1.1 Previous work

The IAM Policy and Research Division has funded a series of projects over the past few years which have looked in detail at the national accident data on specific issues. A unique aspect of these studies was that they combined accident data for several years. The number of accidents included in the combined data was large enough for more complex and multi-dimensional breakdowns of the data to be carried out than are usually possible.

Since 2005, the accident records have included additional information on contributory factors which is designed to provide insights into why and how road accidents happen, to assist in investigating measures aimed at preventing accidents. A total of 77 categories of contributory factor are available. These provide information on the factors which the police officer attending the accident considers may have contributed to the cause of the accident. They are intended to identify the key actions and failures which led directly to the impact.

This report presents the results from a small project which has carried out some preliminary analysis of the contributory factors data for the five years that are currently available: 2005 to 2009.

1.2 Project objectives

The main objective of the project is to analyse and report on contributory factors data for accidents and vehicles to identify the main contributory factors involved for:

- drivers and riders in different age groups, men and women
- accidents on different types of road
- accidents at different times
- accident severity.

The secondary objectives are:

- to identify the role of factors associated with driver error in contributing to road accidents, with a view to focusing on ways to improve the quality of driving
- to use this initial analysis to gain an understanding of the potential for the data to be used to support further investigations on specific topics in future, complementing the IAM's earlier projects based on analysis of the national road accident data.

1.3 This report

This report presents the results of the initial analysis, with a brief commentary. The focus at this stage is on the eight main groups of factors[1] and the 'top ten' individual factors associated with different groups of drivers or accident circumstances (where and when

[1] Road environment; Vehicle defects; Injudicious action; Driver/ Rider error; Impairment or distraction; Behaviour or inexperience; Vision affected; Pedestrian; Special codes

accidents happen). Before that, all of the contributory factors are presented, comparing fatal, serious and slight accidents, to illustrate the full range of information available and the proportion of accidents in which each of the 77 factors is reported.

Over the five years (2005-2009) covered by this analysis, there were almost 700,000 accidents which were attended by the police and for which contributory factors were recorded. These are the accidents which are analysed in Sections 2, 3 and 4. They represent about three-quarters of all accidents reported to the police and recorded in the accident database during this five year period.

Section 5 presents the contributory factors recorded for cars and motorcycles in accidents which were reported to the police during this five year period and shows how these factors vary with the age of drivers and riders, and the gender of car drivers.

The results are summarised in Section 6, along with conclusions on the options for further analysis of the contributory factors data.

1.4 Limitations of the analysis

The contributory factors can be used to provide more insights into the causes of the accident than can be gleaned from the facts about the accident circumstances in the remainder of the accident record. However it is important to bear in mind that there are certain limitations which mean that the contributory factors recorded can only be taken as an indication of the cause of the accidents.

The factors tend to be subjective, reflecting the opinion of the police officer reporting on the accident. They are not necessarily based on a detailed investigation of the accident. Some factors are more 'obvious' than others at the time when the police officer attends the scene. Because the information recorded is admissible as evidence in court, any factors that are recorded need to be supported by clear evidence.

Some research has been done comparing the factors recorded in specific accidents in the national accident database with those recorded in an in-depth study (Richards et al 2010). This found that in general fewer factors were recorded per accident in the national data than in the in-depth study. The types of factor which were less likely to be recorded in the national data than in the in-depth study were those which appear to allocate blame for an accident (such as those in the 'injudicious action' group, which includes 'exceeding the speed limit') and one of the factors in the 'behaviour' group - 'careless, reckless or in a hurry'.

1.5 Contributory Factor Data

The reporting form used by the police at the scene of an accident is designed for recording up to six of the factors which are considered to have contributed to the accident occurring. The 77 factors available for recording are grouped into nine different types.

Factors are assigned to individual participants, and multiple factors can be recorded for individuals. Thus more than one factor can be attributed to accidents, individuals and their vehicles. The percentages presented in this report are the percentage of accidents or vehicles having a specific contributory factor attributed to them, and because more than one factor can be attributed, they do not total 100.

Details of how each factor is defined can be found in the instructions for completing road accident reports (known as Stats20 - see Department for Transport, 2004).

2 Contributory Factors and Accident Severity

A fatal accident is one in which at least one person is killed, a serious accident involves at least one serious injury but no fatalities, and a slight accident involves at least one casualty with minor injuries but no serious injuries or fatalities. (See the Glossary on page iv for definitions.)

Table 1 (which is spread over two pages) shows the proportion of fatal, serious and slight accidents with each of the 77 contributory factors attributed to them, and the proportion with each of the nine types of factor (shown in bold above the group of factors which they describe). Both the groups of factors and the individual factors within these groups are listed in the order of frequency with which they are reported. The key points are:

- At all levels of accident severity, the 'driver/ rider error or reaction' factors are recorded more frequently than other types – 68% of all accidents
- The next most common are 'injudicious action' factors – 26% of all accidents, but a larger proportion of fatal (31%) than serious or slight (26%)
- This is closely followed by 'behaviour or inexperience' factors – 25% of all accidents and again a larger proportion of fatal (28%) than serious or slight (24%)
- Other types of factor which vary with accident severity are:
    - 'road environment' (more often recorded in slight accidents than more serious incidents)
    - 'impairment/ distraction' (more often in fatal accidents than serious or slight accidents) and
    - pedestrian behaviour (more often recorded in fatal accidents and serious accidents than slight accidents).
- Vehicle defects are recorded in very few cases (2%).

Table 1 Contributory factors and accident severity

Contributory factor reported in accident	Accident severity			All accidents
	Fatal	Serious	Slight	
Driver/ Rider Error or Reaction	**65.3%**	**61.8%**	**68.6%**	**67.5%**
Failed to look properly	20.5%	29.3%	36.3%	35.0%
Failed to judge other person's path or speed	11.6%	14.0%	20.0%	18.9%
Loss of control	34.0%	19.7%	13.4%	14.7%
Poor turn or manoeuvre	12.0%	13.8%	14.1%	14.1%
Sudden braking	3.0%	4.5%	7.7%	7.2%
Swerved	6.2%	4.2%	3.7%	3.8%
Junction overshoot	1.7%	1.9%	2.4%	2.3%
Failed to signal or misleading signal	0.6%	1.3%	2.0%	1.9%
Junction restart (moving off at junction)	0.9%	1.1%	1.8%	1.7%
Passing too close to cyclist, horse rider or pedestrian	1.1%	1.4%	1.4%	1.4%
Injudicious Action	**31.4%**	**25.0%**	**26.1%**	**26.0%**
Travelling too fast for conditions	15.9%	11.3%	9.9%	10.2%
Following too close	1.3%	2.8%	7.5%	6.7%
Exceeding speed limit	13.9%	7.2%	4.6%	5.2%
Disobeyed 'Give Way' or 'Stop' sign or markings	2.1%	2.8%	3.5%	3.4%
Disobeyed automatic traffic signal	1.0%	1.4%	1.8%	1.8%
Cyclist entering road from pavement	0.5%	1.0%	0.9%	0.9%
Illegal turn or direction of travel	0.7%	0.8%	0.7%	0.8%
Disobeyed pedestrian crossing facility	0.4%	0.7%	0.4%	0.4%
Vehicle travelling along pavement	0.4%	0.3%	0.3%	0.3%
Disobeyed double white lines	0.9%	0.5%	0.2%	0.2%
Behaviour or Inexperience	**28.0%**	**25.8%**	**24.4%**	**24.7%**
Careless, reckless or in a hurry	17.2%	16.7%	16.1%	16.2%
Learner or inexperienced driver/rider	5.3%	5.5%	5.2%	5.3%
Aggressive driving	8.3%	5.1%	3.6%	3.9%
Nervous, uncertain or panic	1.1%	1.3%	1.8%	1.7%
Unfamiliar with model of vehicle	1.4%	1.1%	0.8%	0.8%
Inexperience of driving on the left	0.4%	0.4%	0.5%	0.5%
Driving too slow for conditions or slow vehicle (e.g. tractor)	0.1%	0.1%	0.1%	0.1%
Road Environment	**10.9%**	**13.3%**	**15.6%**	**15.1%**
Slippery road (due to weather)	5.9%	7.9%	10.6%	10.1%
Road layout (e.g. bend, hill, narrow carriageway)	3.2%	2.8%	2.7%	2.7%
Deposit on road (e.g. oil, mud, chippings)	0.8%	1.7%	1.5%	1.5%
Animal or object in carriageway	0.8%	1.0%	1.2%	1.2%
Poor or defective road surface	0.7%	0.8%	0.6%	0.5%
Inadequate or masked signs or road markings	0.4%	0.4%	0.5%	0.3%
Temporary road layout (e.g. contraflow)	0.2%	0.2%	0.3%	0.2%
Defective traffic signals	0.0%	0.1%	0.2%	0.1%
Traffic calming (e.g. speed cushions, road humps, chicanes)	0.1%	0.2%	0.1%	0.1%

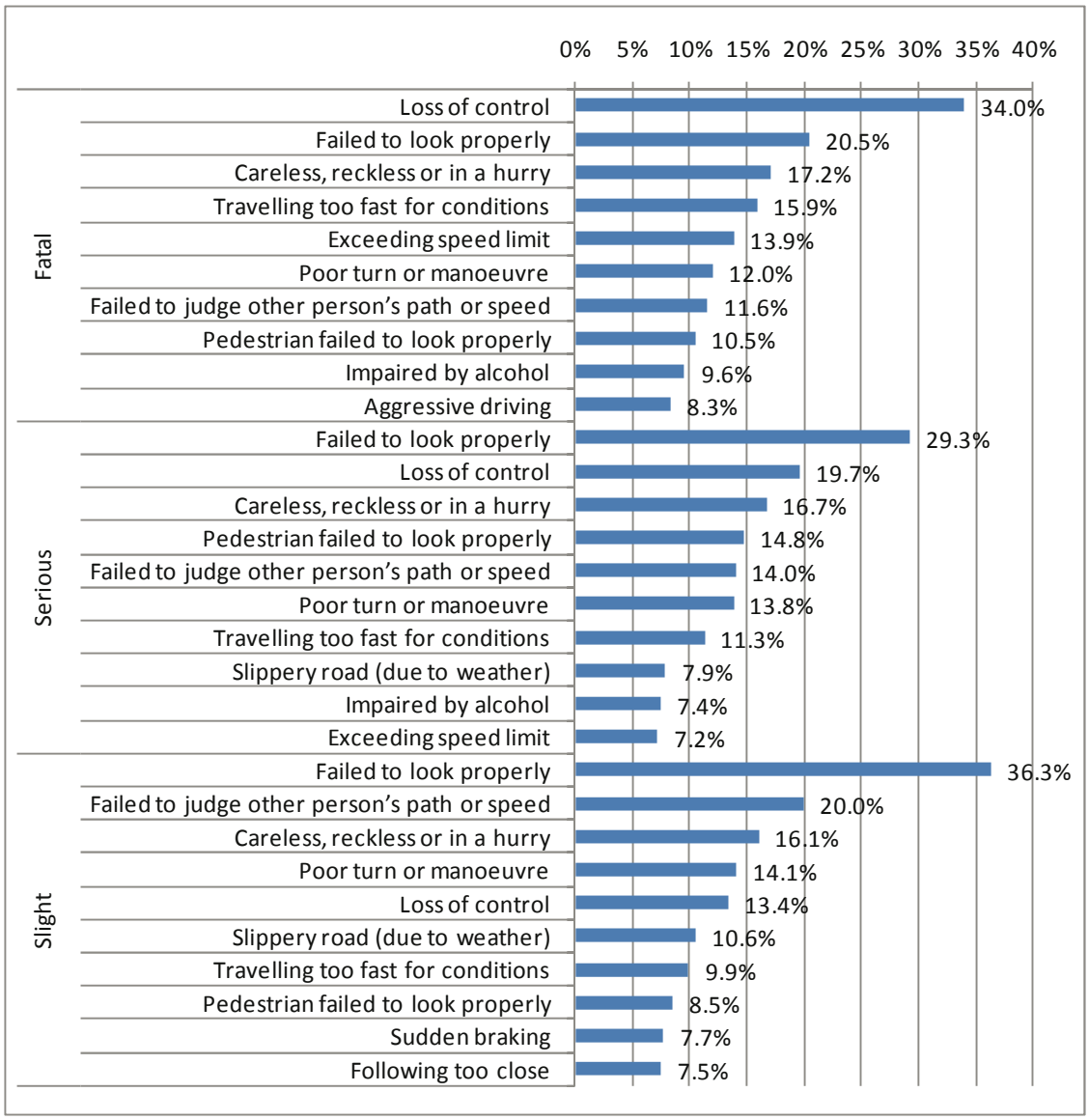
Contributory factor reported in accident	Accident severity			All accidents
	Fatal	Serious	Slight	
Pedestrian only (casualty or uninjured)	**18.2%**	**20.4%**	**11.5%**	**13.0%**
Pedestrian failed to look properly	10.5%	14.8%	8.5%	9.5%
Pedestrian careless, reckless or in a hurry	3.4%	6.3%	3.6%	4.0%
Pedestrian crossing road masked by stationary or parked vehicle	1.9%	4.4%	2.4%	2.7%
Pedestrian failed to judge vehicle's path or speed	5.2%	4.5%	2.4%	2.8%
Pedestrian impaired by alcohol	4.1%	3.5%	1.5%	1.9%
Dangerous action in carriageway (e.g. playing)	2.2%	1.9%	0.9%	1.1%
Pedestrian wrong use of pedestrian crossing facility	1.2%	1.4%	0.7%	0.8%
Pedestrian wearing dark clothing at night	3.3%	1.3%	0.5%	0.7%
Pedestrian disability or illness, mental or physical	1.9%	0.8%	0.3%	0.4%
Pedestrian impaired by drugs (illicit or medicinal)	0.4%	0.3%	0.1%	0.2%
Impairment or Distraction	**19.6%**	**14.2%**	**11.1%**	**11.7%**
Impaired by alcohol	9.6%	7.4%	4.7%	5.2%
Distraction in vehicle	2.6%	1.7%	2.1%	2.1%
Fatigue	3.1%	1.8%	1.3%	1.4%
Distraction outside vehicle	1.0%	1.0%	1.5%	1.4%
Illness or disability, mental or physical	3.6%	1.8%	1.2%	1.3%
Impaired by drugs (illicit or medicinal)	2.2%	0.9%	0.4%	0.5%
Not displaying lights at night or in poor visibility	0.4%	0.4%	0.3%	0.3%
Cyclist wearing dark clothing at night	0.4%	0.4%	0.3%	0.3%
Driver using mobile phone	0.8%	0.3%	0.2%	0.2%
Uncorrected, defective eyesight	0.4%	0.2%	0.1%	0.2%
Vision Affected by:	**7.5%**	**9.2%**	**10.5%**	**10.3%**
Stationary or parked vehicle(s)	1.1%	2.9%	3.2%	3.1%
Dazzling sun	1.5%	1.8%	2.2%	2.2%
Rain, sleet, snow, or fog	1.5%	1.5%	1.9%	1.9%
Road layout (e.g. bend, winding road, hill crest)	1.7%	1.5%	1.5%	1.5%
Vehicle blind spot	1.0%	1.0%	1.3%	1.2%
Vegetation	0.4%	0.4%	0.4%	0.4%
Dazzling headlights	0.4%	0.3%	0.3%	0.3%
Buildings, road signs, street furniture	0.2%	0.2%	0.2%	0.2%
Spray from other vehicles	0.1%	0.2%	0.2%	0.2%
Visor or windscreen dirty or scratched	0.2%	0.1%	0.1%	0.1%
Special codes	**6.1%**	**5.2%**	**4.5%**	**4.6%**
Other	4.4%	3.3%	2.7%	2.8%
Stolen vehicle	1.1%	1.0%	0.7%	0.8%
Emergency vehicle on a call	0.3%	0.4%	0.6%	0.5%
Vehicle in course of crime	0.4%	0.4%	0.4%	0.4%
Vehicle door opened or closed negligently	0.1%	0.4%	0.4%	0.4%
Vehicle Defects	**2.8%**	**2.2%**	**1.9%**	**1.9%**
Tyres illegal, defective or under inflated	1.5%	0.9%	0.7%	0.7%
Defective brakes	0.7%	0.6%	0.6%	0.6%
Overloaded or poorly loaded vehicle or trailer	0.4%	0.3%	0.2%	0.2%
Defective lights or indicators	0.2%	0.2%	0.2%	0.2%
Defective steering or suspension	0.2%	0.2%	0.2%	0.2%
Defective or missing mirrors	0.0%	0.0%	0.0%	0.0%
Total number of accidents	**11,968**	**104,760**	**576,959**	**693,687**

