

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

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Intelligent vehicle systems: safety effects assessed

More and more intelligent vehicle systems are becoming available which help road users drive their cars comfortably, safely and economically. If we look at road safety, positive safety effects are expected from Electronic Stability Control (ESC) in particular. For Intelligent Speed Assistance (ISA), the more intervening systems are expected to have larger safety effects than systems that only alert the driver.

An intelligent vehicle system is a system which receives information from the environment and presents it to the driver. The driver can then react to the information, or, if necessary, the system can interfere autonomously. Many intelligent vehicle systems are already present in part of the vehicle fleet and systems are being developed. For the Netherlands, a SWOV study looked at the road safety effects that are to be expected in 2020 and 2030 of nine systems for passenger cars. Various sources have been used for the effect estimates: research literature, expert interviews, crash analyses, and prognoses for the penetration of the sys-

tems in the Dutch vehicle fleet. When possible the effects have been quantified.

Electronic stability control

ESC is a system that acts autonomously when a car threatens to skid. No driver action is required, but he can keep better control of the vehicle once the system has been activated. In many cases a crash is prevented. ESC in particular is reported to have a substantial road safety effect. Not only has research found the system itself to be very effective; there will also be large scale implementation of ESC. This is the result of European legislation

Continued on page 2

Editorial

The positive effects of intelligent vehicle systems and the less positive effects of using a mobile phone or listening to music while cycling are two topics among the wide variety of subjects in this issue of Research Activities.

Intelligent transport systems can be a powerful tool to support overall transport policy goals in many ways

Slim Kallas, Vice-President of the European Commission in charge of transport at the Intelligent Transport Systems Conference in Brussels, 22 June 2010

QUOTE

that makes the presence of ESC compulsory in all new passenger cars from 2014. Furthermore, EuroNCAP, the European New Car Assessment Programme, awards an extra star when ESC is present in a car. In 2030, more than three quarters of the passenger cars are expected to have an ESC system.

Intelligent speed assistance

ISA is a collective name for systems that continuously compare the speed driven with the local speed limit. The ISA road safety effect very much depends on the type of system that is used. An ISA that uses dynamic speed limits and that interferes automatically when the limit is exceeded is expected to have the greatest road safety effect. An informative system that uses fixed limits is

expected to have the smallest effects. At present, with the exception of the informative ISA that is part of many navigation systems, ISA is barely present in Dutch passenger cars. How fast the implementation will take place is also unclear. The expected ISA effects can therefore not be quantified.

Other systems

The other seven systems, Lane Departure Warning System, Advanced Cruise Control (ACC), Navigation System, Emergency Call (eCall), Alcolock programme, Daytime Running Lights and the Seat Belt Reminder are expected to be much less effective.

Additional research

It is important to detail the separate effects as accurately as possible to gain insight in the pos-

sible overlap of effects and in the interaction of effects. For example, by acquiring more knowledge about the mechanism behind ISA and ACC effects on speed behaviour, research of the possible interactions and overlap effects can be more goal-oriented. The European ADVISORS project has laid a solid foundation, but additional research is required. ◀▶

SWOV report 'Estimate of the safety effects of intelligent vehicle systems' (R-2010-8) is part of the Dutch Transumo project 'Intelligent Vehicles'. The report is in Dutch, has an English summary and can be consulted and downloaded on www.swov.nl under Publications. A SWOV fact sheet about ESC will be published shortly.

Fewer crashes due to more congestion?



Mobility has been increasing significantly in the last few decades. Because road length did not increase at the same pace, an increasing number of road stretches have become increasingly congested. SWOV recently published a literature review to assess the effect on road safety.

It is generally known that traffic congestion has a negative impact on the economy and on the quality of people's lives. Road users experience delay and stress, and environmental pollution increases. The effects of traffic congestion on road safety, however, are less obvious. Given the strong relation between speed and road safety, it is logical to expect congestion to have a positive effect on safety: in a congested situation speed is per definition low. Less positive effects can also be expected: vehicles may drive into the rear of a traffic jam or swerve to avoid it. Drivers can also decide to take a different route along more hazardous roads.

