
Changes in Traffic Safety Policies and Regulations in UK (1950-2010)

1. Review of the Traffic Accident Situation in the UK

1.1 National Population

The population of the UK has grown throughout the century but at a declining rate. For example, between 1901 and 1911 the growth rate of the UK population averaged 1% per annum. Between 1981 and 1991, however, the average growth rate of the population had fallen to about 0.26% per annum. The following graphs in Figure 1 shows how the population has changed over the period 1951-2010.

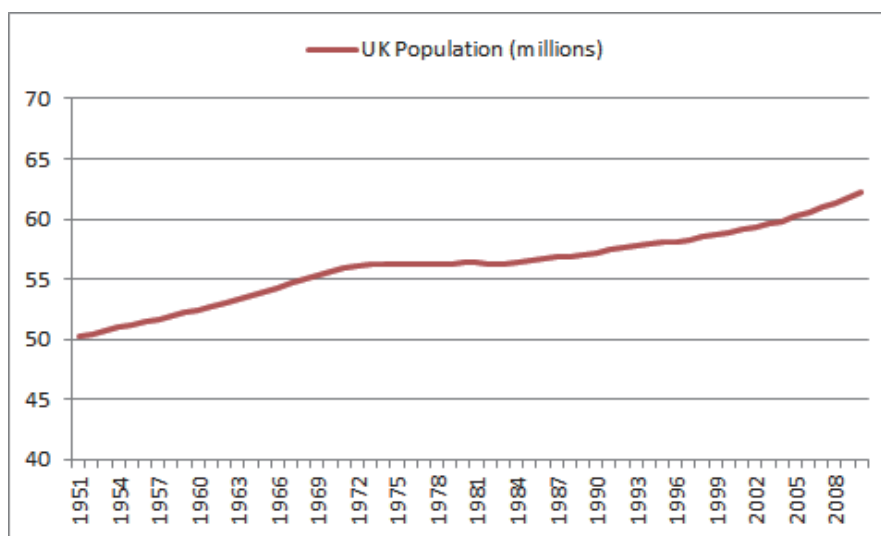


Figure 1 UK population statistics 1951-2010¹

¹ source: <http://www.guardian.co.uk/news/datablog/2009/oct/21/uk-population-data-ons>
Extrapolated between 1951 and 1961 and again between 1961 & 1971

The proportion split between gender and age groups over the same period are shown in Figure 2 and Figure 3.

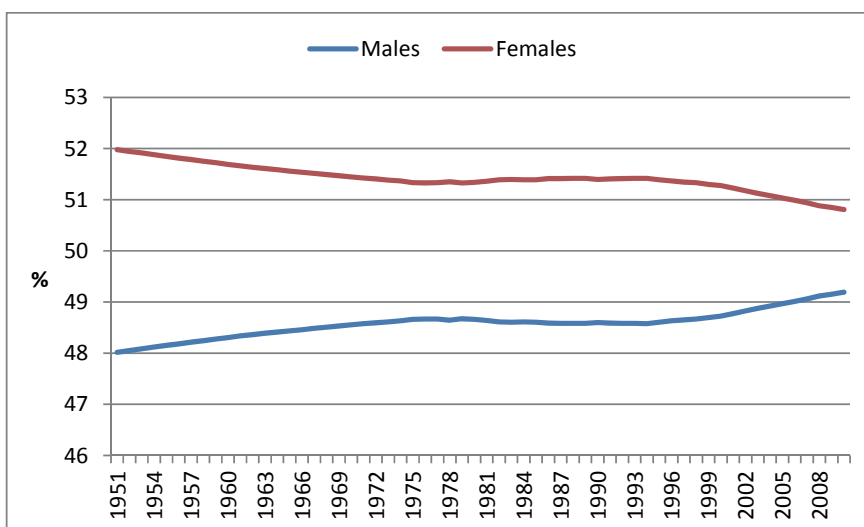


Figure 2 UK population split by gender¹

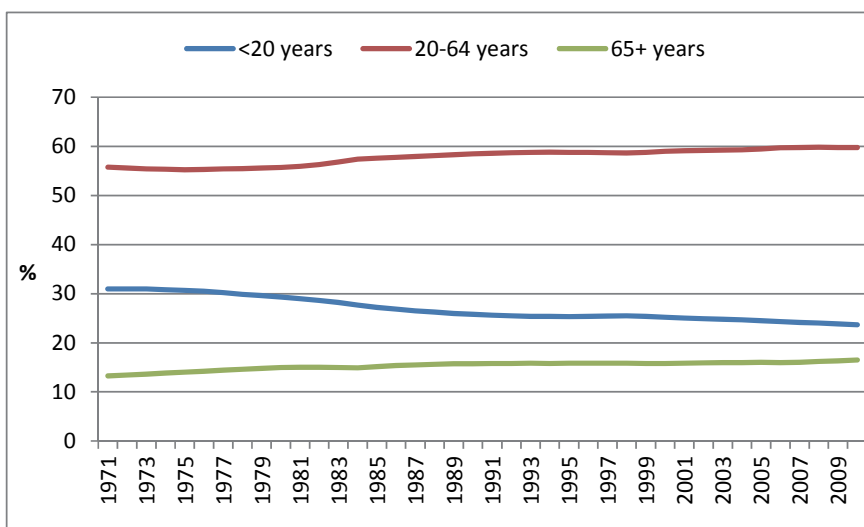


Figure 3 UK population split by age¹

The projection of the UK population statistics is shown in Figure 4.