Figure 1 shows the ten most frequently reported of the individual factors in fatal, serious and slight accidents. The key points are:

- Seven factors are in the top ten for fatal, serious and slight accidents, but their ranking varies with severity of the accident. These are 'loss of control', 'failed to look properly', 'careless, reckless or in a hurry', 'travelling too fast for the conditions', 'poor turn or manoeuvre' 'failed to judge another person's path or speed' and 'pedestrian failed to look properly'
- 'Loss of control' is the most frequently recorded single factor in fatal accidents (34%); it ranks second in serious accidents (20%) and fifth in slight accidents (13%)
- 'Failure to look properly' is the most frequently recorded factor in both serious (29%) and slight (36%) accidents, and is the second most frequently recorded in fatal accidents (21%)
- A driver or rider who is 'careless, reckless or in a hurry' is the third most common factor in fatal, serious and slight accidents, accounting for 16-17% in each case
- 'Travelling too fast for the conditions' and 'exceeding speed limit' are the fourth and fifth most frequently recorded in fatal accidents (16% and 14%) but rank lower in serious (11% and 7%) and slight accidents.[2]
- 'Failed to judge another person's path or speed' is the second most frequently recorded in slight accidents (20%), but ranks seven in fatal accidents and six in serious accidents
- Factors which are not in the top ten in fatal, serious and slight accidents are:
    - 'impaired by alcohol (10% of fatal and 7% of serious accidents, less slight accidents)
    - 'aggressive driving' (8% of fatal accidents, less serious and slight accidents)
    - 'slippery road - due to weather' (11% of slight and 8% of serious accidents but less frequently reported in fatal accidents)
    - 'sudden braking' and 'following too close' (8% of slight accidents each, but less frequently reported in fatal and serious accidents).

[2] Note that 'exceeding speed limit' takes precedence and is intended to be recorded in cases where vehicles were also travelling too fast for the conditions. 'Travelling too fast for the conditions' is intended to be recorded in cases where the driver or rider was travelling within the speed limit, but too fast for the conditions. However some drivers have both factors recorded.

Figure 1 Ten most frequently reported factors in fatal, serious and slight accidents



3 Accidents on different types of road

3.1 Road class

Table 2 shows the types of contributory factor reported for accidents on different classes of road.

- 'Driver/ rider error or reaction' is reported in a larger proportion of accidents on motorways and A roads than on minor roads, particularly C and unclassified roads
- 'Behaviour or inexperience' is less frequently reported in motorway accidents (where learner drivers are not legally able to drive) than on other types of road
- Factors associated with pedestrians are, as expected, rarely reported on motorways and are reported for higher proportions of accidents on minor roads than on major roads
- 'Impairment or distraction' and 'vehicle defects' are reported for a larger proportion of motorway accidents than for accidents on other types of road.

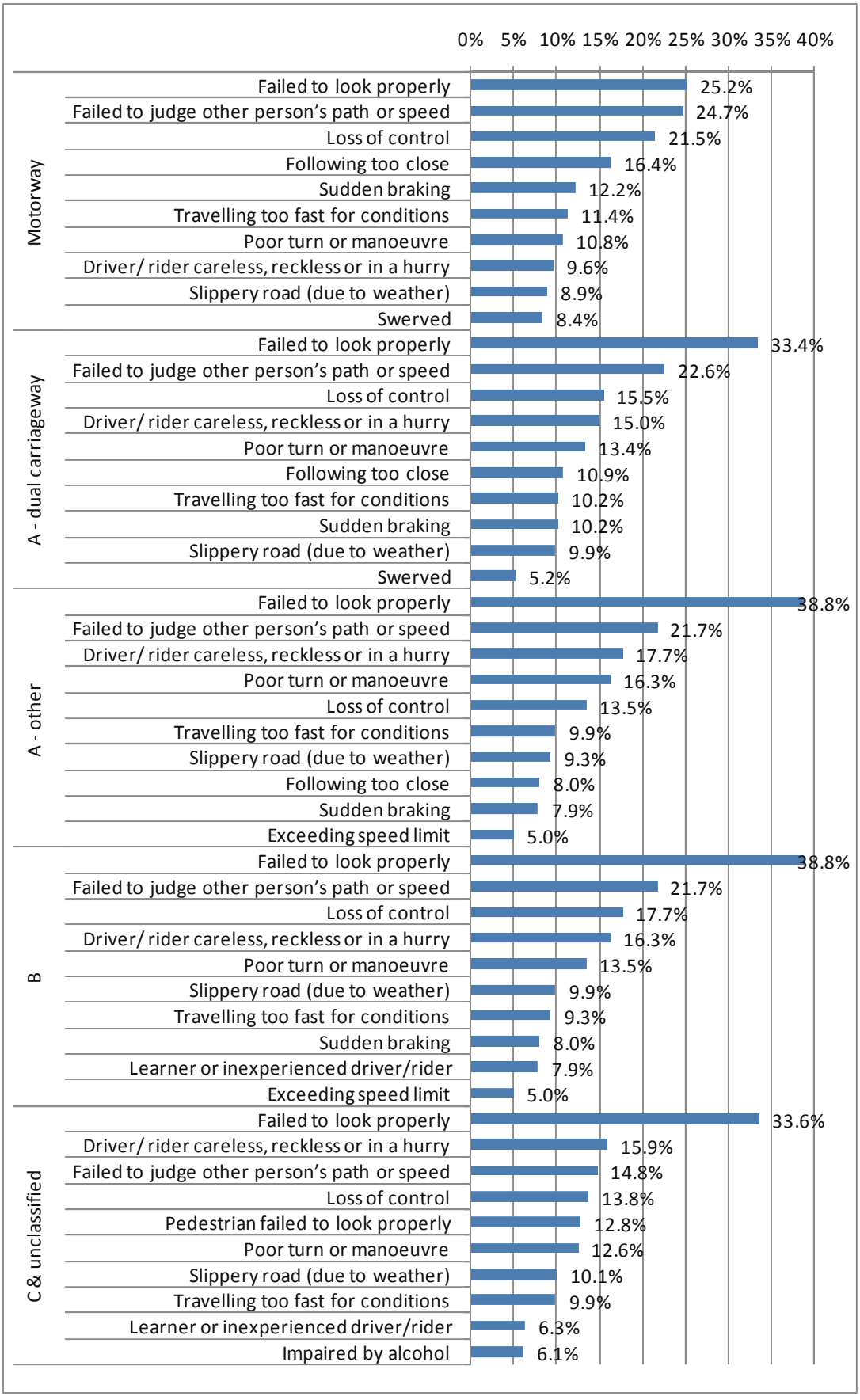
Table 2 Types of contributory factor reported for accidents on different types of road

Contributory factor type	Road Class and Type					All roads
	Motorway	A - dual carriageway	A - other	B	C & unclassified	
Driver/ Rider Error or Reaction	71.3%	69.7%	71.2%	68.0%	62.7%	67.5%
Injudicious Action	26.6%	29.4%	26.6%	26.6%	24.2%	26.0%
Behaviour or Inexperience	16.2%	23.0%	25.4%	25.4%	25.4%	24.7%
Road Environment	12.6%	13.8%	13.6%	19.2%	15.9%	15.1%
Pedestrian only (casualty or uninjured)	1.3%	8.7%	11.6%	11.4%	17.7%	13.0%
Impairment or Distraction	14.7%	11.6%	11.2%	12.2%	11.7%	11.7%
Vision Affected	9.7%	7.6%	9.0%	10.7%	12.2%	10.3%
Special codes	5.1%	4.7%	4.3%	4.0%	5.1%	4.6%
Vehicle Defects	4.1%	2.4%	1.7%	1.7%	1.8%	1.9%
Number of accidents	33,971	71,334	247,090	89,237	252,055	693,687

Figure 2 shows that:

- 'Failed to look properly' is the most frequently reported factor on all types of road but is less frequently reported on motorways (25%) than on other roads (33% - 39%)
- 'Failure to judge another person's path or speed' ranks second on all types of road except for minor roads
- 'Following too close' is reported more frequently on motorways (16%) and dual carriageways (11%) than other roads (less than 5% on minor roads)
- Seven factors appear in the top ten on all classes of road: failed to look properly', 'failure to judge another person's path or speed', loss of control, 'travelling too fast for the conditions', 'poor turn or manoeuvre', 'driver/ rider careless, reckless or in a hurry' and 'slippery road' (due to weather)
- The factors which appear in the top ten on some, *but not all*, classes of road are:
    - 'exceeding the speed limit' (single carriageway A roads and B roads only)
    - 'learner or inexperienced driver/ rider' (B, C and unclassified roads only)
    - 'pedestrian failed to look properly' (C and unclassified roads only)
    - 'impaired by alcohol' (C and unclassified roads only).
- These factors which are in the top ten for minor roads only may reflect the way minor roads are used (pedestrians and learner drivers may be found more on such roads; drink drivers tend to report that they drive on local quiet roads after drinking alcohol (Hopkin et al 2010, Sykes et al 2010).

