Factors contributing to the high accident liability of novice drivers and the role of driver training

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D.A.M. Twisk
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SWOV Institute for Road Safety Research, The Netherlands

SWOV Institute for Road Safety Research

Stichting
Wetenschappelijk
Onderzoek
Verkeersveiligheid
SWOV

Postbus 1090
2260 BB Leidschendam
Duindoorn 32
telefoon 070-3209323
telefax 070 3201261

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1.1. Introduction

The nature of accidents involving novice drivers is continually debated. No single answer has yet been found to the question of what causes these high accident figures. This presentation aims to review the literature on research into novice driver behaviour, to describe the known contributing factors, and to discuss the results with particular reference how driver training may contribute to greater safety. A more detailed description can be found in Lynam and Twisk (1995).

The paper is structured as follows. Starting of with the magnitude and nature of driving accidents, it then discusses how well novice drivers actually drive. Secondly, the question is addressed what factors might contribute to their poor 'performance'. Finally the role of driver training and how inherent limitations of driver training can be overcome, is discussed.

1.2. Magnitude of the problem

To show the magnitude of the problem at a European level, we have analysed the accident data as contained in the international database IRTAD (International Road Transport Accident Data Base). The results of the analysis are presented in *Figure 1*. It shows the fatality frequency of car occupants by different age groups per 100,000 inhabitants. Comparing the European countries, we see that in all countries, without exception, fatalities peak between the age of 18 and 24. This is a very consistent pattern, and the conclusion is justified that the high loss of lives in this age group is a 'European problem', as well as a national problem.
Aside of the similarities, there are also differences between countries. These differences are related to:
- the magnitude of the problem;
- the age group most at risk.

In the graphs and tables country codes are used. The full name of the countries in combination with the codes can be found in *Table 1*.

Country Code	*Country Name*	*Country Code*	*Country Name*
D(O)	East Germany	SF	Finland
A	Austria	GR	Greece
B	Belgium	IRL	Ireland
FR	France	N	Norway
D	Unified Germany	DK	Denmark
E	Spain	NL	Netherlands
CH	Switzerland	UK	United Kingdom
H	Hungary	S	Sweden

Table 1. *List of country codes in combination with the full country names.*

On average 6,000 young people in the age group 18-24 loose their lives in traffic as car occupants in Europe each year. Almost 20% of all fatalities in Europe are in this age group, whereas this group comprises only 10% of the European population.

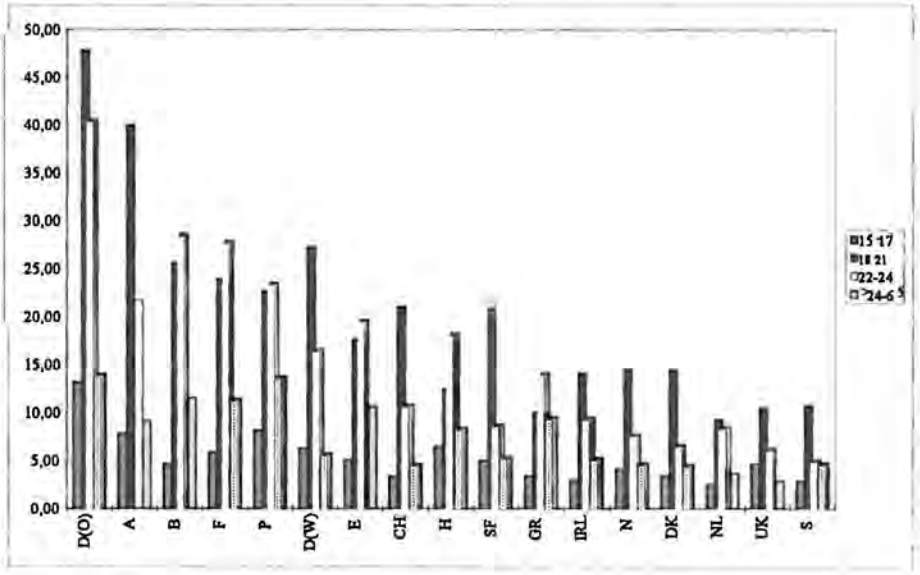

Figure 1. *Fatality rates for European countries per age group and 100,000 inhabitants of that age group*

Comparing the fatalities per 100,000 inhabitants for the age group 18-24 in the different countries, we find the highest unsafety in the former GDR, Austria, Belgium and France. The Northern countries are relatively safe together with the UK (*Figure 1*). The difference between the safest and unsafest country is about a factor 5.5. On average in Europe the accident rates of the 18-24 year old is about five times higher than the accident rates of the 25-65 year old age group.
In most countries the youngest age group (18-21) is most at risk. In contrast, in Belgium, France, Poland, Spain, Hungary and Greece an increase in risk is observed in the age group 21-24. These differences do not necessarily reflect true differences in fatality rates. These frequencies are also influenced by

differences in licensing rates. In some countries youngsters might get licensed in their late teens whereas in other countries this might be in their early twenties. For more detail see Lynam and Twisk (1995), and Twisk (1995).
Figure 2 shows that the fatality rates of youngsters are related to gneral levels of safety.

