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Lifelong education: the context in terms of road accidents

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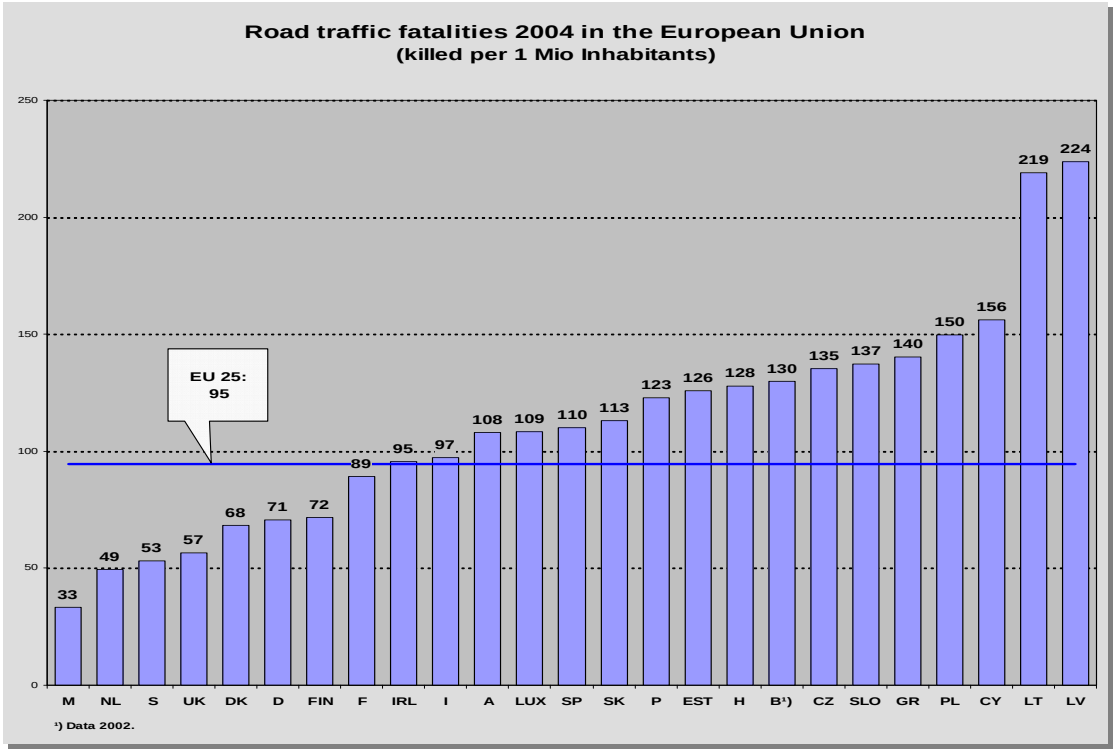
Abstract

56% of traffic participants in EU get killed in cars, followed by 18% on two wheel vehicles and 15% die as pedestrians. Young and older people are much more likely to be injured or killed as car drivers when taking kilometres driven and the deviation of the population into consideration. In general the main cause of accidents is inattention (about one third). In detail accident causes can be attributed specifically to age groups. Driver education programmes for each age group and the driving test shall be optimised in order to fit optimal to the specific accident causes.

Accident figures in EU

Accident figures vary significantly between EU-countries. But the influencing factors vary also form country to country and can not be controlled exactly (graph 1). Therefore, to gain clear results for recommendations on how to improve road traffic education and safety, only specific research studies can provide solutions. In average 96 traffic participants per 1 million inhabitants get killed in EU member states. These figures rages from 33 killed in Malta to 224 in Latvia. The fewest people die in The Netherlands, Sweden, United Kingdom, Denmark and Finland.

Graph 1: (Source: CARE)



56% of traffic participants in EU get killed in cars, 18% on two wheel vehicles, 15% as pedestrians, 5% in Lorries and heavy goods vehicles, 5% on bicycles, and only 1% in buses and coaches.

Referring to CARE Database fatalities in EU-countries decrease over the years, but injury accidents don't.

Following IRTAD the fatality rate per motor vehicle kilometre is about 3 times higher on non-motorways than on motorways.