Figure 2 Ten most frequently reported factors in accidents on different classes of road



3.2 Rural and urban roads

Table 3 shows two main differences in the types of factor reported between accidents in urban and rural roads:

- road environment factors are reported in a larger proportion of accidents in rural areas than urban areas
- pedestrian factors are, as expected, reported in a larger proportion of accidents in urban areas.

Table 3 Types of contributory factor reported for accidents in urban and rural areas

Contributory factor type	Area	
	Urban	Rural
Driver/ Rider Error or Reaction	66.2%	69.6%
Injudicious Action	25.1%	27.5%
Behaviour or Inexperience	24.8%	24.5%
Road Environment	9.1%	24.4%
Pedestrian only (casualty or uninjured)	18.7%	4.2%
Impairment or Distraction	10.5%	13.6%
Vision Affected	10.0%	10.6%
Special codes	5.2%	3.8%
Vehicle Defects	1.5%	2.6%
Number of accidents	417,887	275,710

Figure 3 shows that eight factors appear in the top ten for both urban and rural roads.

- 'Failed to look properly' is the most frequently recorded factor in both, but is recorded in 41% of accidents in urban areas and 26% in rural areas.
- 'Loss of control' and 'slippery road – due to weather' are recorded more frequently on rural roads than urban.
- Factors which are in the top ten for urban but not rural roads are:
    - 'poor turn or manoeuvre', 'pedestrian failed to look properly' and 'pedestrian careless, reckless or in a hurry'
- Factors in the top ten for rural but not urban roads are:
    - 'sudden braking' and 'learner or inexperienced driver/ rider'.

Figure 3 Ten most frequently reported factors in accidents in urban and rural areas

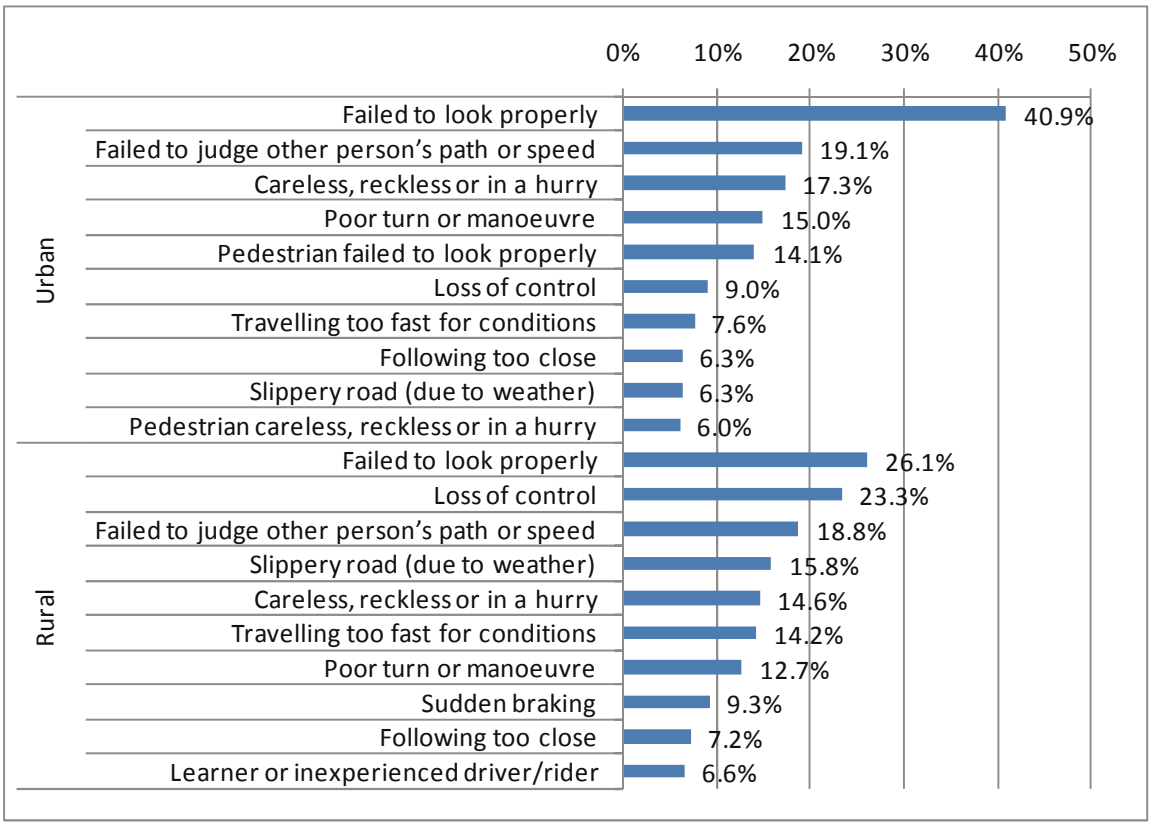


Table 4 shows that comparing types of road between urban and rural areas:

- 'Injudicious action' is reported in a larger proportion of accidents on motorways and dual carriageways in urban areas than on other types of road (in urban or rural areas)
- 'Road environment' factors are reported in a larger proportion of accidents on minor roads in rural areas than in urban areas or on major roads
- 'Impairment or distraction' factors are reported in a larger proportion of accidents on each type of road in rural areas than on equivalent roads in urban areas
- 'Pedestrian' factors are reported in a larger proportion of accidents on minor urban roads than rural roads or major roads.

Table 4 Types of contributory factor reported: road class in urban and rural areas

Contributory factor type and area	Road class and type			
	Motorway	A - dual carriageway	A - other	B, C or unclassified
Urban area				
Driver/ Rider Error or Reaction	73.6%	67.7%	69.7%	63.6%
Injudicious Action	31.7%	31.7%	25.7%	23.4%
Behaviour or Inexperience	17.9%	24.2%	25.7%	24.5%
Road Environment	13.7%	10.1%	7.5%	9.7%
Pedestrian only (casualty or uninjured)	1.3%	13.4%	17.3%	20.9%
Impairment or Distraction	11.5%	9.6%	9.5%	11.2%
Vision Affected	9.0%	7.3%	8.5%	11.5%
Special codes	4.6%	4.8%	5.0%	5.4%
Vehicle Defects	2.7%	1.5%	1.2%	1.6%
Number of accidents	4,444	40,527	142,967	229,949
Rural area				
Driver/ Rider Error or Reaction	70.9%	72.3%	73.3%	65.0%
Injudicious Action	25.9%	26.5%	27.9%	27.7%
Behaviour or Inexperience	16.0%	21.3%	25.0%	27.2%
Road Environment	12.4%	18.7%	22.1%	31.2%
Pedestrian only (casualty or uninjured)	1.2%	2.6%	3.7%	5.9%
Impairment or Distraction	15.2%	14.2%	13.4%	13.2%
Vision Affected	9.8%	8.0%	9.6%	12.5%
Special codes	5.2%	4.7%	3.2%	3.7%
Vehicle Defects	4.4%	3.5%	2.3%	2.1%
Number of accidents	29,523	30,801	104,088	111,298

3.3 Speed limit

The following types of factor are reported in a larger proportion of accidents on roads with a speed limit of 70 mph than on other roads:

- ‘Impairment or distraction’
- ‘Vehicle defects’.

‘Road environment’ factors are reported in a larger proportion of accidents on 60 mph roads than on other roads.

Table 5 shows the following factors to be reported in a smaller proportion of accidents on roads with a speed limit of 30 mph or under than on other roads:

- ‘Driver/ rider error or reaction’
- ‘Injudicious action’
- ‘Road environment’.

The following types of factor are reported in a larger proportion of accidents on roads with a speed limit of 70 mph than on other roads:

- ‘Impairment or distraction’
- ‘Vehicle defects’.

‘Road environment’ factors are reported in a larger proportion of accidents on 60 mph roads than on other roads.

Table 5 Types of contributory factor reported for accidents: speed limit

Contributory factor type	Speed limit				All roads
	30 mph or less	40 - 50 mph	60 mph	70 mph	
Driver/ Rider Error or Reaction	65.3%	72.3%	69.7%	71.9%	67.5%
Injudicious Action	24.4%	29.7%	28.9%	25.7%	26.0%
Behaviour or Inexperience	24.9%	24.4%	26.9%	18.7%	24.7%
Road Environment	9.7%	16.4%	31.6%	15.0%	15.1%
Pedestrian only (casualty or uninjured)	19.3%	6.1%	2.2%	1.7%	13.0%
Impairment or Distraction	10.8%	12.4%	12.7%	14.8%	11.7%
Vision Affected	10.6%	8.8%	10.9%	8.7%	10.3%
Special codes	5.3%	3.8%	3.1%	4.9%	4.6%
Vehicle Defects	1.5%	1.9%	2.3%	4.0%	1.9%
Number of accidents	418,327	80,927	133,824	60,609	693,687

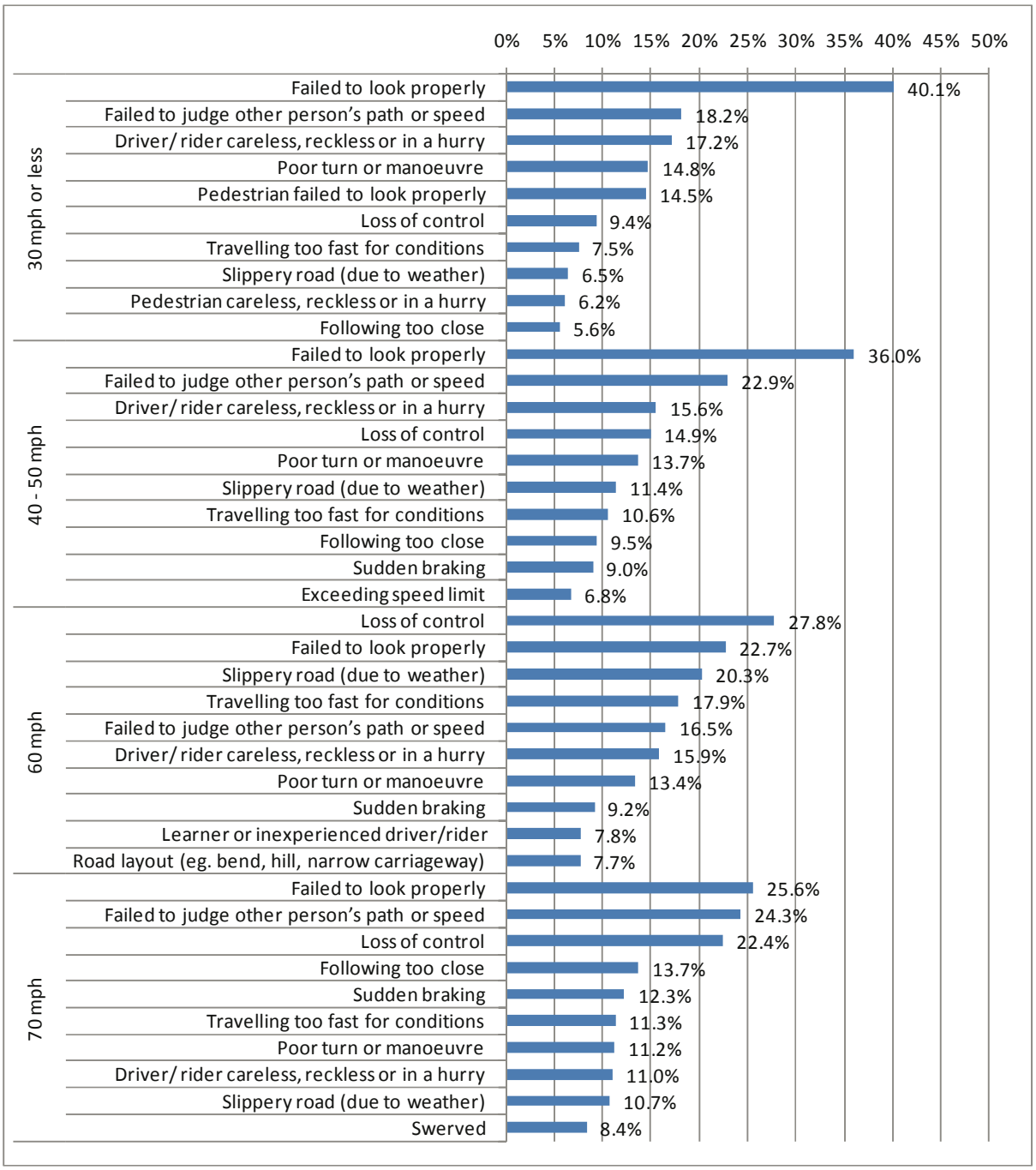
Figure 4 shows that seven factors appear in the top ten for all speed limits.

- Recording of ‘failed to look properly’, the most frequently recorded factor, varies with speed limit from 40% of accidents on roads with a speed limit up to 30 mph to 26% of accidents where the speed limit is 70 mph.
- ‘Slippery road due to weather’ is more commonly recorded on roads with a speed limit of 60 mph than elsewhere.