Congestion: inconsistent findings

The SWOV literature review not only looked at congestion, but also at unstable traffic conditions. Unstable conditions precede the state of congestion and occur when at a particular road, traffic density approaches its critical value. Unstable conditions mean that even the smallest disturbances in the traffic affect the flow and may lead to large speed variability.

The findings in relation with the traffic flow are not consistent. Some studies find that high volume to capacity ratios (V/C) result in higher crash rates but less severe crashes. Another study reports a lower crash rate at higher density levels, and one of the studies does not show any relation between congestion and crash frequency nor between congestion and crash severity.

Unstable conditions, more crashes

With respect to the effect of unstable conditions, the findings are more consistent. As indicated, in unstable conditions the speed variability increases, both within and between lanes.

Also the traffic density variability increases. These increases in variability are found to coincide with an increased likelihood of a crash, in particular an increased likelihood of rear-end crashes.

Traffic jams

With respect to location and type of crash the literature suggests that most crashes occur during formation and dissolving of a traffic jam. These are mainly rear-end crashes, more so when the traffic jam builds up than when it dissolves. When looking at crash severity, the literature reports that this is substantially reduced once all lanes are congested to the same extent. No studies were found that could confirm SWOV's hypothesis that congestion has a stronger effect on crash rate and crash severity if the congestion comes by surprise than if the congestion is at a common location or announced in advance by means of, for example, variable message signs.

Many remaining questions

The available literature shed some light on the relation between congestion and safety. However, several questions remain. Since increasing congestion seems to be relevant for road safety, SWOV recommends investigating the relationship in more detail, by linking data on traffic volumes with congestion and crash data. We expect that in future this knowledge can be used to determine to what extent the increase in congestion contributed to the increase or decrease of traffic crashes or how future developments in relation with the increasing amount of traffic will affect road safety. ◀▶

The report "The relationship between road safety and congestion on motorways: a literature review of potential effects" (R-2010-12) is written in English and can be downloaded from www.swov.nl.

Mobile phone use and listening to music while cycling increases crash rate

Using a mobile phone or portable media player while cycling increases the crash rate. These types of electronic equipment are used on the bicycle especially by young people. These are some of the conclusions in a recently published SWOV study.

The study investigated how and how often portable media players and mobile phones are used by cyclists in the Netherlands and looked at the possible consequences for road safety. The results of this study are based on an online survey among more than 2,500 cyclists.

Frequent usage

The results indicate that about one in every six Dutch cyclists uses electronic equipment on every or nearly every ride. Listening to music is done most frequently: 15% of the cyclists listens to music on (almost) every ride. More than 3% of the cyclists makes or receives phone calls on (almost) every ride; 3% of the cyclists sends or reads a text message on (almost) every ride; and nearly 2% of the cyclists searches for information on (almost) every ride. Using this type of equipment is very much age-related. Three-quarters of the youths in the ages from 12 to 17 say that they use equipment to listen to music while cycling occasionally and also three-quarters use their mobile phone at times. For the over-50s these proportions are one eighth and one third, respectively. Much more than young people, the over-50s state that they do not use their pieces of equipment in busy traffic or in other complex traffic situations.

Higher crash rate

Using electronic equipment while cycling increases the crash rate for cyclists. This conclusion was drawn on the basis of the self-reported



use of portable media players and the mobile phone and the self-reported incidence of crashes, with or without injury. A conservative estimate based on these self-reported incidences indicates that the bicycle crash rate is a factor of at least 1.3 higher for a cyclist who uses the phone and listens to music on every ride than it is for a cyclist who never uses equipment. Approximately 9% of the injury crashes involving bicycles is preceded by equipment being used while cycling. Therefore, these are bicycle crashes in which the use of electronic equipment may have played a role. It should here be noted that other possibly distracting factors like talking with another cyclist, taking out a sandwich, or daydreaming, are mentioned three times more frequently as preceding bicycle crashes. As it is, young people use equipment much more frequently than older road users, they much less adapt this usage to the traffic situation, and they also underestimate the risks.

