

# Strategies to increase the use of restraint systems

Proceedings of a Workshop organized by SWOV and VTT at the  
VTI-TRB International Conference Traffic Safety on Two Continents,  
Gothenburg, 18-20 September 1991

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# Contents

Preface	1
Paul Wesemann, SWOV Institute for Road Safety Research, The Netherlands	
Strategies to increase the use of restraint systems - Background paper	2
Tapani Mäkinen, VTT Technical Research Centre, Finland, and Marjan P. Hagenzieker, SWOV Institute for Road Safety Research, The Netherlands	
Canadian seat belt wearing rates, promotion programs, and future directions	6
Brian A. Grant, Transport Canada, Ottawa, Canada	
Safety belt usage in Finland and in the other Nordic countries	17
Juha Valtonen, The Central Organization for Traffic Safety, Finland	
French experience in seat belt use	22
S. Lassare, INRETS-DERA, France, and Yves Page, DSCR-ONISR, France	
Strategies to increase the use of restraint systems: Report about Germany	29
Hanns Ch. Heinrich, Federal Highway Research Institute (BASt), Germany	
Restraint use by car occupants: Great-Britain, 1982-91	34
Jeremy Broughton, TRRL, England	
Strategies to increase the use of restraint systems: The state of affairs in The Netherlands	39
Marjan P. Hagenzieker, SWOV Institute for Road Safety Research, The Netherlands	
1991 national campaign to increase safety belt use	42
National Highway Traffic Safety Administration (NHTSA), USA	
Conclusions and recommendations	44





# Preface

The idea for this workshop was born in a discussion I had some years ago with my colleague Fred Wegman. I had planned an international comparative study of seat belt use, based on existing knowledge and data from literature. I hoped to find some explanations for different wearing rates under similar conditions and for similar wearing rates under different conditions. These explanations could then be used to increase the relatively low wearing rates in The Netherlands. However, we realized that only part of all the relevant information could be found in literature, at least those sources which were available in Dutch libraries. Therefore we would need the help of our colleagues abroad, e.g. by asking them to bring all kind of data to an international conference.

About one year ago the literature study\* was completed. This could be realized thanks to financial support of the Dutch Ministry of Transport and in cooperation with the Finnish Road Research Institute VTT that sent out dr. Tapani Mäkinen as guest researcher to SWOV. The study revealed quite a lot of new data for us but still we had the feeling that information was lacking. In particular, we found it difficult to interpret trends in seat belt use abroad, in the light of local conditions and national countermeasures. Therefore we (SWOV and VTT) decided to organize an international meeting of experts in this field. Gladly, VTI/TRB gave us an opportunity to organize a workshop on this subject at the conference "Traffic safety on two continents" in Gothenburg. Our work was sponsored by the Dutch Ministry of Transport and the Netherlands Association for Automobile Insurance NVVA.

It was proven again that things are going better when time is short. Within a few weeks we acquired the cooperation of our sister institutes abroad and some months later we received well documented papers from all the invited speakers. These had been coordinated in an excellent way by my colleague Marjan Hagenzieker.

Although we had hoped to receive new data from abroad, we were still surprised by the amount of new information that was presented in these papers: recent wearing rates on front as well as on back seats, long term trends, legal measures, interesting background information and inter-

pretations of all these data. So our literature study was indeed supplemented with a complete picture of important European and North American countries. Therefore, we believe the papers of this workshop are a valuable source of information for researchers and policy makers in this field.

At least as useful are the *Conclusions* from the workshop-discussions. Notwithstanding cultural differences between countries, the participants could agree upon a number of effective countermeasures to increase the use of seat belts on front and back seats. We believe traffic safety could be improved considerably if national governments and international bodies, especially the EC, would act according to these conclusions. An important step in this direction has been taken by the recent decision of the EC to make the wearing of belts obligatory on all seats in cars. Much depends now on the way this new rule will be introduced and enforced by the EC-member countries. We hope they will profit from the work that has been done by the workshop-participants.

Paul Wesemann  
Chairman of the Workshop

\* Mäkinen, T., Wittink, R.D., and Hagenzieker, M.P. (1991). The use of seat belts and contributing factors - An international comparison. R-91-30. SWOV Institute for Road Safety Research, Leidschendam, The Netherlands.

# Strategies to increase the use of restraint systems - Background paper

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## 1. Restraint use

### 1.1. Restraint use is still a current issue

Seat belts for protecting car drivers and passengers have been under evolution for almost half a century and the safety effects of seat belts are beyond doubt nowadays. Despite this fact, belt use rates are still far below a 100% level in most countries. In particular the promotion of rear seat belt use is a current topic due to the low user rates.

Also other means of protecting car occupants such as air bags, fully automatic seat belts and child restraint systems are still "coming," but they are beyond the scope of this review due to the paucity of data and publications regarding user rates. Moreover, the promotion of child restraint use and the installation of air bags may require methods that differ somewhat from those used to improve seat belt use. It is also possible that not all the problems related to a widespread use of fully automatic seat belts and air bags are totally solved yet.

Our review (see also Mäkinen, Wittink, and Hagenzieker, 1991) focuses first on some countries with relatively high user rates, followed by the review of some measures that have been used (or could have been used more effectively) to increase wearing rates. Third, we will take a closer look at the countries with high seat belt use rates to see whether they have some factors in common which could explain the progress made. Accordingly, we will produce some statements in this paragraph about the effectiveness of various countermeasures in the promotion of seat belt use. These statements are expressed in a rather provocative manner to stimulate discussion. We hope that the individual contributors will elaborate upon these statements in their presentations. Finally, we will list some proposals for future action.

### 1.2. Seat belt use rates in some countries

The method of measuring seat belt use in most countries is almost exclusively observational. It has been realized either by unobtrusive observation or by stopping cars at suitable sites (obtrusive observation). There is a great deal of variation in the time and sites selected for observation. This variation is sometimes also noticeable within countries.

Seat belt usage figures are usually based on daytime measurements during working days. The differences in belt use are greatest between urban (streets) and rural areas (highways). The results are normally presented on the basis of that distinction. There is not much data available on the accuracy of unobtrusive observations, probably because of the obvious simplicity of the observation task.

Figure 1A and 1B show safety belt use trends on front seats inside and outside urban areas for a number of countries: Canada (CAN), Finland (SF), France (F), (West-) Germany (D), Great Britain (GB), and The Netherlands (NL). Presenting figures in comparative graphs is problematic. Besides variations in data collection, the way data is presented in research literature also varies from country to country. The depicted data represent belt use rates for drivers in the case of CAN, GB, and NL, while for D, F and SF, the data represent the combined figures for drivers and front seat passengers. For Canada, variations in belt use between different provinces were greater than between rural and urban areas. Therefore, average figures are presented. Also, in the data on locations outside urban areas, motorways are included for CAN, F, SF, and NL but excluded for D and GB.

Strictly speaking, a straight comparison of the figures between various countries is not possible or should be made with caution, because of variations in data collection methods. However, relative comparisons of figures between countries over time may reveal important trends. No graph is presented to indicate belt user rates on rear seats, simply because no systematic observations over time are currently available for most countries. In general, however, seat belt use for rear seats is much lower than for front seats, usually in the range of 10 to 50%.

### 2.1. Applied countermeasures

In many countries, the following countermeasures have been applied - singly or in combination with each other - to increase the use of safety belts:

a. *Public information* is often considered as a precondition for behavioural change or for sustaining behaviour. The public needs to be provided with information about the (new) behaviour and its relative advantages. Media presentation serves to inform and persuade car occupants.

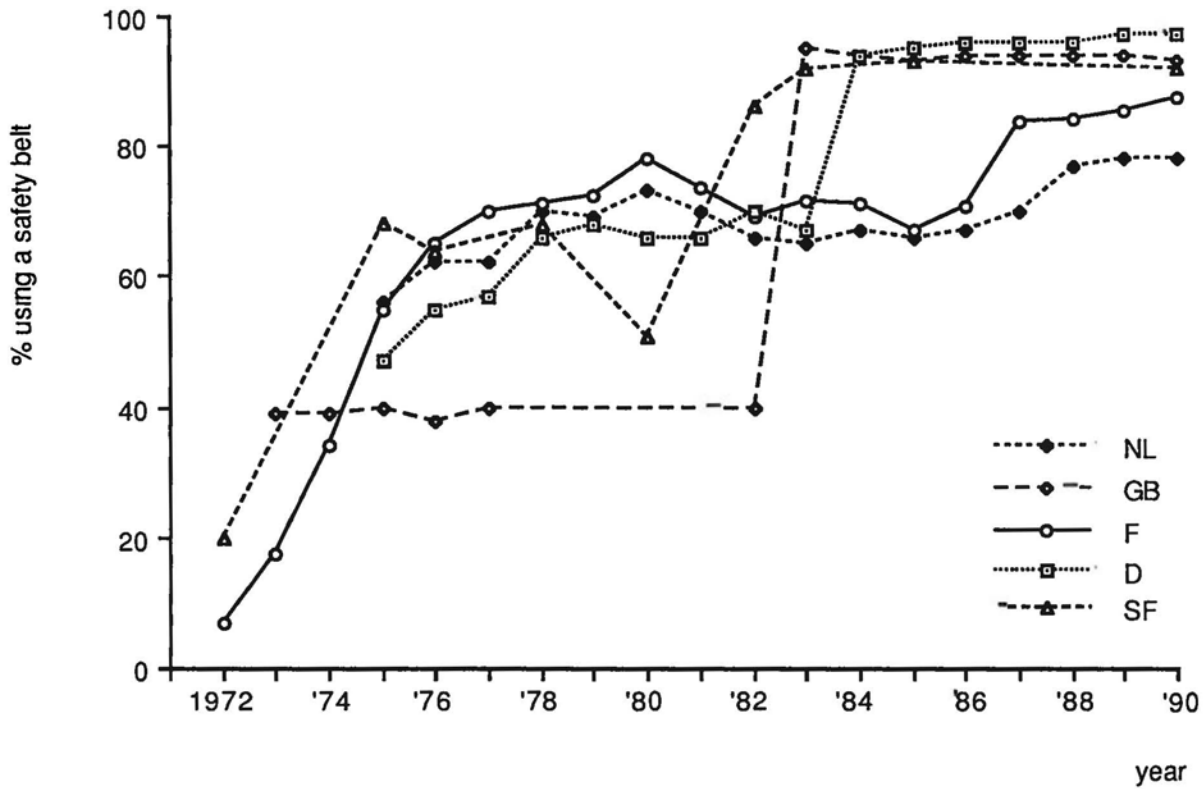


Figure 1A. Safety belt use outside urban areas in Germany (D), Great Britain (GB), The Netherlands (NL), Finland (SF), France (F), and Canada (CAN) 1972-1990.