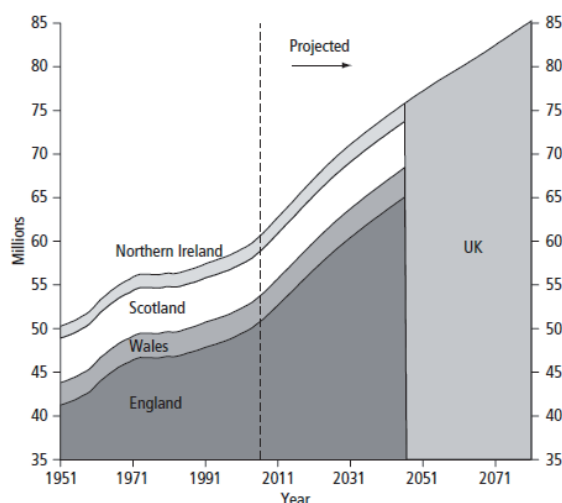


Figure 4 Actual and projected population of the United Kingdom and constituent countries, 1951–2081²

1.2 Vehicle Ownership Numbers

Licensed stock in the UK has been steadily increasing since 1950, with a noticeable increase in motorcycle numbers in 2000 onwards, Figure 5.

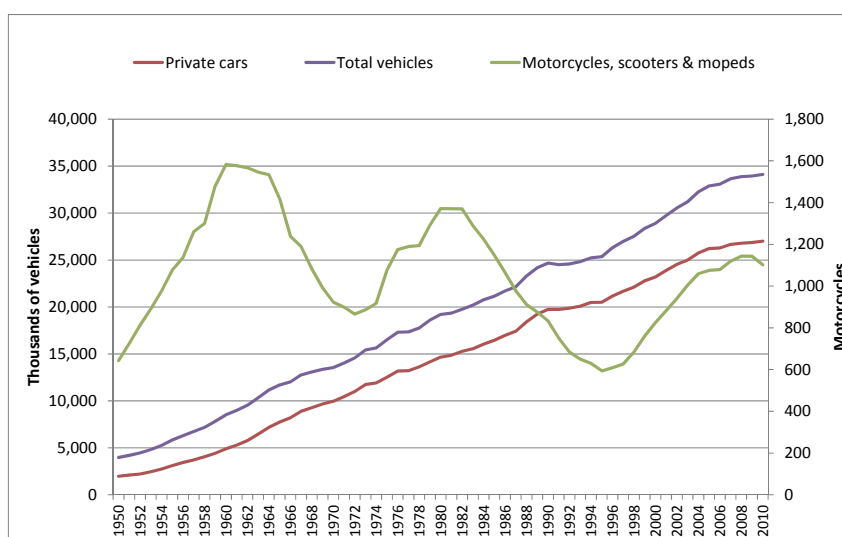


Figure 5 Vehicle ownership (licensed stock 1950-2010)³

²Source: <http://www.ons.gov.uk/ons/rel/npp/national-population-projections/2010-based-projections/rep-2010-based-npp-results-summary.html>

³ Department for Transport statistics Vehicle Licensing Statistics Table VEH0103

1.3 Annual Traffic Accident Fatalities

Fatalities for each mode are shown in Figure 6. All modes show a decline, which is particularly noticeable for 2005 onwards overall. Motorcycle fatalities have remained relatively stable, but have seen large increases in vehicle stock.