Factors which appear in the top ten for some speed limits only are:

- ‘Sudden braking’ is in the top ten for roads with a speed limit of 40 mph or more
- ‘Pedestrian failed to look properly’ and ‘pedestrian careless, reckless or in a hurry’ are reported in the top ten for 30 mph roads only
- ‘Learner or inexperienced driver/ rider’ and ‘road layout’ (e.g. bend, hill, narrow carriageway) are ranked nine and ten respectively on 60 mph roads but do not appear in the top ten on other roads.

Figure 4 Ten most frequently reported factors in accidents on roads with different speed limits



3.4 Type of road and accident severity

Table 6 shows that there are some differences in the types factors reported on different classes of road which vary with accident severity:

- 'Impairment or distraction' is reported in a larger proportion of fatal accidents on motorways (31%) than on other classes of road and is also reported in a larger proportion of serious accidents on motorways (24%) than other roads; but in slight accidents, the proportion of accidents with this type of factor varies less with road class.

- ‘Injudicious action’ is reported in a larger proportion of fatal accidents on A, B and minor roads than on motorways, while there is less variation with road class in the proportion of serious and slight accidents with such factors reported.
- ‘Behaviour or inexperience’ is reported in a larger proportion of fatal accidents on minor roads (32%) than on other classes of road or in accidents with less severe injuries.
- On motorways, ‘pedestrian’ factors are reported in 13% of fatal accidents but only 2% of serious and 1% of slight accidents on motorways.

Table 6 Types of contributory factor reported: road class and accident severity

Contributory factor type and severity	Road class and type			
	Motorway	A - dual carriageway	A - other	B, C or unclassified
Fatal				
Driver/ Rider Error or Reaction	61.1%	60.0%	68.2%	64.8%
Injudicious Action	23.4%	29.9%	31.9%	32.6%
Behaviour or Inexperience	16.0%	23.6%	28.0%	31.5%
Road Environment	8.1%	8.4%	10.7%	12.5%
Pedestrian only (casualty or uninjured)	13.2%	24.0%	16.8%	18.4%
Impairment or Distraction	30.9%	18.4%	18.8%	19.2%
Vision Affected	4.4%	6.0%	7.5%	8.4%
Special codes	9.2%	6.6%	4.5%	7.2%
Vehicle Defects	5.2%	3.2%	2.4%	2.8%
Number of accidents	676	1,693	4,972	4,627
Serious				
Driver/ Rider Error or Reaction	68.6%	62.1%	65.4%	58.5%
Injudicious Action	23.7%	26.2%	25.9%	24.2%
Behaviour or Inexperience	18.6%	23.6%	26.2%	26.5%
Road Environment	12.7%	11.0%	12.4%	14.4%
Pedestrian only (casualty or uninjured)	1.9%	18.5%	18.5%	23.5%
Impairment or Distraction	24.1%	14.9%	13.4%	13.9%
Vision Affected	6.8%	6.5%	8.5%	10.4%
Special codes	6.4%	5.7%	4.6%	5.5%
Vehicle Defects	5.8%	2.4%	1.9%	2.2%
Number of accidents	3,579	10,033	38,561	52,587
Slight				
Driver/ Rider Error or Reaction	71.9%	71.2%	72.4%	65.1%
Injudicious Action	27.1%	30.0%	26.7%	24.8%
Behaviour or Inexperience	16.0%	22.9%	25.2%	25.1%
Road Environment	12.7%	14.5%	13.9%	17.3%
Pedestrian only (casualty or uninjured)	0.9%	6.6%	10.1%	14.6%
Impairment or Distraction	13.3%	10.9%	10.6%	11.3%
Vision Affected	10.2%	7.8%	9.1%	12.1%
Special codes	4.8%	4.5%	4.2%	4.7%
Vehicle Defects	3.9%	2.3%	1.6%	1.7%
Number of accidents	29,716	59,608	203,557	284,078

Table 7 shows some variations with accident severity between urban and rural roads:

- ‘Driver/ rider error or reaction’ and ‘impairment or distraction’ are reported in a larger proportion of fatal and serious accidents in rural areas than urban areas

- ‘Pedestrian’ factors are reported in a larger proportion of fatal and serious accidents in urban areas than in rural areas or in slight accidents
- In slight accidents, the reporting of most factors does not vary between urban and rural areas, except that ‘road environment’ is reported more frequently in rural areas and ‘pedestrian’ factors more in urban areas

Table 7 Types of contributory factor reported: accident severity and urban and rural areas

Contributory factor type	Fatal		Serious		Slight	
	Urban	Rural	Urban	Rural	Urban	Rural
Driver/ Rider Error or Reaction	56.6%	70.2%	56.5%	68.4%	67.9%	69.8%
Injudicious Action	30.5%	31.9%	22.8%	27.7%	25.4%	27.3%
Behaviour or Inexperience	27.0%	28.6%	24.5%	27.5%	24.9%	23.7%
Road Environment	5.4%	14.0%	6.9%	21.3%	9.4%	25.4%
Pedestrian only (casualty or uninjured)	33.7%	9.7%	31.4%	6.7%	16.5%	3.5%
Impairment or Distraction	15.7%	21.7%	11.9%	17.0%	10.2%	12.6%
Vision Affected	8.4%	6.9%	9.3%	9.1%	10.1%	11.1%
Special codes	7.6%	5.3%	6.1%	4.2%	5.0%	3.7%
Vehicle Defects	1.5%	3.6%	1.7%	2.9%	1.5%	2.5%
Number of accidents	4,267	7,701	58,386	46,357	355,234	221,652

4 Accidents at different times

4.1 Time of day

Table 8 shows that the main variations are between accidents at night and those during the day:

- ‘Behaviour or inexperience’, ‘impairment or distraction’ and ‘injudicious action’ are reported in a larger proportion of accidents between 7 pm and 7 am than during the day
- ‘Vision affected’ is reported in a larger proportion of accidents between 7 am and 7 pm than at night
- ‘Road environment’ is reported in a larger proportion of accidents at night and in the morning rush hour than between 10 am and 7 pm.

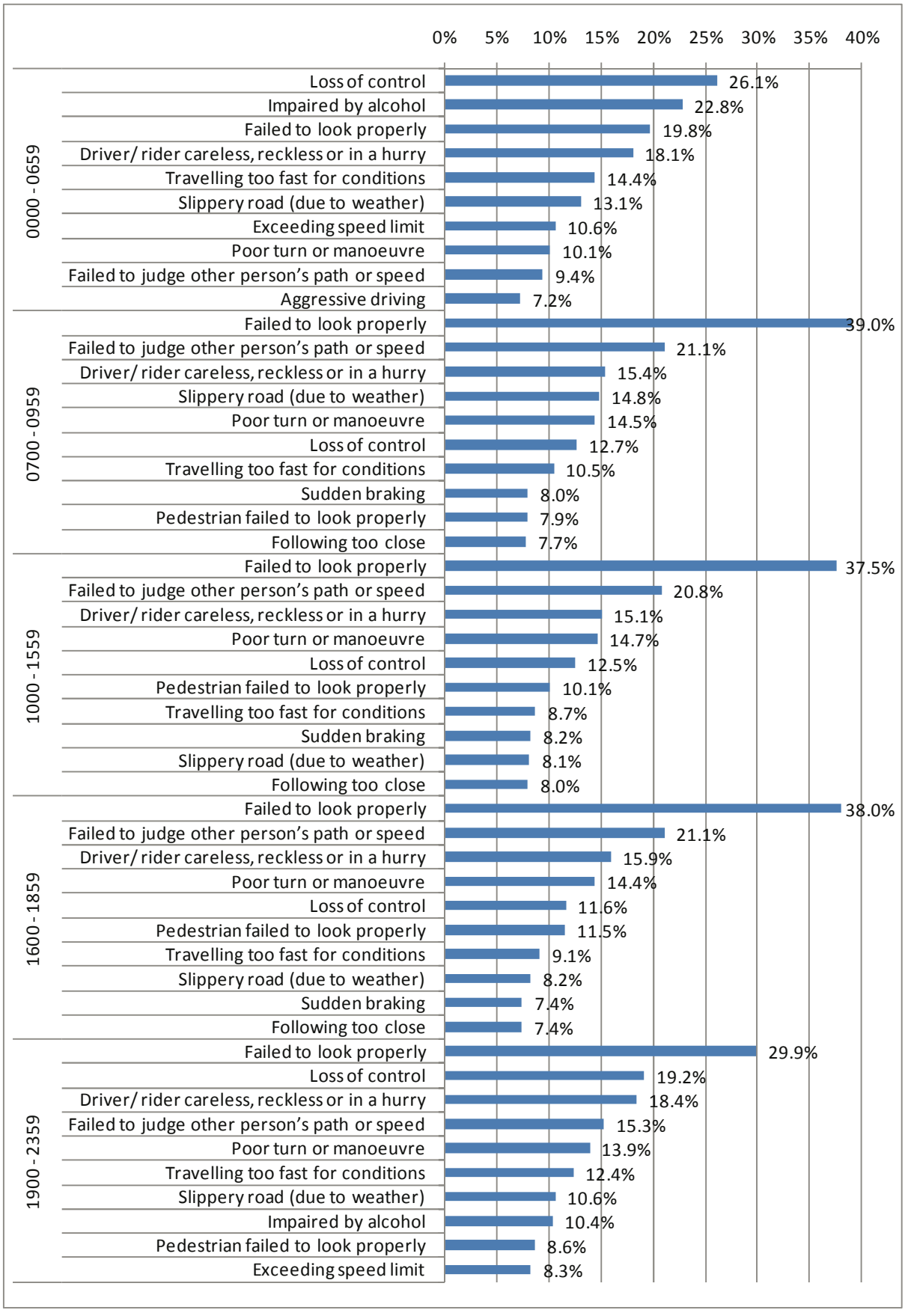
Table 8 Types of contributory factor reported: time of day

Contributory factor type	Time of day					All times
	0000 - 0659	0700 - 0959	1000 - 1559	1600 - 1859	1900 - 2359	
Driver/ Rider Error or Reaction	57.8%	70.2%	69.7%	68.3%	64.5%	67.5%
Injudicious Action	29.7%	25.3%	24.5%	25.0%	29.2%	26.0%
Behaviour or Inexperience	28.2%	21.4%	23.0%	23.9%	30.1%	24.7%
Road Environment	18.8%	19.8%	13.2%	12.7%	16.1%	15.1%
Pedestrian only (casualty or uninjured)	11.4%	10.0%	13.1%	15.2%	13.2%	13.0%
Impairment or Distraction	31.9%	7.1%	8.2%	9.2%	16.4%	11.7%
Vision Affected	6.0%	13.7%	10.6%	10.9%	7.8%	10.3%
Special codes	7.4%	3.4%	4.6%	4.0%	5.3%	4.6%
Vehicle Defects	1.8%	1.8%	2.0%	1.8%	2.0%	1.9%
Number of accidents	57,368	109,723	238,992	159,712	127,818	693,613

Figure 5 shows that seven individual factors are in the top ten at each time of day, but the ranking of the factors within the top ten varies:

- ‘Impaired by alcohol’ is the second most frequent factor reported for accidents between midnight and 7 am (23% of accidents); it features in 10% of accidents between 7 pm and midnight but is not in the top ten at other times
- ‘Exceeding the speed limit’ also features in the top ten between 7 pm and midnight and between midnight and 7 am but not at other times
- ‘Aggressive driving’ ranks tenth between midnight and 7 am but is not in the top ten factors at other times
- ‘Sudden braking’ features in the top ten in accidents between 7 am and 7 pm, but not at night
- ‘Pedestrian failed to look properly’ is one of the top ten factors in each time period except between midnight and 7 am.

Figure 5 Ten most frequently reported factors in accidents at different times of day



4.2 Weekdays and weekends

Table 9 shows that proportion of accidents with different types of factor reported is similar at weekends and on weekdays, except that 'impairment or distraction' is reported in a larger proportion of accidents at weekends (17%) than on weekdays (10%).

