

Research Activities is published three times a year by SWOV Institute for Road Safety Research in the Netherlands.

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Safety effects of the new Dutch beginner's licence not (yet) found

On 30 March 2002 the 'beginner's licence' was introduced in the Netherlands. This is a simple demerit points system for novice drivers which applies during the initial five years after being in possession of the driving licence.

The demerit points system works as follows: novice drivers who are stopped by the police for serious offences on three occasions during the first five years of possessing the driving licence (and have been dealt three demerit points), must take a driving test and a theory test at the Dutch Driving Test Organisation (CBR). If the test shows the driver to be insufficiently capable of driving, the driving licence is declared invalid and the driver must once more take and pass the driving exam. A novice driver can only be given demerit points when he is stopped when committing the offence. A consequence is that demerit points are not given when the offence is recorded by a speed camera, irrespective of the severity of the offence.

The offences that carry demerit points are:

- exceeding the limit by more than 30 km/h on all roads except motorways and by more than 40 km/h on motorways;
- tailgating;
- causing hazardous situations or hindrance in traffic;
- causing a crash resulting in property damage and/or injury after offending against the traffic rules;

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“To ask why we need libraries at all, when there is so much information available elsewhere, is about as sensible as asking if roadmaps are necessary now that there are so very many roads.”

Jon Bing, Professor of Information Technology Law, University of Oslo, Norway

QUOTE

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- causing a fatal crash, irrespective of whether the traffic rules have been offended against. SWOV has looked into the effects of the beginner's licence on the road safety of novice drivers as well as on their traffic behaviour, and has sent its findings to Parliament.

Crashes

SWOV investigated whether after the introduction of the beginner's licence, the number of serious crashes showed a higher decrease for a group of young drivers (many of whom have a licence on probation) than for a group of somewhat older drivers (of whom only a small percentage has a licence on probation). The number of serious crashes per 1,000 licence holders among the group of younger drivers was not found to show a greater decrease than among the older group. This makes it improbable that the beginner's

licence has had a positive effect on the crash involvement of novice drivers.

It was also investigated whether the data about the number of drivers with 0, 1, 2, and 3 demerit points are sufficient basis to conclude that novice drivers abide by the traffic rules better after receiving a demerit point. The observed distribution of the numbers of points (the numbers of drivers with 1, 2 and 3 demerit points that have been reported in the media at different moments in time) offer no basis for the conclusion that the beginner's licence has a deterrent effect after a driver has been dealt a demerit point.

Recommendations

Neither the development of the number of crashes, nor the numbers of novice drivers with 1, 2 or 3 demerit points, are supportive of the idea that the beginner's licence has been an effective measure. This is not indisputable proof that the beginner's licence has had no effect at all. It does,

however, illustrate that the effect cannot be made visible by using the crash data over the period 1996-2007 (six years before to five years after the introduction of the beginner's licence). SWOV expects that the period during which drivers favourably adjust their behaviour after being dealt a demerit point, can be extended by increasing the subjective risk of being caught. This requires specific police efforts aimed at catching recidivists. SWOV recommends to further develop this strategy.

Parliament

The SWOV report led to a discussion in Dutch parliament which made clear that the demerit points registration system had some imperfections. It is not certain to what extent these imperfections are a full explanation for the missing safety effect. However, the Dutch government has given the undertaking that it will repair the imperfections in the demerit points registration. ◀▶

125cc motorcycle: lower minimum age, more casualties

The new SWOV fact sheet Category A1 (to 125cc) of the new motorcycle driving licence reaches the conclusion that lowering the minimum age for riding 125cc motorcycles in the Netherlands from the age of 18 to the age of 17 or 16 will most probably result in an increase of the number of casualties.

The new EU licence Directive sets the minimum age for riding a motorcycle with a cylinder capacity not exceeding 125 cubic centimetres at the age of 16. The Directive, however, gives the Member States the option to set the minimum age at 17 or 18. In the Netherlands, the minimum age for this category presently is 18. What would lowering of the minimum age mean for road safety? To find an answer to this question SWOV looked at the situation in countries that have a lower minimum age than the Netherlands or countries that have lowered the age quite recently.

German experiences

In 1996, when the A1 category was introduced in Germany, the minimum age for riding a 125cc motorcycle after having taken the driving test was set at 16. In 1997, 13% of all light motorcycles were owned by 16 and 17-year-olds, but this age group was involved in 44% of all crashes: an over-representation by a factor of 3.4. In 1998, a German survey among owners of 125cc motorcycles showed that the 16 and 17-year-olds travelled slightly fewer kilometres than riders older than 18 and that they used the light motorcycle somewhat more frequently for com-

muter traffic than these older riders. The young riders also used the motorcycle for motocross and taking bends at high speeds and they rode in groups for pleasure more than the older age groups.

A second German crash report covering the period 1994-2000 indicates that the group of 16 and 17-year-old motorcyclists has by far the highest crash rate: more than 150 road deaths per 100,000 motorcycles as opposed to approxi-

mately 75 road deaths per 100,000 motorcycles for the age groups 18-21 and 21-25-years-old.