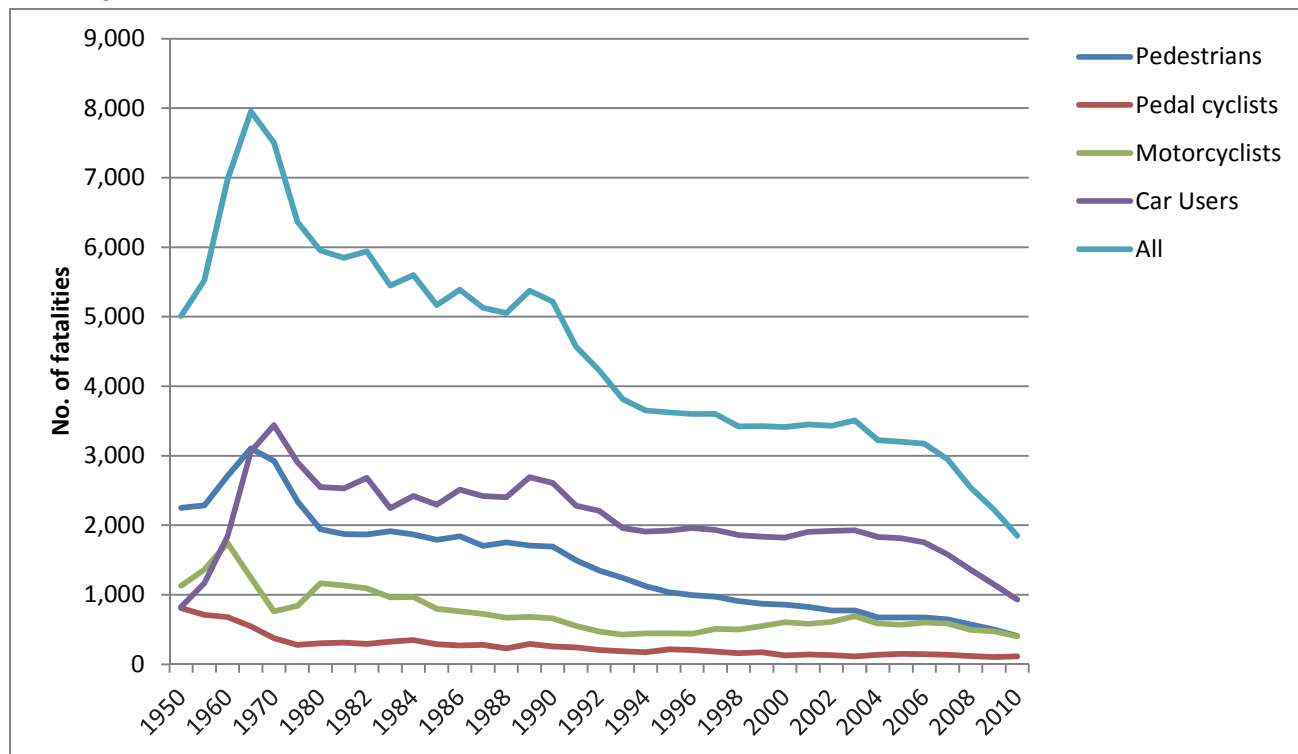


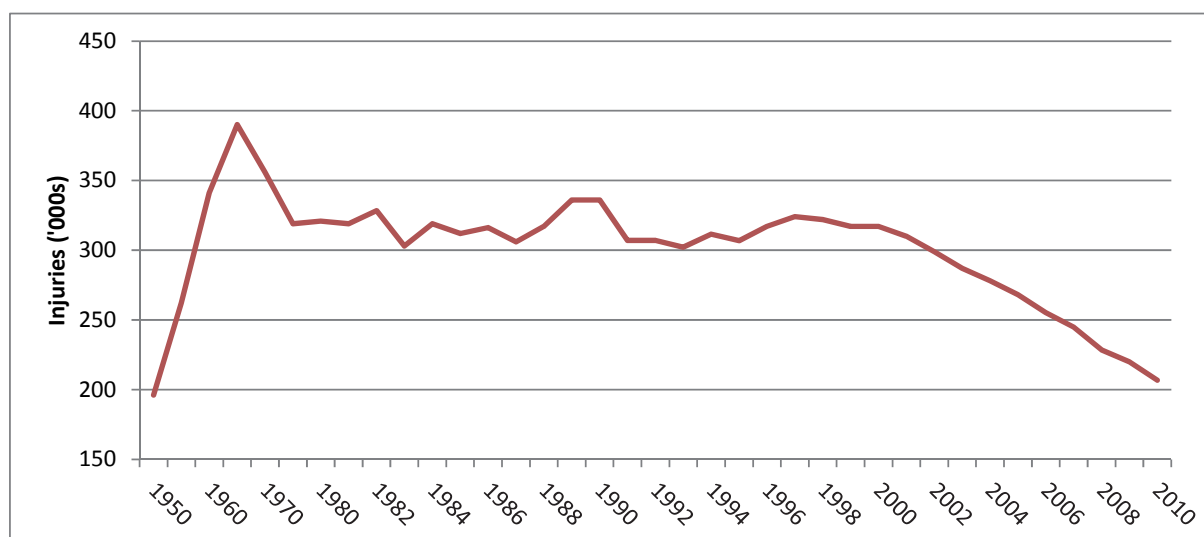
Figure 6 Road fatalities (1950-2010)⁴

There has been a rise in cyclist deaths however over the past three years, with serious injuries being 2,428 in 2007 and 2,660 in 2010.

1.4 Annual Traffic Accident Injuries

Injuries sustained on UK roads are shown in Figure 7. Sharp decreases in overall numbers can be seen from 2000 onwards.

⁴ <http://www.dft.gov.uk/statistics/releases/road-accidents-and-safety-annual-report-2010>

Figure 7 Injuries (1950-2010)⁵

2. National Organizations with Jurisdiction for Traffic Safety

In the United Kingdom, the Department for Transport (DfT) is the government department which is responsible for the English transport network along with a limited number of transport matters in Scotland, Wales and Northern Ireland (those which have not been devolved to local control). The department is run by the Secretary of State for Transport, currently Justine Greening (since 14 October 2011). The Secretary of State is supported by a small team (around 3) of junior Ministers.

2.1 Organisation

The DfT also has a number of executive agencies, considered central to delivering the Government's transport priorities and services:

(1) Vehicle Certification Agency (VCA)

VCA tests and certifies new models of vehicles and components against European and United Nations safety and environmental performance standards. It also provides a service to manufacturers who wish to be certified as meeting international quality, environmental and safety management system standards. VCA publishes the definitive data on emissions, fuel consumption and noise. This helps people decide what vehicle to buy and enables in-service testing of car emissions. This information also supports the Department and the Inland Revenue in applying Vehicle Excise Duty schemes linked to vehicle fuel consumption.

(2) Highways Agency (HA)

HA is responsible for operating, maintaining and improving the strategic road network, on behalf of the Secretary of State for Transport. This comprises 9,380 km/5,863 miles of

⁵ Department for Transport statistics <http://www.dft.gov.uk/statistics/releases/road-accidents-and-safety-annual-report-2010>

motorways and trunk roads in England, on which over 170 billion vehicle/km journeys are made each year. HA's aim is 'Safe roads, reliable journeys, informed travellers' which supports the DfT objective of a transport system that works for everyone. The agency:

- improves road safety;
- makes journeys more reliable through better network management and information; and
- respects the environment.

HA also has an international role, building good working relationships and sharing expertise with other overseas road administrations. This helps promote the value of UK knowledge and best practice across the world to support UK industry.

(3) Maritime and Coastguard Agency (MCA)

MCA delivers and implements the Government's maritime safety strategy. The agency co-ordinates search and rescue at sea through Her Majesty's Coastguard, and checks that ships meet UK and international safety rules. It works to prevent loss of life at the coast and at sea, to ensure that ships are safe, and to prevent coastal pollution.

