SWOV
INSTITUTE FOR ROAD SAFETY RESEARCH

RESEARCH ACTIVITIES

issue 27 December 2004

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

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Editorial

The last Research Activies of the year 2004 discusses the results of a large number of European and EU projects and activities. Two articles in this issue look at different aspects of speed and speed limits, of course from the road safety angle. Finally we give a short description of the 6 new fact sheets which SWOV has published on a variety of topics.

Greater safety through safe and credible speed limits

Speed limits are broken massively in practically all countries. This is also true in the Netherlands. We have estimated that if the present speed limits were adhered to well, it would save 25-30% of all traffic injuries.

The SWOV report 'Safe and credible speed limits' contains a study of how we could invoke road users to actually obey the limits in a safe manner.

Correspondence of a road's layout to its speed limit

Above all, speed limits must indicate safe speeds: crashes must be prevented as much as possible and if one does occur, it must be almost impossible to sustain severe injury. As is indicated elsewhere in this issue of Research Activities, speed is a crucial factor. To invoke road users to actually adhere to these safe limits, it is essential that these limits correspond to the expectations that a road's layout evokes. The limits must, therefore, be credible. In this country, this is not yet the case in many places. That is why SWOV argues in favour of bringing speed limits to correspond with the road layout. This can be done by fitting the layout to the limit or the limit to the layout. On some roads the limit will need to be raised, whereas on others it will need to be lowered. Another important

QUOTE

"The challenge is for the driving public to see speeding as equally anti social as drink driving."

Adrian Walsh, Director RoadSafe

consequence of the concept of credible limits is that where one limit changes to another one, as when leaving an urban area, road users should always be able to see a clear change in road layout.

Greater clarity on site

A good compliance with speed limits also requires road users always and everywhere being clearly shown what the speed limit is. Clear information must, therefore, always be provided everywhere. This can be done in the usual way with information on, or alongside, the road. A more advanced possibility is to show the limit inside the vehicle, e.g. linked to a navigation system.

More credible police enforcement

If speed limits meet the requirements for credibility, we expect that unintentional offences will occur less frequently and that those who say they want to drive with the flow of traffic will also keep to the limit. Then a group of road users will remain who still drive (much) too fast. This group needs police enforcement and there should be no tolerance for stubborn and flagrant offenders. Road users also need to be well informed about the how and why of police control. A greater credibility of the speed limits will lead to greater support for police enforcement. Using the new technical aids such as segment control and electronic vehicle identification (EVI), the police will be better able to manage driving speeds over a longer distance.

Short-term recommendations

In order to have safe and credible speed limits that are adhered to by most road users, four consecutive steps should be taken:

1. *Preparing checklists*
   The first step is to determine criteria for safe and credible limits and the minimum road user information requirements. The knowledge institutes must develop them. The result should be a checklist with which the road authority can determine which limit is safe and credible in a particular situation and how sufficient information can be given to the road user.
2. *Testing and, if necessary, adapting the road network*
   In the second step road authorities will use the checklist for their own roads, assessing if the limits meet the safety, credibility, and information criteria. This test has to result in proposals to change the limit or adapt the traffic situation or (alternatively) layout.
3. *Reorientation on police enforcement*
   When the first two steps have been taken, the best way of managing driving speeds has to be developed. In principle, control only needs to aim at deliberate offenders. The basic principle can be to change the behaviour of stubborn offenders effectively, based on a zero tolerance approach.
4. *Dynamic speed limits*
   This fourth step can be carried out simultaneous with the previous three steps and follows international developments. Important, relevant policy choices must be prepared for road-related and vehicle-related systems of dynamic speed limits. Pilot projects are a possibility.

SWOV report R-2004-12 'Safe and credible speed limits; A strategic exploration' (in Dutch with an English summary) can be studied and downloaded on the SWOV website under Publications.

The relation between speed and road safety: a complicated matter

The faster one drives, the greater the chance of a road crash and of severe injury. However, it is difficult to exactly determine speed's role in how crashes occur. Rules of thumb that attempt to express this in formulas are not of much use if important factors, such as road type or speed differences, are excluded. This is made clear in a SWOV literature study entitled 'Speed, speed distribution, and the chance of road crashes'.