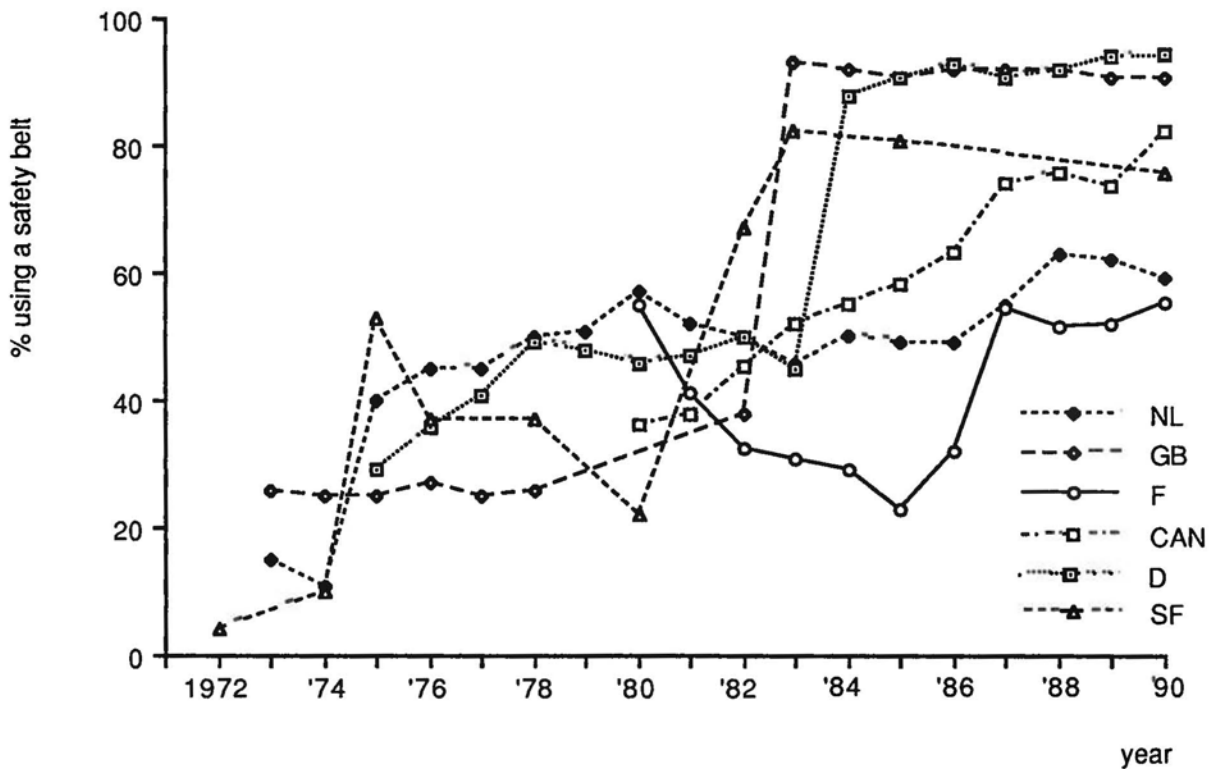


Figure 1B. Safety belt use in urban areas in Germany (D), Great Britain (GB), The Netherlands (NL), Finland (SF), France (F), and Canada (CAN) 1972-1990.

\* Data from BASt Germany; TRRL Great Britain; SWOV The Netherlands; INRETS France; Liikenneturva Finland; Transport Canada.

b. *Compulsory use by means of legislation.* The process of legislation usually starts by making the installation of belts mandatory; after an interval of several years their use is made compulsory as well.

c. *Legal sanctions.* In the countries reviewed in this paper criminal sanctions for non-use, in the form of fines, are applied. Sometimes also private law sanctions (liability for damage in case of accidents) are applied.

d. *Enforcement.* If threatened legal consequences or certain probabilities of these consequences are to serve as deterrents, they must be credible. Therefore, enforcement can be regarded as an important countermeasure. It is our impression that enforcement is not applied regularly or structurally as a countermeasure in most countries. Usually, enforcement is applied incidentally, either in the form of short term local campaigns or in connection with other surveillance activities.

e. *Incentives.* Actions which bring rewards are generally repeated, whereas those with unrewarding or punishing outcomes tend to be discarded. Sometimes, incentive programs have been applied to increase the (voluntary) use of safety belts.

## 2.2. The effectiveness of various countermeasures

### *Public information*

It seems that public information campaigns have been effective in isolation only when they precede law changes to "prepare" public opinion for the new behaviour. When public information has been *combined* with other measures such as amendments to the law, legal sanctions and enforcement, better results have probably been achieved than if these measures had been resorted to in isolation. Actually, it does not make any sense to think of amendments to the law and other comparative measures if the public is not informed.

The exploration of drivers' motives has not led to fruitful approaches, since motives for non-use are both various and often situational. Accordingly, the number of target groups would be great. By combining information and other activities, habituation for using belts may be developed and a habit may finally be seen as a motivating factor for usage.

THE EFFECTS OF INFORMATION IN INCREASING BELT USE RATES ARE STEPWISE: FIRST, BEFORE AMENDMENTS TO THE LAW INFORMATION PREPARES THE PUBLIC FOR THE NEW BEHAVIOUR, AND AFTER AMENDMENTS TO THE LAW INFORMATION IS EFFECTIVE IN COMBINATION WITH OTHER MEASURES.

### *Legislation*

One aspect of safety belt use promotion goes above everything else. Without legislative efforts, no good results are achieved nationwide. Currently, there are seat belt laws which prescribe the compulsory use of seat belts in one form or another in about 40 countries. Most countries adopted the law in the first half of the 1970's. Some countries waited longer (or are still waiting: some states in the USA). The process of legislation regarding belt use in rear seats started much later. In some countries, a belt use law for rear seats is already in effect (e.g. France, Germany and Scandinavian countries).

LEGISLATION PRESCRIBING THE MANDATORY USE OF SAFETY BELTS IS A NECESSARY PRE-REQUISITE TO INCREASE USER RATES OVER THE 60% LEVEL. WITHOUT LEGISLATION, EFFORTS TO REACH HIGH NATIONWIDE USER RATES ARE FRUITLESS.

### *Sanctions*

It has been found that the introduction of sanctions some time after the law became into effect accelerated user rates even more (Finland, Germany). However, little is known about the application policies of these sanctions.

BY PRESCRIBING SANCTIONS AGAINST NON-USE THE EFFECTS OF SEAT BELT LAWS ARE STRENGTHENED.

### *Enforcement*

In particular, the role of publicity and enforcement or the combination of these are worth discussion. So far, the real effects of enforcement have been mainly mediated through the mere possibility of enforcement (= subjective risk of detection). The role of so called primary enforcement (enforcement which is focused mainly on seat belt use) has probably been a minor one in most countries. Various studies have shown that (a combination of public information and) primary enforcement can raise user rates substantially, also over a relatively long period (more than one year).

TO DATE, THE POSSIBILITIES OF SELECTIVE OR PRIMARY ENFORCEMENT IN THE PROMOTION OF SEAT BELT USE HAVE BEEN LARGELY NEGLECTED.

### *Incentives*

During the past few years, incentives, especially in the form of rewarding drivers for using a seat belt, have yielded promising results. By rewarding drivers either collectively or individually it has been possible to raise

user rates. So far, the results apply only to isolated communities such as military camps, factories, etc. Also, the permanence of the effects of incentives is uncertain - but this is also the case with other types of efforts (e.g. enforcement campaigns).

INCENTIVE PROGRAMS HAVE SO FAR BEEN APPLIED IN RELATIVELY ISOLATED, SMALL COMMUNITIES. THE GENERALIZATION OF THE RESULTS TO ALLOW NATIONWIDE APPLICATION IS QUESTIONABLE, DUE TO THE LACK OF LARGE SCALE EXPERIMENTS.

### 3. Proposals for future action

The solution for high user rates may be found in the combination of four factors: (1) a law making usage obligatory; (2) publicity (a) before the law change: preparing people for the law change and (b) after the law change: increasing the subjective risk of apprehension; (3) increasing the objective risk of detection of non-use; (4) producing comfortable, user friendly restraint systems. In principle, if these four factors can guarantee sufficient habituation with the wearing of seat belts, no complicated theories are necessary. Probably the combination of these four factors will also be effective in promoting the use of *rear* seat belts. It is therefore important to use experiences gained with the promotion of front seat belt use for future actions to improve rear seat belt wearing.

HABITUATION IS A VERY IMPORTANT MEDIATING FACTOR FOR SEAT BELT USE. ONCE A HABIT IS FORMED, IT IS RELATIVELY EASY TO MAINTAIN HIGH USER RATES.

From a political point of view, however, more efforts are needed to activate decision makers and the police to take the promotion of belt use seriously.

BY INCREASING THE AWARENESS OF DECISION MAKERS AND THE POLICE ABOUT THE COST EFFECTIVENESS OF BELT USE, USER RATES CAN BE IMPROVED CONSIDERABLY.

The proposed actions imply many coercive measures. The question can be raised whether this can be allowed or is desirable in most cultural settings, because none of them value the "free will" of the human being. On the other hand, countermeasures such as incentive programs may also lead to political problems, namely, whether one should reward actions that are already mandatory in many countries.

### 4. Reference

Mäkinen, T., Wittink, R., and Hagenzieker, M.P. (1991). The use of seat belts and contributing factors - An international comparison. R-91-30. SWOV Institute for Road Safety Research, Leidschendam, The Netherlands.



# Canadian seat belt wearing rates, promotion programs, and future directions

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## 1. Seat belt wearing rates

### 1.1. Background

In Canada, the ten provincial two territorial governments have the authority to require vehicle occupants to wear seat belts and each has chosen to do so at a different time. The first province to require the use of seat belts was Ontario in 1976, with Quebec, British Columbia and Saskatchewan enacting legislation by the end of 1977 (these provinces have 77% of the current licensed drivers). It was not until 1982 that additional provinces began passing seat belt wearing legislation, and it took until 1991 for all provinces and territories to pass legislation requiring seat belt use. Table 1 presents the year in which seat belt and child restraint use was required in each province. In addition, the provincial governments are also responsible for enforcement of the law. Large increases in seat belt use from year to year are generally traceable to an additional province passing legislation, or an individual province conducting a major seat belt program.

All provinces allow for primary enforcement of their seat belt wearing laws, that is, vehicles may be stopped and a citation issued if the occupants are not wearing seat belts. The current seat belt laws require that where a seat belt is provided in the vehicle it must be used, and federal government vehicle standards have required that a seat belt be installed at all seating positions of automobiles and light trucks since the late 1960's.