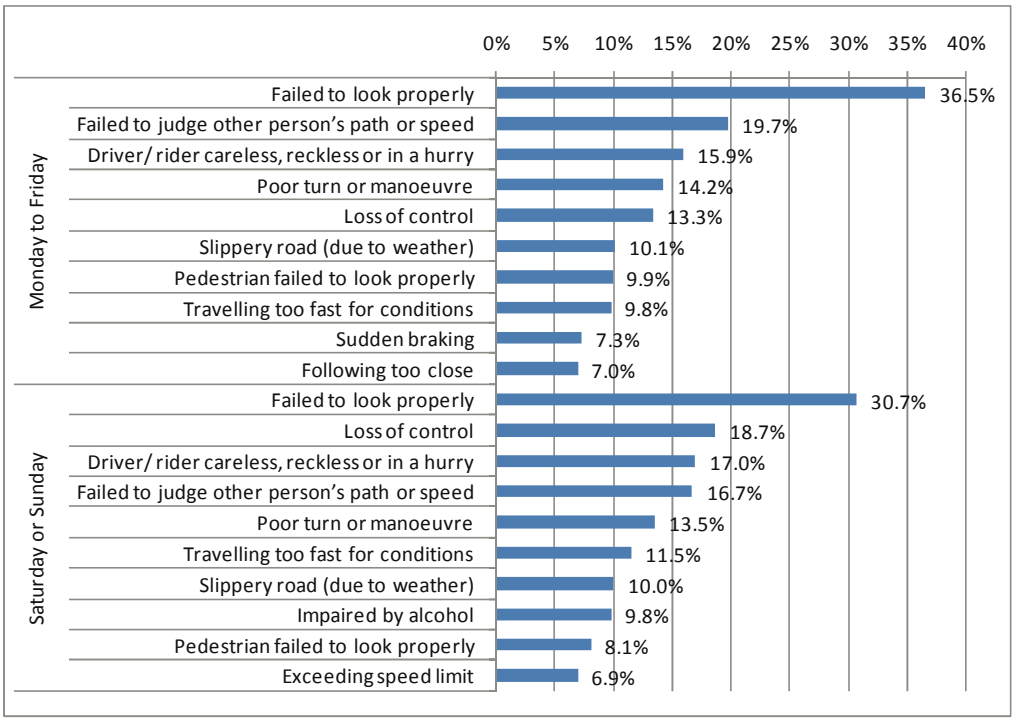
Table 9 Types of contributory factor reported: weekdays and weekends

Contributory factor type	Weekday or weekend	
	Monday to Friday	Saturday or Sunday
Driver/ Rider Error or Reaction	68.1%	65.9%
Injudicious Action	25.4%	27.8%
Behaviour or Inexperience	24.0%	26.8%
Road Environment	24.0%	26.8%
Pedestrian only (casualty or uninjured)	13.3%	12.0%
Impairment or Distraction	10.1%	16.5%
Vision Affected	10.8%	8.7%
Special codes	4.5%	5.0%
Vehicle Defects	1.9%	2.0%
Number of accidents	515,754	177,933

Figure 6 shows that of the top ten factors reported, eight are the same on weekdays and weekends, although the ranking varies. The differences are:

- 'Impaired by alcohol '(10%) and exceeding the speed limit (7%) are in the top ten at weekends only
- 'Sudden braking' and 'following too close' are in the top ten on weekdays (7%) but not at weekends.

Figure 6 Ten most frequently reported factors in accidents on weekdays and at weekends



4.3 Season

Table 10 shows that the main difference between different times of year is that 'road environment' factors are reported in a larger proportion of accidents in winter (21%) than at other times (e.g. 13% in summer).

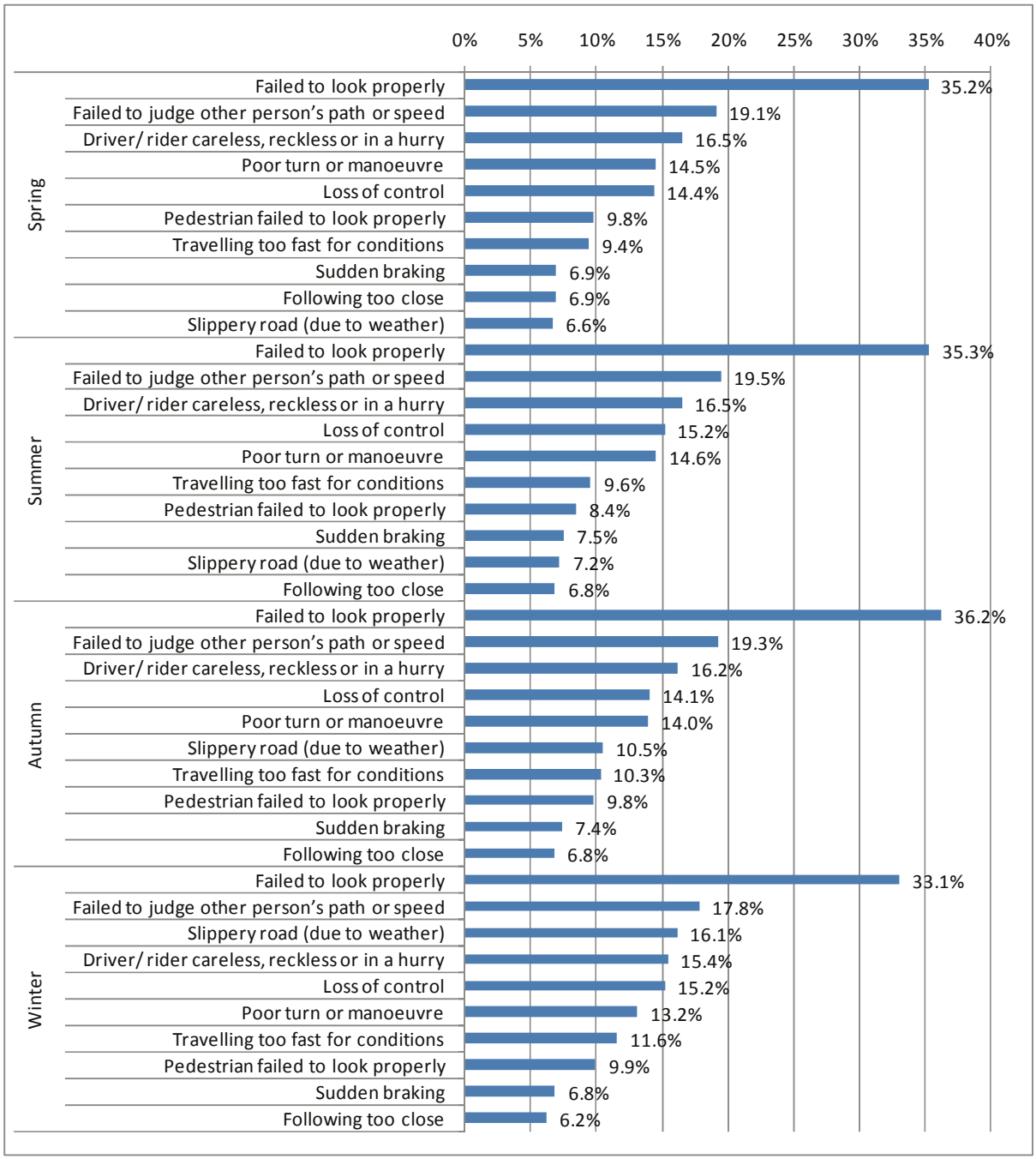
Table 10 Types of contributory factor reported: season

Contributory factor type	Season				All year
	Spring	Summer	Autumn	Winter	
Driver/ Rider Error or Reaction	67.7%	69.1%	68.0%	65.3%	67.5%
Injudicious Action	26.0%	26.1%	25.8%	26.2%	26.0%
Behaviour or Inexperience	25.4%	25.5%	24.6%	23.3%	24.7%
Road Environment	11.9%	12.7%	15.4%	20.8%	15.1%
Pedestrian only (casualty or uninjured)	13.4%	11.7%	13.2%	13.5%	13.0%
Impairment or Distraction	12.1%	12.1%	11.4%	11.3%	11.7%
Vision Affected	9.5%	9.4%	10.9%	11.1%	10.3%
Special codes	4.9%	4.8%	4.4%	4.5%	4.6%
Vehicle Defects	1.9%	2.2%	1.8%	1.7%	1.9%
Number of accidents	166,279	176,710	185,641	165,057	693,687

Figure 7 shows that in each season, the top ten factors reported in accidents are the same, but their ranking differs.

- The main difference is that 'slippery road (due to weather)' ranks third in winter (16% of accidents) but as expected, has a lower ranking at other times of year (7% in spring and summer, 10% in autumn).

Figure 7 Ten most frequently reported factors in accidents at different times of year



4.4 Time and severity

Table 11 shows that within an accident severity category, many of the types of factor are reported in a similar proportion of accidents in each time period, with a few exceptions:

- 'Impairment or distraction' and 'injudicious action' are reported in a higher proportion of accidents between midnight and 7 am, to a lesser extent in the evening and much less during the day, in the case of fatal, serious and slight accidents.

Table 11 Types of contributory factor reported: time of day and severity

Contributory factor type and severity	Time of day				
	0000 - 0659	0700 - 0959	1000 - 1559	1600 - 1859	1900 - 2359
Fatal					
Driver/ Rider Error or Reaction	57.4%	69.2%	70.7%	67.4%	61.5%
Injudicious Action	36.0%	28.6%	26.5%	30.5%	35.7%
Behaviour or Inexperience	29.1%	22.7%	23.6%	24.9%	30.6%
Road Environment	12.1%	15.3%	10.2%	8.9%	10.6%
Pedestrian only (casualty or uninjured)	17.5%	14.2%	16.8%	21.5%	19.6%
Impairment or Distraction	33.5%	15.5%	14.3%	14.8%	21.2%
Vision Affected	5.3%	10.7%	9.0%	8.1%	5.2%
Special codes	9.1%	4.1%	5.7%	4.9%	6.2%
Vehicle Defects	2.0%	3.8%	3.0%	2.3%	3.4%
Number of accidents	2,135	1,294	3,396	2,279	2,864
Serious					
Driver/ Rider Error or Reaction	54.1%	66.7%	63.8%	62.0%	59.3%
Injudicious Action	30.4%	23.6%	22.5%	22.9%	29.0%
Behaviour or Inexperience	29.1%	22.7%	23.6%	24.9%	30.6%
Road Environment	14.7%	18.1%	12.4%	11.2%	13.3%
Pedestrian only (casualty or uninjured)	16.6%	16.1%	20.9%	23.9%	20.6%
Impairment or Distraction	36.5%	8.2%	9.2%	9.6%	19.1%
Vision Affected	5.3%	13.4%	10.0%	10.0%	6.7%
Special codes	8.2%	4.0%	5.2%	4.3%	5.6%
Vehicle Defects	2.1%	2.1%	2.3%	2.1%	2.3%
Number of accidents	11,334	13,613	33,518	24,281	22,002
Slight					
Driver/ Rider Error or Reaction	58.8%	70.8%	70.7%	69.5%	65.7%
Injudicious Action	30.4%	23.6%	22.5%	22.9%	29.0%
Behaviour or Inexperience	27.9%	21.2%	22.9%	23.7%	30.0%
Road Environment	20.1%	20.1%	13.4%	13.1%	16.9%
Pedestrian only (casualty or uninjured)	9.7%	9.1%	11.7%	13.5%	11.5%
Impairment or Distraction	30.6%	6.8%	7.9%	9.0%	15.7%
Vision Affected	6.3%	13.7%	10.7%	11.1%	8.1%
Special codes	7.1%	3.3%	4.5%	4.0%	5.2%
Vehicle Defects	1.7%	1.7%	2.0%	1.8%	1.9%
Number of accidents	43,899	94,816	202,078	133,152	102,952

Similarly, Table 12 shows that ‘impairment or distraction’ factors are reported more frequently for accidents at the weekend than in the week, in fatal, serious and slight accidents. ‘Injudicious action’ is reported more frequently for fatal accidents at weekends (35%) than on weekdays (30%), but the difference in reporting of ‘injudicious action’ for serious and slight accidents between weekends and weekdays is smaller.

Table 12 Types of contributory factor reported: weekdays and weekends and severity

Contributory factor type	Fatal		Serious		Slight	
	Monday to Friday	Saturday or Sunday	Monday to Friday	Saturday or Sunday	Monday to Friday	Saturday or Sunday
Driver/ Rider Error or Reaction	65.0%	66.0%	62.0%	61.1%	69.2%	66.9%
Injudicious Action	29.5%	35.2%	24.0%	27.4%	25.6%	27.7%
Behaviour or Inexperience	26.7%	30.8%	24.9%	28.0%	23.8%	26.4%
Road Environment	10.4%	12.1%	13.0%	13.9%	15.4%	16.0%
Pedestrian only (casualty or uninjured)	19.4%	15.8%	21.4%	18.1%	11.8%	10.7%
Impairment or Distraction	17.5%	23.8%	12.1%	19.3%	9.6%	15.7%
Vision Affected	10.0%	7.4%	10.0%	7.4%	11.0%	9.0%
Special codes	5.1%	5.5%	5.1%	5.5%	4.4%	4.8%
Vehicle Defects	2.8%	2.9%	2.2%	2.2%	1.8%	1.9%
Number of accidents	7,962	4,006	74,477	30,283	433,315	143,644

5 Contributory factors reported for vehicles: cars and motorcycles

While a large proportion of accidents have at least one contributory factor reported, many vehicles involved in accidents have no contributory factor; 46% of cars and 39% of motorcycles have no contributory factor reported. The figures presented in this section show the percentages of vehicles with contributory factors as a percentage of all vehicles in accidents where the police attended the scene, including those with no contributory factor reported.