UK data

In the UK, which has set the minimum age at 17 for riding all motorcycles, an extensive survey was carried out among 11,265 motorcyclists. The total number of crashes in which this group of motorcyclists had been involved was 1,495. More than half of these crashes happened in commuter traf-





fic or in work-related traffic. The motorcyclist's age was found to be the most important indicator for a high crash rate: young riders have a higher risk of a crash. Although age is by far the most important factor, experience also plays a role: the more experience, the smaller the risk of a crash. In addition to age and experience, the annual number of kilometres travelled also predicts the crash involvement: proportionally fewer crashes occur when more kilometres are travelled. Furthermore, motorcyclists riding a 125cc motorcycle were shown to have a 15% higher risk of a crash than motorcyclists with heavier bikes. The injury severity, however, was less in crashes involving 125cc motorcycles than in crashes with heavier motorcycles.

Age reduction in the Netherlands?

An age reduction for riding a motorcycle in the 125cc category in the Netherlands from 18 to 16-years old may have other effects than just having younger motorcyclists on the road:

- Some of the 16 and 17-year-olds who at present ride a moped, will switch to a motorcycle. The German study indicates a relatively high risk for 16 and 17-year old motorcyclists. In the Dutch situation it is to be expected that partly due to the higher speeds that can be reached on a 125cc motorcycle, the crash rate will be higher for 16 and 17-year-old motorcyclists than for 16 and 17-year-old moped riders. This would result in an increase of the number of casualties (fatali-

ties and severely injured). It must however be noted that the experience that is gained by a motorcyclist at the age of 16 to 17, will reduce the risk at a later age. This has fewer casualties as a result. It is difficult to estimate whether a younger starting age compensates for the experience that is gained.

- A (probably small) group of 16 and 17-year olds who do not have a (light) moped in the present situation, but make use of bicycle or public transport, will transfer to a motorcycle. As the crash rate for motorcyclists is considerably higher than that of cyclists and public transport passengers, this will result in more casualties.
- The total number of kilometres travelled will be higher because a rider will make more kilometres on a 125cc motorcycle than he would have done on a moped. Extra kilometres result in more casualties.
- The number of motorcyclists of 18 years and older will increase because the 18-year-old already possesses a motorcycle and will postpone the switch to a car. Taking account of the large difference in risk between motorcycle and car, this will result in more casualties.

SWOV expects a reduction of the minimum age for riding a motorcycle to cause some changes in mobility. Although research is required for a reliable estimate of the extent to which road safety will be affected, we expect that a lower minimum age will result in an increase of the number of road crash casualties. The Dutch Minister of Transport will shortly send a proposal to parliament about the minimum age. ◆◆

The SWOV fact sheet 'Category A1 (to 125 cc) of the new motorcycle driving licence' offers more information about this topic and can be found on www.swov.nl.

Literature

The international data that has been used can be found in the following literature:

Assing, K. (2002). *Schwerpunkte der Unfälle von Motorradfahrern. (Focuses on motorcycle accidents)*. In: Safety environment future IV; Proceedings of the 4th International Motorcycle Conference, München, 16-17 September 2002. IfZ Forschungshefte Zweiradsicherheit No. 10, p. 41-53.

Baughan, C., Sexton, B. & Elliot, M. (2005). *Motorcyclists' accident risk: results from a new survey. Paper presented at the seminar Behavioural Research in Road Safety 2004*. TRL Staff Papers PA/SE/4107/04, Transport Research Laboratory TRL, Crowthorne.

Schoon, C.C. (2004). *Traffic legislation and safety in Europe concerning the moped and*

the A1 category (125 cc) motorcycle. A literature and questionnaire study commissioned by the Swedish National Road Administration. SWOV-report, R-2004-10.

Schulz, U. (2000). *Zur Unfallverwicklung 16- und 17-jähriger Leichtkraftradfahrer und die motivationalen und einstellungsmässigen Hintergründe*. In: Safety environment future III; Proceedings of the International Motorcycle Conference, München, 11-12 September 2000. IfZ Forschungshefte Zweiradsicherheit No. 9, p. 35-52.

Sexton, B., Baughan, C., Elliott, M. & Maycock, G. (2004). *The accident risk of motorcyclists*. Prepared for the Department for Transport, Road Safety Division. TRL Report No. 607. Transport Research Laboratory TRL, Crowthorne.

Alcolock: introduction in the Netherlands

To more effectively deal with heavy drinkers in traffic, the Dutch government has decided on the introduction of an alcolock programme in 2010. The programme compels serious offenders and recidivists to have an alcolock installed in their car. If they fail to do so, their driving licence is revoked.

In the Netherlands, alcohol use is involved in an estimated 25% of the fatal crashes. Three quarters of these crashes is caused by offenders with a blood alcohol content (BAC) of more than 1.3 ‰. Since 2000, this situation has barely changed despite increased police enforcement of driving under the influence. Each year, approximately 150 of an estimated 200 alcohol related road deaths are the consequence of crashes that are caused by serious offenders.

Alcolock

An alcolock is a breath analyser, also called

breathalyser, which acts as a vehicle immobilizer. Not until the driver has breathed alcohol-free breath into the breathalyser, he or she can start the car.

The Netherlands is not the first country to introduce the use of an alcolock; this was previously done in the United States, Canada, Australia, Sweden, Finland, and France.

Several international assessment studies have shown that, on average, recidivism is 75% less for drivers with an alcolock than for drivers whose licence has been suspended.

