

Speeders–Hey! Not So Fast!



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The speed at which vehicles travel is a controversial and often discussed topic. Today, the UK- similar to Ireland - finds itself in a situation where 48pc of vehicles exceed the 30mph speed limit in free-flowing traffic on built-up roads – a fall from 53pc over the past five years. There is both support and opposition for setting and enforcing speed limits. As well as being a causation factor in around one third of fatal accidents, speed is an aggravating factor in the severity of all accidents. Vulnerable road users are particularly exposed to vehicle impacts - especially in urban areas - at speeds which are above the limits of human tolerance. This article looks at how speed limits came about, excessive and inappropriate speed, the psychology of speeding and the benefit of speed limiters on commercial vehicles. Finally, a conclusion is given.

Speeders – Hey! Not So Fast!

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“Speed thrills, but kills, this catchphrase are perfectly matched as more than in one-third of road crashes are due to over- speeding”.

Introduction

Mahatma Gandhi (1869-1948) ¹ once said: *“There is more to life than simply increasing its speed”*. This quote is not only about life, it is about everything, including driving. When people are in a hurry they are more inclined to make mistakes. Also, when driving, if they are speeding they’re more prone to having an accident or at least picking up a speeding ticket. Drivers who speed are also more likely to commit other driving violations such as red-light running and tailgating. If an individual drives more than 10/15pc above the average speed of the traffic around them, they are much more likely to be involved in an accident or incident. Research indicates that the probability and severity of a crash taking place is strongly influenced by vehicle speed and driver inattention. Higher speeds mean that drivers have less time to identify and react to what is happening around them, and it takes longer for the vehicle to stop. It removes the driver’s safety margin and turns near misses into crashes. Speeding is a serious societal and public health issue in all countries. Speed has many positive impacts, the most obvious being that it allows a reduction in journey times and therefore enhances mobility. However, speeding has also some strong negative consequences (e.g. on road safety and the environment) and can contribute to significant adverse impacts on the livability of residential and urban areas. So, when planning a journey, plan ahead to allow extra time to get to your destination, take time to call ahead if you’re running late, and drive safely. “Speeding” for the ordinary driver is one thing, but what is it like to drive and break the sound barrier. On 15th October 1997, Royal Air Force (RAF) pilot Andy Green OBE became the current holder of the Outright World Land Speed Record in his Thrust SSC, a twin turbofan jet-powered car which achieved 763.035 mph – 1227.985 km/h over one mile. This was the first supersonic record as it broke the sound barrier at Mach 1.016. ²

¹ Mohandas Karamchand Gandhi was an Indian lawyer, anti-colonial nationalist and ethicist, who employed non-violent resistance, to lead the successful campaign for India’s independence from British rule, and in turn inspire movements for civil rights and freedom across the world. At 78 years of age, Gandhi was shot and killed by Hindu extremist Nathuran Godse, who was upset at Gandhi’s tolerance of Muslims.

² FIA World Land Speed Records. fia.com

Locomotives Act 1861 & 1865

The UK has speed limits longer than it has had motor vehicles. The idea persists that traditionally our roads had no speed limit, and the imposition of the National Speed Limit meant eroding an historic freedom, but in fact restrictions on the speed of road traffic have been a feature of British laws for centuries. So, how did we get the speed limits we got today? The first speed limit may have been in 1861- the Locomotives Act, which regulated the use of steam locomotives and traction engines on the open road. It set a maximum speed of 10mph in open country and 5mph in towns with fines of 10 shillings (50 pence) for exceeding either. Convictions must have been scarce, because there was no instrument or means of knowing or in the hands of the police that could have indicated how fast a vehicle was travelling. The heady days of tearing around at breakneck speeds of 10 mph were short-lived, because just four years later the Locomotive Act (1865) lowered speed limits to four and two mph.. Presumably, drivers would be convicted of speeding if a policeman couldn't overtake the engine at a gentle walking pace. Over the past five decades, society and individuals have benefited greatly from rapidly improving road systems. During the same period, industry has manufactured and sold motor vehicles able to travel at increasingly high speeds. Higher speed vehicle transport has contributed to the economic development of European countries, and has contributed to improvements in the general quality of life.