(4) Government Car and Despatch Agency (GCDA)

The GCDA is a non-profit making executive agency which aims to be the first choice supplier of secure transport, distribution and mail related services to Government, the wider public sector and other approved customers.

(5) Driver and Vehicle Licensing Agency (DVLA)

DVLA maintains an up-to-date record of all those who are entitled to drive various types of vehicles, together with a register of all vehicles entitled to travel on public roads. It is responsible for driver licensing, the collection of vehicle excise duty and vehicle registration policy for Great Britain. DVLA also contributes to Government policies and to broader objectives, such as an improved environment and modernised, customer-focussed services.

(6) Vehicle and Operator Services Agency (VOSA)

VOSA works with Traffic Commissioners to improve road safety and the environment and to safeguard fair competition by promoting and enforcing compliance with commercial operator licensing requirements.

(7) Driving Standards Agency (DSA)

DSA promotes road safety in Great Britain by improving driving standards, through testing drivers and driving instructors. The DSA has continued to contribute to the target for reducing road casualties set in the Government's road safety strategy, Tomorrow's Roads - Safer for Everyone.

2.2 Brief History

Over the years the name of the department has changed numerous times:

1919–1941: Ministry of Transport

1941–1945: Ministry of War Transport - after absorption of Ministry of Shipping

1945–1953: Ministry of Transport

1953–1959: Ministry of Transport and Civil Aviation

1959–1970: Ministry of Transport

1970–1976: Department for the Environment

1976–1979: Department of Transport

1979–1981: Ministry of Transport

1981–1997: Department of Transport

1997–2001: Department for the Environment, Transport and the Regions

2001–2002: Department for Transport, Local Government and the Regions

2002– Department for Transport

In 1910, the Road Board was set up to administer grants paid to local authorities for road improvements. Its functions were taken over by the new Ministry of Transport in 1918. In 1936 Trunk Roads Act transferred responsibility for main roads from local authorities to Ministry of Transport. In 1967 the Ministry of Transport issued "Road Safety - A Fresh Approach", a Paper proposing a wide range of measures to reduce the number of injuries and the Road Traffic Act 1974 was published. In 1980, the Parliamentary Advisory Committee on Transport Safety (PACTS) was set up followed by the Driving Standards Agency in 1990.

The role of the Department is to determine overall transport strategy and to manage relationships with the Agencies responsible for the delivery of that vision.

The Department was set up to provide a stronger focus on delivering the Government's transport strategy. The role of the centre of the Department is to set strategy and policy context, and to establish and manage relationships with the organisations that are responsible for delivery. The centre of the Department has been structured to reflect this role with a strong central strategy, delivery, communications and finance group.

The Transport Committee is charged by the House of Commons with scrutiny of the Department for Transport. Its formal remit is to examine the expenditure, administration and policy of the Department for Transport and its associated public bodies. Recently, The Transport Committee has decided to undertake an inquiry into the Government's strategic framework for road safety, which was published in May 2011. The Government's vision for road safety is to ensure that Britain remains a world leader on road safety and that the relatively high risk of accidents amongst some groups, such as cyclists and children from deprived areas, is quickly reduced. The Committee will examine whether the strategic framework will fulfil this vision.

2.3 The Road Safety Bill – a Case Study

DFT published its strategy for reducing road accident casualties over the next ten years in its report "Tomorrow's Roads - Safer for Everyone" in March 2000. The Road Safety Bill emanated from that strategy and aimed to improve road safety measures to reduce casualties on the roads. Bills and Legislation sets out the proposals for new laws, and plans to change existing laws, that are presented for debate before Parliament. A Bill is a draft law; it becomes an Act if it is approved by a majority in the House of Commons and House of Lords, and formally agreed to by the reigning monarch (known as Royal Assent). An Act of Parliament is a law, enforced in all areas of the UK where it is applicable. The passage of a Bill is shown in Figure 8.

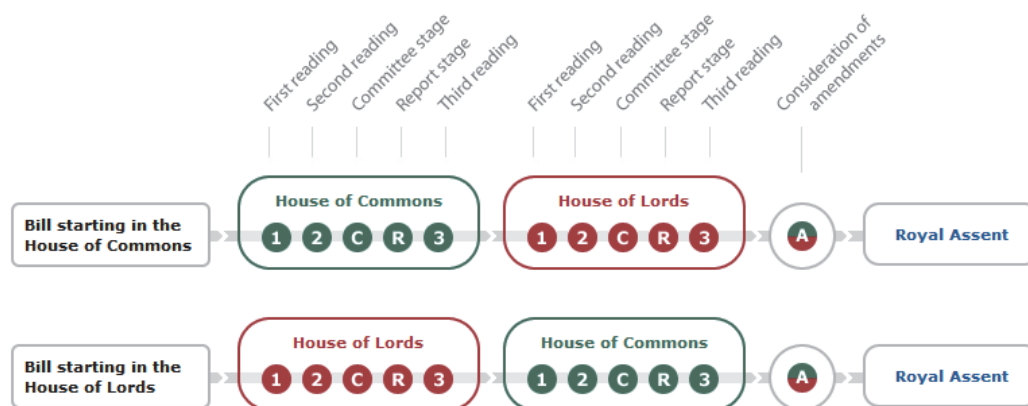


Figure 8 Passage of a Bill in the UK

The main provisions of the Road Safety Bill were:

- (1) Police given power to use roadside breath testing as evidence
- (2) Offenders disqualified for two years or more to re-take the driving test, closing a loophole allowing those at highest risk of re-offending to drive pending medical enquiries and encouraging take-up of the Drink Drive Rehabilitation Scheme and introducing an experimental scheme for alcohol ignition interlocks
- (3) Variable fixed penalties for speeding, increasing the range of penalty points from 3-6 to 2-6 and maximum penalties increased for other road traffic offenses
- (4) Bans the carriage or use of speed camera detectors and jammers
- (5) Exemptions from speed limits and other traffic restrictions allowed in certain cases, such as donor vehicles
- (6) Provision is made to prevent foreign drivers escaping punishment in the UK by requiring them to pay a deposit where an offence is committed

- (7) Gives police the power to detect uninsured driving through the use of Automatic Number Plate Reading technology
- (8) Gives police access to insurance data and confers new enforcement powers on vehicle examiners

Timeline:*Origin: House of Commons*

Introduced: 30 November 2004

Second reading: 11 January 2005

Programme motion: 11 January 2005

Money resolution: 11 January 2005

Committee stage: From 20 January 2005 to 3 February 2005

Remaining stages: 8 March 2005

*Responsible department: Department of Transport**Origin: House of Lords*

Introduced: 24 May 2005

Second reading: 8 June 2005

Committee stage: 27 June, 4 July, 17, 26 October 2005

Report stage: 22 & 29 November 2005

Third reading: 10 January 2006

COMMONS:

First reading: 11 January 2006

Second reading: 8 March 2006

Committee stage: 16, 21 & 22 March, 18 & 20 April, 19, 24 & 25 July, 4 & 5 October 2006

Report stage: 9 October 2006

Third reading: 9 October 2006

ROYAL ASSENT: 8 November 2006

3. Major Changes in Traffic Safety Policies and Regulations

3.1 Government Target Setting

One of the most recent strategic implementations in terms of traffic safety policy is that of target-setting. Having clear goals and identifiable measures of success provide direction and cooperation. By way of example the road safety strategy “Tomorrow’s Roads - Safer for Everyone” was published by the UK government on 1 March 2000⁶.

⁶ Prior to this the 1987 target to reduce road casualties by one-third by 2000 was more than achieved for deaths and serious injuries, cutting deaths by 39 per cent and serious injuries by 45 per cent.

Even though the UK has a comparatively good road safety record and the casualty reduction targets for deaths and serious injuries, set in 1987, were achieved, by the late 1990s the decline was lessening. Therefore the new strategy was formulated.

By 2010, the Government wished to achieve, compared with the average for 1994-98:

- a 40% reduction in the numbers of people killed or seriously injured in road accidents;
- a 50% reduction in the numbers of children killed or seriously injured; and
- a 10% reduction in the slight casualty rate, expressed as the number of people slightly injured per 100 million vehicle kilometres.

The strategy and targets were reviewed every three years and a Road Safety Advisory Panel was established to assist in that review process. The keys areas identified were:

(1) Safer for children

- babies and very young children - through advising their parents and first teachers on protection in cars and teaching safe behaviour on the road;
- primary age children - through child pedestrian training schemes and, later, cycle training, alerting parents to the risks of cycling in particular traffic conditions;
- older children - by providing road safety information as they change schools and go on longer journeys on their own; and
- older teenagers - providing advice as they contemplate much more independent mobility.

(2) Safer drivers - training and testing

- instil in young people the right attitudes towards road safety and safe driving;
- guide learner drivers to take a more structured approach to learning, to prepare them for their driving career, not just to pass a test;
- raise the standard of tuition offered by driving instructors;
- improve the driving test in the light of better understanding about what needs to be examined and effective ways to do it;
- focus on the immediate post-test period for novice drivers;
- enhance the status of advanced motoring qualifications;
- address the needs of professional drivers; and
- bring safety benefits for all categories of motor vehicle.

(3) Safer drivers - drink, drugs and drowsiness

- introduce new measures to reduce drink-driving further;
- develop more effective ways to tackle drug-driving;
- carry out research to improve understanding of drug-driving;
- strengthen and enforce laws on driving time for lorry, bus and coach drivers; and
- make people aware how much tiredness contributes to road accidents and advise drivers and employers how to cut the risks.

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- (4) Safer infrastructure
- ensure safety continues to be a main objective in designing, building, operating and maintaining trunk and local roads;
 - ensure safety continues to be part of the planning framework for main and local routes;
 - publish guidance about engineering for safer roads based on sound research and experiment;
 - use local transport plans to promote safer neighbourhoods; and
 - monitor progress on local efforts to reduce casualties.
- (5) Safer speeds
- publicise widely the risks of speed and reasons for limits;
 - develop a national framework for determining appropriate vehicle speeds on all roads, and ensure that measures are available to achieve them;
 - research a number of speed management problems to gain the necessary information to develop and test new policies; and
 - take into account environmental, economic and social effects of policies when assessing their ability to reduce accidents.
- (6) Safer vehicles
- improvements which prevent accidents happening in the first place;
 - improvements which protect car occupants in the event of an accident;
 - improvements which protect other road users;
 - better information for consumers, helping them to choose safer vehicles;
 - better standards of vehicle maintenance; and
 - renewed emphasis on new vehicle safety inspections by manufacturers and dealers.
- (7) Safer motorcycling
- to improve training and testing for all learner riders;
 - to publish advice for people returning to motorcycling after a break, and people riding as part of their work;
 - to ensure the quality of instruction;
 - through training and testing, to help drivers become more aware of how vulnerable motorcyclists are;
 - to promote improvements in engineering and technical standards which could protect motorcyclists better; and
 - to work with representatives of interested organisations, in an advisory group, to look at issues of concern.
- (8) Safety for pedestrians, cyclists and horse riders
- helping drivers become more aware of their responsibilities towards all vulnerable road users through better training and testing.
 - working with the CTC to develop cycle training courses for adults:
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- schemes to promote cycle helmets;
 - supporting training schemes for horse riders through the British Horse Society; and improving victim support systems.
- (9) Better enforcement
- more effective road traffic law enforcement;
 - better public understanding of and respect for road traffic law;
 - penalties more appropriate and proportionate to the seriousness of offences;
 - more emphasis on education and retraining; and
 - maximum use of new technology.