Participants

If in the Netherlands all serious offenders would be eligible for the alcolock programme, this would result in approximately 13,500 participants per year. That is an equal number to those who at present have to follow the compulsory driver improvement course 'Educational Measure Alcohol and traffic' (EMA) or those whose fitness to drive is assessed. In actual fact, the number of

participants will be considerably lower. The most serious offenders (novice drivers with a BAC > 1.8 ‰ and experienced drivers with a BAC > 2.1 ‰) and suspected offenders who refuse to cooperate with the breath analysis, are not eligible for the alcolock programme. The majority of the remaining group first faces suspension or legal withdrawal of the driving licence. Only afterwards they can take part in the alcolock programme.

Expected savings

For the above reasons, the annual number of offenders that will start on the alcolock programme is expected not to be 13,500, but only 2,200. If another 10% of the participants are assumed to drop out, there will permanently be some 4,000 drivers who participate in the alcolock programme from the third year after the introduction onward. The alcolock programme could then save three to five road deaths per year. This reduction can go up to eight to ten road deaths per year if offenders are not allowed to leave the alcolock programme until they have demonstrated to be capable of separating alcohol and road use. This provision is included in the present bill.

The annual benefits of the alcolock programme could amount to € 110 million, which is € 11 million per road death saved. At the same time, the costs, which are paid by the offenders themselves, are less than € 10 million.

If other criminal and administrative measures are optimally geared to the alcolock programme, an annual reduction of 30 to 35 road deaths seems feasible in the somewhat more distant future. ◀▶

More about this subject can be found in the English fact sheets 'Driving under the influence of alcohol' and 'Alcolock' and in the English summary of SWOV report D-2009-1 'The estimated road safety effect of an alcolock programme and its cost-benefit ratio'. Both publications are available on www.swov.nl.



European research project PROLOGUE has started

SWOV coordinates the new European research project PROLOGUE (PROmoting real Life Observations for Gaining Understanding of road user behaviour in Europe) which has started in August. PROLOGUE will investigate the use and feasibility of a large-scale European Naturalistic Driving study. In Naturalistic Driving studies traffic situations and drivers are studied in a discreet manner by making use of small cameras and sensors in their own vehicles, during normal journeys and without a test supervisor. This gives a reliable picture of the drivers' natural behaviour and enables analysis of the interaction between road user, vehicle, road, and

other road users under normal conditions, in conflict situations, and in crashes. This improves our understanding of the factors that influence road safety and in the possible ways to make the traffic system inherently safe using, for example, in-vehicle technology, 'self-explaining' roads, driver training, etc. The work in PROLOGUE includes a number of pilot studies in different research areas, including novice drivers, vulnerable road users and in-vehicle information systems, which we expect to provide interesting results in themselves. PROLOGUE will result in an overview of potentially interesting research questions, proper study designs

and required technology for a large scale European Naturalistic study. PROLOGUE expects to present its results after 24 months of study.

SWOV coordinates the research. The other partners are CErTH-HIT from Greece, KfV from Austria, Loughborough University from the UK, Or Yarok from Israel, the Dutch TNO, the Norwegian TØI, the Austrian TTI and the Universitat de València from Spain.

PROLOGUE will continue until August 2011. PROLOGUE is part of the EU Seventh Framework Programme (FP7). ◀▶

Cooperation SWOV and TRB: improved access to SWOV publications

SWOV librarian Dennis van den Braak and TRB librarian Barbara Post are pleased to announce their intensified cooperation: SWOV now provides records of (SWOV) reports and publications available in SWOV Library to be included in the Transportation Research Information Services (TRIS) Database.

The information about publications in the SWOV Library is now made available in both TRIS Online and TRISWorld. This will make SWOV, its library, and its collection better known and makes it available to a wider public.

SWOV library

In the Netherlands, the SWOV library is the national centre for road safety literature. It contains a large amount of literature on traffic, transport, and other related subjects. In its 45 years existence, the collection has grown to more than 135,000 titles including, books, reports, congress proceedings, and journal articles, etc. The library has nearly 350 journal titles that can be consulted.

TRIS

The Transportation Research Board (TRB) in Washington maintains the TRIS database: the world's largest and most comprehensive biblio-



SWOV library staff

Dennis van den Braak: Everyone who (professionally) deals with road safety can use the SWOV library and use the on-line catalogue to search for relevant publications. Many of these are already digitally available, and this is indicated by a link in the database. SWOV Library is very proud to participate in Tris Online and offer its vast collection to an even broader audience.

graphic resource on transportation information, with more than 640,000 records of published

research. TRIS covers all modes and disciplines of transportation.



TRB library staff

Barbara Post: The Transportation Research Board is pleased to be sharing records with SWOV. The addition of SWOV records to TRIS improves international coverage in TRIS and helps researchers have access to the important transportation research done by SWOV.

SWOV publications in TRIS

The records of SWOV publications are in English and SWOV publications have an English summary although the full text is often in Dutch. Most of the SWOV publications are available in full text on the SWOV website and TRIS offers links to the full text. ◀▶

ETSC publishes 3rd PIN Report

This 3rd Road Safety Performance Index (PIN) Report entitled *2010 on the Horizon* provides an overview of European countries' performance in four areas of road safety. It shows how countries have progressed in reducing road deaths between 2001 and 2008 and how they perform in protecting a particular vulnerable group: children. It also gives an overview of the striking disparities in the market penetration of safe cars and outlines the role of European capitals as an example for other cities in reducing road mortality. ◀▶

The report is available on the ETSC website www.etsc.eu.