The influence of speed on crash chance and severity

Speed is one of the core aspects of the road safety problem. However, we know insufficient about the precise relation between speed and road safety, and the circumstances that influence this relation, to be able to accurately calculate the effects of concrete speed measures.

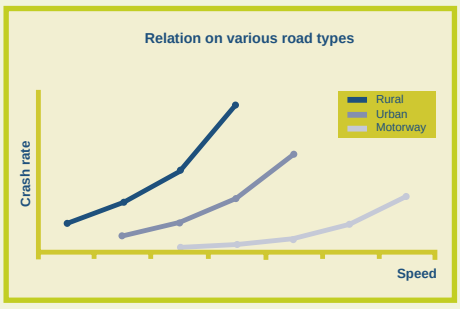
The relation between speed and road safety rests on two pillars. The first is the influence that speed has on crash severity: the higher the collision speed, the more severer the crash. In spite of all the measures taken during the past years to protect occupants during a collision, it remains a fact that it has significant consequences for the outcome. At a collision speed of 80 km/hour, the chance of car occupants being killed is 20 times greater than at 30 km/hour.

The second pillar is the crash rate: it gets higher the faster one drives. On the one hand, this is because of the longer braking distance and, on the other hand, that humans are limited in their capacity to process information and use it to take action. The faster one drives, the more information per unit of time there is to be processed, and the less time there is to react to it. However, the relation between speed and crash rate is much less direct and much more complicated than the relation between speed and crash severity.

The SWOV's literature study has shown that most studies found an exponential relation between speed and crash rate. An often-quoted conclusion was found in the British study of Finch et al. (1994). These researchers reported a linear relation in which the crash rate increases steadily. This study gave rise to the often used rule of thumb: "1 km/hour faster or slower results in a 3% increase or decrease in crash rate". This rule of thumb, therefore, does not allow for how fast the speed is, nor for different road types. However, they indicate that other relations, such as an exponential one, are a good alternative. Simplicity may have motivated the emphasis on a linear relation for small speed differences. Considering the results of the vast majority of the studies on this topic, we conclude that the speed-crash relation is not linear but exponential.

Differences by road type

The fact that 'the faster the speed, the higher the crash rate', suggests that speed measures have a greater effect on, for example, motorways than urban roads. However, the opposite is the case. The size of the rate and the amount this increases with faster speeds are both strongly dependent on the road type. Broadly speaking, motorways have the lowest crash rate and, as the speed increases, the crash rate increases less quickly than, for example, on urban roads. (Figure). What also applies is that the same speed reduction has a greater road safety effect on urban roads than on motorways.



These differences are very probably a result of the complexity of the road and traffic surroundings, in combination with the human limitations in coping with large amounts of information. Compared with motorways, other roads have much more complex traffic surroundings: encounters with a larger variety of road users from various directions and with less predictable behaviour. The road design speed is also of influence. On a road with a design speed of 80 km/hour, an increase in speed from 80 to 90 km/hour leads to a larger increase in crash rate than the same increase on a road with a design speed of 100 km/hour.

Speed differences

Beside the absolute speed, speed differences between vehicles also influence the crash rate. There are two types of study that look at this phenomenon. The first type are those studies that compare the crash rates of roads with a large speed variance (large differences between the speeds of vehicles) and roads with a small speed variance. These studies all conclude that roads with a large speed variance are less safe. The second type are those that concentrate on the differences in speed between individual vehicles involved in a crash and the rest of the vehicles. The first studies of this type were carried out in the 1950s and 1960s in the United States (for example Solomon in 1964). These studies repeatedly found a so-called U curve: the faster or slower motorists drove than most of the vehicles on the road, the greater the crash involvement. However, recent studies that used modern measuring equipment, and also another research design, have not been able to reproduce these findings (Kloeden et al. in 2002). They found that vehicles that drove much faster than the average had a greater crash rate: those that drove slower did not.

The future

To make a somewhat accurate estimation of the effects of speed measures on the crash rate, we will in any case have to allow for:

- absolute speed: the relation with crash rate is not linear but exponential;
- road type: in complex traffic situations, the absolute crash rate and its increase at faster speeds is greater than in less complex situations;
- speed differences: larger speed differences go together with higher crash rates; if a measure results in a slower average speed, but simultaneously in higher speed differences between vehicles, then the eventual safety effect can be smaller than, or even the opposite of, the effect of the average speed reduction on its own.