In 2010, the targets were met or exceeded with:

- 24510 people killed or seriously injured – down 41% from 41564 in 2000 (against a target of 40%)
- 184,138 slight injuries – down 34% from 278,719 in 2000 (against a target of 10%)
- 2502 children killed or seriously injured in the 0–15 age group – down 52% from 5202 in 2000 (against a target of 50%)

In parallel, a post-2010 strategy was considered, with a scoping study taking place in 2009 along with a consultation (Department for Transport, 2009). It provided a number of recommendations to inform the development of a road safety strategy beyond 2010. Consequently, the Strategic Framework for Road Safety was published in May 2011 highlighting the following areas for further improvement:

- (1) Make it easier for road users to “do the right thing”
- (2) Better education and training for children and learner and inexperienced drivers
- (3) Remedial education for those who make mistakes and for low level offences
- (4) Tougher enforcement for a small minority of drivers who deliberately choose to drive dangerously

The Road Safety Action Plan was developed as a result and more sophisticated methods of monitoring progress are under development with the Road Safety Outcomes Framework, to help local authorities assess and prioritise their actions.

3.2 Changes to the Driver Training Regime

Prior to July 1996, drivers in the UK were required only to pass a practical driving test, taken in a test centre local to the candidate and lasting for approximately forty minutes. The driving skills of the candidates are evaluated by driving examiners employed by the Driving Standards Agency (DSA), an agency of the Department for Transport. The tests are conducted on public roads, on one of several test routes selected for that particular test centre. The UK driving test covers a range of different types of road and driving conditions, as well as being required to pass an eyesight check, answer vehicle

safety questions and demonstrate a range of driving skills including a reversing manoeuvre and an emergency stop.

The Environment, Transport and Rural Affairs Committee (ETRAC) conducted an inquiry on Young and Newly-Qualified Drivers: Standards and Training in 1999 and made a number of specific recommendations, including the introduction of a Hazard Perception Test as part of the computerised theory test. ETRAC rejected suggestions for a probationary driver scheme and a proposal that the Pass Plus scheme be made mandatory.

Thus the Theory Test for Car Drivers (and Motorcyclists) was introduced in July 1996 and aimed to improve the safety of newly qualified drivers and includes assessment of:

- alertness
- attitude and safety margins
- hazard awareness
- vulnerable road users
- vehicle handling
- rules of the road
- road & traffic signs

The test is separated into two parts with the first consisting of multiple choice questions and the second part being the hazard perception test. Candidates must pass both parts of the test. Some of the multiple choice questions are presented in the form of a case study which shows a scenario followed by five questions. The subject of the scenario focusses on real life examples and experiences that may be encountered when driving.

With regards to effectiveness, the ‘Cohort II’ study was commissioned by the Department for Transport, in order to evaluate how different cohorts of learner drivers in Great Britain are trained. One of the aims of the study was to assess the impact of changes to the testing procedures, specifically the hazard perception test which was introduced during the period of study. The findings (Wels et al. 2008) indicate that the introduction of the hazard perception component in the theory test is associated with a small reduction in the likelihood of having accident:

“For reported non-low-speed accidents on a public road where the driver accepted some blame, the size of the accident reduction in the first year of driving for those who had taken the hazard perception test (controlling for age, sex, experience and exposure) compared with those who had not was at least 3%”.

There was also found to be a relationship between scores on the hazard perception test and levels of reported accidents in the first year of driving:

“For non-low-speed public road accidents, in which the driver accepted some blame, those in the highest scoring group in the hazard perception test had an accident liability estimated to be at least 4.5% lower than that of the lowest scoring group”.

3.3 Changes to Motorcycle Policy

Over the last sixty years there has been more substantial changes to motorcycle training than there has been for passenger car drivers. In 1960 law was introduced which limited all new riders to riding machines of less than 250cc with L-plates. In the early 1970's whilst 16 year olds were still allowed to ride mopeds (less than 50cc and restricted to 30 mph), the new learner age was raised to 17. In the 1980's a two part test was introduced with Part 1 requiring riders to complete a figure of eight, a slow ride and a junction crossing. Part 2 still required a test being conducted by an examiner watching from the side of the road. In addition, learners can no longer take a passenger on their motorcycle.

In 1990 the Part 1 test abolished and replaced by Compulsory Basic Training; meanwhile the Part 2 test is updated with a "pursuit" test whereby the examiner follows the learner in a car or on a motorcycle and communications via a radio headset. The road ride is approximately two hours in length.

In 2001, all new riders had to complete a theory test and in 2002, a hazard perception test was introduced as part of this test. More recently there have been moves to bring the UK motorcycle test in line with those in the rest of Europe.

With regards to the efficacy of these changes in training, there has been little longitudinal research completed in the UK. A scoping study (Sudlow, 2003) concluded that the UK motorcycle training industry

“is very fragmented, with many one-man or small businesses, a wide range of qualifications held by instructors, many agencies providing training and a wide variation in courses offered”.