### 1.2. National driver seat belt survey

Each year, in late October, a national survey of seat belt use is conducted (starting in 1991 a survey will also be conducted in June). The observational survey, which collects approximately 50,000 observations, is conducted from 7:00 to 17:00 Monday to Saturday, and from 12:00 to 17:00 on Sunday (Arora, 1975). A stratified sampling plan was created to produce a representative sample from 178 sites located in cities and towns ranging in size from 5,000 inhabitants to major metropolitan areas. In addition, 22 rural sites located on major roads (but not limited access highways) are used to obtain an estimate of non-urban belt use. Each site is observed for 2 one hour periods selected randomly without replacement. Driver

shoulder belt use is recorded for these surveys because it is the most reliable measure of belt use and because most passenger cars are equipped with shoulder belts (99.6% in 1990).

Table 1. Year of implementation of seat belt and child restraint laws.<sup>1</sup>

Province or Territory	Seat Belt Law	Child Restraint Law	%age Licensed Drivers
Ontario	1976	1982	36.0
Quebec:			23.0
Front seat only	1976	1983	
All occupants	1990	1990	
Saskatchewan	1977	1980	3.6
British Columbia	1977	1985	14.6
Newfoundland	1982	1982	1.8
New Brunswick	1983	1983	2.5
Manitoba	1984	1984	3.6
Nova Scotia	1985	1985	3.3
Alberta	1987	1985	10.6
Prince Edward Island	1988	1985	0.5
Northwest Territories	1989	1989	1.1
Yukon	1991	1991	0.2

N= 17 455 542

<sup>1</sup> Laws apply to all seating positions except Quebec

The seat belt wearing rates for drivers from 1980 to 1990 are presented in Figure 1 (Transport Canada, 1991). The data in the figure show that there has been a steady increase in seat belt use from 36% in 1980 to 82% in 1990. Figure 2 presents the wearing rates by province for the year 1990. The data in this figure demonstrate the variability in seat belt use from province to province with a range of 65% to 94%. Not only is 1990 the year with the highest seat belt wearing rate to date, but the Figure 2 data show that six provinces had wearing rates greater than 80% and two provinces had rates over 90%, record levels of belt use in the country. The highest rate was for the province of Quebec where the seat belt wearing rate reached 94%.

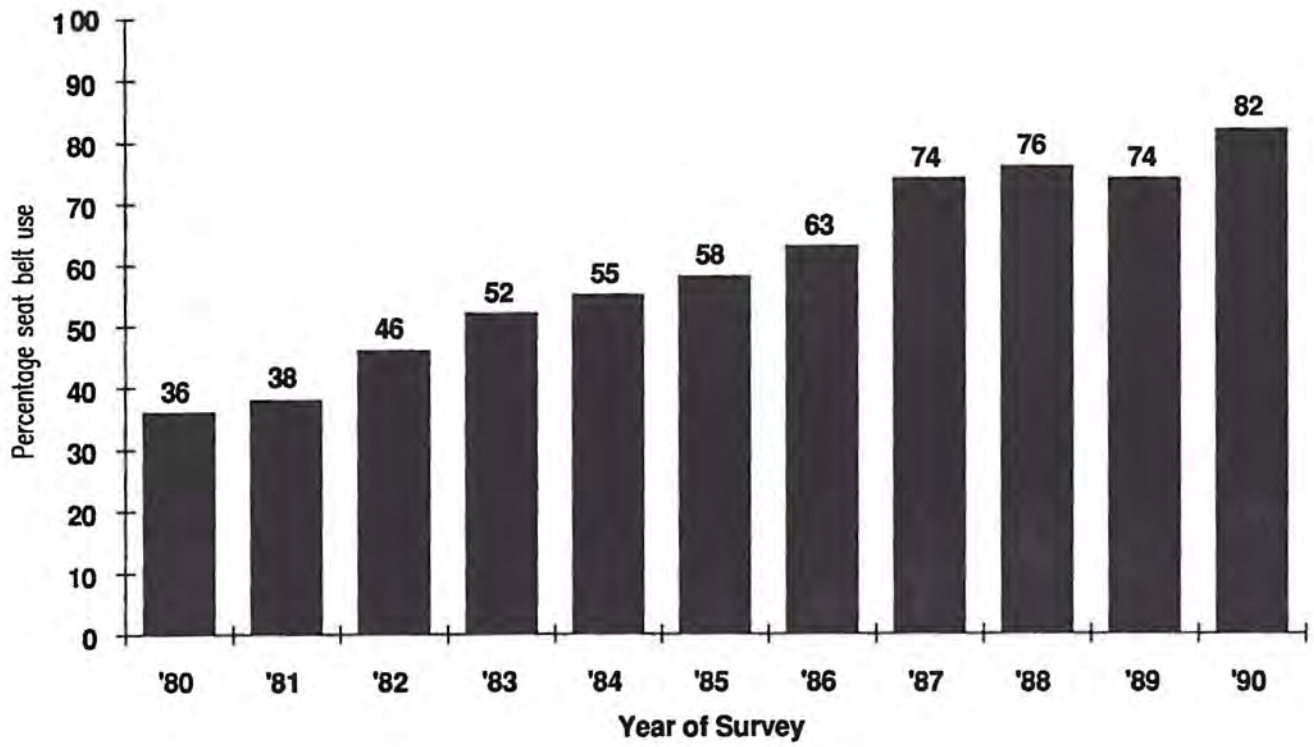


Figure 1. Seat belt wearing rate from 1980 to 1990.

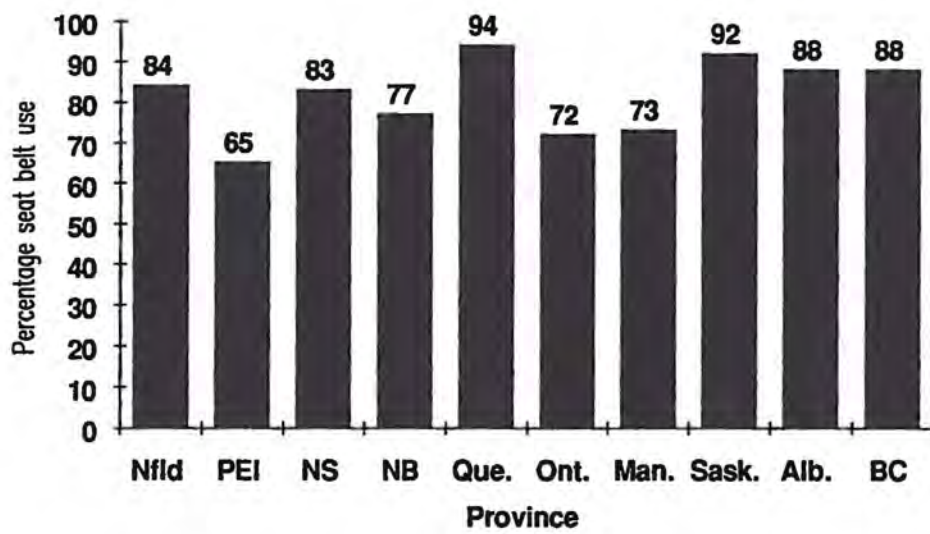


Figure 2. Seat belt wearing rate by province .

In recent years data on the seat belt use of drivers of light trucks and passenger vans have been collected. The wearing rates for these two classes of vehicles were 78% for passenger vans and 68% for light trucks, both of which have increased over the previous year (1989) when belt use was 65% for passenger vans and 52% for light trucks.

### 1.3. Passenger and evening seat belt use

Data on the seat belt use of passengers is not routinely collected in Canada except for children and these data are discussed below. However, a study conducted in 1987 (Grant, 1989) in one urban area provides some insight into both passenger seat belt use (front outboard position where the shoulder belt is available) and evening seat belt use (20:00 to 22:00), a period not normally covered by national surveys. Figure 3 shows that passenger seat belt use was marginally lower than driver seat belt use in the daytime, but the differential was greater in the evening. Belt use in the evening was also lower than in the daytime.

### 1.4. Child restraint belt use

Four surveys conducted in 1984, 1985, 1987, and 1989 (Dawson, Jonah, and Arora, 1986; Transport Canada, 1985, 1986, 1988, 1990) have been conducted to determine the use of child restraints and seat belts by children (occupants under 16 years of age). Figure 4 present the data from these surveys. Seat belt and child restraint use has increased since the 1984 survey, but is lower than that for drivers. In the 1989 survey 85% of children under 1 were restrained in an appropriate restraint system, but the percentage drops to 67% for those 1 to 4 years old, 60% for those 5 to 9 years, and was 68% for those 10 to 15 years old. Transport Canada data also indicate that child restraints, for children under 5 years of age are used correctly in only 58% of the cases. Failure to use a tether strap, which fastens the top of the child restraint to the vehicle, is the main form of misuse. The child restraint data are collected at the same time as the national seat belt survey, but at only 130 of the sites. In these surveys observers collect data for 8 hours at each site divided into 2 hour blocks of time randomly distributed throughout the week. Observers look inside the vehicle while it is stopped at a traffic light and if children are present the driver is asked for their ages. The type of restraint used is noted along with the type of misuse, if present.

## 2. Countermeasures and effectiveness

Four major types of programs for increasing seat belt use have been evaluated in Canada. The first, the effects of legislation, may be seen in the changes in seat belt wearing rates before and after the introduction of seat belt use

legislation. The second type of program, Selective Traffic Enforcement Programs (STEP), have been evaluated in both regional and provincial programs. One innovative STEP included the use of incentives. Two other smaller scale programs, public posting (feedback) of seat belt use and employer based seat belt programs have also been evaluated. Programs which include either enforcement or education have generally not been conducted in Canada, because it has been argued that they would not be successful.

### 2.1. Legislation

The implementation of seat belt wearing laws at different times in Canadian provinces provides several opportunities to see the effects of their implementation. Figure 5 shows that the immediate effect of mandating seat belt use in three provinces (Newfoundland, New Brunswick and Nova Scotia) was to increase the seat belt wearing rate by 60 percentage points in each province.

Another example of the effect of seat belt legislation can be seen in data from the province of Alberta which are shown in Figure 6 for the period 1980 to 1990. When Alberta mandated the use of seat belts in 1987 seat belt use rose from 28% to 74%. It increased to 83% the following year, but dropped to 45% in 1989 when the seat belt law was declared invalid. In 1990, with the validity of the seat belt law accepted by a higher court, the seat belt wearing rate rose to 88%.

However, there is evidence that high belt use will not be maintained without the presence of enforcement. Provinces which adopted seat belt use laws in the mid 1970's had large increases in belt use, but these gains were lost without the addition of effective enforcement programs. Belt use in provinces with legislation was only 44% in 1980, although this was still significantly higher than in provinces without legislation which had a seat belt use rate of 9%.