The SWOV report (in Dutch, but with a summary in English) ' Speed, speed distribution, and the chance of road crashes; Literature study and inventory of research methods' (R-2004-9) may be consulted and downloaded from the SWOV website http://www.swov.nl/Publications.

EuroNCAP crash tests: tests of cyclist-car front collisions recommended

On 25th November, the EU EuroNCAP organization published the latest results of the collision tests. The newest car models were thus assessed as to their crashworthiness. Up till now, the safety of occupants had been the core value. What is new in the crash tests is the attention being paid to the safety of pedestrians hit by a car. Starting in 2010, there will be new EU requirements for the crashworthiness and safety of car fronts for the large number of vulnerable road users. In Research Activities 26 SWOV paid attention to the Car front-cyclist collisions report (R-2003-33). Cyclists usually are hit by completely different parts of a car front than pedestrians. This is why the safety benefits of the new guidelines will not be optimal for cyclists. SWOV recommends to take cyclists into account in EuroNCAP and in the new EU requirements.

SWOV report R-2003-33 ' Cyclist-car front collisions; Factors that influence occurrence and injury severity ', in Dutch with an English summary, can be consulted and downloaded on the SWOV website under Publications. The EuroNCAP 2004 test results can be studied at www.euroncap.com.

What does the European motorist think about road safety?

A large proportion of European drivers are concerned about road safety. In addition, they recognise that driver behaviour is a significant risk factor in accidents. In general, they are in favour of enforcement and even of more severe penalties, especially for drinking and driving.

These are some of the results of the international SARTRE 3 study (Social Attitudes to Road Traffic Risk Europe). In 2002, for the third time, SARTRE was carried out in 23 European countries.
A minimum of 1000 car driving licence holders in each country was asked for their opinions on drink driving, speeding, and driving without a seatbelt. In this way, the opinions of 24,000 motorists could be compared. In Research Activities 24 we presented the Dutch results. The final report and a summarizing brochure have recently become available and this article takes a look at the results on a European scale.

Drink-driving

Two thirds of all motorists in countries with a limit of 0.5‰ g/l say they support a lowering of the limit to a uniform one throughout Europe. Motorists in countries with a lower limit than 0.5‰ g/l are less in favour of a uniform limit.
A minority of motorists says to favour specific measures for recidivists, and nearly all motorists questioned support a limit of 0‰ for young novice motorists. On the other hand, only a few motorists support an electronic alcohol lock. With such a lock, the car can only be started after the driver has passed a breath test.

Speeding offences

The SARTRE 3 study shows that motorists do not associate their own behaviour of 'fast driving' with danger. However, they do regard other motorists as driving dangerously if they exceed the speed limit. There is a large variation in the extent to which there is public support for intensified police control: from 39% to 89%. The majority of the motorists interviewed support using more speed cameras and higher fines for speeding.

Not wearing a seatbelt

The SARTRE study shows that a large percentage (85%) of cars are equipped with seatbelts in the back as well as the front. Estonia and Italy score lowest on this. The motivation for wearing a seatbelt on a motorway is greater than on urban roads. An average of 66% says to wear a belt on urban roads. An average of 19% of European motorists feel that they don't need to wear one as long as they drive safely. It seems remarkable that many countries still have such low seat belt wearing rates; given the time that they have been around and how effective they have proved to be in reducing the severity of accidents.

Police enforcement

Motorists claim that the chance of encountering a speeding control is twice as high as for an alcohol control. Motorists who have been fined for speeding don't regard their speeding offence as being very serious. However, they regard drink driving as unacceptable behaviour that should of course be punished.
Approximately two-third of drivers declare that they are satisfied with existing traffic regulations (judging that the size of the punishment fits the seriousness of the offence, that it is quickly administered and that it focuses on promoting safety, as opposed to raising revenues). Overall, 76% of drivers are in favour of greater levels of enforcement of the traffic laws, but this varies from 50 to 90% between countries. Sixty per cent are in favour of more severe penalties for speeding offences and 90% support more severe penalties for drink-driving offences.