In 2010 (compared with the 1994-98 average), there were reductions in the number of reported KSI casualties (of between 25 and 64%) for all of the main road user types, with the exception of motorcyclists where the number fell by 20%. However, over this period motorcycle traffic increased by 21 % in total (more than any other road user type), so that the KSI casualty rate for motorcyclists actually fell by 34%. Motorcycle traffic increased from the 1994-98 average until 2003. Since 2003, the traffic has been fairly volatile, with the 2010 traffic figure 10% lower than the 2008 figure; this volatility makes it quite difficult to assess any effects of training, without investment in experimental or longitudinal studies. The move to introduce compulsory helmet wearing in 1973 has undoubtedly decreased the likelihood of serious head injury. Hurt et al. (1981) concluded that the risk of death is more than halved if a helmet is worn.

Talking about improvement of helmet protection, Hopes and Chinn (1989) investigated the effect of helmet shell and liner stiffness on the ability of a helmet to protect the head. Research found that present helmets are too stiff and resilient, with the maximum energy absorption of the liner occurring at high impact velocities where the probability of death is high. Helmet shells and liners should be less stiff in order to provide maximum energy absorption at lower, more prevalent, impact velocities where the benefit of wearing a helmet can be more effectively realised.

3.4 Introduction of Mobile Phone Legislation

Following the rapid increase in mobile phone sales at the turn of the century, the government introduced a law banning the use of hand-held phones while driving. Following numerous roadside surveys that indicated wide-spread flouting of the law, the legislation was updated in 2007 whereby the maximum fixed penalty fine was doubled to £60, and three points could be added to offenders' licences (with 12 points comes a ban from driving). It was also announced that motorists will be prosecuted for using a hands-free phone if they are not in control of their vehicle.

Much effort has been taken by the government to support the legislation via educational campaigns, with particular reference to the Think! Campaign in 2009. The THINK! Road Safety publicity campaign was launched in 2000, as part of the Government's road safety strategy, Tomorrow's roads: safer for everyone (see earlier).

With the stricter legislation coming into force in February 2007, the campaign activities took place between January to March 2007 in order to raise awareness of the new penalties and of the dangers of using a hand held mobile phone whilst driving. TV, radio and on-line material was produced and the evaluation focussed on:

- (1) Awareness and recognition of the Mobiles campaign
- (2) Awareness of the change in legislation for using a hand held mobile phone whilst driving
- (3) Attitudes towards use of mobile phones whilst driving
- (4) Communication of the campaign's key messages

It was found that campaign awareness saw a steady decline since the high level of awareness achieved at the original post stage of research conducted in April 2007. Surveys to monitor mobile phone use by drivers have been carried out, commissioned by the government, since 2002. Each year the survey is carried out at 30 sites in the South East of England. Surveys take place throughout daylight hours and involve observers recording mobile phone use by drivers in free-flowing traffic, aided by a mobile phone detector. Since the previous survey in September 2008, the proportion of drivers observed using hand-held mobile phones whilst driving increased (from 1.1 per cent to 1.4 per cent for car drivers and from 2.2 per cent to 2.6 per cent for van and lorry drivers). There was also an increase in the number of drivers who appear to be using hands free mobile phones (from 0.5 per cent to 1.4 per cent for car drivers and from 1.1 per cent to 2.4 per cent for van and lorry drivers) was observed in the same period.

There is thus still room for improvement with regards to the effectiveness of the legislation – education and enforcement are key here. Further discussions within the academic community are taking place regarding the appropriateness of banning only hand-held mobile phones, when hands free phones have the potential to cause cognitive distraction (e.g. Lin et al., 2006).

3.5 Drink Driving Legislation

Driving whilst impaired by drink or drugs has been an offence in the UK since 1930. However, until the 1960s, impairment had to be proven. Following the publication of international research documenting the relationship between blood alcohol levels and involvement in road traffic accidents, in 1967 legislation was introduced such that it was illegal to drive with a blood alcohol limit above 80mg/100ml. Following that, evidential breath tests in police stations were introduced in the 1980s. This required a suspect to undergo road-side screening, and then, if the breathalyser indicated a positive result, this further breath test at the police station was performed which can be used as evidence.

Policies on drink driving have combined the enforcement of heavy penalties for drink driving and high profile advertising. A cultural shift has occurred – among the general driving population, drink driving is longer considered acceptable. Over recent decades there has been a reduction in deaths and serious injuries associated with drink driving, with current levels at around 400 deaths and 1600 serious injuries. The North Report (North, 2010) reported that “there is very considerable public support for a reduction in the current drink drive limit,that support is clear from the evidence to the Review, both written and oral”. It has been estimated that a reduction to 50 mg/100 ml would save between 43 - 168 lives.

3.6 Investment in Road Engineering

The variety of engineering solutions for improving traffic safety is too wide to go into detail here. However, the introduction of 20mph zones in the UK serves as a good example. They were introduced on the premise that urban roads account for a high number of casualties and that the majority of pedestrian casualties occur on residential roads. Given that speed significantly increases the chance of being injured in a collision and that studies have shown that accidents at speeds above 20mph are more likely to result in severe injuries, rather than slight injuries (Cuerden et al., 2007) it was thought that urban 20m zones could provide a way of significantly reducing the likelihood of a serious injury.