Road safety campaigns: facts, fiction and future avenues

Research shows that road safety campaigns have some positive effect on road user behaviour and casualties, but only if they are used in combination with other measures such as legislation and enforcement. In isolation, road safety campaigns have no effect.

This is one of the conclusions of SWOV Director Professor Fred Wegman in his keynote presentation at the 11th PRI World Congress, 24-26 June in Rotterdam, the Netherlands. PRI (La Prévention Routière Internationale) is an international non-governmental and non-profit organisation, aiming to promote cooperation among national road safety institutes. The 2009 World Congress marked PRI's 50th anniversary.

Campaigns not as stand alone measure

Fred Wegman's presentation focused on road safety campaigns. Campaigns and public information are a widely used road safety measure, usually targeted at the adult road users who are otherwise difficult to reach. Campaigns are gen-



erally used to inform, educate or persuade road users, with the aim to motivate or help them to behave safely in traffic. As Fred Wegman noted, there are surprisingly few good studies that assess the effects of road safety campaigns. Based on the results of the available studies, a Norwegian meta-analysis reported that mass media campaigns alone don't have an effect on the number of road crashes. Mass media campaigns in combination with enforcement would on average result in a road crash reduction of almost 13%; in combination with enforcement and education to a reduction of 14%. According to this analysis, a much larger effect of up to 40% can be expected from local, person-oriented information campaigns.

Focus message on specific groups

One of the often used arguments to use mass media campaigns is that they can reach the entire population. However, as explained by Fred Wegman, that is not true. Research shows that campaigns are more effective when they focus on specific groups rather than on all road users and when they focus on a specific theme. Mass

media campaigns are less likely to reach the less educated. This has nothing to do with the difficulty of the message, but people with a lower level of education appear to be less inclined to pay attention to mass media campaigns. To reach this group, personal communication is more effective. Furthermore, it is important that campaigns show the desired effect and the desired behaviour, rather than what is undesirable. And last, but not least, the literature states that it is important to:

- Make the target group feel that the problem is relevant to them.
- Provide a specific action that the target group can take to prevent the portrayed consequence from happening.
- Ensure that the target group believes that the proposed solution is effective in preventing the consequence.
- Portray the solution as something that the target group can easily do.

Fear appeals

An ongoing discussion takes place on the usefulness of fear-based campaigns, i.e. campaigns that confront people in a rather hard and often

CAST: the EU project on campaigns

Road safety campaigns were the subject of the European CAST project which was completed early 2009. CAST is an acronym of Campaigns and Awareness-raising Strategies in Traffic safety. The project resulted in, among other things, guidelines and tools to encourage the proper design and evaluation of road safety campaigns. The project formulated a number of recommendations to increase the effectiveness of road safety campaigns, including:

- Base the design of a campaign on available statistics and research results;
- Select a specific target audience;
- Translate the overall goal into specific objectives;
- Base the campaign strategy on a theoretical model of behaviour or behaviour change;
- Formulate a credible, clear, consistent message about behaviour that is attainable;
- Ensure a thorough and valid effectiveness evaluation and disseminate the results.

Guidelines, tools and other outcomes can be found at the CAST website <http://www.cast-eu.org/>.

| | Best estimate | 95% confidence interval |
|--------------------------------------|---------------|--------------------------|
| Mass media alone | + 0.9% | Between -8.6 and +11.7% |
| Mass media + enforcement | - 12.7% | Between -18.9 and -6.2% |
| Mass media + enforcement + education | - 14.2% | Between -22.0 and -4.9% |
| Local, personally directed campaigns | - 39.3% | Between -56% and - 17.4% |

Effects of road safety campaigns according to a Norwegian meta-analysis

Source: Vaa et al. (2004; TØI rapport 727/2004)

Dutch road safety target for 2010 realised in 2008

shocking way with the negative consequences of risky behaviour. From a scientific point of view, the effectiveness of fear appeals in mass media campaigns is a controversial issue. Again there has been very little systematic research, but research that has been carried out shows positive as well as negative effects. As Fred Wegman said, "one cannot scare people into good behaviour; whereas fear can indeed motivate people to change their behaviour, it can also lead to avoidance coping strategies." There are indications that females respond more favourably to fear appeals than males, in particular young males. Little is known about cultural differences or about the effect of repetition of fear-based campaigns. In short, as Fred Wegman concluded: "Systematic research supporting and improving road safety campaigns is urgently needed". And that applies to road safety campaigns in general and to fear-based campaigns in particular. ◀▶

At www.swov.nl you can find two fact sheets on the issue of road safety campaigns: 'Public information about road safety' and 'Fear-based information campaigns'.

In 2008, there were 750 road fatalities in the Netherlands. That was 41 (5%) less than in 2007. The number of 750 exactly equals the Dutch road safety target for 2010. The Dutch Minister of Transport Eurlings stated that he would not set a new 2010 target, but that instead he would focus on the realization of a more ambitious target for 2020 than the 580 which was set previously: a maximum of 500 road fatalities.

The latest road safety data revealed by the Ministry of Transport show that also in 2008 there was a decrease in the number of road fatalities in the Netherlands, from 791 to 750. This decrease of 5% was comparable to the decreases of respectively 1%, 2.5% and 7% in 2007, 2006 and 2005, but considerably less spectacular than the decrease of 19% in 2004. According to the Minister of Transport the positive developments should not lead to slackening our road safety efforts.