New technologies

During recent years, the number of systems using new technologies to improve road safety has increased dramatically. These have ranged from enforcement systems, e.g. speed cameras, to those designed to help the drivers, e.g. on-board navigation systems. Some systems can be compulsory, like speed limiters on lorries, or optional in that they can be switched on or off by the driver, like cruise control. Less than 41% of Swiss motorists support a system that intervenes if the speed limit is exceeded, whereas 81% of Irish motorists favour it. At any rate, Swiss, Austrian, German, and Dutch motorists do not like the idea of intervening in their driving behaviour. The Swiss motorists are the most opposed to speed cameras, whereas the Irish are their greatest supporters (87%). 61% of all motorists have no objection to a vehicle identification system in their car. Such a system makes automatic toll collection as well as catching traffic offenders possible. 49% do think it's a problem if the police use this system. The European motorists have fewer objections to 'black boxes' that register driving speed, steering and braking behaviour, etc. in order to find out the cause of a crash.

Demerit points driving licence

A majority (72%) of European motorists is positive about introducing a demerit points driving licence. This already exists in some countries. The Irish are great supporters, whereas the Swiss and Austrians are less enthusiastic.

Driving behaviour

The SARTRE 3 study shows that the majority of the European motorists are of the opinion that they drive safer than other motorists. Many admit that they sometimes take liberty with safety, but many do not realize that their driving style endangers themselves and other road users. Poles, Germans, Swiss, and Irish say the most that they enjoy driving fast; Spaniards, Italians, and Czechs the least. At least 40% of the motorists in Cyprus, Estonia, and Italy phone at least once a day while driving. The lowest percentages are in the United Kingdom (14%) and France (12%). Austrians (4%) say that they are the least guilty of tailgating, whereas Greeks (35%) and Cypriots (25%) say they are the most guilty of this dangerous driving behaviour. This has changed very little since the last SARTRE in 1996.

The Netherlands

The Dutch motorists' opinion about speeding, seatbelt wearing, driving behaviour, and phoning in the car do not differ much from motorists in other European countries. They only think that the chance of getting caught for speeding is a lot greater in the Netherlands.
In the table you can find the Dutch percentages compared with the European average.

Conclusion

The SARTRE 3 survey has clearly identified examples of good and bad practice. The survey reveals that a large proportion of European drivers are concerned about road safety. In addition, motorists recognise that driver behaviour is a significant risk factor in accidents. In general, drivers say they are in favour of enforcement and even of more severe penalties, especially for drinking and driving. The SARTRE report concludes that it seems that an overall strengthening of traffic regulations will be necessary to improve safety, especially if the EU fatality reduction target is to be achieved. However, this will need to be accompanied by mass media education and publicity campaigns to improve public awareness and support for measures that may place restrictions on their behaviour.
Attention needs to be given to what the public sees as being fair, since without public support interventions will fail. While drivers are prepared to accept restrictions to promote road safety, this support will disappear if the measures are seen as being ways of raising revenue rather than preventing accidents. It will be important, therefore, that extensive information is given to the public as to the benefits of the measures.
The survey found marked differences for attitudes, behaviour, perceptions, and experience of enforcement as well as accident involvement between the drivers in European countries. However, it should be remembered that there are also sizeable differences between individual drivers in each country. When planning safety measures on a European level, it is important to consider these differences. In addition to these differences, it is necessary to consider the different traffic law legislation in each country, as well as the social, economic, and cultural context in which the drivers exist.

You can find the complete summary and the international report about the SARTRE 3 study at http://sartre.inrets.fr under SARTRE-3/Publications.

Percentage of motorists that:	European average	Netherlands
have been punished for speeding during the past 3 years.	18%	46%
thinks wearing a seatbelt is not really necessary if one is driving safely enough.	19%	11%
thinks they drive safer than other motorists.	63%	59%
likes to drive fast.	52%	39%
phones handsfree at least once a day while driving.	28%	26%

Large scale evaluation study into the effects of traffic education on its way

For the first time SWOV is carrying out a large scale evaluation study on the effects of traffic education. The study has been included in the SWOV research programme 2003-2006 on the request of regional road safety organizations in the Netherlands who have a keen interest in the subject.