Serious problem

The results of the study give an indication of the increased crash rate due to listening to music and using the phone while cycling; a problem that should be taken seriously. From the road safety point of view it is therefore wise to refrain from listening to music and using the mobile phone while cycling. SWOV advocates first investigating the problem further before (legal) measures are taken. At the same time, according to SWOV, it is advisable to use public information and education especially aimed at the younger cyclists to point out the dangers of using electronic equipment while cycling. ◀▶

The study is published in SWOV report R-2010-5: 'The use of portable media players and mobile phones while cycling'. The report is in Dutch, but has an English summary. It can be consulted and downloaded on www.swov.nl under Publications.

Safety Science special issue on road safety management: SWOV workshop results published



In the area of road safety there is a growing interest in policy-related research. The complex nature of this type of research combined with the observation that scientific journals pay limited attention to the subject was the basis for SWOV to organize a workshop on Scientific Research on Road Safety Management. The workshop was held in November 2009 in Haarlem, the Netherlands and generated a lot of attention in the road safety research community as well as in the policy making community. Therefore it was decided to publish a special issue of the peer reviewed journal

Safety Science based on the contributions and discussion of this workshop. In addition to the nine articles based on presentations at the workshop, an extra seven articles relevant to the topic have been included in the special issue. ◀▶

A report of the SWOV workshop was published in Research Activities 42. The digital version of 'Safety Science 48', the special issue on road safety management, is already available for subscribers via www.elsevier.com/locate/ssci. The printed version of the journal will be available in November 2010.

Fewer road fatalities in the Netherlands once more

In 2009, 720 people died in traffic in the Netherlands. Compared to year 2008 this is a further reduction of 4%. The 2010 target of a maximum of 750 road fatalities has therefore already been met. To meet the target for 2020, a maximum of 500 fatalities, there is still some progress to be made.

The 2009 road safety statistics were announced by the Dutch Minister of Transport Camiel Eurlings at the bi-annual Dutch road safety conference earlier this year. Since the beginning of the current millennium the Netherlands has realized a reduction in road fatalities of around 40%: from almost 1,200 fatalities in 2000 to just over 700 in 2009.

Extra effort for cyclists

In his keynote address at the Dutch road safety conference, SWOV Director Fred Wegman pointed out there was no time to sit back. He explicitly asked attention for the safety of cyclists. Currently around a quarter of the Dutch road fatalities is a cyclist and the number of fatalities has hardly reduced. The number of serious injuries amongst cyclists is even increasing. Fred Wegman called on the Dutch road safety profession-



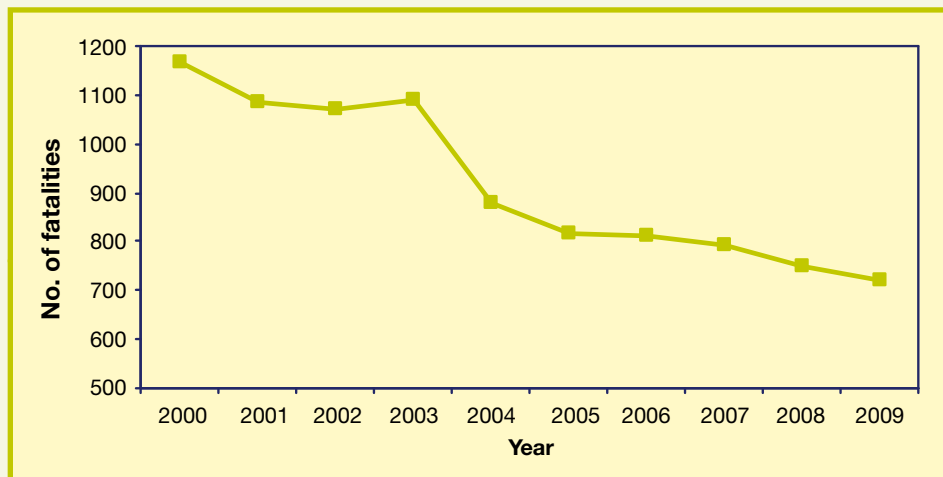
als to make a special effort to improve the safety situation of cyclists. Safer infrastructure, better lighting of bicycles, encouraging the use of bicycle helmets, and inducing safer behaviour, including less drink-cycling and less red light running, would need to be elements of such a plan of action according to Fred Wegman.