### 2.2. Selective traffic enforcement programs (STEP)

Selective Traffic Enforcement Programs can be viewed as having three major components, education, enforcement, and evaluation. The theory behind STEP is that it is more effective to inform people, and encourage voluntary use, before applying the enforcement. In this way those who do not wear their seat belts are given a fair chance to change their behaviour. When the police start enforcing the law those who still refuse to wear a seat belt are unable to claim that they have been caught by overzealous police action, and therefore there is less likelihood criticism about the program.



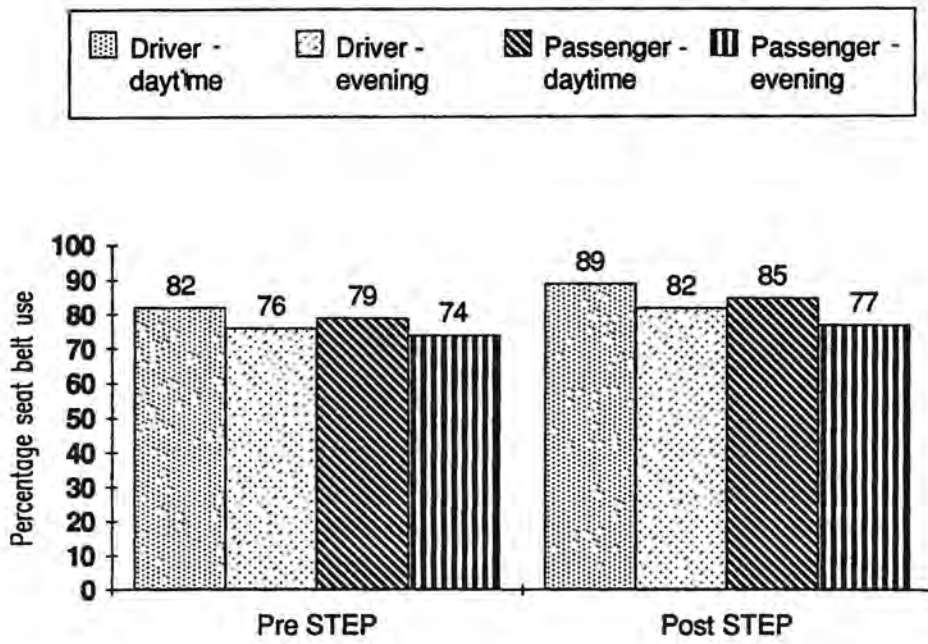


Figure 3. Seat belt wearing rate in the daytime and evening for drivers and passengers before and after a selective traffic enforcement program (STEP).

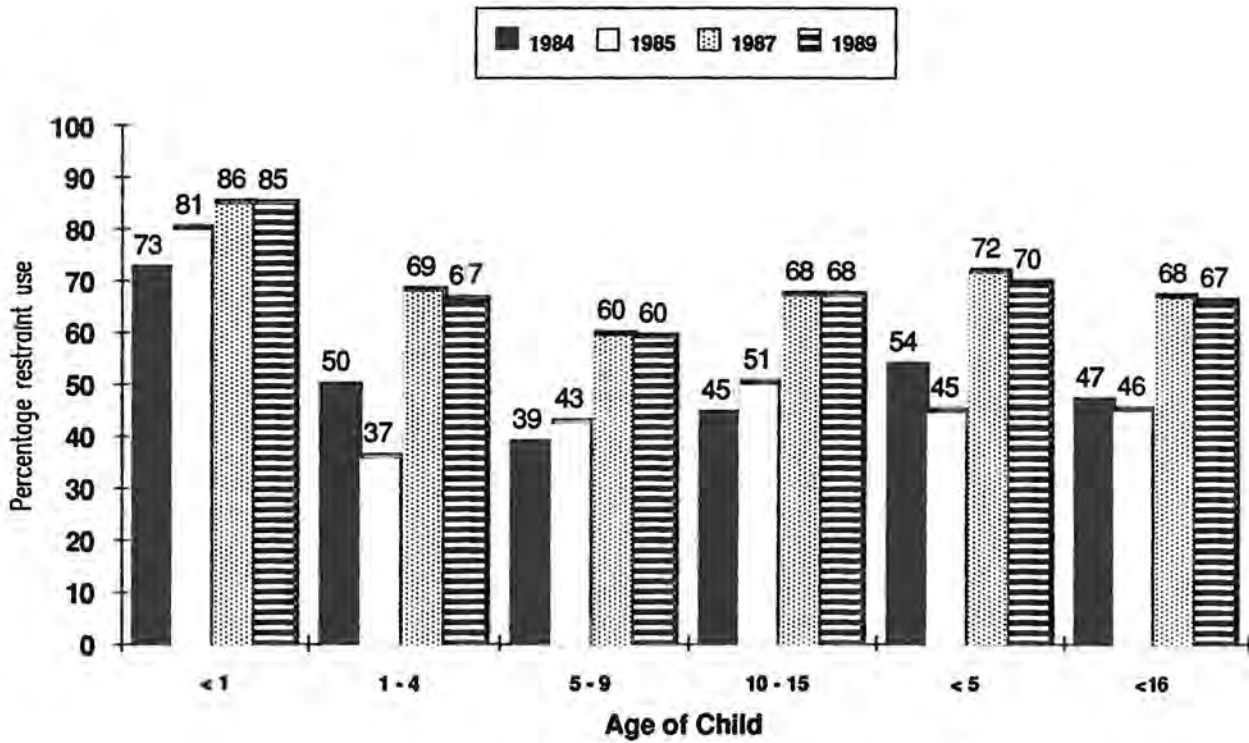


Figure 4. Percentage of children in appropriate restraint system by age.

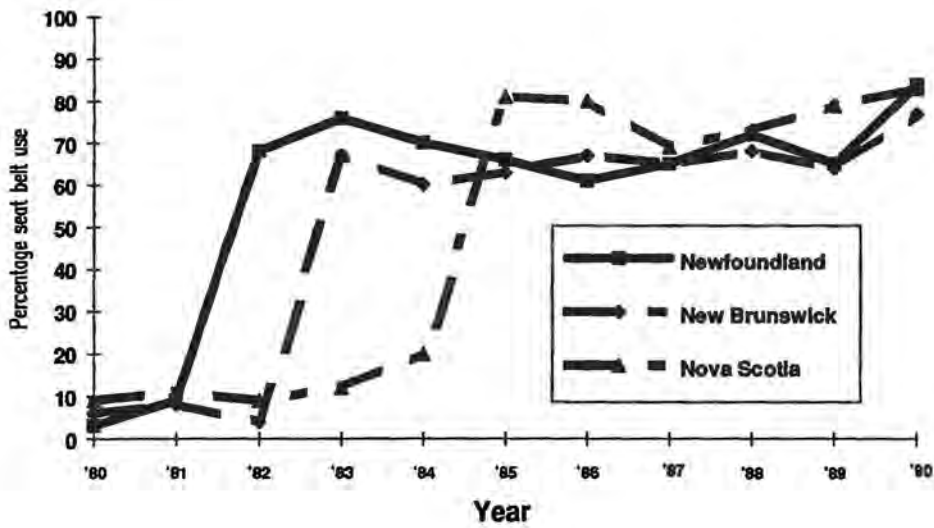


Figure 5. Effect of seat belt legislation in Newfoundland (1982), New Brunswick (1983) and Nova Scotia (1985).

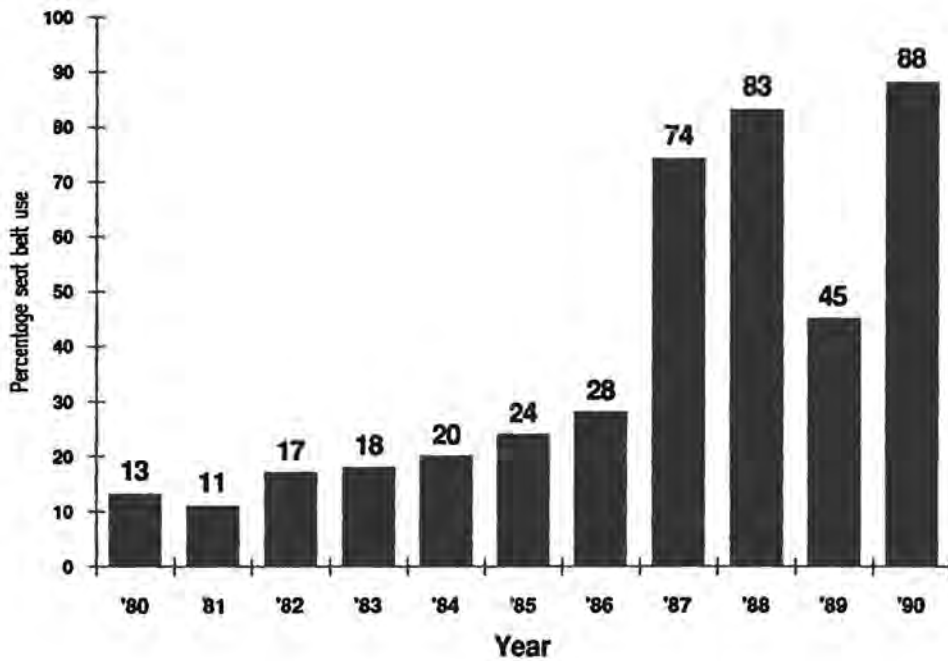


Figure 6. Annual seat belt use in Alberta. Seat belt wearing law introduced in 1987, declared invalid in 1989, and restored to effectiveness in 1990.

### 2.2.1. Education

The educational part of the STEP is generally provided through the use of either paid or free publicity. Free publicity is generated through the use of press conferences to announce the program, and through the provision of written materials describing the importance of wearing seat belts, how they work, and why they work. The generation of ongoing publicity throughout the program is important in order to maintain contact with the target population. One way to do this is to provide the news media with information on the level of police enforcement and the changes in seat belt use.

The other method of obtaining publicity is through the use of paid advertising. With paid advertising specific messages can be delivered to target groups. Paid advertising can be very expensive, but it may be necessary to reach target groups in the case of very large programs. To reduce the costs of advertising the government of Quebec solicited sponsors for their major seat belt program (Dussault, 1990). Money raised from the sponsors paid for supplements inserted in all newspapers in the provinces. In addition, advertisements were placed on television and radio.

### 2.2.2. Enforcement

The enforcement of the seat belt wearing law is critical for the success of a STEP program. For the enforcement phase to be successful it must be more intensive than normal and it must be perceived as more intense than normal. The most effective way to achieve this is to ensure that when enforcement activities are conducted they are highly visible. For example, roadside checkpoints are both highly visible and very efficient because a large number of vehicles can be checked in a relatively short time, and those not checked are clearly aware that the police are enforcing the seat belt law because of the preceding publicity. The high visibility checks may allow some vehicle occupants to buckle their seat belts prior to being checked, but that is acceptable because the goal of the enforcement is to ensure that people are aware that the law is being enforced and to encourage the use of seat belts.