Traditionally, road safety measures can be divided in three categories: engineering, enforcement and education. Engineering and enforcement are well accepted measures with proven effectiveness. The effects of education, however, have only been scientifically studied to a limited extent, and are largely unknown. In a time of budget constraints, interest in cost effective education programmes increases and education becomes a frequently used tool. To support decision making on education and to enable cost benefit analysis, it is important to know the effects of education. The SWOV research project aims to study these effects, first by doing a literature study and secondly by evaluating actual education programmes which are developed and managed by regional road safety organizations in the Netherlands.

Literature search

The literature study aims to provide an overview of existing knowledge on the topic of traffic education and to describe effective evaluation tools and methods. The primary search shows that so far little research has been done on the safety effects of this type of education.
Worldwide numerous traffic education programmes have been implemented, only few, however, have been thoroughly evaluated. A comparison of traffic safety education with the field of public health, also proved to be enlightening on the criterion of effectiveness. Traditionally, traffic safety education is considered to have been effective when casualty levels have decreased. In the field of public health, none of the evaluation studies used the ultimate criterion (e.g anti-smoking education leads too fewer smoking related death), but chose the behaviour related criterion, which in this example would be "self reported smoking". Based on this finding it has to be concluded that in traffic education also, "behaviour" is the adequate criterion in those cases in which the relationship between behaviour and accident risk is evident. Furthermore, it was concluded that a pre and post test is needed in each evaluation, as is a control group.

Evaluation of education programmes

The second part of the study will evaluate the effects of existing education programmes.
In August 2004 regional road safety organizations in the Netherlands were invited to submit their educational programmes for participation in a large scale evaluation study. The response to this SWOV request confirms the growing interest in education: more than 40 projects were submitted, covering a wide area of educational topics. While the projects are aimed at road users of all age groups, a large number of programmes focus on two specific target groups: young mopedists and pupils in primary and secondary education. Other projects aim at elderly drivers, repetitive traffic offenders, safe use of child's car seats, the interaction between children and lorries, etc.
After the projects had been submitted, a committee of traffic education experts selected those that were suitable to be used in the SWOV study. After extensive discussion and careful consideration, most education projects were included in the study, keeping the research as broad as possible. The actual evaluation studies will be executed and financed by regional organizations. Depending on the financial feasibility of the evaluations, it is now foreseen that approximately 25 education projects will be evaluated in the coming two years. SWOV will coordinate the effort and will provide guidance and research tools. In order draw conclusions about the effectiveness of specific features of individual programmes, a meta analysis will be carried out which will include the results of all evaluated programmes. The study will take approximately two years and the results are expected to become available in early 2007.

ROSEBUD

In road safety, as in most other fields, efficiency is an important criterion in political and professional decision making. Tools are available to help choose the policy which gives the highest return on investments.

ROSEBUD (**Ro**ad **S**afety and **E**nvironmental **B**enefit-Cost and Cost-Effectiveness Analysis for **U**se in **D**ecision-Making) is a thematic network funded by the European Commission. It is meant to support users at all levels of government in judging the efficiency of road safety measures by making use of Efficiency Assessment Tools (EATs) like Cost Benefit Analysis (CBA) and Cost Effectiveness Analysis (CEA). A CBA is meant to answer the integral efficiency question and investigates the social output of a measure or a policy.; The monetized value of all effects is compared with the implementation costs of the measure. The CEA is used for the partial efficiency question and estimates the numbers of the casualties saved per invested euro.

Barriers

Policies and decisions are often based on other grounds than effectiveness and efficiency. One Workpackage of ROSEBUD identified three groups of barriers that were reason for not using CBAs and CEAs: fundamental barriers, institutional barriers, and technical barriers. A total of 28 individual barriers were found and fitted into these three groups of barriers. A large number of barriers are beyond the scope of ROSEBUD. They either are of a philosophical nature, or they are central elements in a certain system of political decision making. Another Workpackage, Workpackage 3, looked at the remaining barriers (see frame) and tried to find practical solutions to overcome them, and to improve the use of EATs.

Solutions

Workpackage 3 arrived at a number of solutions which can lead to an increased use of EATs for making road safety policies and decisions.