Higher quality, more efficiency

Furthermore, Fred Wegman pointed out that a substantial road safety profit was to be gained by improving the quality and the efficiency of traditional measures, including road engineering, education, and enforcement. In particular, he argued for systematic road infrastructure quality checks. New measures are to be found in, for example, the introduction of intelligent technologies, the application of traffic management technologies to improve safety, and the development of safer vehicles including in-vehicle and co-operative systems.

New research programme

Many of these ideas are intended to become part of SWOV's new research programme that is currently being prepared and is expected to run from 2011-2014. Like SWOV's previous programmes, the new programme aims to improve road safety and to support evidence-based policy making by explorative and applied research and targeted knowledge dissemination. ◀▶



Number of road fatalities in the Netherlands in the period 2000-2009
(Source: Dutch Ministry of Transport)

Thinker in Residence

Developed in South Australia in 2003, the Adelaide Thinkers in Residence programme brings new ideas into the state and translates them into practical solutions to improve the lives of the people who live there. The Premier of South Australia, Mike Rann, invited SWOV Director Fred Wegman to become 'Thinker in Residence'. The Thinker in Residence programme (www.thinkers.sa.gov.au) brings an international expert on

a specific subject to South Australia to come to an innovative approach together with the community. As a leading expert in the field of road safety, sustainably safe road traffic in particular, Fred Wegman was asked to think along and give input about road safety innovation in South Australia.

The results will be used as a contribution to the South Australia road safety strategy that is to be

drawn up. The residency covers a considerable number of weeks, to be divided over different working visits. Fred Wegman accepted the invitation and in May spent the first four weeks of the residency in Australia. During these four weeks Fred Wegman was also invited in Perth (Western Australia) and Brisbane (Queensland) to speak on road safety. He will return to Australia late 2010. ◀▶

Dutch traffic through Australian eyes: Nimmi Candappa relates

When SWOV and the Australian Monash University Accident Research Center (MUARC) signed their Memorandum of Understanding two years ago, they not only agreed to exchange knowledge and information and to cooperate within projects, they also wanted to exchange employees.

From August 2008 until May 2009, it was SWOV researcher Nicole van Nes who moved her desk from Leidschendam in the Netherlands to Melbourne, Australia. This year MUARC researcher Nimmi Candappa travelled in the opposite direction to work at SWOV from March until December. We asked her about her experiences so far.

Why work in the Netherlands?

"The aim of the exchange of employees is that we learn from each other, and improve cooperation between the institutes. Apart from the actual projects, simply being here and interacting with people at SWOV makes a contribution. This has already resulted in more cooperation between some Dutch and Australian researchers who were working on a similar research topic.

I work on MUARC research projects as well as on European projects in which SWOV is involved, like RISMET and DaCoTA. Sometimes it's tricky to balance the time, but I feel that my first responsibility is the work I do for SWOV.

Besides working on these concrete SWOV projects I also observe the way Dutch traffic works for hints on how to improve things back home. I've therefore photographed much of the interesting Dutch infrastructure."



What do you think of the Dutch traffic?

"The biggest difference with Australia is the infrastructure that is provided for cyclists. That is really good here, pretty much unsurpassable. Cyclists therefore seem very confident. I've seen people moving big packages on their bikes or a mother transporting four kids at the one time. You won't see that in Australia. But the consequence is that not that many people seem to walk here. The other day I heard someone say: 'I know I'm lazy. It's so close, but I'd rather cycle than walk.' For me it's the opposite. Cycling takes more effort than walking."

What will you take home with you?

"The speed humps at intersections I find very

interesting. It slows the cars travelling through the intersection, so that in the event of a crash the consequences aren't that severe. In Australia there is still a lot of resistance to speed humps, but at MUARC, together with the state road authority VicRoads, we're in the process of trialling an intersection speed hump. This is a direct result of the cooperation between the two institutes. I've already taken a lot of video footage and photos of these Dutch intersections.