An important aspect of the enforcement component of a STEP is the need for strong support from the police who must conduct the enforcement activities. The police come face-to-face with the public and they need to be assured that what they are doing is important in the promotion of safe driving and is perceived to be important by the general public. Frequently, the police perceive the enforcement of a seat belt law as a nuisance charge and therefore are reluctant participants in a STEP; this can be overcome by ensuring that the police are aware of the relative importance of seat belts in saving lives.

In the Quebec program efforts were made to reach all

12,000 police officers in the province (Dussault, 1990). This was accomplished by having program representatives meet face-to-face with representatives from 270 police units (municipal police forces and provincial police forces). At these meetings representatives were provided with an 11 minute video tape which was to be shown to all police officers in the province. An information booklet was also provided to ensure that all police officers were aware of the program goals.

### 2.2.3. Evaluation

Evaluation of a STEP is necessary for a number of reasons. Most importantly, the evaluation is needed to determine whether or not the program was successful in increasing the level of seat belt use. Equally important, is the need to provide feedback about the program to the community and to the police. If the police are aware that their activities have been successful then they are more likely to participate in future programs. The available data indicate that single STEPs generally do not maintain wearing rates and therefore program organizers need information to be able to solicit support for future programs. Providing feedback to the community about the success of the program is also likely to increase support. In addition, during the program, information on the increasing level of belt use indicates that the program is being taken seriously, and that there is an increased probability of being stopped if you are not wearing a seat belt.

### 2.2.4. Long-term application of STEPs

A series of STEPs, which were conducted in the Regional Municipality of Ottawa-Carleton over eight years, demonstrate that repeated programs can produce increases in seat belt use, that there are declines in belt use following the end of a program, but that new programs continue to increase the use rate. There is also evidence from these studies that the STEP affects most vehicle occupant groups. The Regional Municipality of Ottawa-Carleton, with approximately 600,000 residents, consists of 6 cities including the capital of Canada, Ottawa, as well as rural areas.

The overall results of the three STEPs are presented in Figure 7. The first STEP produced an increase in seat belt use from 58.3% to 76.5% (Jonah, Dawson, and Smith, 1982). The second program consisted of three separate STEPs, which varied in length from 4 weeks to 4 days, conducted over one year. Each of these STEPs increased seat belt use, and the overall program resulted in an increase in belt use from 66% to 84% (Jonah and Grant, 1985). The third major STEP was conducted in 1987, and lasted one month; seat belt use increased from 79% to 87% (Grant, 1989). Data presented in Figure 3 show that the STEP increased the belt use of both drivers and passengers and of those observed in the daytime and in the evening. Data collected in this last STEP also indicated

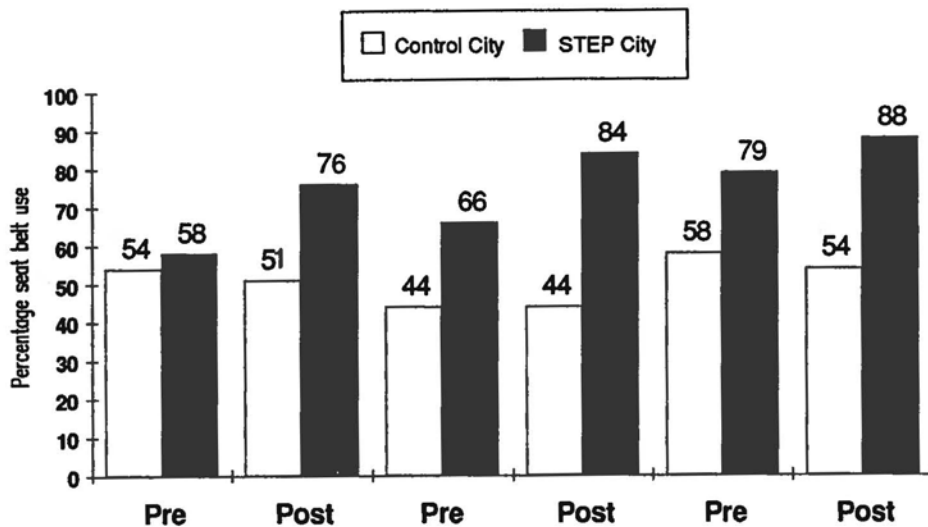


Figure 7. Effect of repeated STEPs from 1979 to 1987 (percentages in the STEP city are based on approximately 3000 observations and in the control city 2000 observations).

that the program had no effect on the belt use of those leaving drinking establishments late at night (10:00 to 1:30) and that their wearing rate was significantly lower, at approximately 61%, than the general population of drivers.

residents of the province by a series of press conferences and it was preceded and followed by public information announcements on radio and television, with additional information presented on billboards and in newspapers. The cost of the public information program was estimated at just under one million dollars.

## 2.2.5. Major programs

### 2.2.5.1. Quebec program

The 1987 Quebec STEP (Dussault, 1990) required the coordination of over 12,000 police officers in provincial and municipal police forces. As described earlier extensive efforts were made to ensure that all police personnel were aware of the importance of the program and the importance of seat belt use. The program was introduced to

During the program the police issued over 1,467 citations each day for not wearing seat belts, 3.4 times the number issued per day prior to the program. In addition, as an incentive to encourage belt use, promotional vouchers, which could be exchanged for free items (average value of \$1.18), were distributed by police at seat belt check points during the final week. The vouchers had a tear-off portion which could be used to enter a draw for larger prizes (8 prizes with an average value of \$3,000 each). The police distributed 226,830 of the vouchers.

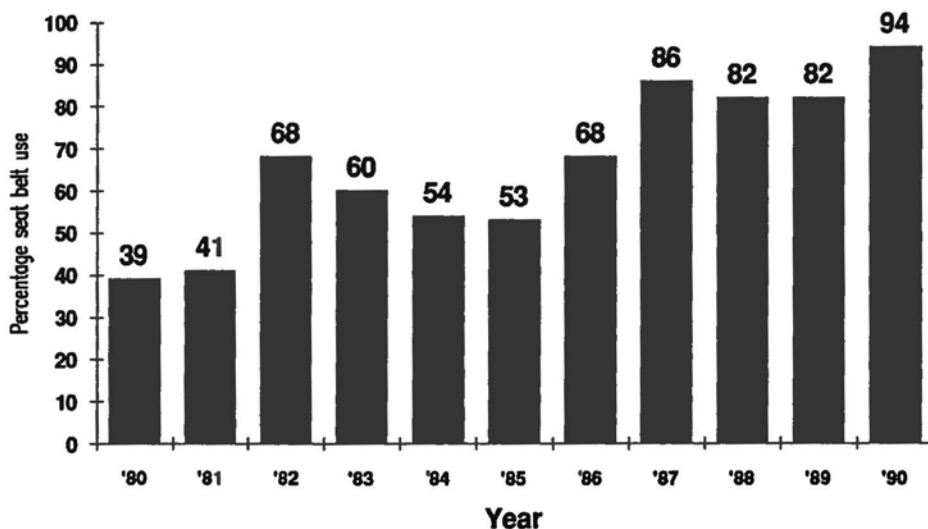


Figure 8. Effect of major STEP on seat belt use in Quebec. STEP introduced in 1987.

Figure 8 presents the changes in seat belt wearing rates as a result of the program. A small scale STEP in a few communities in 1986 increased seat belt use in that year to 68% from 53%. The major province wide STEP was conducted in 1987 and increased seat belt use to 86%. Seat belt use remained high, at 82% in the following year and continued semi annual enforcement programs have further increased the seat belt wearing rate to 94% in 1990.

#### 2.2.5.2. Other programs

A major program conducted in the province of British Columbia in 1983 resulted in seat belt use increasing from 58% to 73%. The program required the coordination of a large number of different police departments and community groups. One of the unique activities in this program was to encourage community groups to organize local activities promoting seat belt use during the program (B.C. Research, 1983). More recently, British Columbia has conducted a major impaired driving enforcement program and coupled it with seat belt promotion. The program resulted in seat belt use increasing from 80% to 85%. The program used extensive media advertising which was provided by the Broadcasters Association.

#### 2.3. Public posting (feedback)

Posting the percentage of seat belt use on a large sign is another technique for increasing seat belt use. In this method a large sign is installed at a high volume intersection and carries the message "Drivers wearing seat belts yesterday \_\_\_%". The percentage of drivers wearing seat belts is determined by observational surveys. The first example of this was reported by Nau and Van Houten (1981), but they were unable to demonstrate consistent increases in seat belt use. Their study was conducted in an area without a seat belt use law, and further evaluations were conducted in another region where vehicle occupants were required to wear seat belts. Grant, Jonah, Wilde, and Ackersville-Monte (1983) were able to demonstrate a positive effect on belt use of publicly posting seat belt wearing rates in different locations in two different cities. In general, the technique increased seat belt use by about 10% at the locations where it was used. Although not a major program this technique may be used effectively with other programs.

#### 2.4. Employer based seat belt programs

Employer based seat belt programs are conducted at the work site. These programs were initiated in the United States as incentive programs and the majority of them have been evaluated in areas without seat belt legislation. Geller et al. (1987) reviews the effects of 28 of these programs. In Canada, employer based programs have been evaluated in areas where there is seat belt use legislation and have not generally included the use of incentives. The programs consist of four main elements. The initial

step is to establish both union and management support for the program. Observers collect data on the seat belt use of those entering the site and these data are used to monitor the program. The seat belt use rate is posted on a large sign located at the entrance to provide staff with feedback about the program. The educational component is delivered through the use promotional materials posted around the work site and circulated to all employees, and through a 45 minute meeting. During the meeting an audio-visual presentation is given and participants have the opportunity to ask questions about seat belts. The purpose of the audio visual presentations is to show how seat belts work to prevent injuries in different types of accidents.

Grant (1990) describes the results of one of these programs conducted at a government training centre. Figure 9 presents the results from this study. Seat belt use increased from a baseline level of 65% to 79% following the installation of a feedback sign and the distribution of a letter from the Centre's management describing the benefits of seat belt use. A further increase to 82% was measured during the educational phase. Belt use declined after the program, but remained above baseline levels. Larger increases in belt use were observed for passengers (45% to 76%). Seat belt use at a control location remained relatively constant at about 52% during the program.

The employer program was also conducted at 3 industrial sites (Grant, 1987) including a large factory located at a major metropolitan area. Belt use increased from 35% to 84% at one location (see Figure 10), from 55% to 84% at the second location, and from 3.3% to 66% at the third location. These programs were relatively short, varying from 2 to 3 weeks. Belt use did decline after the programs, but remained above baseline levels.