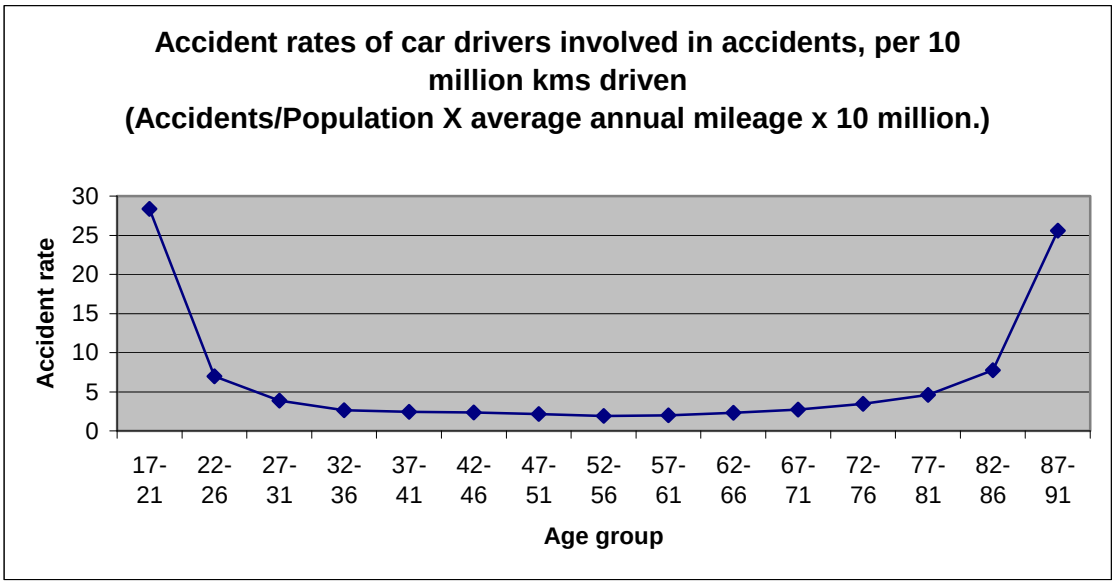
The accident risk differs between genders. More male than female pedestrians get killed in EU-member states, except in Finland (CARE).

Female car drivers have fewer accidents because they drive less. In Austria it was found that females have more accidents per kilometres driven, but male's accidents are the more serious ones (Bartl & Hager, 2006). The same result was found for USA: Female car drivers have more injury accidents, male care driver more fatalities per mileage (Williams, 1996).

The risk of getting killed in an car-accident with personal injury is about eight times higher without wearing a seat belt or a child restrain system than with a belt or a child restrain system (Source: Statistik Austria). The seat belt wearing rates vary within EU member states. But the methods of reporting the wearing rates vary too. Hence, a clear comparison is difficult.

The clearest distinction between different accident risks can be found when analysing different age groups of drivers. Two studies from Sweden (Mattsson & Grummas Granstroem, 2000) and recently from Austria, see table 2, (Bartl & Hager, 2006) show, when taking kilometres driven and the deviation of the population into account, young drivers have a nine to twelve times higher risk to get injured as a car driver than a driver at the age between 30 and 60 years. And at the end of eighty years the risk again is almost as high as the risk for young drivers. These are exposure corrected figures.

Graph 2:



In absolute figures older drivers have the fewest accidents, but only because many of them do not drive anymore, if they drive they drive few kilometres only and finally older people have a smaller share of the population than mid age and younger ones.

Following the results of the very recent study from Austria the accident risk increases considerably at the age of mid seventy.

The figures for average kilometres driven were gathered in this study by 1,000 randomly selected telephone interviews. These figures were compiled together with the data for injured and killed car drivers per age group and the deviation of the Austrian population (Source: Statistik Austria).

Exposure according to age group:
Number of Austrians according to age group multiplied with average mileage.

Calculation of the accident risk for Austrians according to age group and per car-driven kilometres can be calculated using the following formula:

$$\frac{\text{Number of car drivers in accidents according to age group}}{\text{Exposure}}$$

To make the results clearer, they were multiplied by 10 million. Statistically seen, the accident risk is portrayed in the graph 2 above.

The results in detail are: For every 10 million kilometres driven by 17-21 year old Austrian car drivers, 28 have accidents in this age group every year. This constitutes an accident risk which is 12 times higher than that of a driver between 32 and 61, whose accident risk is 2.3 accidents per 10 million kilometres driven. Austrians between 72 and 76 have 1.5 more chance of an accident compared to an average-aged driver, for drivers between 77 and 81 it is 2 times higher, for 82 to 86 year olds it is 3.3 times higher and for 87 to 91 year olds it is 11 times higher. (The age categories are split into periods of 5 years, starting at the age of 17.)