Reduce Adverse Impacts

On the other hand, these higher vehicle speeds have had major adverse impacts, principally in terms of road accidents - and consequent death, injury, and material damage but also in environmental terms including noise and exhaust emissions and in terms of the livability of residential and urban areas. Recently, there has been increasing demand, particularly in urban areas, for strategies that reduce such adverse impacts. A growing portion of the population has sought to improve road safety, reduce adverse environmental impacts and improve the general quality of life. In urban areas in particular, residents are increasingly in favour of lowering vehicle speeds in order to protect the environment, provide a better level of amenity for the general resident population, better protect those living near roads, and in particular ensure the safety of pedestrians, cyclists, children and people with reduced mobility. Speed management policies which can deliver these outcomes have become a high priority in many countries. The effects of speed have many positive impacts, the most obvious being that it allows a reduction in journey time and therefore enhances mobility.

Excessive & Inappropriate Speed

Advances over the past century in roads, motor vehicles and road transport have decreased travel times significantly – and have also contributed to the development of national economies, facilitated access to employment, goods and services and facilities such as hospitals, entertainment and shopping centres, and in turn widened opportunities for housing, jobs, etc. These advances have clearly contributed to improvements in the general quality of life. Speed also has some strong negative consequences (e.g. on road safety and the environment) and can contribute to significant adverse impacts on the livability of residential and urban areas. The problem of excessive and inappropriate speed is the number one road safety problem in many countries, often contributing to as much as one third of fatal accidents and is an aggravating factor in all accidents. Speeding - which encompasses excessive speed (i.e. driving above the speed limits) or inappropriate speed (driving too fast for the prevailing conditions, but within the limits) - is dangerous. As well as being a causation factor in around one third of fatal accidents, speed is an aggravating factor in the severity of all accidents.³ It also has serious consequences on the environment and energy consumption. Therefore, speed management could be the answer. Speed management can be defined as a set of measures to limit the negative effects of excessive and inappropriate speeds.⁴

Road Fatalities - The Biggest Contributing Factor

In GB in 2015, 217 people were killed in crashes involving someone exceeding the speed limit and a further 132 died when someone was travelling too fast for the prevailing conditions.⁵ In Ireland, between 1996 and 2004, 29pc of road fatalities were due to speeding which was the biggest contributing factor. In 2005, there were 9,557 speed-related fatalities on US roads. In fact, speed was a contributing factor in 27pc of all fatal car crashes that occurred in 2015, according to the National Highway Transportation Safety Authority (NHTSA). In all injury accidents, as the impact speed increases, the forces that vehicle occupants must absorb in a crash increase dramatically, in accordance with kinetic energy principles. Occupant protection systems are very effective at low and moderate speeds. However, they cannot adequately protect vehicle occupants from these kinetic forces at high impact speeds. Vulnerable road users are particularly exposed to vehicle impacts - especially in urban areas - at speeds which are above the limits of human tolerance.

³ OECD. Executive summary speed management. ECMT. (2006). observatoriumbrd.pl

⁴ OECD organisation for economic co-operation and development. ECMT European Conference of Ministers of Transport. *Speed Management*. OECD, 2006. OECD Publishing, Paris, France.

⁵ RoSPA. Inappropriate Fact Spreadsheet. June 2018. Rospa.com

From a safety perspective, the threshold of physical resistance of the human body to the energy released during an accident (which is related to the impact speed) is a critical input to the assessment of appropriate speed. For example, the World Health Organization (WHO, 2004) has highlighted that pedestrians incur a risk of around 80% of being killed at an impact speed of 50 km/h, while this risk is reduced to 10% at a 30 km/h impact speed. This human impact factor suggests that in urban areas with a high concentration of pedestrian activities, the appropriate speed should be below 30 km/h. The speed limit setting process should take into consideration elements such as road alignment and surface quality, as well as the number and location of people living along the road and the presence of pedestrians and other vulnerable road users.