11 to 30 days

A preliminary SWOV analysis indicated that by far the largest part of the reduction was found in the number of people who died 11 to 30 days after the crash. Both in 2006 and 2007 this was the case for 50 casualties; in 2008 for only 19. This is a remarkable development. At this stage an explanation is lacking, but SWOV will analyse to what extent this development is due to road safety developments, developments in medical treatments or developments in the quality of registration.

International comparison

The road safety developments in the last decades in the Netherlands are comparable to the average in the former 15 EU Member States. However, some of these Member States had better results, e.g. France, Germany, Portugal, and Spain. In addition, the United Kingdom and Sweden where the safety level is similar to the level in the Netherlands, realized larger reductions in 2008. Nevertheless, the Netherlands still belongs to the safest countries in the world. ◀▶

Safe mobility for young and old: the ITMA congress

ITMA (the International Traffic Medicine Association) organised its 21st World congress with the theme 'young and older drivers' in the Hague from 26-29 april.

Under the leadership of ITMA's president Wiebo Brouwer (University of Groningen) the conference succeeded to attract over 120 attendees and speakers from all continents. Topics included

examples of best practices in the field of driver assessment, simulators to study fitness to drive, older and young drivers, and safety in developing countries.

SWOV&Friends

The attendance of the ITMA congress by so many distinguished researchers, created a unique opportunity to invite several of them for a one-day symposium at SWOV to share findings from their research with SWOV colleagues, other Dutch researchers and policy makers.

Leonard Evans gave an inspiring overview of issues in traffic safety research that would advance our scientific understanding. Marie-Claude Ouimet, of the USA National Institute of Child Health and Human Development (NICHD), presented findings from studies into the biological and neuropsychological characteristics of DWI offenders. Jeff Caird, University of Cal-

gary, reported on his simulator study in which passenger conversation led to an increase in 'Looked-but-Failed-to-See' crashes of young drivers. Donald Fisher, University of Massachusetts, presented his work on attention and attention training of young drivers, while Jean Shope, University of Michigan Transport Research Institute (UMTRI), addressed the effects of involving parents in the first period of solo-driving.

Maura Houtenbos, SWOV, talked about her work on the role of expectations in interactive driving, and Willem Vlakveld, SWOV, presented his preliminary results on using eye tracker data to understand how novice drivers detect and assess hazardous conditions in traffic.

SWOV contributed in several ways to the conference. Not only was SWOV a member of the organizing committee, also several researchers from SWOV presented their work either as oral presentations or as posters. Ragnhild Davidse presented the results of her simulator studies on the question to what extent ADAS may improve safe driver performance in the elderly. Tamara Hoekstra presented the evaluation of a training programme aimed to improve safe driving behaviour in older drivers. Divera Twisk presented two lines of SWOV research: work by Saskia de Craen on the question 'how expertise develops over time in the novice driver' and research by Willem Vlakveld on the development of a valid and reliable hazard perception test to be included in a driving exam. ◀▶

Titles, abstracts, posters and presentations are available on the ITMA website <http://www.trafficmedicine.org/>.

Perception of lack of traffic safety: feeling safe or being safe

When people *feel* safe, they not necessarily *are* safe, and when people *are* safe, they not necessarily *feel* safe. Feelings of unsafety can occur during traffic participation, but they can also be of a more general nature: concern about the road safety problem. In the first case feelings of unsafety can affect traffic behaviour; in the second case they can affect traffic participation itself.

In 2008, SWOV closed off a study which, on the basis of the literature, further defined and analyzed the concept 'subjective lack of road safety'. The concept 'subjective lack of road safety' refers to the personal perception of road safety and the feelings of threat and danger. Subjective lack of road safety can be, but does not necessarily have to be, related with objective lack of road safety, which is defined by the number of crashes and the injuries, damages and costs that are the result.

Weak relation between subjective and objective lack of road safety

The relation between subjective and objective lack of safety is generally estimated to be weak. This means that situations and circumstances that are *experienced* as dangerous, are not dangerous, measured in terms of numbers of crashes or near-crashes. This weak relation between subjective and objective feelings of safety also appears to exist in, for example, crime. This is due to the fact that, beside the number of crashes or crimes, people also include other aspects in their assessment of the situation. Examples are the extent to which they have control of the situation, the extent of attention from the media, and how conceivable a crash is. Feeling unsafe, however, may also cause people to adapt their behaviour which, in its turn, may improve the actual unsafe conditions.



In addition, there are indications that people more frequently talk about their feelings of unsafety when they become more aware of the hazards. This can result in the paradoxical situation that people feel less safe after a safety measure has been taken.

Speed, mixing and heavy traffic

In residential areas, the main factors which cause feelings of unsafety are the large amount of traffic and high speeds. In other situations the feelings of unsafety mainly occur when there are no separate facilities for fast traffic and slow traffic; hence on those locations where the different transport modes have to mix. Feelings of unsafety also occur on locations with relatively much heavy traffic. Furthermore, certain types of driving fear could be seen as a subjective feeling of unsafety, for example the fear of driving in darkness, of driv-

ing in tunnels, on motorways, et cetera. Feelings of unsafety can be focused on the road user himself or herself, but can also concern other, mostly vulnerable road users like children playing outdoors or an elderly parent riding a bicycle.