High risk group older drivers

It is interesting to see, that many initiatives have been started to decrease the accident risk of young drivers, but non to reduce the accident risk of older drivers. Older drivers are more likely to have an accident at crossroads, referring to the EU-project AGILE. Their hazard perception skills and willingness to make more eye movements as well as their concentration skills shall be optimised in order to reduce their risk. Older drivers are more likely to be involved in falling asleep accidents especially in the afternoon (Pack et al., 1995).

High risk group young drivers

Young drivers primarily get killed in single vehicle accidents. Young drivers with high risk attitudes and high risk lifestyle are more likely to get involved in accidents (e.g. La Cour Sell, 2006; Schulze in e.g. Kroj & Schulze, 2002; Sagberg, 2002 and Engstroem et al, 2003). These results refer to level 4 of the GDE Matrix (e.g. Keskinen, 1996): Values, Personal attitudes, lifestyle.

The accident risk of novice drivers decreases from the first months on as a consequence of practicing (Maycock, 1991; Kroj & Schulze, 2002; Schade, 2001; Willmes-Lenz, 2004; Gregersen, 2000 and Bartl & Hager, 2006).

Especially Maycock found, that the accident risk for younger novice drivers is higher than for older novice drivers. Taking into account the accident decrease beginning in the first months, post licensing measures have to take place as early as possible after licensing. 3 Years later like in Switzerland and 2 years in Luxembourg (EU-project DAN) must fail. In Austria a 10% reduction of novice drivers accidents have been observed during the first two years after implementing the second phase system. The accident decrease of experienced drivers in the same period was only 3 % (Bartl & Esberger, 2006 and Bartl, 2006). The earlier significant results of accident decrease in Finland after implementing a second phase are evident (Katila et al., 2000).

An interesting detail concerning the pass rate of the practical driving test was found in Luxembourg: Drivers who passed the test the first time and reported low stress during the test had more accidents during the first two years than those who did not pass the test the first time and reported high stress during the test (Pannacci & Margue). When optimising the driving test these results shall be taken into consideration.

For the education of young novice drivers it can be recommended, that traffic education must not only focus on vehicle manoeuvring, but also on attitudes and motivation (levels 3 and 4 of the GDE-Matrix).

Main accident causing factors

For all drivers it has been found that inattention appears to be the main accident factor at all. Maycock (1995, 2002) carried out a questionnaire study with male drivers and found that the majority of accidents were caused by inattention, followed by misjudgement.

A follow up study by Bartl & Hager (2006) in co-operation with the Austrian federal institute for traffic analysed in 2,128 face to face interviews 852 guilty accidents of both genders, found the same result as Maycock and analysed for the first time also the reasons why being inattentive.

In the following the results of Bartl & Hager are presented in percentage terms of the primary accident causes according to frequency, when considering all the accidents analysed in this study.

1. Inattentiveness/Distraction

In determining primary accident causes, inattentiveness or distraction was found to be responsible for 35,6% of the 853 accidents investigated. When divided according to accident gravity, inattentiveness was responsible for 39,3% of accidents involving light material damage, for 25,5% of accidents involving moderate to heavy material damage and for 20,6% of accidents involving personal injury. These differences are significant (Chi-Square, p=,000).

When looking at the exact nature of the inattentiveness which caused these 35,6% of accidents, the first reason, with 17,1%, was being ‘lost in thought’, followed by

'intensive discussions' in the car with 4,6%, distraction due to mobile phones with 4,3%, busy doing something (radio, smoking, eating…) with 3,9%, distracted by something interesting in the street with 2,8%, distraction due to a child-passenger at 1,4% and 'other' distractions at 1,6%.

Also when taking into account accident gravity, being 'lost in thought' was the primary factor.

2. Inappropriate Speed

In second place as an accident cause, and far behind distraction, 14,4% of accidents were explained by inappropriate speed. It is plausible that only 10% of accidents involving light material damage could be put down to speed, whereas it was 23,6% for accidents involving moderate to heavy material damage. 8,8% of accidents involving personal injury could be explained here by inappropriate speed. These differences are significant (Chi-Square, p=,000).

The reasons for inappropriate speed were explained primarily by stress or being in a hurry (6,5%), followed by thoughtlessness (4,2%). Other factors such as excessive speed due to aggression or annoyance, enjoying speed or testing ones skills led to 1% of the accidents. Frustration, showing off and other factors were named in less than 1% of cases as the main cause of the accident.