Best practice guidelines

Public authorities on the national and EU level can improve the quality and uniformity (comparability) of efficiency assessment studies by establishing 'best practice' guidelines for the methods and techniques. The guidelines can provide some examples of best practice solutions. Examples are: a sensitive type of analysis with scenarios (optimistic, realistic, pessimistic) to handle uncertainties and careful descriptions of the distribution of costs and/or benefitsamong the various groups that are affected by a measure. They are informal guidelines with no obligation.

Creating and maintaining a database

To stimulate the application of more uniform and reliable values of safety effects in the EU, it would be useful to establish a database with typical values of the effects, based on international experience. The database should give general values of safety effects on initial steps of CBA/CEA and could assist in comparisons of local effects observed. The database should be accessible to a European network of experts.

System of quality control

The quality of efficiency assessments can be improved by the introduction of impartial quality control. This can be achieved by the introduction of a board for impartial quality control. Another instrument to improve the quality of CBAs might be the stimulation of a competitive market for institutes executing CBAs, and certifying institutes that are highly specialized in these types of analyses. A system of impartial quality control should be developed as a follow-up to the ROSEBUD project.

Support and structure cooperation

It is necessary to support and structure the process of close cooperation between decision makers and analysts by introducing an informal professional code for analysts. Decision makers must be trained and educated. 'Tips and tricks' will be provided for understandable reporting on the results of CBAs and CEAs .

Legal embedding

It is still felt to be too early to generally recommend a legally binding CBA for road safety measures. However, the use of CBA in decision making can be stimulated by legal embedding of this assessment tool in decision making processes where large road investments are involved. In those countries where such an obligation does already exist for large investments in infrastructural projects, it should be included as part of the procedure. The EC could introduce a similar obligation at the EU level.

Next

The ROSEBUD project will continue in the next Workpackage with testing the efficiency assessment tools on selected road safety measures. A first version of a (small) training course for decision makers will also be tested. It will also test the presented data sources. The final Workpackage will draw up an overview of all measures that have been assessed and of practical guidelines for EA-studies.

The final report of Workpackage 3 'The Use of Efficiency Assessment Tools: Solutions to Barriers' has recently been published and will shortly be available on the ROSEBUD website http://partnet.vtt.fi/rosebud/.

Barriers dealt with in ROSEBUD

- A lack of generally accepted evaluation techniques,
- Inadequate treatment of uncertainties,
- Disputable values of parameters in the analysis (e.g. discount rates),
- Inadequate methods to deal with distributional effects,
- Lack of knowledge of relevant impacts,
- Absence of impartial, institutionalized, quality checks on CBAs,
- Wrong timing of CBA-information in the decision making process,
- Costs of CBA,
- CBA-information does not come from a reliable source (e.g. monopoly position of CBA conductors),
- Wrong form of the CBA information (text or figures, tables, diagrams, understandable language, way of offering the information, transparency and accessibility of conclusions),
- Prejudices among governors and civil servants because of little knowledge about CBAs.

EXTRAWEB makes European research readily available

During the 10th World ITS Congress in Madrid in November, the new European Commission website EXTRAWEB was presented. The website contains all traffic and transport research results of the 5th Framework Programme.

This portal also contains information about relevant research being carried out in 29 European countries and by international organizations. Thus a new step has been set in making European research readily available to everybody.
EXTRAWEB is a project in the 5th Framework Programme that mainly aims at making the results of this programme accessible. Moreover the aim is to give publicity to the national research that is being carried out in 29 European countries.

Entitled 'Transport Research Knowledge Centre', the site makes information available at the programme and project level.
The website has identified more than 200 research programmes and contains information about an estimated 2,400 projects. The projects are subdivided into 26 themes. Keywords can also be used to find information about research projects and their results. Although the project is part of the 5th Framework Programme, its continuity is guaranteed: in the 6th Framework Programme, the European Commission has obliged the consortiums to provide project filing cards about transport projects according to the EXTRAWEB format.

EXTRAWEB can be found at http://europa.eu.int/comm/transport/extra/home.html

New fact sheets on the SWOV-website

Since the introduction of the SWOV-fact sheet, the number of fact sheets on the SWOV website www.swov.nl has been growing steadily.