Limitation of mobility

There are two ways to express feelings of unsafety. In the first place, subjectively unsafe circumstances can be avoided, for example by not using the bicycle or by not driving in the dark. This is considered socially undesirable, because it limits people in their mobility unnecessarily. This is especially the case for elderly road users and, through their parents, for children. For this reason, policy also needs to pay attention to subjective feelings of unsafety. This is also the reason why police enforcement focuses at locations and areas about which there are complaints about the safety, more in particular about the speed of motorized traffic. In 2009, SWOV will make further study of the subjective feelings of unsafety of parents with young children and the effects on mobility and objective safety.

A second way of dealing with feelings of unsafety is adapting the behaviour during traffic participation, for example by reducing the driving speed. It is important to realize that lessening the subjective lack of safety will have little effect on the number of crashes. After all, the relation between subjective lack of road safety and objective lack of road safety is very weak. ◆◆



SWOV report ' Perception of lack of traffic safety; An exploration of subjective safety (R-2008-15) is available on www.swov.nl. The report is in Dutch, but it has an English summary.

Quantifying weather effects

Weather is one of the external factors that affects road safety and is responsible for part of the annual fluctuations in crash numbers. Weather conditions affect both risk and mobility. In a recently updated factsheet SWOV discusses the international literature on the relationship between weather conditions and road safety. SWOV also published the results of a study with Dutch weather and crash data.

Direct and indirect effects

According to the international literature, precipitation (including snow and hail), fog, low sun, wind, black ice, and hot temperatures are the weather conditions that could have a direct effect on road safety. It is generally found that road users adjust their behaviour in bad weather conditions, but insufficiently to compensate for the increased risk during adverse conditions. Weather conditions also have an indirect influence on road safety, namely by changes in mobility. First of all, weather conditions affect the number of kilometres traveled. This effect is generally limited to social traffic; it has hardly any effect on work-related traffic. Secondly, weather conditions influence the choice of transport mode (modal split). For example, on bad weather days there are fewer pedestrians and cyclists than on nice weather days. As walking and cycling involve a higher risk than driving a car, it may be expected that the numbers of casualties increase in warm, dry summers and decrease in cold and wet summers.

Quantifying effects

In addition to these qualitative findings, quite a few international studies have quantified the effect of weather conditions – in particular rain – in terms of the number of road casualties. Quantified information about the relationship is important to, for example, control for annual fluctuations in road safety models. For this reason SWOV is also interested in this subject. There is no question that the results in other countries can simply be transferred to the Dutch situation. General characteristics of the country's climate may affect



the response of road users and road authorities to particular weather conditions, and, consequently, will affect the weather's impact. For example, in Nordic countries road authorities and drivers are better prepared for snow than in southern countries. Transfer of foreign weather data to the Dutch situation is particularly tricky, since we have a high proportion of bicycles which are particularly affected by weather conditions. SWOV therefore carried out a study to quantify the influence of weather conditions in the Netherlands.

Work-related travel affected most

First the study looked at the effects of temperature (mean, minimum and maximum) and precipitation (amount and duration) on the kilometres travelled for different transport modes. The results indicate that, in general, work-related travel (determined by the reported trip motive) is less affected by these weather conditions than non-professional travel. Work-related travel is only affected by weather conditions if performed by weather sensitive modes like the bicycle or the moped, but still to a lesser extent than non-work-related travel. With respect to temperature, the results indicate that the maximum temperature is stronger related to the amount of travel than the minimum temperature. This may indicate a 'summer' effect on travel

habits. There are also indications that the crash rate increases with temperature.

Effects of precipitation

Looking in more detail at the effects of precipitation, the results show that there are more casualties during precipitation. The effect, however, is different for different levels of crash severity. Precipitation affects the number of fatalities less than the number of in-patients; and the number of in-patients less than the number of slightly injured. During precipitation, the number of fatalities almost doubles, and the number of 'killed or hospitalized' more than doubles. The results also indicate that there is a seasonal effect: the effect of precipitation is larger in autumn and winter than in spring and in summer. This may be related to the fact that the negative effect of precipitation is more severe in conditions of darkness. It should be noted that snow and ice are rare in the Netherlands and that in actual practice precipitation mostly is rain in this study. ◀▶

The Dutch study can be found in SWOV report 'The influence on weather conditions on road safety' (R-2009-9). The fact sheet entitled 'The influence of weather on road safety' contains more general information. Both publications are in English and are available on www.swov.nl.



Safety on 30km/h roads can be further improved

In the Netherlands, the number of casualties among pedestrians and cyclists on 30km/h roads has increased strongly during the past decade. This increase can mainly be attributed to the increasing number of 30km/h roads in that period. The crash rate of cyclists has also increased and this seems to be related to poor road design. Nevertheless, 30km/h roads are considerably safer than 50km/h roads.

These are conclusions in the recently published SWOV report *Pedestrian and cyclist road safety on 30km/h access roads* which focuses on casualties among pedestrians and cyclists in crashes with a motor vehicle.