### 3. Future action

Seat belt use in Canada has been increasing steadily over the past 10 years. These increases are the result of major activities like the passage of legislation mandating all vehicle occupants to wear seat belts and Selective Traffic Enforcement Programs (STEPS) which combine education and enforcement. There is evidence that other activities like public posting of the seat belt wearing rate and employer based seat belt programs can contribute to the gains in seat belt use.

It has been argued that reaching 80% seat belt use may be easier than moving from 80 to 95% use. Canada is now at the stage of trying to convince this last 15% of nonusers of seat belts to buckle up. The province of Quebec has shown that a seat belt use rate of 95% is possible and so current planning is directed at the last, but hardest group to convince. In addition, there is evidence that passengers are less likely to wear seat belts than drivers and so efforts are needed to convince these people of the benefits of seat belt use.

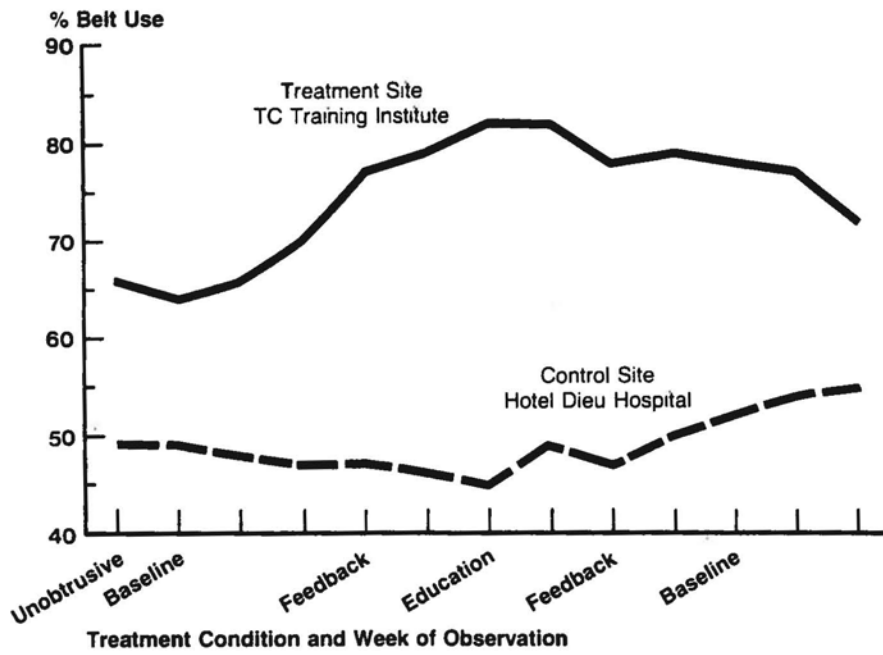


Figure 9. Changes in seat belt use during an employer based seat belt program conducted at a government training centre.

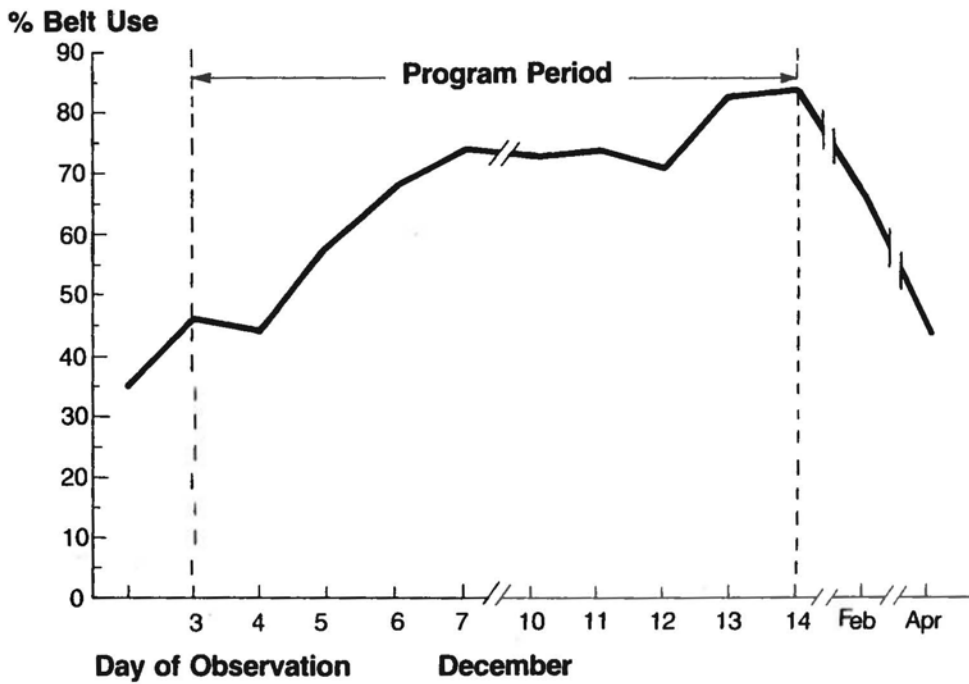


Figure 10. Changes in seat belt use during an employer based seat belt program conducted at an industrial plant.



The following section describes some of the current and planned activities within Canada which it is hoped will provide the means of reaching a 95% seat belt use rate for all vehicle occupants.

### **3.1. Target enforcement**

Research has shown that sub-groups of drivers are resistant to the efforts to date to encourage seat belt use. For example, drivers leaving drinking establishments have been shown to have lower seat belt use rates than other drivers (Grant, 1989; Malenfant and Van Houten, 1986; Preusser, Williams, and Lund, 1986). The research has shown that when STEPs are conducted these drivers do not increase their belt use when other groups show increases. It has also been shown that those who drive while impaired are less likely to wear seat belts than those who do not drive when impaired (Transport Canada, unpublished roadside survey data; Wilson, 1989) and that these drivers may have a variety of unsafe driving practises.

Directing programs at these problem groups, whether they be STEPs or other programs, is necessary if the seat belt wearing rate is to be increased. There is some data to suggest that these drivers may be the ones most likely to have accidents and therefore there is a greater likelihood of reducing the injuries and fatalities resulting from accidents if this group can be convinced to wear seat belts. Police will need to be more aware of how to identify members of the problem groups using variables such as location and time of day. In addition, it will be necessary to ensure that the identified groups are aware that there will be increased police enforcement.

Data presented earlier indicated that people who drive light trucks and vans are less likely to wear seat belts. Additional effort will be needed to convince this group of vehicle occupants of the need to wear seat belts, although it is not clear whether there is simply a need for education or whether additional enforcement will be needed.

### **3.2. Police education**

If enforcement programs are to be used to increase seat belt use then it is important to ensure that police officers receive training on how and why seat belts are effective for reducing injuries and fatalities. In addition, they must be shown the relevance of their enforcement activities to the goal of reducing the injuries and fatalities which occur on the roads. The police also need to be reassured that enforcing a seat belt law is viewed by the general public as an effective use of their time. The collection of survey data can be useful in keeping the police informed about public attitudes and the success of programs in which they participate.

### **3.3. Exemptions**

In most Canadian jurisdictions some groups of drivers are exempt from wearing seat belts. These include taxi drivers, police officers, delivery truck drivers, and those who can obtain a certificate from their doctor indicating that wearing a seat belt may cause injury as the result of a medical condition. It is estimated that these groups may represent 5% of drivers, and therefore, as seat belt use nears the 90% level it is important to ensure that exemptions are provided only where they are truly needed. Efforts are currently underway in Canada to reduce the number of drivers who are exempt from the belt use laws, and to reduce the use of medical exemptions. There are very few medical conditions for which wearing a seat belt is more dangerous than not wearing one.

### **3.4. National seat belt use target: 95% by 95**

The Canadian Conference of Ministers of Transport has set a goal of 95% seat belt use in the country by 1995. This means that the governments of all 10 provinces, 2 territories and the federal government are committed to establishing programs needed to reach the target. Rather than establish a national program each government has created a program committee which will coordinate their activities. The provincial committees are better able to coordinate activities within their jurisdiction, particularly those requiring police enforcement, than a centrally located committee could. Efforts are also being made to coordinate information between the provinces and to reduce the duplication of activities, particularly in the production of educational materials.

### **3.5. Passenger seat belt use (rear seat)**

As indicated in the data presented earlier passenger seat belt use is somewhat lower than that for drivers. It is anticipated that additional promotion and enforcement efforts will have to be used to encourage passengers to buckle their seat belts, likely in the form of STEPs. Enforcement of rear seat belt use has been difficult because of problems associated with seeing the belts. However, with the increased installation of shoulder belts in the rear seats of cars this will become less of a problem. Data on passenger seat belt use will be collected in future national surveys.

### **3.6. Proper use of child restraints**

The data presented earlier indicated that children frequently do not wear seat belts and that child restraint systems, child seats or infant carriers, are frequently not used properly thereby reducing their effectiveness. Currently, research is underway to develop more effective

methodologies for measuring improper use of child restraints so that corrective action can be taken through educational programs, the manufacturers, and the use of STEPs.

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# Safety belt usage in Finland and in the other Nordic countries

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Legislation has played a significant role in increasing safety belt usage in all the Nordic countries. Publicity and enforcement have, however, been required to support the legislation.

The development of safety belt regulations has been nearly similar in all these countries, both in terms of their content and dates of implementation. The principal features of the development of safety belt regulations in these countries are shown in Table 1.

## Safety belt usage in the front seats

The first legislative step was the compulsory installation of safety belts in the front seats of private cars. In Finland this step was taken in 1971. Measurements of the safety belt usage rate began in Finland as long ago as in the 1960's. The voluntary use of safety belts was minimal. Outside urban areas it rose to only about 20 per cent (Figure 1).

The development of safety belt usage in Finland is a very good example for the effect of legislation. Safety belt usage in front seats became compulsory on 1.7.1975. The measure raised the safety belt usage rate to about 60 per cent. But this increase in the usage rate was followed by a gradual decline. One reason for this trend of development was that failure to use safety belts was not a punishable offence.

Neglecting to use a safety belt became a punishable offence on 1.4.1982, after which the safety belt usage rate has been at about 90 per cent. Neglecting to use a safety belt is more common in urban areas than it is outside them. In urban traffic, safety belts are not regarded as being as necessary and their use in that environment is experienced as being inconvenient (Figure 1).

Table 1. The development of safety belt regulations in the Nordic countries [1].