5.1 Car drivers

The proportion of car drivers with no contributory factor reported is lower for young drivers and drivers over 70 than for those between 30 and 70, as Table 13 shows.

- 'Driver error or reaction' is reported more frequently for younger and older drivers than for those between 30 and 70, reflecting factors such as poor judgement by younger drivers and decrease in functioning among older drivers
- 'Injudicious action' and 'behaviour or inexperience' are reported more frequently for drivers under 30, and particularly under 20, than for drivers over 30
- 'Impairment or distraction' is reported more frequently for drivers over 70 and slightly more frequently for those under 30, than for those aged 30-70, again reflecting decrease in functioning among older drivers
- 'Road environment' factors are also reported more frequently for younger drivers, particularly those under 20, reflecting inexperience and poor judgement in more difficult driving conditions
- 'Vehicle defects', although reported in only a small proportion of accidents, are reported for a larger proportion (1%) of drivers under 30, who tend to drive older vehicles, than for drivers over 30 (around 0.5% - 0.7%).

Table 13 Types of contributory factor reported for cars: driver age

Contributory factor type	Driver age									All ages
	Under 20	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90+	
Driver/ Rider Error or Reaction	49.8%	42.1%	34.7%	32.2%	32.4%	35.3%	46.0%	58.7%	65.0%	38.1%
Injudicious Action	24.9%	18.3%	12.4%	10.3%	9.4%	8.9%	9.7%	10.9%	11.9%	14.0%
Behaviour or Inexperience	33.4%	15.3%	9.5%	7.5%	6.9%	6.9%	8.5%	10.6%	12.1%	12.3%
Road Environment	16.6%	11.4%	7.9%	7.1%	6.5%	6.0%	5.8%	6.2%	5.8%	9.1%
Impairment or Distraction	8.3%	8.3%	6.2%	5.2%	5.0%	5.5%	8.4%	12.4%	16.6%	6.7%
Vision Affected	6.3%	6.2%	5.7%	5.7%	5.9%	6.7%	7.9%	9.6%	9.5%	6.1%
Special codes	2.7%	2.1%	1.9%	1.5%	1.2%	1.3%	1.6%	2.5%	5.0%	1.8%
Vehicle Defects	1.4%	1.1%	0.7%	0.6%	0.5%	0.5%	0.6%	0.7%	0.6%	0.8%
No factor recorded for vehicle	26.3%	39.0%	50.0%	54.1%	54.8%	52.0%	40.3%	25.8%	18.9%	45.7%
Number of car drivers	88,285	248,251	207,255	179,811	113,795	64,241	33,993	13,804	862	950,297

Table 13 shows that the variation in the frequency of reporting different types of factor between drivers in their 30s, 40s, 50s and 60s is relatively small; the main differences are between younger drivers, older drivers and drivers in this 30 – 69 group. Therefore the analysis of the top ten individual factors which follows in Figure 8 shows the top ten factors reported for drivers in three key age groups with different levels of accident involvement: young drivers under 25, 25 to 69 year olds and over 70s. Six of the top ten factors reported for drivers in each of these groups are the same in each group and in most cases these are in the top six, but there are differences in ranking and frequency of reporting.

The main differences are between drivers over 70 and others:

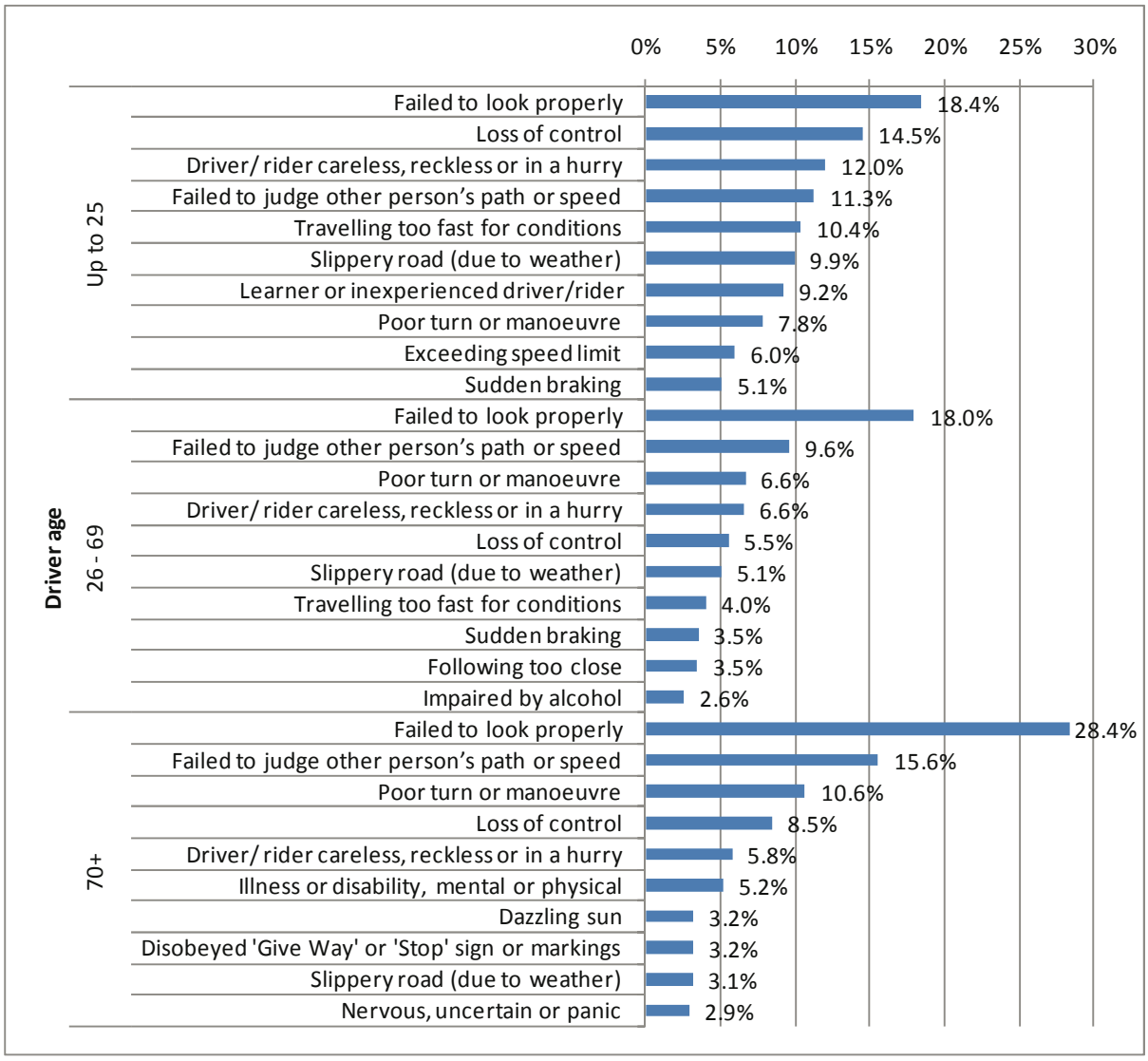
- 'Failure to look properly' is reported more frequently than other factors in each of the three age groups but is reported far more frequently in the case of older drivers (28%) than in the other two groups (18%)
- The factors ranked six to ten in frequency of reporting for older drivers include some associated with ageing and difficulty coping with the traffic environment which do not appear in the top ten for other drivers: 'illness or disability', 'dazzling sun', 'disobeyed Give Way or Stop sign' and 'nervous, uncertain or in a panic'.

In the other age groups:

- Some of the factors associated with more aggressive driving styles appear in the top ten: 'exceeding the speed limit' in the under 25 age group and 'travelling to fast for the conditions', 'sudden braking', 'following too close', in the under 25 and 25 – 69 age groups
- Alcohol features in the top ten factors for drivers aged 25 – 69 (3%) and ranks 11 (4.6%) in the 17-24 age group
- Inexperience features in the top ten for those under 25
- 'Slippery road due to weather' is recorded for almost 10% of drivers under 25 but 5% of those aged 25 - 69; this may be associated more driving on rural roads but may also reflect lack of experience with these conditions.

These differences in the frequency with which contributory factors are assigned to drivers of different age groups are consistent with findings of other research (as summarised in Hopkin 2010 and Hopkin 2008) and can to some extent be explained by where drivers of different ages are driving.

Figure 8 Ten most frequently reported factors for cars: driver age



Almost half of the cars involved in accidents which are driven by women have no contributory reported (49%) this is rather higher than the proportion for cars driven by men (44%).

The main difference between men and women in the types of factor reported is that a smaller proportion of women than men are attributed with 'injudicious action' and 'behaviour or inexperience'.

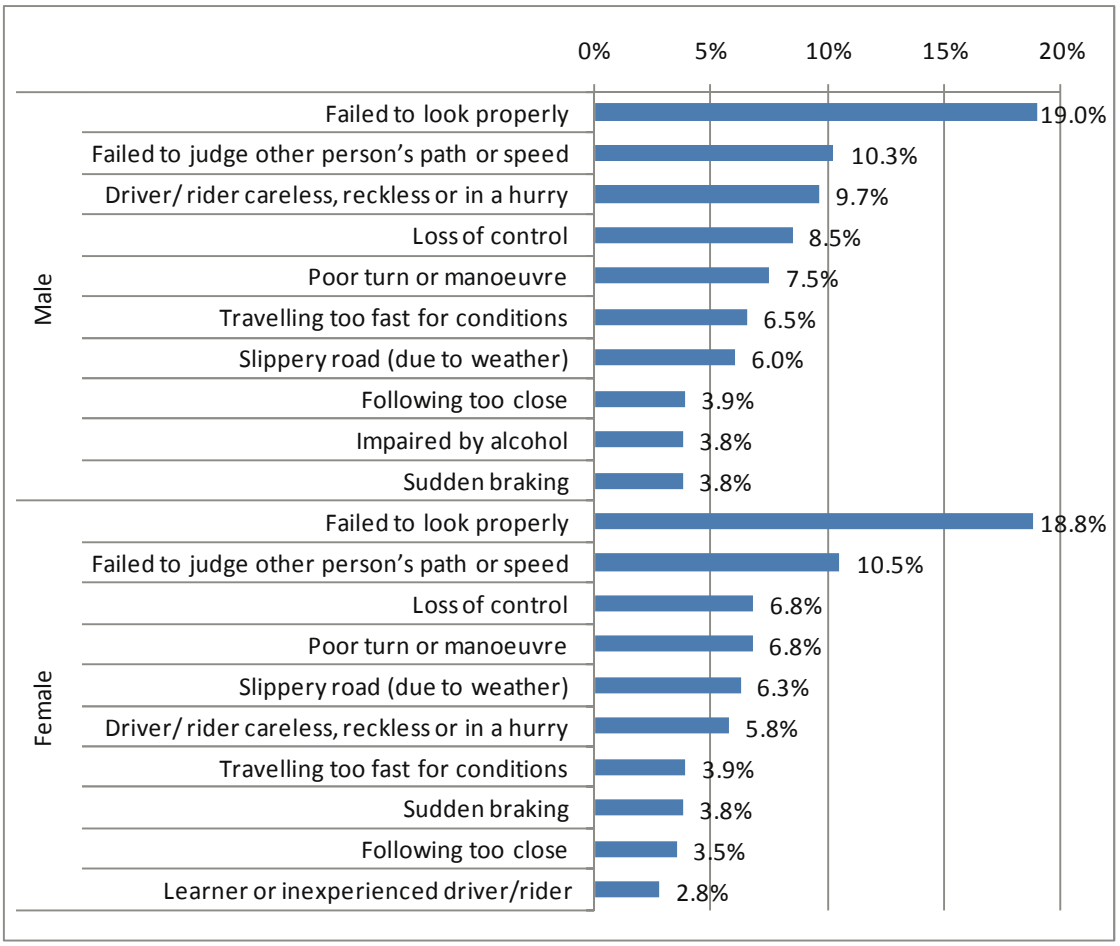
Table 14 Types of contributory factor reported for cars: male and female drivers

Contributory factor type	Driver gender	
	Male	Female
Driver/ Rider Error or Reaction	38.9%	37.0%
Injudicious Action	15.8%	11.0%
Behaviour or Inexperience	14.2%	10.0%
Road Environment	8.8%	9.0%
Impairment or Distraction	7.6%	5.0%
Vision Affected by	5.8%	6.4%
Special codes	2.3%	1.3%
Vehicle Defects	0.9%	0.7%
No factor recorded for vehicle	43.8%	48.7%
Number of car drivers	633,601	348,294

Nine of the top ten individual contributory factors are the same for men and women. 'Careless, reckless or in a hurry' is recorded more frequently for men (10%) than women (6%), while 'travelling too fast for the conditions' is recorded for more men (7%) than women (4%).