A Widespread Social Problem

The proportion of drivers of passenger cars driving above the speed limit on single carriageways in 2003 was 30pc in Ireland. But in the UK in 2005 it was just 10pc. Speeding is the number one safety problem in a large number of European countries. It is responsible for around one third of the current unacceptable high level of road fatalities. Speeding has an impact not only on accidents but also on the environment, energy consumption and quality of life particularly for residents in urban areas. Reducing average speeds by as little five per cent will save around 20pc of current fatalities. Reducing speed will also reduce the environmental and social impacts associated with excessive speed, especially in urban areas. Appropriate speed limits should also take into consideration by noise levels generated by traffic for people living in the surroundings. However, there is no magical formula for defining appropriate speed on a given section of road, as it takes into account a wide variety of factors.⁶ Excessive speed is a widespread social problem, which affects the entire road network (motorways, main highways, rural roads, urban roads). Typically, at any time, 50% of drivers are driving above the speed limit. Often, drivers exceed speed limits by less than 20 km/h. but a proportion of drivers travel at speeds more than 20 km/h above the limit. Speeding concerns all types of motor vehicles and all groups of road users. However, young drivers are the group most involved in speeding behaviour. The significant adverse road safety impacts of higher vehicle speeds have been confirmed by extensive research. The relationship between serious injury accidents, fatal accidents and speed has been modeled by many researchers.

⁶ OECD. Executive summary speed management. ECMT. (2006). obserwatoriumbrd.pl

The Psychology of Speeding

There are many reasons why people speed. Social norms often lead to speeding being considered justifiable because many other drivers speed and existing rules of thumb (e.g. thinking authorities will turn a blind eye to speeding, or not enforce it in a certain area) are thought to maintain this behaviour.⁷ Also, people admit to taking deliberate risks, but tend to defend occasional speeding with reasons such as: own speed choice felt safe; the driver has their own personal experience on the road; the speed limits were too stringent or out of date due to modern car technology; the roads were empty; the journey is thought to be of little risk (e.g. motorway travel); being in a rush/time pressure; anger, stress and emotions (particularly connected to congestion and urban driving); thrill seeking (particularly younger drivers with a risk-taking personality); boredom, particularly on long journeys; and lapses in concentration. People can also find themselves speeding unintentionally, and this is often found to be the case when keeping up with other traffic. Additionally, signaling others for police traps is often found in country and urban roads. This may be explained by the fact that drivers exceeding speed limits want to express their brotherhood feelings against a common ‘enemy’ (the police) and protect other drivers exhibiting similar behaviour (breaking speed limits) from being fined or arrested. People also find that not paying attention to the speedometer can lead to inadvertently travelling over the speed limit.⁸ It has also been found that people’s perceptions of other people’s speeds are inaccurate. The ability of humans to judge speed accurately resulted in the introduction of the speedometer in cars in the first decade of the 20th century. The speedometer is essential to the driver for maintaining a desired speed, particularly for observing speed limits. At typical analogue (moving needle) speeds with very high maximum speed indications (as on high performance cars and motorcycles), the closely spaced markings make significant changes in speed relatively less noticeable by the driver than would be the case if the markings were further apart. Digital speedometers offer a number of benefits: more legible, more ‘neutral’ (one does not see high speed). But there are also disadvantages, such as inertia (to avoid the displayed speed changing all the time).

Phenomenon of Adaptation & Velocitation

Aberg et al. (1997)⁹ found that more than 50% of drivers failed to respect speed limits despite most claiming to be in favour of compliance.

⁷ DfT 2010a. *Speed limits—a review of evidence*. Elizabeth Box, Edited by David Bayless. RAC Foundation. August 2012.

⁸ (DfT, 2010c).