Another interesting thing in Holland is the use of roundabouts, where cyclists have their own separate lane adjacent to the cars. In Australia the cyclists generally use the same carriageway as the cars. Many Australian cyclists aren't fond of roundabouts for this reason."

What is better in Australia?

"Back home almost every car stops for pedestrians at a zebra crossing. I noticed that drivers in the Netherlands often drive on without stopping. Also I find it strange that most cyclists in the Netherlands don't wear helmets. People don't seem to be aware of the danger. When I wear a helmet here people look at me as though I'm a little crazy and sometimes point at it. 'Only children wear helmets' is what I often hear.

But apart from these I have few other criticisms, especially not about policy. This is another reason I'm here: the road safety and Sustainable Safety policy of the Netherlands have a good reputation worldwide. I hope I can transfer some of its thinking back home." ◆◆

Fred Wegman receives ITE Safety Council Award

On 10 August 2010, SWOV Director Professor Fred Wegman received the ITE Transportation Safety Council Edmund R. Ricker Award.

The Edmund R. Ricker Awards are given in two categories: individual and organization for outstanding contributions to the field of traffic safety. They are chosen by members of the Transportation Safety Council each year. The individual award is given to a person who is recognized as a leader in the field of traffic safety through his/her safety activities in professional organizations, in the community, or in the performance of traffic engineering.

Fred Wegman received the award for the development of the road safety programme Sustainable

Safety which is not only considered a leading road safety vision in the Netherlands, but also internationally.

Founded in 1930, ITE is an international community of transportation professionals including, but not limited to transportation engineers, transportation planners, consultants, educators and researchers. Presently ITE has nearly 17,000 members in more than 90 countries, organizes meetings and seminars and brings out many publications in the field of transport. ◆◆

More information can be found at the ITE website www.ite.org.

The website www.advancingsustainablesafety.nl offers more information about Sustainable Safety.



Subjective safety influences parents' decisions

Recent SWOV research indicates that the subjective feelings of safety experienced by parents with young children is to a large extent dependent on what other parents say about the safety of a traffic location. Objective information in figures has much less influence. Feelings about the dangers of traffic influences the parents' decision whether or not to allow their child to go to school independently.

Although there is no clear relation between subjective and objective safety, subjective safety may have an effect on, for example, older road users and (parents of) young children choosing which mode of transport and which route to take. However, there is no factual information about this. To fill this hiatus to some extent, SWOV investigated the influence of subjective safety on the parents' choice whether to let their children go to school independently or accompanied.

Objective and subjective information

The study focused on how feelings of being unsafe evolve and the effects they have on parents with children in the age group 6 to 10 years old. A total of 765 parents participated in the SWOV study. Through the internet they were given information about the road safety situation in the fictitious town of Lonkervoort. The information consisted of objective information (number of inhabitants, schools, number of traffic crashes) as well as personal, subjective information (the opinions of parents and children about the road safety of locations in the vicinity of the schools in Lonkervoort). The information was provided in different



forms, for example as made-up newspaper articles (see figure). The information that was offered, was varied systematically. Next, the parents had to answer some questions about how they estimated the risk of a crash and about if and how they would bring and collect their children in both the fictitious and the real life situation. The feelings of being unsafe were measured in an indirect manner to prevent people becoming aware of possibly hazardous situations as a result of the questions. This has shown to be a weakness of more traditional questionnaire studies.

Main findings

How the participating parents experienced road safety in Lonkervoort, was for the greater part determined by the subjective information they received in the form of personal opinions of fictitious parents and children. Objective information in figures about the road safety conditions had a much smaller effect. Although a relation was found between the parents' feelings of being unsafe and their estimated risk of a crash, this was not a very strong relation. Only a few parents indicated they would allow their children in this age group to go to school unaccompanied. However, when other parents had said that they

found the traffic situation safe in the vicinity of the school, the children were somewhat more frequently allowed to go to school on their own. This was mainly the result of parents themselves also experiencing the traffic situation as safer.