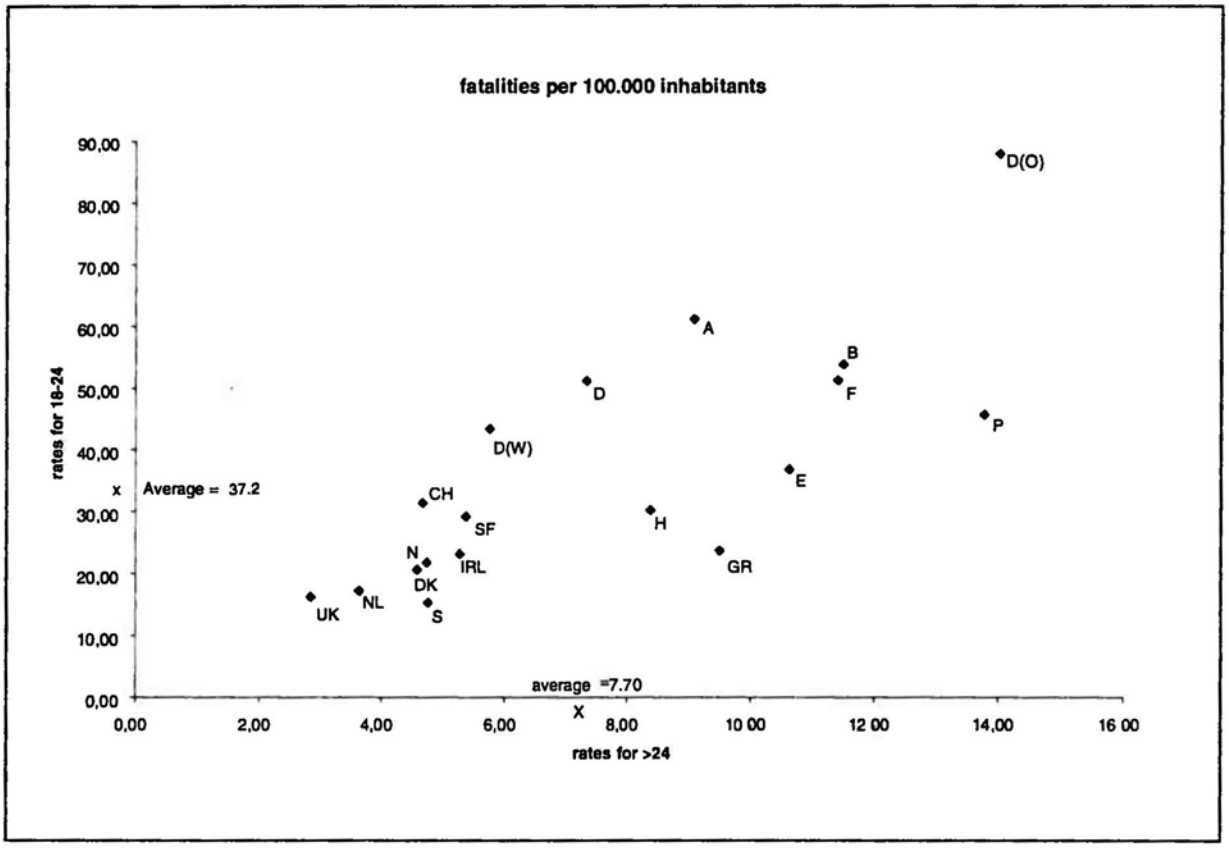

Figure 2. *A between country comparison of experienced (25-65) and inexperienced (18-24) car occupants*

If we take the older group (25-65) to be the more experienced traffic participants, we can use their fatality rates as an indication of the general safety level in that country for car occupants. The average fatality rate in Europe for 18-24 year olds is 37.24 per 100,000 inhabitants of that age group and for 25-65 olds is the average 7.7. By comparing each country against the European average we can illustrate the differences between groups of countries. *Figure 2* presents for each country the fatality rate for the age group (18-24) against the Y-axis and for the older age group (25-65) against the X-axis.
The figure shows that in safe countries (with below average fatality rates of 25-65 year olds), accident rates of the age group 18-24 are also low. The same relationship can be observed in the unsafe countries, where fatality rates for the older *and* young age group are above the European average. Exceptions are Hungary, Greece and Spain that are relatively *unsafe* countries with a below average of fatality rates for the young age group. Probably this is due to the low motorization grade in these countries combined with a low access of youngsters to cars. With an increase in economic growth in these countries it is to be expected that fatality rates for young people will also increase.