⁹ Ahberg et al 1997. *Observed vehicle speed for drivers - perceived speed of others*. researchgate.net

Given this finding it is clear that other variables, other than willingness to obey the law, influence the observation of speeds. Drivers who overestimate the speed of other vehicles are also more likely to maintain higher speeds. A study by *Lerner et al. (2005)*¹⁰ found that, as well as teenage drivers in general driving slightly faster than the average population, male drivers tended to drive faster than female drivers and this was significantly influenced by the presence of a male passenger. For the male driver group, the difference in speed between the male passenger and female passenger conditions was almost 5 mph.¹¹ Distortions in speed estimation have also been attributed to the rate at which drivers accelerate or decelerate. It has been observed that the sharper the deceleration the greater the error in the estimation of speed (*Denton, 1967*).¹² Managing these transitional situations is said to be difficult for drivers (*Saad, 1983*),¹³ and it has been found that drivers who have travelled a long distance on motorways tend to drive faster than other drivers once they have left the motorway (*Nouvier, 1987*).¹⁴ This is known as the *phenomenon of adaptation*, which reduces the sensation of speed the longer the driver remains behind the wheel.¹⁵ Similarly, *velocitation* is caused by long periods of high speed travel. The eyes become fatigued in the horizontal plane to images streaming through the windscreen. Velocitation can be noticed when entering built-up areas after long periods of country driving. The speed drops for 100km/h to 60km/h makes the driver think the car is moving much slower. The eyes can no longer judge horizontal velocity correctly and as such cannot judge following distances. The only remedy to stop the images streaming through the windscreen is to stop and park for several minutes to allow the eyes to rest.¹⁶ Human factors research indicates that reducing the noise level in vehicles can, in the absence of other limiting factors including traffic and drivers' reference to the speedometer, cause drivers to increase their speeds. Interior noise levels have been reduced in recent years as the manufacture and design of vehicles have improved. The increased use of air conditioning, double-glazed side windows (now featured on a few premium car models) and other noise-reduction techniques has gone some way to skew a driver's perception of speed. However, it should also be remembered that these applications have also had a positive impact on road safety, as they help to reduce fatigue and other stress factors associated with driving.

¹⁰ Lerner et al 2005. *The observed effects of teenage passengers on risk driving behaviour of teenage drivers*. ncbi.nlm.nih

¹¹ (OECD/ECMT, 2006)

¹² Denton 1967. *Influence mechanism of visual perception in drivers speed*. google.com

¹³ *Speed management 2006* by European Conference of Ministers of Transport. books.google.ie

¹⁴ *Speed management 2006* by European Conference of Ministers of Transport. books.google.ie

¹⁵ *Speed Management 2006* by European Conference of Ministers of Transport. books.google.ie

¹⁶ *Safe drive training - driving vision*. sdt.com.au

How vehicle gearboxes are staged also has an impact on a driver's speed decisions, especially in urban areas, where the staging of gearboxes can make it difficult for vehicles to respect the speed limit with ease.¹⁷ Peripheral and central vision is important components that help a driver establish appropriate speed. Early studies in the 1960s revealed the role played by peripheral vision in estimating driving speeds (*Salvatore, 1967*).¹⁸ Speeds are estimated more precisely in peripheral vision and underestimated in central vision, which goes some way to explain why drivers underestimate speed on wide roads that lack points of reference.¹⁹

Won't Be Prosecuted

Despite higher speeds, motorways are generally the safest roads, due to their higher design standards. Most countries interurban motorways have a speed limit of 120/130km/h. While there is no legally enforced speed limit on approximately half of German motorway networks, the recommended top speed is 130km/h. Furthermore, in the event of an accident on such roads the driver is automatically held responsible if it is proven that he or she was travelling above 130km/h. Speed limits must be credible given the characteristics of the roadway and the surrounding environment. For example, there should be a clear difference between speed limits on motorways and other roads in order to maintain the attractiveness of motorways, which is the safest road category. Almost 6,000 British drivers are caught speeding every day – up 30pc on five years ago, therefore, is it time for a higher 80mph motorway speed limit? Road safety experts have admitted that upping the national speed limit on motorways could actually help reduce these numbers – without risking safety. Holland has already increased the limit and previous studies have found the majority of British drivers would back a UK trial. That's mainly because the majority of British drivers already drive at 80mph because they believe they won't be prosecuted. Department for Transport (DfT) figures show that as many as 49pc of drivers currently flout the current 70mph limit. With increased speeding fines, breaking the speed limit is no trifling matter. But is the current speed set at the right limit in the first instance? But over 50 years on, is the 70mph speed limit still the right speeds for motorways? Some parties argue that safety features and modern technology has made driving easier and safer, so is it now time to raise the speed limit? Equally, there is talk of reducing speed limits on certain sections of motorway to deal with air pollution.