Communication

Looking at parents with young children we may conclude that subjective road safety information has a greater influence than objective information. This can be important for schools, municipalities and other organizations in considering how to handle road safety communication. If they wish to influence the problem awareness and the parents' intentions and behaviour in the vicinity of schools, the opinions of other parents should be given a major place in the communication. But providing personal, subjective information in addition to objective information is also important for reducing feelings of being unsafe in traffic. ◀

SWOV report R-2010-7 'Alone or accompanied to school: perceived safety in traffic by parents of primary school pupils' The report is in Dutch, but has an English summary. It can be consulted and downloaded on www.swov.nl under Publications.

Tevreden ouders: "Het gaat de goede kant op!"

- Van onze verslaggever -

Zo eens in de zoveel tijd laat de discussie weer op: de verkeersveiligheid van Lonkervoort. Vandaag staat de Bloemenbuurt in de belangstelling. Deze kinderrijke wijk in Lonkervoort wordt gekenmerkt door het grote aantal scholen.

Ondanks het drukke autoverkeer zijn er nu prima routes om je kind naar school te brengen. Zo zegt Annika de Bruijn, moeder van Amber (9): "Eerder overwoog ik wel om Amber, ook als ze wat ouder is, met de auto naar school te blijven brengen. Maar de laatste tijd is het hier zo veilig geworden, dat ik haar straks alleen laat fietsen. Ze rijden hier rustig genoeg."

Peter Wittenberg, vader van Gijs (9) beamt dit. Hij vertelt: "Laast bracht ik Gijs naar school. Toen we wilden oversteken richting het schoolplein, kwam er net een auto aangereden. Deze minderde duidelijk vaart, en hoewel we geen voorrang hadden, liet hij ons wel voorgaan. Wat dat betreft is de mentaliteit hier zeker verbeterd."



Ook de kinderen zelf vinden de route tussen school en huis veilig. Wesley (8): "Ik vind het leuk om zelf te fietsen. Er zijn veel auto's en brommers en zo maar ze kijken goed uit."

Wethouder Merkens geeft desgevraagd aan dat er in Lonkervoort sinds vorig jaar extra maatregelen zijn ingezet om de verkeersveiligheid te bevorderen, met name in de omgeving van scholen. Zo wordt door de politie regelmatig gecontroleerd op snelheids- en parkeerovertreedingen. Tevens zijn er rond de begin- en eindtijden van scholen daar-overs aanwezig, om de kinderen te helpen oversteken.

Example of a made-up newspaper article about how parents and children experience road safety in Lonkervoort. The heading reads: Satisfied parents: "It is moving in the right direction!"

Small and sometimes unintentional speeding offences

SWOV has calculated that annually five to ten traffic fatalities can be saved and two to three hundred inpatients can be prevented if the, often unintended, urban speeding offences of 10 to 15 km/h above the limit were to be expelled. These offences were addressed in a recent public information campaign in the Netherlands.

From mid-April to mid-June 2010, the Dutch Ministry of Transport, together with the Regional Road Traffic Safety Authorities, the police, and the Dutch Traffic Safety Association conducted an information campaign about speeding. The campaign mainly focused on the speeding offences on urban roads which are often said to be unintentional. The Ministry of Transport defines these speeding offences as speeds of 10 to 15 km/h above the legal limit of 30 km/h or 50 km/h. The basic assumption was that many of these offences are committed by people who say to be unaware of their speed being too high, or people who drive too fast out of habit.

An approximation

The Dutch Ministry of Transport asked SWOV for an indication of the share of traffic fatalities and inpatients due to small speeding offences in urban areas. SWOV's estimate is based on research data of the relation between speed and safety for individual vehicles, and on the speed

distributions that were measured on a number of urban roads. Of course, these results are no more than an approximation. Unfortunately, no information is known to be available about the relation between driving speed and risk in the Netherlands. The relation between safety and speed has been established using international research. This research cannot be applied to the Dutch situation directly. It cannot be ruled out, for example, that the often large numbers of cyclists on Dutch urban roads may result in a considerably different traffic situation.