When taking into account the gravity of the accident, stress and being in a hurry remained the primary explanations for inappropriate speed. Though 2,9% of accidents involving personal injury due to excessive speed came about as a result of frustration.

3. Lack of experience

In 14,1% of cases an incorrect assessment of the situation as a result of a lack of experience with such specific situations was thought to be the primary cause of the accident (particularly due to overlooking or wrongly anticipating something). In these cases the drivers had basic skills but they had not yet experienced such a situation and consequently could not rely on prior experience. Lack of experience led to 11,8% of accidents involving moderate to severe material damage or personal injury and to 14,1% of accidents involving minor material damage. As one would expect, this accident cause was found considerably more frequently amongst young drivers.

4. Safety margins

Lack of proper safety margins in relation to the vehicle in front was found to be the main cause of the accident in 9,6% of cases. In accidents with minor material damage this percentage was 11,1, with moderate to serious damage it was 7,8 and in the case of accidents with personal injury it accounted for 2,9% of cases.

The main reason for the lack of proper safety margins was found to be thoughtlessness (4,9% of all accidents), followed by stress or being in a hurry (4,1% of all accidents). Other emotions apart from stress such as aggression, frustration, showing off, feeling powerful, having fun, etc, only accounted for about 0,6% of all accidents.

5. Unexpected events

Sudden unexpected external events were considered to the main cause of the accident in 9,3% of cases. These essentially external factors such as wild animals, sudden blinding due to lights, technical dysfunctions, etc was responsible for 7,5% of accidents involving light material damage, 12,2% of accidents with moderate to serious material damage and for 14,7% of accidents involving personal injury.

6. Lack of skills

6,6% of accidents could be accounted for by a lack of knowledge or skills (e.g. an incorrect reaction or over-reaction due to an excessively demanding situation because everything happened too quickly or too many things happened at once). This percentage stayed the same for all categories of accidents involving material damage, but it accounted for no accidents resulting in personal injury.

7. Fatigue

4,9% of the accidents could be explained primarily by fatigue. Accidents due to fatigue were underrepresented in those causing light material damage (3,3%), it accounted for 7,8% of accidents with moderate to serious damage and for 5,9% of accidents involving personal injury.

8. Other factors and Alcohol

3,6% of accidents could be explained by alcohol consumption, and only 1,8% due to 'other factors'. But 6,1% of the drivers involved in the accidents admitted they were driving under the influence of alcohol, even if they didn't consider this factor to be the primary cause of the accident. So the accident would, in their opinion, have taken place in the same way even if they had been sober. These results correspond to official statistics on personal injury provided by Statistik Austria, according to which 6,7% of all accidents involved alcohol.

The high correlation between the results of this study and official statistics can be explained by the high level of openness generated in the interviews. It can be assumed that the previously high rate of unreported cases has been reduced now in Austria by the Ministry of Transport's decree to carry out an alcohol test on all drivers involved in accidents with personal injury.

This openness in the interviews probably means that the small percentage of drug-related accidents corresponds more or less to reality too: only 0,6% of drivers admitted they were under the influence of drugs during the accident.

High risk group drunk drivers

It is well known that the accident risk increases disproportional with the level of blood alcohol concentration, analysed in the USA (Borkenstein et al., 1974) and Germany (Krueger, 1995). In most countries about 7% of injury accidents are drink driving accidents.

Even at a blood alcohol level of .07% 30% fewer eye movements have been observed and the mean reaction time was extended from 1 to 1.3 seconds in a real driving experiment (Bartl, 1997, 1998). The efficiency of specific driver rehabilitation programmes for alcohol offenders have been proven in the EU-project "Andrea" (Bartl et al, 2002). Such programmes can reduce the recidivism rate by 50% compared to control groups without treatment.

Recommendations

As a consequence of these results of road accident figures for the future education (and driver testing) the following shall be emphasised:

1. Awareness of inattentiveness and stress as the main accident causing factor shall become subject of especially further education of professional drivers, but also novice drivers.

2. Specific training programmes for older drivers focussing on concentration and eye movements shall be implemented.

3. For young drivers: not only focussing on vehicle manoeuvring skills, but also on attitudes must be self evident in driving school education.

4. Implementation of specific drink driving programmes for offenders.

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