¹⁷ *ibid.*

¹⁸ *Speed management 2006* by European Conference of Ministers of Transport. books.google.ie

(Increasing the motorway speed limit to 80mph is worthy of further consideration, provided that ‘ordinary’ drivers have effective control and the requisite knowledge and driving skills to handle their vehicle at such speeds. Ed.)

Speed & Accidents

If you are in a vehicle travelling at 100kmh (62mph) and you weigh 50kgs (130 lbs), your stored energy at this speed is 22,774 joules.²⁰ If you are forced to stop in a short distance of say 3mts (9.8ft.), at this speed your body would be subjected to a 75kg force. Therefore, over three quarters of a tonne would in all probability be severely applied to your body by a combination of seat belt material, metal, plastic and engine parts. Modeling on the impacts of higher vehicle speeds has led to the following rule of thumb: a 5% increase in average speed leads approximately to a 10% increase in all injury accidents and a 20% increase in road fatalities. The same research indicates the positive impacts on reducing vehicle speeds: a 5% decrease in average speeds leads to approximately a 10% decline in injury accidents and a 20% decrease in fatal accidents. Reducing speed a few kilometers can thus greatly reduce the risk of accidents as well as mitigating the consequences of an accident.²¹ There is a higher likelihood of a crash as speed increases. In a 60km speed limit area and travelling at:

- 65km you are 2 times as likely to have a serious crash
- 70km you are 4 times ditto
- 75km you are 10 time ditto
- 80km you are 32 times ditto

Speed Limiters – A Legal Requirement?

An EC Directive (92/24/ECE requires road speed limiters (RSL) on trucks over 12 tonnes and buses manufactured after 1 January 1988. The specified limits are 90 to 100 kmh respectively. The Directive has since been extended to light commercial vehicles over 3.5 tonnes and passenger vehicles with more than nine seats. (ECE 2004/11). Research supporting the regulations showed positive effects on emissions and fuel consumption through prevention of over speeding. The EC Directive requires RSLs to be generally resistant to tampering and not to be adjustable while the vehicle is in motion. However, the illegal modification of RSLs to allow higher speed continues to be a problem. Transport operators generally favour RSLs for their positive effects on fuel consumption.

²⁰ One joule is one Newton of force acting through one metre.

²¹ Nilsson G. (2004) Traffic Safety Dimensions and the Power Model to Describe the Effect of Severity on Safety. Lund Institute of Technology, Department of Technology and Society Traffic Engineering.

However, RSLs do nothing to reduce speeding on roads with speed limits below the RSL setting or on downgrades steep enough to cause free-rolling. In some cases, truck drivers may be tempted to always reach the maximum speed set by the limiters. In addition, overtaking between two LGVs may take a considerable time. However, overall, RSLs have contributed significantly to reducing accidents involving trucks. There are many countries where RSLs are not used and consideration should be given to mandatory RSLs for trucks and coaches. Speeding of commercial vehicles in EU member countries has increased in recent years. This is partly due to the fact that trucks are equipped with more powerful engines to handle heavier loads and to maintain trip times and that the demands of industry for “just in time” deliveries place additional pressure on transporters to operate trucks at higher speeds to make up for potential delays. European and Australian transport authorities have responded to the resultant speeding by legislating the use of speed limiters. RSLs act independently of the engine governors, although the two functions are increasingly interrelated into “power train” computers. It’s a legal requirement for speed limiters to be fitted to vehicles with more than eight passenger seats, such as busses, coaches and limousines, as well as goods vehicles with a maximum laden weight of more than 3.5 tonnes. Speed limiters usually work by restricting the fuel supply to the engine when the vehicle reaches its maximum speed. Many fleet operators also fit them in a bid to reduce Co2 emissions and improve fuel economy. Most manufacturers are also now offering manual speed limiters, which drivers can set themselves. They’re a useful way to ensure you don’t unintentionally break the speed limit in, say average speed zones. The European Commission provisionally approved rules that speed limiters will become mandatory for all vehicle sold in Europe from 2022. In the UK, the Department for Transport says it will follow suit, even after their exit from the EU.