30km/h roads much safer than 50km/h roads

Many of the present 30km/h roads in the Netherlands were previously 50km/h roads. The SWOV study shows that the conversion of these roads into 30km/h roads has resulted in a considerable reduction of the number of casualties. The reduction appears to agree with the expectations on the basis of the literature which was up to 70%. Most casualties on 30km/h roads are pedestrians and cyclists in crashes with motor vehicles. However, in comparison with the numbers of casualties on other road types, this is a modest number: approximately 10% of the fatalities and 15% of the in-patients in the category pedestrians and cyclists in crashes with motor vehicles are casualties in crashes on 30km/h roads.

Growing number of 30 km/h roads

In recent years the number of casualties among pedestrian and cyclist casualties on 30km/h roads increased considerably in an absolute sense. Between 1995 and 2007 the number of severely injured pedestrians and cyclists in crashes with a motor vehicle in Zones 30, went up from 27 to 590. This is an increase by a factor of more than 20. In the same period, the number of fatalities went up from 3 to 16. A considerable part of this increase can be attributed to the increase in the length of 30km/h roads. Since 1989, more than 30,000 kilometres of road have been converted into 30km/h access roads. The number of casualties among pedestrians remained in step with this increase in road length; this means that the crash rate for pedestrians on 30km/h roads has remained nearly the same. During the last decade, however, the number of casualties among cyclists showed a larger increase than the road length, while at the same time the increase of the number of kilometres cycled in Zones 30 remains behind the increase in road length. The situation on 30 km/h roads has therefore become relatively less safe for cyclists.

Road design

Next, the study investigated whether the road layout could have played a role in the cyclist and pedestrian crashes on 30km/h roads in the Netherlands. In approximately three-quarters of the more than 150 crashes in 2006 that were studied, the road layout most probably was a contributory factor. The crashes for which this was the case were crashes at junctions and crashes involving children crossing a road unexpectedly. For these crash types the road layout is of particular importance because it influences the driving speed of the motorized vehicles. In approximately 20% of the crashes, the road layout probably was unimportant. These are crashes during special manoeuvres like reversing or parking, or caused by sudden opening of the vehicle door. The possible role of the road layout remained unclear in the remaining 5% of the crashes.



Credible limit

Using photographs of the crash locations, the characteristics of the crash locations' environments were surveyed. The result was used to check the Sustainable Safety quality and the credibility of the speed limit. For both criteria checklists were used that had been developed by SWOV. Especially the credibility of the speed limit appeared to be a distinguishing feature. In 70% of the crashes in which the road layout

probably played a role, the 30 km/h speed limit appeared not to be credible. This share was 57% for crashes in which the road layout seemed to be of little or no importance. This indicates that the risk of a crash is higher on 30km/h roads with a less credible speed limit than on roads with a credible limit.

Junctions without designated priorities

The number of crashes involving cyclists on priority junctions is remarkably high. According to Sustainable Safety this type of junction does not belong in a Zone 30. Especially drivers appear to obey the priority rules better on junctions without designated priorities than on priority junctions. Measured by the investigated crashes, cyclists obey the priority rules equally well or badly on all types of junction. Especially separate bicy-

cle paths, where the cyclist has right of way on the intersecting road, appear to be dangerous. In addition, it is important to investigate which demands the layout of priority junctions must meet to become more safe. ◀▶

SWOV report R-2009-6 'Pedestrian and cyclist road safety on 30km/h access roads' is available on www.swov.nl. The report is in Dutch, but it has an English summary.

SWOV research presented at Young Researchers Seminar



Kirsten Duivenvoorden



Yvette van Norden

The Young Researchers Seminar 2009 took place on 3-5 June in Torino, Italy. Two young SWOV-researchers presented their work dealing with respectively modelling road safety developments using disaggregation and the relationship between driving behaviour, road infrastructure and road safety.

The Young Researchers Seminars are organized once every two years by the European traffic and transport research institutes represented in ECTRI, FEHRL and FERSI. During these seminars, young researchers present the results of their research. Senior researchers chair the sessions and act as tutors during the preparation of the written paper and following the oral presentation. As such, SWOV senior researcher Marjan Hagenzieker was in charge of the session Transport Behaviour 1. A total of around 50 young researchers participated, among whom SWOV researchers Yvette van Norden and Kirsten Duivenvoorden.

Disaggregated modelling

The first SWOV contribution was on disaggregated modelling. SWOV is working on the development of a road safety assessment model using disaggregation. A general assumption in road safety research is that the number of casualties is strongly related to mobility: the longer the total distance travelled, the more road crashes, and thus casualties, there will be. Usually the focus in road safety research is on the risk, which is the number of casualties per distance travelled. The developments in risk are often studied at an aggregated level, i.e. the annual number of traffic casualties and the annual car mobility or motorized mobility. However, there are large differences in risk between, for example, different traffic modes, different age groups, different road types, and these differences may change over time. In addition, the distribution of the mobility over dif-

ferent traffic modes or different road user groups may change over time, and that influences road safety as well. At the Young Researchers Seminar SWOV-researcher Yvette van Norden presented the results of a study in which the feasibility of risk estimations as a function of traffic mode and age was studied.