- 'Impaired by alcohol' appears in the top ten factors for men (reported for 4% of men driving a car involved in an accident)
- 'Learner or inexperienced driver' is in the top ten for women (reported for 3% of women driving a car involved in an accident).

Figure 9 Ten most frequently reported factors for cars: male and female drivers



5.2 Motorcyclists

As for car drivers, the proportion of motorcyclists with no contributory factor reported is lower under the age of 30 and over 70 than in the 30-70 age group, as Table 15 shows:

- 'Rider error or reaction' is reported more frequently for those over 70 (48%) and under 30 (43%) than for those aged 30-70 (39%)
- 'Behaviour or inexperience' is reported for a larger proportion of riders under 30 (and particularly those under 20) than for riders in other age groups
- 'Injudicious action' is reported rather less frequently for riders over 50 than in other age groups.

Table 15 Types of contributory factor reported for motorcycles: rider age

Contributory factor type	Rider age							All riders
	Under 20	20-29	30-39	40-49	50-59	60-69	70+	
Driver/ Rider Error or Reaction	43.1%	43.0%	40.1%	38.9%	38.8%	40.7%	47.7%	41.3%
Injudicious Action	17.2%	18.4%	15.3%	13.5%	10.6%	10.2%	8.5%	15.6%
Behaviour or Inexperience	34.7%	20.5%	13.7%	10.4%	8.7%	8.3%	7.0%	19.2%
Road Environment	13.4%	11.7%	11.4%	12.2%	13.6%	12.6%	12.4%	12.3%
Impairment or Distraction	4.3%	4.2%	3.1%	2.6%	2.3%	2.5%	2.2%	3.5%
Vision Affected	5.2%	4.6%	4.3%	4.4%	4.4%	4.5%	4.2%	4.6%
Special codes	3.3%	2.0%	1.6%	1.6%	1.4%	1.4%	1.6%	2.1%
Vehicle Defects	1.7%	1.2%	0.8%	0.9%	1.0%	1.1%	1.6%	1.1%
No factor recorded for vehicle	31.6%	36.8%	42.3%	44.5%	45.0%	44.3%	37.1%	39.1%
Number of riders	24,051	24,262	21,495	18,929	8,275	2,549	669	100,230

Figure 10 shows the top ten factors reported for riders in three key age groups, with different levels of accident involvement: young drivers under 30, 30 to 59 year olds and over 60s.

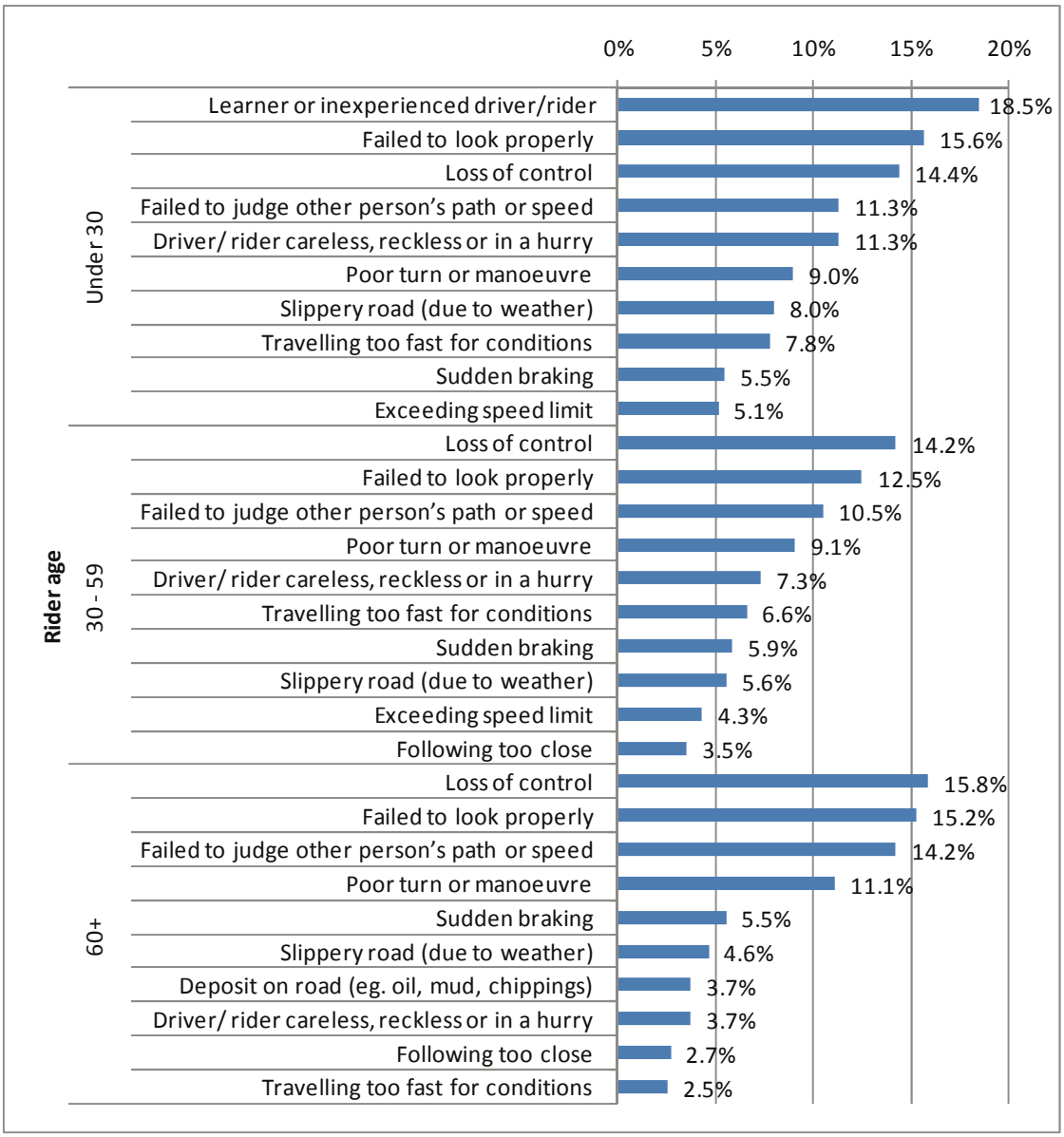
- ‘Failed to look properly’ and ‘loss of control’ were the most frequently reported factors for riders aged 30 – 60 and over 60 (13% - 16%).
- ‘Learner/ inexperienced’ was the factor reported most frequently for riders under 30 (19%), with ‘failed to look properly’ and ‘loss of control’ ranking second and third (16% and 14%).

Ranking of factors varied between age groups but most of the top ten factors were the same for riders in each of the three age groups. Factors which did not appear in the top ten in all three age groups were:

- ‘Deposit on road’ - 4% of riders over 60 but less frequently for other age groups
- ‘Learner/ inexperienced’ – 19% of riders under 30
- ‘Exceeding speed limit’ – 5% of riders under 30 and 4% of riders aged 30 – 59 but fewer riders over 60.

These differences between age groups are consistent with the findings of other research on motorcycle accidents (see Hopkin 2009).

Figure 10 Ten most frequently reported factors for motorcycles: rider age



5.3 Comparison between car drivers and motorcyclists

As mentioned earlier, the proportion of motorcyclists with no contributory factor reported is lower than for car drivers. Comparison of Table 13 with Table 15 shows:

- 42-45% of motorcyclists in their 30s, 40s, 50s and 60s have no contributory factor reported compared with 52-55% of car drivers in these age groups
- 32% of motorcyclists under the age of 20 have no contributory factor reported compared with 26% of car drivers under 20.

The main differences in the types of factor reported for motorcyclists and car drivers are:

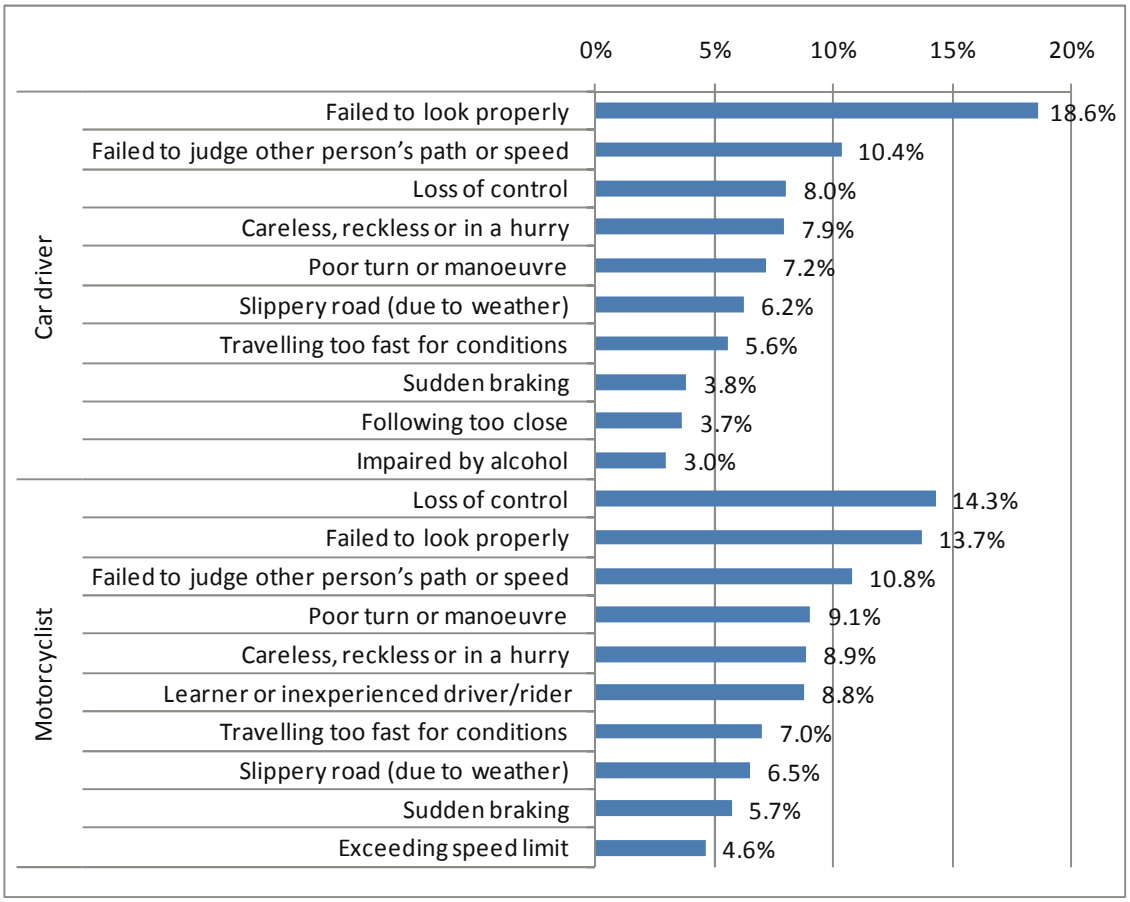
- 'Behaviour or inexperience' is reported more frequently for motorcyclists than for car drivers, particularly between the ages of 20 and 50, reflecting the greater take up of motorcycling over the age of 30 compared with driving

- ‘Road environment’ is reported more frequently for motorcyclists than car drivers over the age of 30.

Figure 11 shows that of the top ten factors reported for car drivers and motorcyclists, nine are the same, although the ranking varies:

- ‘Loss of control’ is more frequently reported for motorcyclists than other factors (14%) and is less frequently reported for car drivers (8%)
- ‘Failure to look properly’ is more frequently reported for car drivers than other factors (19%) and is less frequently reported for motorcyclists (14%)
- ‘Impaired by alcohol’ is the tenth most frequently reported factor for car drivers (3%) but ranks 15 (2%) for motorcyclists
- ‘Learner or inexperienced’ ranks 6 for motorcyclists (9%) but ranks 12 for car drivers (3%).

Figure 11 Ten most frequently reported factors: cars and motorcycles



6 Summary and conclusions

6.1 Summary of results

Types of factor

Human factors are recorded as contributing to the cause of accidents far more frequently than the road environment or defects in the vehicle.

The most frequently recorded factor type is ‘driver/ rider error or reaction’, in 68% of all accidents. Two other types of factor are reported in a quarter of all accidents: ‘injudicious action’ and ‘behaviour or inexperience’. Between 10 and 15% of accidents are recorded in the ‘road environment’, ‘pedestrian’, ‘impairment or distraction’ or ‘vision’ groups. Vehicle defects are recorded in just 2% of accidents.

Accident severity

There are some differences between fatal, serious and slight accidents in the individual contributory factors recorded.

‘Loss of control’ is recorded in a third of fatal accidents, a fifth of serious accidents and fewer slight accidents.

‘Failure to look properly’ is the second most frequently recorded factor in fatal accidents (one fifth) and the most frequently recorded factor in serious and slight accidents (one third).