West Germany is also exceptional as it has a below average fatality rate for older drivers, whereas West-German young drivers are unsafer than the European average. The current database does not allow us to draw conclusions about the underlying causes. Exposure and mileage are variables that need to be taken into account.

1.3. Accident types

If these are the fatalities, in what type of accidents were these youngsters killed? On this matter there are only few studies available. These studies nevertheless demonstrate consistent patterns, as is shown in *Table 2.*

Country	NL	B	UK	Fr	GE W	GE E
Alcohol	-/+	-	-	-	–	0
Weekend	?	?	+++	+++	?	
Night	0	?	+++	+++	?	?
Weekend night	+++	+++	+++	?	+++	+++
Speed	+++	?	?	+++	+++	++
Single accident	++	+++	+++	++	+++	+++
Severity	++	++	?	++	+++	++
Experience	+++	+++	?	+++	+++	++
Hp of cars	?	?	?	-	?	
Passengers	++	?	?	?	?	
Priority	—	—	?	?	0	+
Curves	++	?	?	?	?	
Gender (males)	+++	+++	+++	?	+++	+++
Young age	+++	+++	+++	?	+++	++
No licence	?	?	?	?	++	++
Leisure trips	+++	+++	?	+++	?	
Age of car	++	?	?	++	?	

+++	strongly over-represented
++	moderately over-represented
+	weakly over-represented
0	no over-representation
-	weakly under-represented
---	strongly under-represented
?	no information available on the issue

Table 2. *Over representation of young drivers by different accident types/circumstances (Twisk, 1992)*

The table shows that in comparison to older drivers, young driver accidents happen more frequently:

- In weekend nights.
- Less often alcohol is involved. If alcohol is involved, this is mainly in the weekend nights.
- More often single accidents. These are accidents in which no other party was involved, e.g. getting off the road in curves.
- Often speed related.
- More serious accidents. This may be related to the fact that young drivers often drive older cars, carry many passengers, drive with high speed.
- Young men are more frequently involved than young women.

More detailed information is presented in Twisk (1992).

To design countermeasures to reduce the fatalities, we need to understand why these accidents happen. What is it that young drivers do wrong that expert drivers are doing right? How does expert driver performance differ from driving by novices?

1.4. Young/novice driver behaviour

Novice drivers are rather competent in handling the vehicle. However, novice drivers are devoting too much of their attention to the vehicle handling routines. They primarily look at nearby hazards and their search patterns are more error prone. Expert levels of perception routines will not be reached before 3,5 years of driving.
Regarding reaction times to sudden obstacles, novice and experienced drivers do not differ. However a different pattern emerges in case of blocked view. In these situations young drivers adopt smaller margins, than more experienced drivers. By driving 'too' fast, they allow themselves only a short period of time to take evasive action. Young drivers (especially males) drive at higher speeds. This does not necessarily mean that they 'speed', that is violate the speed limit, but that they drive too fast for prevailing conditions. Contrary to common beliefs, young drivers do not drink and drive more frequently than more experienced drivers.

1.5. Why do they drive in this manner?

1.5.1. *Ability: hazard perception*

Novice drivers are poor in 'hazard perception', as was shown in the following studies. If a driver is explicitly asked to identify hazards, it was found that young/novice drivers spot fewer hazards and concentrate on non-moving objects at close range. Novice drivers mention hazards more frequently when related to the infrastructure such as narrow roads, road conditions, and the presence of intersections.
They concentrate less on the other traffic participants. Young inexperienced men regard driving at high speeds as *less* hazardous than more experienced drivers, whereas they considered snow covered roads to be *more* hazardous.

When young males become more familiar with a route, they lower their hazard estimates. Also, the perceived level of control is important. Young males have lower estimates of hazard when they are driving in comparison to when they are passengers. Furthermore young/novice drivers are less able to

detect sudden changes in the task condition, which would require a lower driving speed.