Behaviour, infrastructure and road safety

The second SWOV contribution was on the relationship between driving behaviour, road infrastructure and road safety. Whereas road infrastructure has been the subject of many studies, studies generally focus on either the relationship between road infrastructure and road safety or on the relationship between infrastructure and behaviour. The specific interaction between road safety and both infrastructural characteristics and driving behaviour has yet not been widely studied. Recently, SWOV-researcher Kirsten Duivenvoorden started a PhD study on this subject. At the seminar she presented the results of her preparatory activities, including a literature study, and her plans for the remaining work. In her study, one of the approaches investigates accident prediction models, and the paper presented in Torino focused on that element. Accident prediction models are mathematical models which generally express the safety performance of a specific road type or intersection type in terms of traffic and road design characteristics. One of the aims of the PhD study is to develop accident prediction models which express the safety performance not only in terms of traffic and road design characteristics but also in terms of driving behaviour. ◀▶

All papers and presentations of the 2009 Young Researchers Seminar can be downloaded from www.ectri.org/YRS09, including those of Yvette van Norden and Kirsten Duivenvoorden.

Colophon

Research Activities is published three times a year by SWOV, Institute for Road Safety Research in the Netherlands. Research Activities contains articles about road safety research and scientific projects carried out by SWOV and by others.

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Editors: Ingrid van Schagen
Hansje Weijer
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SWOV Institute for Road Safety Research,
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The Netherlands
T + 31-703173333
F + 31-703201261
E info@swov.nl
I www.swov.nl

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The SWOV website contains a wealth of information about a variety of road safety topics. SWOV fact sheets are all available in English. The library has extensive possibilities to search for international road safety literature and publications.

Fact sheets

In the past period some new SWOV fact sheets have been published and some have been thoroughly updated. Below you find a selection.

Types of junctions

In the Netherlands, 44% of all seriously injured road crash victims sustain their injuries in crashes at junctions. Numerous junction types can be found in the Netherlands. According to Sustainable Safety the number of junction types needs to be limited, depending on the intersecting road types. The types of junctions needed should be determined by the potential conflicts and differences in mass and speed that may occur. The fact sheet *Types of junctions* discusses which junction types are most suitable for different types of intersecting roads.

Blind spot crashes

Each year, there are approximately fifteen fatalities in the Netherlands in crashes involving lorries turning right and cyclists going straight on. The cyclist, who has right of way, is often overlooked by the lorry driver. For his part, the cyclist often



is unaware that the lorry driver cannot see him clearly and that the lorry wants to turn right. The fact sheet *Blind spot crashes* discusses how this crash type can occur, and looks at the measures that could be taken to prevent this type of crash.

The influence of the weather

The weather has an influence on road safety. Weather conditions partly determine the road

conditions, traffic volumes, modal split, and the driver's behaviour. Most studies into the relation between weather and road safety are about the situation during rainfall. However, many other weather conditions are serious influences: fog, snow and black ice, low sun, hard wind, and high temperatures. The SWOV fact sheet *The influence of the weather on road safety* looks at the ways weather affects road safety.

Publications

Below is a selection of reports that have recently been published by SWOV. Most SWOV reports are written in Dutch, but they all include an English summary. Reports that were published in or after the year 2000 can be found on our website (www.swov.nl) and may be downloaded free of charge. Fact sheets are also placed on our website under Research.

Pedestrian and cyclist road safety on 30 km/h access roads; The influence of the layout of urban access roads on collisions between slow traffic and motor vehicles

E.M. Berends & H.L. Stipdonk. R-2009-6. 104 + 15 pp. € 18.50 (Dutch).

In the Netherlands, many residential streets with a 50 km/h speed limit have been converted into 30 km/h roads during the last decade. This is the reason for a higher number of casualties on 30km/h access roads. This study investigates whether 30km/h access roads are sufficiently safe, and whether the increase of the number of casualties is in step with the increase of 30km/h access roads. The study focuses on severely injured pedestrians and cyclists in crashes with motor vehicles.

Traffic offences, multiple offenders and road safety; Knowledge from existing research

Ch. Goldenbeld & drs. D.A.M. Twisk. R-2009-7. 68 + 9 pp. € 12.50 (Dutch) .

Recently it was suggested to extend the recidivism regulations in the Netherlands for drivers who repeatedly commit traffic offences. This extension could involve a recidivism regulation also applying to different kinds of offences that are determined on licence number. This idea has prompted a study of the relation between traffic offences and crashes, of the size of the group of multiple offenders, and of the expected effects of an extended recidivism regulation on road safety.

Social forgivingness; A theoretical exploration

M. Houtenbos. R-2009-8. 40 pp. € 10.- (Dutch).

This report explores one of the new Sustainable Safety principles that was introduced in the update of the Sustainable Safety vision: social forgivingness. The report first looks at how social forgivingness fits into the vision of a sustainably safe road traffic. In addition, the report discusses relevant concepts from (mainly psychological) lit-

erature. Finally, some suggestions are made for future studies into social forgivingness. Consequently, this exploration gives insight in the importance and the possibilities of social forgivingness as a principle in the Sustainable Safety vision

The influence of weather conditions on road safety; An assessment of the effect of precipitation and temperature

Frits Bijleveld & Tony Churchill. R-2009-9. 24 + 23 pp. € 11.25 (English).

The influence of changes in extreme weather conditions is often identified as a cause of fluctuations in road safety and the resulting numbers of crashes and casualties. This report focuses on an analysis of the aggregate, accumulated effect of weather conditions (precipitation and temperature) on the number of road crashes and injuries in the Netherlands.

Fact sheets:

- Blind spot crashes
- The influence of weather on road safety
- Zones 30: urban residential areas
- Alcohol