‘Failed to judge another person’s path or speed’ is the second most frequently recorded factor in slight accidents (one fifth) but less often in serious or slight accidents.

‘Travelling too fast for the conditions’ and ‘exceeding the speed limit’ are more frequently recorded for fatal accidents than less severe incidents.

‘Slippery road due to weather’ is the main ‘road environment’ factor and is more commonly reported for slight accidents (one tenth) than fatal or serious accidents.

Where accidents happen

‘Failed to look properly’ is recorded more frequently than other factors on all types of road but is more frequently recorded on roads in towns, roads which are not motorways, and roads with a speed limit of 50 mph or less, than on rural roads, motorways and high speed roads.

‘Failed to judge another person’s path or speed’ the second or third most frequently recorded on most types of road and at most speed limits, the exceptions being minor roads and 60 mph roads.

‘Loss of control’ is recorded in a higher proportion of accidents on motorways, high speed roads and rural roads, than lower speed and urban roads.

Factors associated with pedestrians are recorded more frequently on minor urban roads than other roads, reflecting different patterns of use.

‘Learner or inexperienced’ is recorded as a contributory factor more frequently on rural roads, minor roads and 60 mph roads than elsewhere.

‘Slippery road due to weather’ is one of the top ten factors on all types of road but is recorded more frequently on 60 mph roads and rural roads than elsewhere.

Factors associated with impairment or distraction are more frequently recorded in fatal and serious accidents on motorways and rural roads, than in slight accidents or more severe accidents on other roads.

‘Behaviour or inexperience’ is reported in a larger proportion of fatal accidents on minor roads than on other roads or in accidents with less severe injuries.

When accidents happen

The contributory factors recorded vary between accidents at night and in the daytime. Between 7 pm and 7 am, ‘loss of control’, ‘failed to look properly’ and ‘driver/ rider careless reckless or in a hurry’ are the most frequently recorded factors. In addition between midnight and 7 am ‘impaired by alcohol’ is the second most frequently recorded factor.

At other times, ‘failed to look properly’, ‘failure to judge another person’s path or speed’ and ‘driver/ rider careless reckless or in a hurry’ are the three most commonly recorded factors, with ‘failed to look properly’ recorded far more frequently than at night.

Comparing weekdays and weekends shows that many of the most commonly recorded factors are recorded to a similar extent on weekdays and weekends. However ‘impaired by alcohol’ and ‘exceeding the speed limit’ are among the ten most frequently recorded factors at weekends but not during the week , while ‘sudden braking’ and ‘following too close’ are more frequently recorded on weekdays than at weekends.

In winter, ‘slippery road due to weather’ is recorded more frequently than at other times of year but otherwise differences between seasons in the types of factor recorded are small.

Cars and motorcycles involved in accidents

A larger proportion of motorcyclists involved in accidents are reported with a factor thought to have contributed to the accident, compared with car drivers. Younger motorcyclists and younger car drivers more frequently have contributory factors reported than their older counterparts.

Younger and older drivers and riders (under 30 and over 70) have ‘error or reaction’ factors recorded in a larger proportion of cases than among those between 30 and 70.

Young drivers and riders also have ‘behaviour or inexperience’ factors attributed to them more frequently than older people.

Older car drivers have ‘failed to look properly’ recorded more frequently than younger drivers and factors associated with ageing and difficulty coping with the traffic environment, which are less frequently recorded for younger drivers.

Car drivers under 25 have ‘exceeding the speed limit’ ‘travelling too fast for the conditions’ and ‘learner/ inexperienced’ recorded more frequently than drivers over 25. ‘Exceeding the speed limit’ features in the top ten factors for motorcyclists in the under 30 and 30 – 59 age groups.

Alcohol features in the top ten factors for drivers aged 25 – 69 and ranks 11 for drivers under 25, but is less frequently recorded for motorcyclists.

Comparisons between men and women car drivers show many similarities in the contributory factors reported, but ‘careless, reckless or in a hurry’, ‘travelling too fast for the conditions’ and ‘impaired by alcohol’ are recorded more frequently for men than for women, while ‘learner or inexperienced driver’ is recorded more frequently for women.

6.2 Conclusions

Improving safety

The data provide a subjective indication of the causes of accidents, not a definitive view. Factors which are more obvious to the police officer attending will tend to be recorded more than those which are less obvious, while those which allocate blame or imply careless or reckless behaviour are less likely to be recorded. However the results can still be used to highlight areas for further investigation or improvement in road safety.

It is clear that driver and rider errors, particularly failure to look properly and failure to judge the path or speed of other road users correctly remain significant contributory factors in road accidents. Factors such as 'careless, reckless or in a hurry', 'loss of control' and 'travelling too fast for the conditions' together make up another significant group which could be addressed by a more measured style of driving, taking greater account of the traffic and road conditions prevailing. These human factors are attributed to drivers of all ages, although some factors are more frequently assigned to young drivers and others to older drivers, which points to the value of post-test driver training for improving the quality of driving, and hence road safety.

Some factors which are reported in relatively few accidents in total, are more prominent in specific situations. Analysing these specific groups of accidents can provide insights into their causes which may help to develop measures for improving road safety - for example accidents involving specific groups of road users, or particular combinations of accident circumstances. In fatal accidents on motorways for example, alcohol, fatigue and vehicle defects (mainly tyres and brakes) are more frequently reported than in other accidents. Information on the increased risks of driving in these specific circumstances may encourage drivers to take a more responsible approach.

Factors associated with the road environment are less frequently attributed as factors contributing to the cause of accidents than the 'human' factors. Engineering measures have been developed to address many of these, but an anticipatory and measured driving style will reduce the role of factors such as road surface conditions and the road layout in causing accidents.

The analytical approach

One of the objectives of this report was to explore the potential for the data to be used further. The results have demonstrated the feasibility of comparing the types of contributory factors recorded for four or five different accident circumstances. Graphical presentation of the 'top ten' individual factors recorded for two or three different sub-groups of accidents has successfully depicted the key factors and how they vary (or not) with accident circumstances. More specific conclusions on the options for further analysis are summarised below.

Number of cases for analysis

This analysis has not been limited by small numbers of cases. With nearly 700,000 accidents having contributory factors recorded, it would be feasible to undertake further analysis of variations in contributory factors with accident circumstances, or of accidents with specific factors recorded. There is also some scope for further analysis of contributory factors attributed to broad sub-groups of drivers or riders. However it is recommended that

analysis should focus on simple categorisations and on two-dimensional rather than three-dimensional comparisons, as explained below.

Approach to presentation

Presenting the percentage of accidents or vehicles for which the full range of 77 factors was reported (as in Table 1) provides a comprehensive picture of the data. However because most of the factors are reported in a very few cases, the value of these '77 factor' tables appears limited.

The graphs showing the 'top ten' individual factors provide a snapshot of the key factors (reported for at least 5-8% of accidents and at least 3-5% of drivers or riders) and how they vary with accident circumstances and driver characteristics. This appears to be a more useful approach to presenting the individual factors than the tables covering all 77, and does show some differentiation between sub-groups, often in the factors ranked towards the bottom of the top ten.

The tables showing how the incidence of reporting the nine contributory factor types vary with accident circumstances and driver or rider characteristics provide an overview. In further work, commentary on the main factors reported within some of these groups would enhance this type of analysis.

Complexity of analysis

Some of the analysis has compared factors in fatal, serious and slight accidents on different types of road or time of day. Presenting variations in the incidence of the types of contributory factor becomes complex when there are more than four or five categories to compare (such as Table 4, Table 6, Table 7, and Table 11). However the results show that combining fatal and serious accidents into one group to simplify the comparisons would mask differences in factors reported in fatal and serious accidents. Graphs illustrating the top ten individual factors should be limited to two or three categories (see for example Figure 2 and Figure 5 which have more categories).

For any future analysis of the contributory factors data, it would be worthwhile to refine the grouping of accidents to simplify the presentation and focus on the main differences, taking these considerations into account.

Confidence in factors recorded

When contributory factors are recorded, they are assigned a 'confidence' rating by the police officer at the scene: factors are recorded as either 'possible' or 'very likely'. One element of further analysis could focus on the contributory factors recorded as 'very likely', omitting those classified as 'possible', to investigate whether different patterns and associations emerge among the factors which police officers felt more certain about recording.

7 Acknowledgements

The assistance of the Department for Transport Accident Statistics Branch, for providing a copy of the accident records for analysis, is gratefully acknowledged.

Thanks are due to Neil Greig, who managed the project at the IAM.

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The IAM

President: Nigel Mansell OBE

Chairman: Alistair Cheyne OBE

The IAM (Institute of Advanced Motorists) is the UK's largest independent road safety charity, dedicated to raising driving standards, engaging with the road-using public and influencing road safety policy.

Established in 1956, the IAM is best known for the advanced driving test and the advanced driving course. The IAM directly influences the driving and riding of more than 160,000 road users a year (full members, associates and commercial clients) in the UK and Ireland.

Brunel University found most drivers and riders who receive advanced driving coaching developed significantly better skills, from speed management and cornering to hazard awareness and keener anticipation.

IAM Drive & Survive is the commercial arm of the IAM and provides occupational driver training and risk management products.

IAM products include:

- Skill for life: the advanced driver programme
- DriveCheck
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- Momentum, for younger drivers
- Special assessment, for advanced drivers
- Skill for life: the advanced motorcyclist programme
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- RideCheck+
- RideCheck
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- CycleRide
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Director of policy and research: Neil Greig

Established in 2007 the IAM policy and research division supports the advocacy work of the IAM. Core activities include:

- undertaking a unique programme of road safety research
- encouraging responsible motoring by promoting advanced driver and rider training
- promoting practical evidence-based policies that improve the safety of all road users

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- IAM older drivers – safe or unsafe?
- IAM motorcycling facts
- Cycling motorists
- 16 – the dangerous age for moped riders
- Young drivers – where, when and why they are unsafe
- Barriers to change – designing safer roads for motorcyclists
- Rural roads – the biggest killer
- Star rating roads for safety (partnership with the Highways Agency)
- Traffic laws and policing – does Sweden do them better?
- Child safety – a guide for parents

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The study was carried out by road safety researcher Jean Hopkin.

The recommendations shown in the foreword are those of the IAM.

The IAM welcomes debate on the facts and issues that Jean Hopkin's analysis presents; please email us at **info@iamtrust.org.uk** to tell us what you think should be done to increase the priority given to solving the human factors in crashes.

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http://www.thenewspaper.com/news/39/3950.asp

Thursday, November 15, 2012

Redflex In Turmoil Over Shareholder Revolt, Ethics Investigation

Australian investors angry at the recent performance of Redflex Traffic Systems let management know by issuing a "first strike" Wednesday against the photo enforcement firm's compensation plan. Under recently implemented Australian Securities Exchange (ASX) rules, a company receives a strike if its remuneration report does not receive the support of 75 percent of shareholder votes.

At the Redflex annual meeting in Melbourne yesterday, the compensation report received 61.8 percent of the vote, with significant protest against the re-election of Max Findlay to the board of directors and to the compensation of Karen Finley, who is in charge of US operations. Finley's award of $142,187 in stock options was approved, but the generous payment could become a liability next year.

Under ASX rules, Redflex must now provide shareholders an action plan to address the issues raised by the first strike. If shareholders lodge a second protest against the executive pay plan at the 2013 annual meeting, the vote would "spill the board" giving shareholders the choice of setting up an election to replace the entire board of directors.

Just one day before this year's meeting, Redflex issued a statement informing investors that the Chicago, Illinois Inspector General was conducting an investigation into allegations of corruption related to the city's red light camera contract with Redflex -- the largest automated ticketing contract in the world. Last month, Chicago announced it **excluding Redflex from bidding** on the forthcoming speed camera contract after learning about a breach of the city's ethics rules.

"The Inspector General's Office may recommend that sanctions be imposed," the Redflex statement explained. "Prior to the finalization of any recommendations it is premature to speculate on the outcome of the investigation, or the nature and extent of any impact on the Redflex business."

The most likely sanction would be for Chicago to choose another vendor when the red light camera contract expires on January 31. This would cost Redflex 13 percent of its revenue -- enough to eliminate the firm's profit.

The investigations began after the Chicago Tribune newspaper uncovered evidence that Redflex paid for luxury accommodations for John Bills, the Chicago official in charge of the red light camera

contract, in violation of city ethics rules. Though Redflex is on the hot seat for providing perks to city employees, this remains a common industry practice. In 2010, the Australian firm also put the police chief of Oak Ridge, Tennessee up at the Ritz-Carlton Hotel **in return for his favorable testimony** at a court trial two years ago. Affiliated Computer Services (ACS, now a part of Xerox) was caught **giving hockey tickets and other services** to police officers in Edmonton, Canada, although criminal charges were ultimately dropped. American Traffic Solutions (ATS) **regularly entertains** public officials involved in red light camera business, but the airfare, lodging and wages during the event is paid for by taxpayers, not ATS.