Speeding- the Solution?

If we had to develop a completely new road transport system – which for most countries would be a purely theoretical exercise – the following would be the sequence of events: new roads would built, each having a clear and well defined function, which would be reflected in its design. By their design and construction, these roads would guide the drivers into driving at the appropriate speeds. To guide them even further, posted signs with speed limits, which would be fully credible and compatible with the appropriate speed. Dynamic speed limits would be used as often as possible, taking full account of the specific local conditions. To assist the driver further, there would be clear road markings and clear signs to provide the driver with relevant information on the speed to be adopted. At the same time, vehicles would be designed in a way that would discourage drivers from speeding.

To make drivers aware of the danger of excessive speeds, road information campaigns would be created also programmes to educate the population from childhood about the dangers of high speed and, during training courses; drivers would be taught about the adverse impacts of driving at high speeds. Despite all this, some drivers could – voluntarily but also inadvertently – drive too fast for the prevailing conditions. To avoid this, an enforcement strategy would be developed by implementing both manual and automatic enforcement. In a longer term, to avoid “inadvertent” speeding, cars would be equipped with technologies to warn drivers when driving too fast and possibly control the speed of the vehicle. Further technologies would continue to develop. All these measures would be implemented in harmony with each actor of the chain well informed about the actions taken by the others. In turn, excessive and inappropriate speed would only be an exceptional event.²²

Conclusion

Speeders are a high-risk group. Their speeding behaviour is not likely to be controlled without proper training, road safety education, vigorous and consistent enforcement including the use of automated technology. Speed has been found to have a very large effect on road safety, probably larger than any other known risk factor. Speed is a risk factor for absolutely all accidents, ranging from the smallest fender-bender to fatal accidents and is greater for serious injury accidents and fatal accidents than for property damage-only accidents. If government wants to develop a road transport system in which nobody is killed or permanently injured, speed is the most important factor to regulate. Driver speed choice may not always be perfectly rational; hence, a legitimate basis exists for limiting the freedom of choice with respect to speed. The need for such regulation is very widely recognized, as nearly all motorized countries have an extensive system of speed limits and a programme of enforcement. Speed limits and their enforcement are very important road safety measures. Comprehensive measures are required which are best developed as part of a coordinated speed management policy package. What contributions can be made by infrastructure improvements, speed limits, signage, and education, as well as by enforcement? Which are the most cost-effective elements of a speed management policy? What are the prospects for the use of new technologies which encourage drivers to choose appropriate speeds and assist in achieving greater compliance with speed limits? To have an effective impact on driver behaviours, speed countermeasures must take into account the psychological aspects of speed perception.

²² Speed Management 2006. European Conference of Ministers of Transport. (ECMT)

This is particularly important when addressing the issue of speed reductions in transition situations e.g. entering urban areas. To address the problem of excessive speed, special management measures must be developed on a very large scale – for all types of vehicles, on all types of roads. This requires the involvement of a variety of actors in the transport field, especially authorities responsible for road transport systems, as well as other stakeholders and generally the community at large. As mentioned above, the problem of excessive and inappropriate speed is the number one road safety problem in many countries, often contributing to as much as one third of fatal accidents and is an aggravating factor in all accidents. Speeding - which encompasses excessive speed (i.e. driving above the speed limits) or inappropriate speed (driving too fast for the prevailing conditions, but within the limits) - is dangerous. As well as being a causation factor in around one-third of fatal accidents, speed is an aggravating factor in the severity of all accidents. Remember that following a serious crash where the driver or occupants are injured, spare parts for humans are not as original as those for cars. Finally, drivers should use speed intelligently and drive fast only in the right places because any fool can drive fast enough to be dangerous. Therefore, rather than “flooring it” or putting the “pedal to the metal”, it’s better to lose your speed rather than lose your vehicle and possibly your life, but that’s entirely your prerogative. Remember that “stepping on the gas” kills more people than inhaling it, better late here than early hereafter.