	FINLAND	SWEDEN	NORWAY	DENMARK	ICELAND
<b>Compulsory installation of safety belts</b>					
- front seats	1.1.1971	1.1.1973 (1)	1.1.1971	1.7.1969	1.1.1969
- back seat	1.1.1981	1.1.1973 (2)	1.1.1984	1.4.1989	1.1.1989
<b>Compulsory use of safety belts in</b>					
<b>front seats</b>					
- adults (> 15 yrs.)	1.7.1975	1.1.1975	1.9.1975	1.1.1976	1.10.1981
- children	1.4.1982	1.4.1988	1.10.1988	1.10.1990 (3)	1.10.1981
<b>back seats</b>					
- adults (> 15 yrs.)	1.11.1987	1.7.1986	1.3.1985	1.10.1990	1.10.1990
- children	1.11.1987	1.4.1988	1.10.1988	1.10.1990 (3)	1.10.1990
(1) models 1969 ->					
(2) models 1970 ->					
(3) of 3 years of age or older					

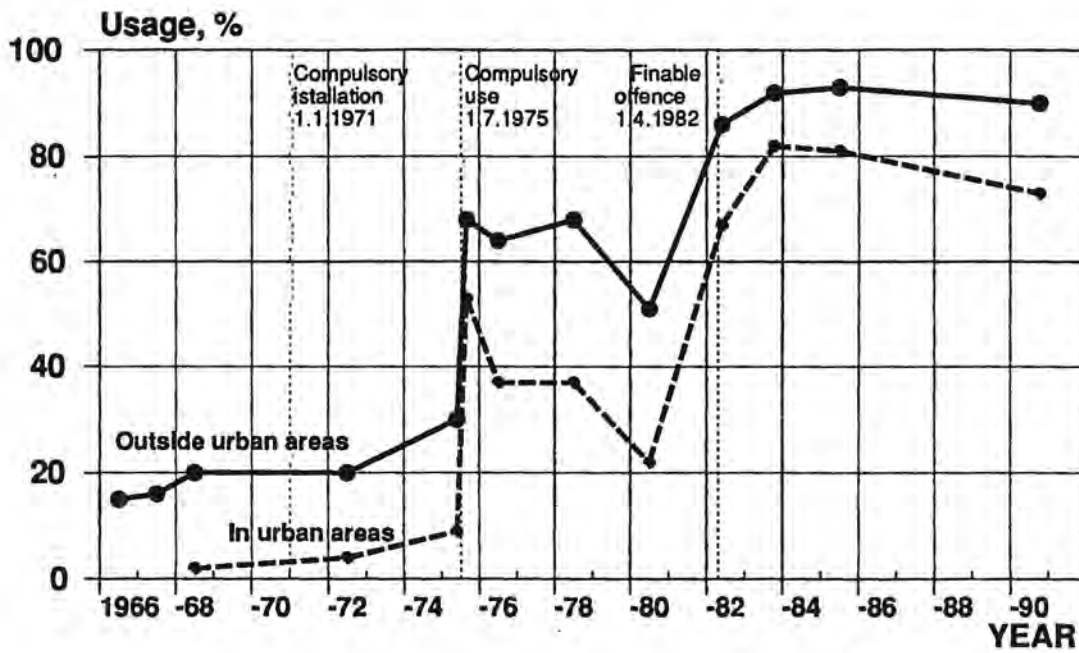


Figure 1. Safety belt usage and the safety belt regulations with regard to the front seats of private cars in Finland [2].

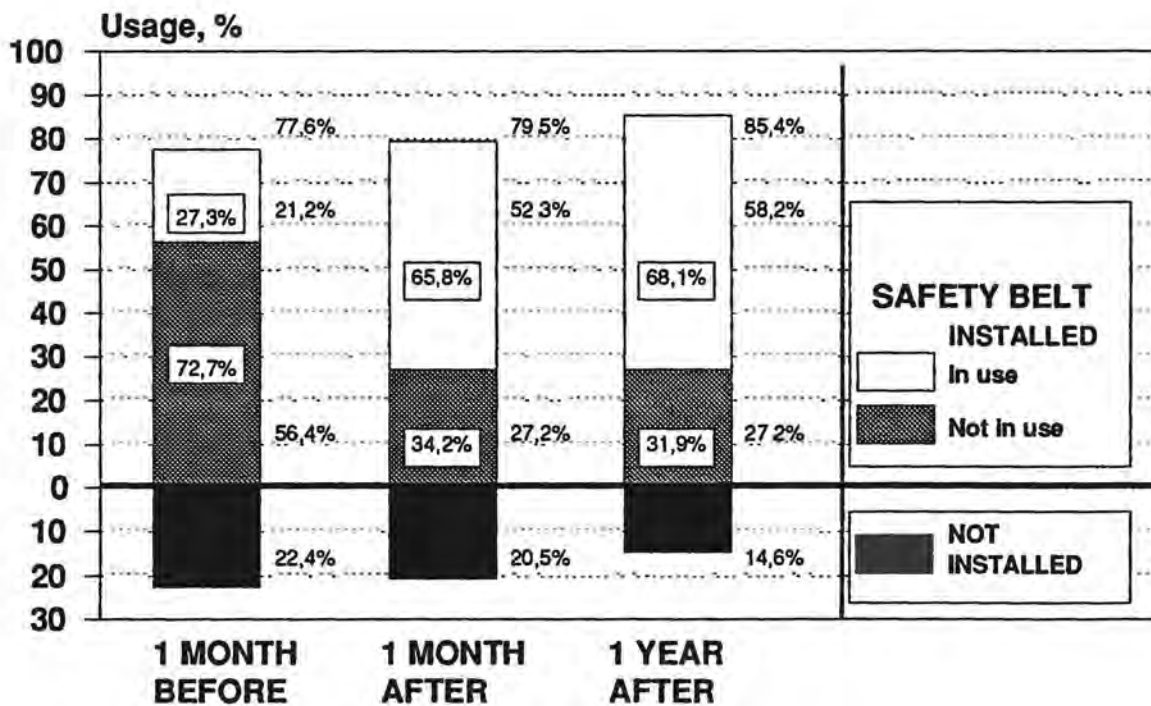


Figure 2. Safety belt usage in Finland in the back seats of private cars before and after the amendment to the safety belt law [2].

## Safety belt usage in the back seats

The installation of safety belts in the back seats of new private cars has been compulsory in Finland since 1981. In Sweden it became compulsory earlier than in the other countries (1973 and applies yearmodels 1970->).

The compulsory use of safety belts fitted in the back seats of private cars came into effect in Finland on 1st November 1987. Surveillance measures on safety belt usage were performed to study the effect of this amendment to the safety belt law.

Only about a month before the law came into effect, safety belts were being used by 27 per cent of adult back seat passengers for whom safety belts were installed (Figure 2). Usage had not increased much at all from the level of the previous measurement (one year before), even though the forthcoming change in the safety belt law was generally known at that time and its benefits had been publicized by a large campaign.

Only the coming into force of the law increased the safety belt usage rate significantly. About a month after the amendment had been in effect, the safety belt usage rate among adult back seat passengers for whom safety belts were installed had risen to 66 per cent. About a year after the law became effective, the usage rate was still at about the same level.

A very similar trend of development was reported [3] in Sweden, where the effect of a publicity campaign on safety belt usage was first studied in 1984. The study was extended when a decision was made to introduce legislation making it compulsory to use safety belts in the back seats. The use of safety belts by adults had risen to about 24 per cent while it was still voluntary. In connection with the law coming into effect, the usage rate rose by 36 percentage points (to 60 per cent).

## Safety belt regulations and children

Taking account of children in the safety belt regulations has been a problem. Safety belts were not regarded as being safe for children; rather, it was believed that children were safe on a back seat. The question of juridical liability was also a problem.

For these reasons, the safety belt regulations initially only applied to adults, i.e. those aged 15 years and over. In Sweden and Norway the obligation additionally did not apply to adults less than 150 cm in height.

On 1.4.1982 in Finland the compulsory use of safety belts (or safety equipment) in the front seats was extended to encompass children. Similarly, the compulsory use of safety belts in the back seats (1.11.1987) also applied to children from the outset. In Sweden and Norway compul-

sory safety belt usage in the back seats initially applied only to adults; it was extended to encompass children a couple of years later.

In Finland the problem of juridical liability has been solved by making the driver responsible for the safety belt usage of persons less than 15 years of age. If, however, the father, mother or guardian of a child is present in the car, the responsibility for the child's safety belt usage rests with him or her.

## How much can increased safety belt usage improve traffic safety?

In Finland almost all road traffic accidents in which the driver or passenger of a motor vehicle is killed are investigated by road accident investigation teams (Figure 3). On the basis of this material we know, for instance, that only about 55 per cent of private car drivers killed in accidents were definitely wearing their safety belts at the time of their accidents.

The road accident investigation teams also assessed how the safety belts had affected the outcome of the accidents or the effect that they would have had if they had been in use. According to these assessments in the years 1985-1989, of all the drivers and passengers who were not wearing safety belts when killed in vans and private cars, the use of safety belts would have saved the lives of 18 per cent definitely, 31 per cent probably, and 49 per cent possibly. In other words, if everyone travelling in vans and private cars in Finland had always been wearing their safety belts, almost a quarter (23 per cent) of all the traffic fatalities that occurred in these vehicles might not have happened (an average of 70 lives a year).

## Why are safety belts not used?

In the accidents investigated by the road accident investigation teams, one can observe many factors connected with the neglect to use safety belts. These include:

- Drivers involved in one-vehicle accidents used their safety belts less frequently than those primarily responsible for collisions, who in turn used their safety belts less often than those involved in collisions and assessed as being the less responsible party.
- Drivers in their cars by themselves used their safety belts less often than those who were accompanied by passengers.
- Drivers under the influence of alcohol used their safety belts less often than those with no alcohol in their blood.
- Drivers whose attitude was assessed as being a background cause of the accident used their safety belts less often than other drivers involved in accidents.