Casualty reduction

The SWOV calculation indicates that approximately five fatalities per year are due to speeding offences of less than 10 km/h. Speed violations of up to 15 km/h are responsible for approximately ten traffic fatalities. Moreover, offences of up to 10 km/h above the limit are responsible for one hundred to two hundred inpatients per year, and offences of up to 15 km/h for two to three hundred. The Ministry of Transport used the results of the SWOV estimate in the national information campaign about this topic. ◀▶

SWOV report R-2010-4 'The safety effects of small speeding offences' contains the detailed calculations. The report is in Dutch, but has an English summary. It can be consulted and downloaded on www.swov.nl under Publications.



Colophon

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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.

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.

The safety effects of small speeding offences; An estimate for the number of traffic casualties in urban areas

H. Stipdonk & L. Aarts, R-2010-4, 32 + 4 pp. € 10.- (Dutch).

In this report an estimate is made of the numbers of registered traffic fatalities and inpatients due to small speeding offences on urban 30- and 50 km/h roads. This estimate is based on measured speed distributions on some urban roads and on relations between speed and unsafe situations that were found in literature. The results are an approximation. Firstly because the measured speed distributions that were used need not be representative of all relevant roads in the Netherlands, and secondly because the available literature about the relation between speed and unsafe situations does not specifically focus on Dutch urban roads.

The use of portable media players and mobile phones while cycling; Results of a large-scale internet survey

Ch. Goldenbeld, M. Houtenbos & E. Ehlers, R-2010-5, 58 + 35 pp. € 15.- (Dutch).

Increasingly, Dutch cyclists own portable media players and/or mobile phones which they also often use while cycling. This raises the question of how frequently this is done and whether the use of these appliances while cycling contributes to reduced safety. In the summer of 2009, a questionnaire study was carried out. The present report discusses this study of the frequency and the manner of using portable media players and mobile phones and of the possible road safety consequences.

Alone or accompanied to school: perceived safety in traffic by parents of primary school pupils

A. Hoekstra, J. Mesken & W. Vlakveld, R-2010-7, 50 + 1 pp. € 11.25 (Dutch) .

This report describes a study on subjective safety, also called perceived safety, in traffic. Subjective safety in traffic refers to personal feelings and perception of safety in traffic, or to the concerns about being unsafe in traffic. These concerns may apply to people themselves and/or to others. The feelings do not necessarily relate to the actual number of casualties in traffic. Because feelings of not being safe in traffic are unpleasant, people will try to limit them. This can be done in various



ways; one of them is avoiding certain modes of transport, routes or times. This behaviour of avoidance can, for instance, lead to parents taking their children to school by car, so that they need not participate in traffic as vulnerable road users (pedestrians or cyclists). The research described in this report investigates the extent to which feelings of not being safe in traffic play a role in the choices made by parents to have their children go to school accompanied or on their own.

Estimate of the safety effects of intelligent vehicle systems; A literature study

M. Christoph, R-2010-8, 52 + 2 pp. € 11.25 (Dutch) .

An increasing number of vehicle systems are becoming available to assist the driver in comfortable, safe and economical driving. The question presents itself if these systems do indeed result in increased safety and decreased emissions and if the systems lead to less or indeed to more congestion. This report contains an effect estimate for intelligent vehicle systems (IVS) in the Netherlands. This study has taken literature, expert interviews, crash analyses, and prognoses about the penetration of the systems into the Dutch vehicle fleet as a basis for the effect estimates concerning the systems. Wherever possible the estimated safety effects have been quantified.

The relationship between road safety and congestion on motorways; A literature review of potential effects

P. Marchesini, & W. Weijermars, R-2010-12, 28 pp. € 8.75 (English) .

Mobility has been increasing significantly in the last few decades and will continue to increase. On road stretches which have insufficient capacity, traffic becomes congested. Traffic congestion has a negative impact on the economy and on the quality of people's lives. Road users experience delay and stress, and environmental pollution increases. The effects of traffic congestion on traffic safety, however, are less obvious. This literature review investigates the relationship between congestion and safety at road sections of the main road network (mainly motorways) and specifically looks at the effects of unstable and congested traffic conditions.

Fact sheets

Updated

- Daytime running lights (DRL)
- Road crash casualties in the Netherlands
- Motorcycle and moped helmets
- Intelligent Speed Assistance (ISA)
- International comparability of road safety data
- Recognizable road design
- Young novice drivers
- Safe road shoulders