1.5.2. *Risk acceptance*

Novice drivers seem to accept more risks. Different motives may underlie this risky behaviour. Identifying these motives is essential to understand how this risky behaviour came about and how it may be prevented.

a. Risk utility
Risky behaviour may have on balance many positive consequences. It has high utility. Youngsters may decide to drink and drive just to gain respect from the peer group, to speed to be in time for school, or to avoid being bored. This type of behaviour is not gratifying in itself, and the behaviour can be influenced by push and pull measures, to tip the balance. This is contrast to risk seeking.

b. Risk-seeking
Risk-seeking refers to deliberate risk taking just for the thrill of it. Within the group of young drivers there is a sub group of drivers who are deliberate risk takers. About 25-30% of young men are in this group along with 5-10% of young women. They have greater confidence in their own skills, do not think activities are so dangerous, are more often prosecuted for traffic violations and are more frequently involved in accidents. Deliberate risk-seeking happens most often during the night, after alcohol consumption and after encouragement by friends.

c. Unintentional risk-taking
This form differs from the previous ones in that in the former the driver is consciously aware of the fact that he is taking a risk. Whereas in the latter the youngster is not aware that he is engaging in risky behaviour, because of his limited experience. For example, he misjudges the sharpness of a bend and drives into it with a speed that is too high.

1.5.3. *Self-assessment*

When asked to assess driving competence, most drivers (young and mature) consider their own competence to be above average. Young male drivers over-estimate in this respect their actual skills, and the traffic environment does not provide with the necessary feedback, in order to achieve a more adequate self-assessment. To make matters worse, young drivers underestimate the traffic complications and the consequences of road accidents.
This in contrast to young females who tend to underestimate their skills and overestimate the complexity of the traffic situation.

1.5.4. *Overload*

Novice drivers have to carry out new tasks, fast and without errors. After licensing the task complexity in traffic is the same for novice and experienced drivers. In these conditions task demands may easily exceed the driving capacity of the novice and as a result sensory overload may occur, showing in the missing of significant information and thus making inappropriate responses. Overload can be prevented if the pace of the task can be set by the driver himself.

It may be because of the problem of (cognitive) overload that novice drivers are not able to benefit from any improvement in driver training. As a result, positive effects of training on accident involvement may only show two years after licensing.

1.5.5. *Extra motives: how it is to be young*

Exposure
Youngsters drive relatively frequently under the more dangerous conditions, such as, during darkness, for leisure purposes, often accompanied by friends. In Germany young males drive on average even more kilometres than more mature men.

Image
Image is what we want others to believe about us. The young adult 'wuses' in particular car driving to create such an image of himself. Boys, believe driving to be a natural (male) skill; they do not have to learn it, they are born with it. Driving lessons and exams are even seen as obstacles that have to be taken in style, in order to eventually be allowed to do what they were always capable of. For boys, it is important to be good 'drivers'. They believe that they should be good at controlling the vehicle, to give them status within the peer group. Driving style is important for reputation and identity.
Other people (members of the peer group) do not need to be present, to motivate the driver to show the peer group valued driving style. Thus driving styles reflect individual identities that are to large extent shaped by social processes.

Lifestyle
One can take this one step further and conjecture whether at a group level, particular values, preferences, attitudes and behaviours (lifestyle) are associated with good or poor traffic safety records. Studies have shown that deviant driving styles may be concentrated in small sub groups, such as Drunk Driving, and that within subgroups combinations of risky traffic behaviour occur, e.g. no use of safety belts, DWI, high speed, drug use, petty crime which is also called the risk syndrome. A German study failed to demonstrate differential accident involvement, but showed that the presence of extra driving motives was connected with particular lifestyles that differed in leisure preferences, choice of clothes and music choice.

1.6. How may driver training contribute to young driver safety

To sum up: in young drivers all factors work adversely. They have limited skills, but have high opinions about themselves as drivers, they like to be on the road a lot and primarily under the most risky conditions, they have many extra motives in the sense that car driving as an activity means a lot to them. They enjoy risky activities, do not see the consequences, are easily affected by peer group appraisal. These factors are most prominent in young males.

Is there a role to play for driver training?
Accident data show that the more kilometres someone drives, the greater the number of years someone participates in traffic, the less often one is involved in accidents. Apparently, driver training does not do enough in creating safe drivers. Drivers learn to drive safely because of practice and experience. So what can 'experience' do, that the current driver training cannot do? Can driver training accelerate the acquisition of skills? As we

saw above, accident involvement is not only related to poor driving skills (e.g. poor hazard perception) but also factors such as, lifestyle, self-assessment and exposures. Should driver training only focus on driving performance or should it also strive to influence these contributing factors?