In December 1990 the Department of Transport set out guidelines for the introduction of 20mph speed limits whereby local authorities had to apply for consent from the Secretary of State to introduce one in their area. There were 450 20mph speed limits introduced between 1991 and 1999. Following that the law changed giving Highways Authorities more flexibility so they no longer had to apply for permission to implement a zone. The updated legislation made two distinct types of 20mph speed limit possible:

- (1) 20mph limits, which consist of just a speed limit change to 20mph and indicated by the speed limit (and repeater) signs, and
- (2) 20mph zones, which were designed to be “self-enforcing” due to the traffic calming measures that were also introduced

The Department for Transport encourages and supports Local Authorities to implement 20 mph limits and zones where there is a particular risk to vulnerable road users (DfT, 2006). The advice is that they should be implemented where average speeds are already low (below 24mph) or along with traffic calming measures. The latest figures in England are that by 2008 there were an estimated 2,148 20mph zones, of which 399 were in London.

With regards to their effectiveness, the first widespread evaluation of 20mph zones in the UK was carried out by Webster in 1996. They reported that injury accidents were reduced by 60%, and child injury accidents were reduced by 67%. Whilst there was a decrease in traffic by 27% in the zones during the evaluation, this was attributed to parallel bypass schemes. Hull, in the North of England led the way in wide-scale implementation of 20mph schemes – by 2003, there were 120 zones covering 500 streets and with a reported 56% decrease in accidents. The largest reductions were pedestrian casualties, which fell by 54%, with child pedestrian casualties falling by 74%.

TRL examined the effectiveness of 20mph limits that were implemented with and without traffic calming measures (Mackie, 1998). It was found that traffic calming was a more effective way of reducing vehicle speeds than signs only, which only produced a small reduction in speed.

The Department for Transport (DfT) guidance for the implementation of 20mph limits has evolved over time and currently stipulates that they should not be implemented on roads with a strategic function or on main traffic routes, and that they should be generally self-enforcing.

3.7 Primary and Secondary Safety Measures

While primary safety systems provide assistance to the driver in normal driving and in crash scenarios, secondary safety measures aim to lessen the consequences of the accident. The development of policy for both of these has been driven at the European level, but they are worth discussing in relation to theirs on the UK situation. A notable example of each will be covered.

With regards primary safety, Euro NCAP organises crash-tests and provides motoring consumers with a realistic and independent assessment of the safety performance of some of the most popular cars sold in Europe. It was established in 1997, and in its own words “has rapidly become a catalyst for encouraging significant safety improvements to new car design”. It is a non-profit international association, independent of the automotive industry, supported by seven European governments (France, Germany, Sweden, the Netherlands, the United Kingdom, Luxembourg, and the Catalonia region of Spain), consumer groups through International Consumer Research and Testing, European motoring clubs through the Fédération Internationale de l'Automobile, and the Motor Insurance Repair Research Centre (Thatcham).

By law, all new car models must pass safety tests before they are sold, but these are minimum standards. On the other hand, Euro NCAP encourages manufacturers to exceed these minimum requirements. Following testing, Euro NCAP releases an overall rating with a maximum of 5 stars for

each vehicle. The rating is comprised of scores for:

- adult protection (driver and passenger)
- child protection
- pedestrian protection
- safety assisting technologies

The underlying dynamic tests include full-scale frontal and side-impact tests, front-end component tests for pedestrian protection, and sled tests for whiplash prevention during rear-end crashes. The types of technologies that can increase a rating are seat belt reminders, speed limiters, and electronic stability control.

Since 2010, Euro NCAP Advanced awards higher rating to vehicles that are equipped with new technologies with a scientifically proven safety benefit for consumers and society. These technologies are usually crash-avoidance ones, which inform, advise or alert drivers to a potentially dangerous situation. Some also initiate autonomous braking. This provides an incentive to manufacturers to accelerate the availability of new safety equipment across all their vehicles (not just the luxury ones).

As an example of secondary safety, seatbelt and child restraint legislation has become more stringent in the past 50 years. Whilst home-made devices were used by some U.S. physicians as early as the 1930's and competing racing drivers in the U.S. were required to wear one, it was not until much later were they made mandatory. Voluntary belts were supplied in Volvos throughout the 50's and 60's, it was not until 1962 when the consumer magazine *Which?* strongly advocated belt wearing, revealing that a "first survey" of their effectiveness in Britain showed they would reduce the likelihood of death and serious injury by 60%. In 1965 it became compulsory to fit seat belts in the front of cars built in Europe (but not compulsory to wear them) and in 1967 front seat belts by law in the UK. A period of compulsory retrofitting took place in parallel there were various attempts to introduce a seat belt Bill.

Finally, in 1981, with an amendment to the Transport Bill which introduced seat belt wearing for a trial period of three years the Bill became law and from 31 January 1983, it became compulsory for drivers and passengers (adult and children) to wear seat belts for a three-year trial period. Over 90 % of drivers complied at that time. The law was retained, and modified to include a requirement that rear seat belts required to be fitted to new cars, with compulsory use following shortly after. The law continues to be effective, with the most recent observational survey reporting that the proportion of car drivers observed wearing seat belts is 95%, with rear passenger compliance being at 90% (PACTS, 2009).

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Author:

Dr. Samantha Jamson

Principal Research Fellow,
Institute for Transport Studies,
University of Leeds, UK

Dr. Jamson is a Chartered Psychologist at the Institute for Transport Studies, University of Leeds. She has been principal investigator on a range of projects including evaluations of driver support systems, road design, and driver impairment. She is a member of the British Standards group on Human Machine Interface issues and chaired a European Working Group on motorcycle safety, delivering high-priority research needs to the European Commission. Her research involves collaboration with national and international policymakers (Department for Transport, Highways Agency, European Commission) as well as industrial collaboration. Dr. Jamson has published widely in the field of traffic safety and is a member of the Editorial Board for Transportation Research Part F. She is currently supervising PhD students working in the areas of driver workload, fatigue, and medical impairment.