After the introduction of the initial four fact sheets which was announced in the previous issue of Research Activities, another six fact sheets on a variety of topics have been added. More fact sheet will follow in the near future.

Young mopedists

Young mopedists of 16 and 17 years old have a relatively high risk of being killed and injured in a road crash in comparison with other modes of transport. Especially boys make many kilometres on a moped. Some reasons for this high risks are: the overestimation of one's own skills, a limited capacity to convert knowledge into safe behaviour, speeding, and not wearing a crash helmet. The introduction of a moped registration number and number plate will make police control of offences easier and possibly more effective. SWOV has estimated the safety effects when raising the minimum age from 16 to 18 years old. Raising it to 17 years old will obviously have a smaller, but nevertheless considerable, safety improvement. *More information can be obtained from the fact sheet.*

The relation between speed and crashes

The faster one drives, the higher the crash rate as well as the severe injury rate. The role of speed in the occurrence of crashes is, however, difficult to determine exactly. Generally speaking, rules of thumb that attempt to express the speed-crash relation in formulas are too general if they ignore important factors such as road type or speed differences. At this moment in time, SWOV is studying the speed-crash relation on 80 km/hour roads in the Netherlands. *More information can be obtained from the fact sheet.*

Road safety effect of obligatory eye test for 45 year olds and older

SWOV expects that the introduction of an obligatory eye test for motorists of 45 years old and older will have a very slight, positive effect on road safety. This measure, in which only the vision sharpness is tested, will save a few deaths and 15 to 20 in-patients a year. However, under certain assumptions, the benefits are greater than the costs. SWOV recommends a more accurate calculation of the expected costs before deciding on introduction. *More information can be obtained from the fact sheet.*

Young novice motorists

Young novice motorists (18-24 years old) have a crash rate that is more than four times higher than that of experienced motorists (30-59 years old). The crash rate of young males is even more than six times higher. The main causes are a lack of experience and the young age itself. Effects of the existing measures for young novice drivers (the current driving course, the driving examination, and the novice's driving licence) are as yet unknown. *More information can be obtained from the fact sheet.*

The graduated driving licence

Young novice motorists, when compared with experienced motorists, have a higher chance of being involved in a road crash. This is only to a limited extent caused by a lack of the basic skills of vehicle control and application of traffic rules. Improving only the basic driving course is no solution to this problem. However, a substantial road safety effect can be expected from a graduated driving licence system, i.e. a longer learning period in various phases. *More information can be obtained from the fact sheet.*

Bicycle facilities on road sections and intersections of distributor roads

Bicycle facilities that separate motorized traffic from relatively vulnerable road users such as cyclists and (light)-mopedists (i.e. the sum of light-mopedists and mopedists) are necessary in a sustainably-safe traffic environment. Research has shown that the road segments of distributor roads with adjacent or separated cycle paths are safer than road segments without such bicycle facilities. The number of crashes can be reduced by additional measures at intersections: priority regulations, speed humps, and plateaus. The absolute separation of the various road users is not always feasible, even in a sustainably-safe traffic environment. That is why conflict situations, and the accompanying crashes, can never be completely excluded. *More information can be obtained from the fact sheet.*

All fact sheets are available in English and can be downloaded from the English part of the SWOV-website http://www.swov.nl.

Colophon

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

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Realisation: SLEE Communicatie, www.slee.nl

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ISSN: 1380-703X

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HAZOP: valuable road safety assessment method

What can road safety policy makers learn from managers in the chemical industry? The surprising answer is: brainstorming sessions. This is one of the results of the study that Ellen Jagtman fervently illustrates when she is awarded her doctorate at Delft University of Technology.

The doctoral research about ITS policy maker applications was aimed at developing an instrument that helped clarify the intentional and unintentional effects of proposed road safety measures. To do this, Jagtman used the brainstorming session method that is common in the chemical process industry. It is called HAZOP (HAZard and Operability study). During a HAZOP brainstorming session, experts systematically analyse a certain process or problem by going, step by step, through all parameters, possible deviations, and consequences. In her doctoral research, financed and facillitated by SWOV, Jagtman transferred this method to road traffic.