1.6.1. *The role of driver training*

We firmly believe that driver training has a lot to offer. Not so much on skill acquisition in itself but in creating solid driving routines, by structured learning and consistent feedback about good and bad performance.
In the daily traffic environment, feedback will not consistently 'occur' in every situation. Furthermore as a car driver, one is in a physical and social sense isolated from others.
Physical isolation can lead to a driver not noticing signals from outside. Social isolation can lead to feelings of 'detachment' from the rest of the system, and this may reinforce the illusion that one is invincible. Moreover the novice driver lacks the cognitive ability to identify and evaluate the signals that might indicate inadequate performance on his part.
This indicates that 'learning' on one's own is seriously confined due to the absence of essential feedback. It is unlikely that learners will receive appropriate feedback and this may lead to reinforcement of undesirable driving behaviour.

In contrast, in driver training, the instructor is able to provide immediate feedback and can show the pupil the correct behaviour. This teaches the correct behaviour at the initial stage of skill acquisition, before the bad habits are formed and ingrained. In this respect it is to be expected that driver training is superior to 'practice on one's own'. Furthermore the instructor may play an important role in structuring the task of the learner, so that his task load is not so great that is makes him unable to assimilate and process the feedback. He may organize his instruction, so that skill acquisition is built up hierarchically and in modular fashion. First the basic skills must be learnt, after which more complex skills can be trained. The learning process should therefore not simply aim to having the novice imitate the expert's example. He should learn in a stepwise progress, with a set strategy per phase adapted to the level of skill acquired.

Additionally, the instructor may be an influential role model for the transmission of 'safety related behaviour and attitudes'. The small number of studies which relate to the learning of safe behaviour demonstrate that the learner imitates the instructor's behaviour.

1.6.2. *The inherent limitations of driver training: how these may be overcome*

However, a driver training course is subject to inherent limitations. Firstly, a limitation in time. The skill must be acquired in a restricted number of lessons. Certainly after a limited number of lessons, one may assume that 'learning' continues. Particularly higher order skills, such as taking decisions, develop slowly and require much more practice. Secondly, aside from limitations in time, a limitation in circumstances applies. Not all critical traffic situations present themselves during the lessons.

There is evidence that after the driving exam, driving performance deteriorates.

The results show that:
- driving style is changing considerable over time;
- driving speed goes up and errors in driving routines develop;
- driving performance falls below test standards.

As learning continues after licensing and performance deteriorates, post-licensing requirements should be introduced. Some research indicates that from this type of post-license measures, more safety gains are to be expected than from measures directed at the training period itself. The prime objective of post-license measures is to create a safe learning environment. In this period the driving task should be structured such that overload is prevented. There is great potential in the French Accompanied Driving Scheme in which after a formal driving instruction period, a driver is only allowed to drive if he is accompanied by an experienced driver. Also the graduated driving license has great potential. In this system, the complexity of the traffic conditions is regulated by putting restrictions on the novice drivers. Novice drivers are not allowed to drink any alcohol when driving, to carry passengers, to drive during the weekend nights. When the driver acquires more experience, the restrictions are gradually lifted.
Furthermore, error free routines should be protected, at the post-exam stage. This may be achieved by introducing a second test after a fixed driving period or by accompanied driving in which the novice is continuously provided with feedback on his performance, or by educational support.
Last but not least a safety-oriented attitude should be nurtured in the novice driver, and serious offences should be penalized, for instance by implementing a strict point demerit system for novice drivers. One serious offence is enough to take a closer look at a specific young driver.

2. Conclusion

Young drivers are a risk in all European countries, but there are large differences between countries in fatality rates. A literature survey showed that driving performance of young/novice drivers falls short in many aspects, such as adequate speed choice, visual search and safety margins. These limitations may account for the high accident risk for young/novice drivers. There are many factors that are contributing to inadequate performance. These factors are associated with inexperience, exposure, extra motives and range from technical driving deficits to the role of youth in western society and the values placed upon car driving.

Despite the fact that studies have failed to show its effectiveness, driver training has an important role to, play, and improvements may be found in the field of the training with respect to hazard perception, self-assessment, motivation, reduced exposition and training of correct routines. However the scope of the problem also indicates that simple solutions will not suffice and that only improving driver training will not be enough. In addition to the improved driver training in the post-exam period, safe driving circumstances should be created in order to enable to young/novice drivers to gain experience in a safe manner and to stimulate a safety-oriented attitude.

Literature

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