Added value

A precondition of this structural method was that it would add something to the currently available approach. In order to test its usefulness, she applied the HAZOP method to a large-scale field test and compared the result with the results of the evaluation approach that had actually been used. This test project was Intelligent Speed Adaptation (ISA), one of the four projects of a large-scale Swedish ISA study. The comparison showed that the HAZOP method raised more relevant evaluation questions than were used in the Lund project.

Integrated approach

The method is especially useful for judging new measures. The possible effects of, for example, various intelligent transport systems can be made visible systematically. In her transfer to the traffic HAZOP method, Jagtman developed an integral safety approach. This approach is not yet common in existing road safety assessment procedures and is recommended to be used.

Three steps

In her thesis, Jagtman describes how she worked with three successive steps: an analysis of current methods, the development of the integrated safety approach, and testing it.

Analysis of current methods

The first step consisted of analysing the current methods used to gain insight in the effects of measures before they come into force. The analysis showed that the present approach does not explicitly identify risks and deviations that measures can unintentionally introduce. Such problems can occur because, for example, the applications are used beyond the limits/circumstances for which they were originally designed. For example, cruise control can be used on urban roads, in busy traffic, or in poor weather; whereas they were designed for use on motorways and trunk roads, in calm traffic, or in dry and clear weather. In addition, the current assessment procedures have a limited point of view. The majority are aimed at one particular safety level: e.g. if the apparatus functions correctly, or which problems could occur if the apparatus is used as intended.

Integrated safety approach

Based on her analysis of current methods, Jagtman has developed a procedure that allows for the inadequacies found. The development approach consists of two phases. The first one is a selection of measures, including defining the appropriate desired process. The second one is the description of the deviations that can occur as a result of introducing a certain measure. Designers and policy makers must not only base their decisions on the extent to which the desired effects occur, but also the unintentional side effects. The result is a set of evaluation questions that need an answer before a decision can be made about the intended measure.

Traffic HAZOP

The HAZOP applied to traffic (Traffic HAZOP) was tested in a number of cases for its usefulness to policy makers. The method was tested for two speed-reducing measures, humps and Intelligent Speed Adaptation (ISA). The method was also (afterwards) applied to a large-scale Swedish ISA study. Members of the field experiment project team participated in a HAZOP brainstorming session in order to test whether the method can reveal problems that were not studied during the experiment itself. The cases showed that the Traffic HAZOP is very useful for road traffic.

Widely useable

The method is very useful as an addition to the available evaluation methods. In the cases she studied, Jagtman found that the composition of the HAZOP team was not of crucial importance for identifying possible problems. She therefore concluded that policy makers could also use the procedure without using specific designers' knowledge to draw up a list of safety aspects that require further discussion before implementing the measure studied. However, further research is needed to determine which knowledge of the HAZOP participants is really necessary to make a list of the most essential problems. The proposed approach can uncover problems that can already be solved before the test phase. It can also contribute to designing a framework for a field experiment.

The thesis can be ordered from the publisher: Eburon in Delft (www.eburon.nl): H.M. Jagtman. Road Safety by Design: A decision support tool for identifying ex-ante evaluation issues of road safety measures. ISBN: 90 5972 045 8. See also: www.tbm.tudelft.nl/webstaf/ellenj.

Publications

Most SWOV reports are written in Dutch but they all include an English summary. Below is a selection of reports that have recently been published by SWOV. Records of all SWOV reports that were published from 1980 onward can be found on our website (www.swov.nl). Reports that were published in or after the year 2000 can be downloaded free of charge.

Safe and credible speed limits;
A strategic exploration
I.N.L.G. van Schagen, F.C.M. Wegman & R. Roszbach. R-2004-12. 48 pp. € 11.25. (In Dutch)
In its earlier publication Safe; what is safe? SWOV proposes to aim for all road users keeping to the speed limits which are valid at that time. This report presents a strategic view on the Dutch speed policy for the short and medium long period. Road safety is the main line of approach.

Fact sheets:
- Young mopedists
- The relation between speed and crashes
- Road safety effect of obligatory eye test for 45 year olds and older
- The graduated driving license
- Young novice motorists
- Bicycle facilities on road segments and intersections of distributor roads

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