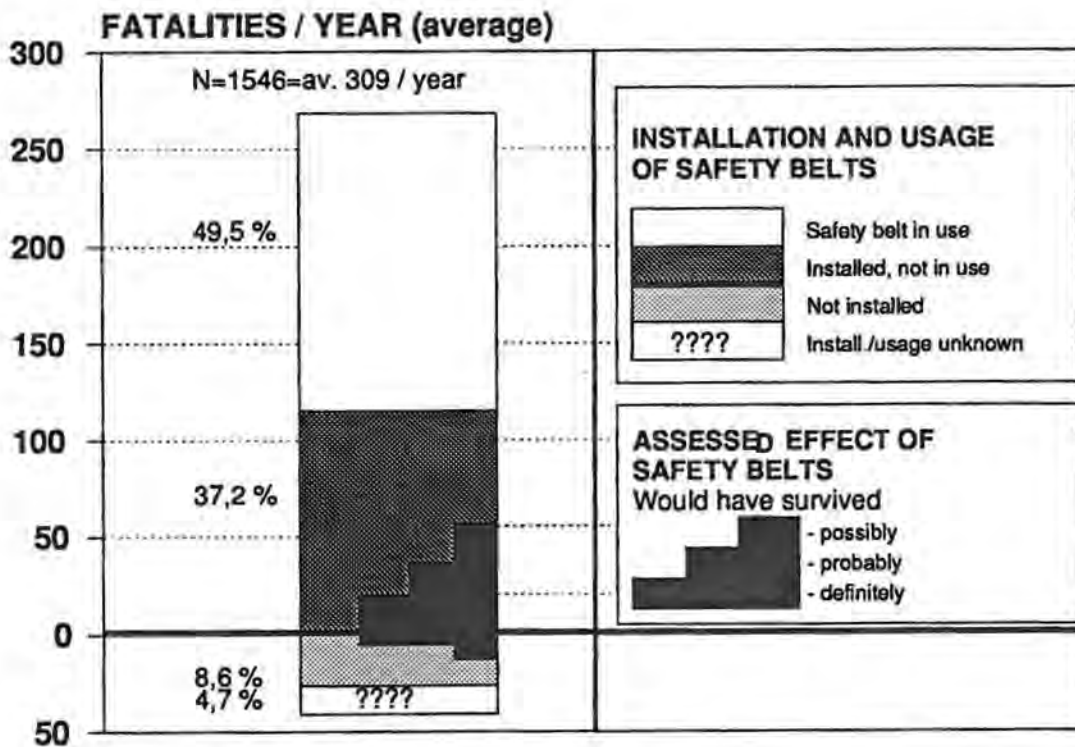


Figure 3. Drivers and passengers (in private cars and vans) killed in accidents investigated by road accident investigation teams in 1985-1989 in Finland - Safety belt usage and its assessed effect [2].

In Finland was recently carried out a small interview study [4] in which private car drivers who neglected to use their safety belts were asked the reason why they did so. Most of the reasons put forward by the drivers indicated some degree of slight indifference:

- "I forgot to fasten it."
- "A safety belt isn't necessary on a journey like this."

In a number of cases safety belts were regarded as being uncomfortable or inconvenient to use. But there were also about one in five of those interviewed, who said that they were strongly opposed to the wearing of safety belts.

#### How can safety belt usage be increased?

In the Nordic countries, where the safety belt usage rate has been measured at over 80 per cent, and even near 100 per cent at best, in the front seats and at 50-70 per cent in the back seats, increasing safety belt usage by the pre-

sented conventional means will not be easy. However, as is clear from the accidents investigated by the road accident investigation teams, it is worth trying to increase the usage of safety belts.

Private cars carrying at most one passenger in addition to the driver account for the majority of passenger kilometreage. There are passengers travelling in the back seats of comparatively few cars. Thus, a decline of a few percentage points in the front seat safety belt usage rate means as great loss as that which back seat safety belt usage has yielded when measured using the kilometreage driven without safety belts.

Some categories of vehicles are still not subject to compulsory safety belt usage. In Finland, safety belt usage is resisted tooth and nail by those involved in commercial transport. For this reason, for instance, the drivers and back seat passengers of taxis are not covered by compulsory usage regulations. Nevertheless, the benefits of safety belts are indisputable also in the case of trucks.

At present, fastening one's safety belt is an extra inconvenience when setting off on a journey. In my opinion, technical solutions can be used both to make it easier to use safety belts and to make it more difficult to neglect their use. One such solution may be the automatic fastening of safety belts. I would rather see effective (sufficiently disturbing) warning lights and audible alarms to indicate that safety belts are unfastened being made compulsory in cars as cheaper solution. One possibility

would be to prevent the car engine from starting or the vehicle from moving off if the safety belts are not fastened. In this manner it would actually be easy to prevent "unnecessary" traffic fatalities. On the other hand, the problem of how to improve passive safety in addition to safety belt usage will be more difficult and more expensive to solve.

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# French experience in seat belt use

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## 1. Introduction

In the 1960's, the seat belt was highly thought of as effective safety equipment to protect the occupants of private cars in a collision. Since then, France has taken legal action to introduce seat belts gradually. The government, working through the bodies responsible for dealing with road safety problems, has backed up the regulations making wearing seat belts obligatory by mounting campaigns to inform people about them, to encourage and check on their use, and to punish those who do not use them. The campaigns were aimed at making drivers and passengers of private vehicles aware of the effectiveness of this system of protection by restraint in a collision and to mobilize the public to make more use of it.

A Road Safety "Dashboard" has been set up which monitors such indicators of driver behaviour as seat belt utilization levels, which makes it possible to evaluate the impact of legal measures and the effectiveness of measures taken to increase the wearing of seat belts in private vehicles.

As well as the seat belt regulations, the strategies employed to reinforce the wearing of seat belts by using information and encouragement campaigns and checks by the police and gendarmerie are described here along with their timetables and rates of intensity. The data will be analyzed to evaluate the effectiveness of these road safety measures by examining the annual chronological series of the rates of seat belt wearing by front-seat occupants of private vehicles in both the country and in urban areas from 1972-1991, alongside the timetable of implementation of the backup measures taken.

## 2. Timetable of legal measures

In France, as seat belts come high on the list of road safety programmes selected by the ELECTRE method of multi-criteria aggregation of preferences (OECD, 1981), a series of regulations covering the installation and wearing of seat belts has been taken since 1970, using a gradualist approach (See Table 1).

The first phase ran from April 1970 to August 1977, with the gradual installation in the front seats of private vehicles built before 1967 of seat belts attached to three anchorage points (which had been obligatory since

1/01/64) and a legal requirement to wear them at first in the country, where accidents are more serious, then in urban areas during the night. The use of seat belts and nationwide speed limits were two of the major safety measures taken in 1973 which halted the upward trend of traffic accidents and road deaths (Lassarre, 1986).

Table 1. Dates of implementation of obligatory installation and use of seat belts in France (Source: Journal Officiel).

Implementation	Installation	Utilization
April 1970	Front seats of new private vehicles	
July 1, 1973 (Decree of 28/06/73)		Front seats of private vehicles in the country
January 1, 1975		Front seats of private vehicles in urban areas
October 1, 1977	Front seats of vans*	10pm-6am (roads reserved for motor vehicles)
October 1, 1978 (Decree of 1/08/77)	Back seats of new private vehicles + 3-point inertia-reel belt in front seats of new cars	
October 1, 1979 (Decree of 26/09/79)		In rural and urban areas, day and night
December 4, 1989		Front seats of vans*
December 1, 1990		Back seats of private vehicles

\* Maximum weight 3.5 tons



The second phase, from August 1977 until now, saw the introduction under EEC directives of three-point inertia-reel belts<sup>1</sup> in the front seats and fixed three-point belts in the rear (anchoring points have been obligatory since 1/09/72). From October 1979 seat belts had to be worn in the front seats on the whole road network at all times, and from October 1990 in the rear seats. A decree of September 1979 made a few exceptions to these requirements to take account of personal physical size and medical or professional reasons.

### 3. Strategies to encourage seat belt use

Legal enforcement was chosen as the best way to make passengers use their seat belts. However, to ensure maximum effectiveness, specific operations were needed to raise public awareness, and strategies were adopted to optimize seat belt use by acting directly on the user (Dejeammes and Lassarre, 1986). We can divide these government-sponsored operations since 1973 into three categories:

1. Information
2. Raising awareness and incentives
3. Enforcement.

Each of these types of operation has been used either continuously or intermittently to explain the reasons behind the regulations, to revive flagging driver motivation or to heighten public consciousness of road safety and courtesy.

#### 3.1. Communication strategies

Communication campaigns are always linked to slogans which are brief and explicit but not backed up by arguments, and which are obviously varied according to the message to be put across (information, awareness-raising, encouragement, remotivation, message as part of a multi-theme campaign...), to public attitudes towards seat belts, to the relative importance of new statutory measures, to the advertising media most suitable at the time and to the target audience. The media used were as varied as possible (TV, radio, the press, stickers, pamphlets, demonstration models, messages on the roads...) but with a strong preference for radio, TV and large posters, so as to reach the greatest number of people. These publicity campaigns were mounted either at national level or in the recent framework (1987) of the Departmental Plans for Road Safety Action (PDASR, DSCR 1988, 1989, 1990) and local programme contracts (formerly Objectif -10%).

The campaigns attempted to reconcile the demands of short-term action, inspired by political marketing, with the development of studies and research on cost/efficiency ratios, but with an increasing tilt towards production

budgets (L'Hoste, 1982). They were most often characterized by the repetition of slogans angled at the human factor, by the brevity of the message and by monitoring through the use of opinion polls. A summary and descriptive table of the seat belt campaigns is given in Annexe 1 (on page 28). The information campaigns follow a recurrent three-cycle pattern, in which we see phases of expansion and retraction:

#### *1st cycle*

From 1972-79: regular campaigns on seat belts, aimed at informing the public (1972-76) based on the idea of establishing a reflex action in the user ("Clic, Clac") and at making people aware of the new regulations, with the added intention of demonstrating the government's confidence in the effectiveness of the legislation (see results of five years of road safety, 1978) by legitimizing the regulations with demonstrations ("It Saves" and "In 5 years, 20,000 Lives Saved").

From 1979-82: Seat belt campaigns were put on the back burner in favour of the other two major road safety themes: alcohol and speeding.

#### *2nd cycle*

From 1982-87: less regular campaigns but with greater shock value to remotivate users, particularly a multi-phase campaign from 1986-87 with the support of local centres, (Objective -10% then PDASR since 1987), helped to plug a message on the harmful consequences of not wearing seat belts ("Unbuckled Belts: 2,000 Deaths a Year"). The 1986 campaign had a strong and lasting impact on the rate of belt utilization in the front seats of vehicles. From 1987-90: another fallow period.

#### *3rd cycle*

1990: The theme was taken up again with a campaign which strongly emphasized the wearing of belts in the rear seats, an important new safety measure which had to be explained and made acceptable to users.

The first 10-year cycle (1972-82) concerned the introduction and increase of seat belt use; the second cycle, of eight years, was a follow-up period of reinforcing the use of seat belts in the front seats of vehicles, and the third cycle is to launch the wearing of belts in the rear seats.

### 3.2. Incentives

Even though communication and/or information campaigns raise awareness, a pertinent short-term or permanent road safety message (especially concerning seat belts) can be put across by background actions based on socio-cultural group behaviour or pressure and lobbies who inspire confidence and whose persuasiveness is enhanced by their authority. Reinforcement measures can also be taken at the level of businesses (training/information conferences), in schools, or by driving instructors stressing the increased safety provided by the seat belt, its usefulness and its merits (Dejeammes, INRETS, 1986).

<sup>1</sup> The inertia-reel belt is a technical advance in user comfort and especially protection, as it must hug the body to be efficient.

Clearly, the deferred and latent long-term effect of this type of encouragement is difficult to evaluate because these actions or "role models" have a slight and isolated impact due to the chosen method of persuasion - continuous and discreet dissemination of information - which is often effective but is spread over a long period.

### 3.3. Enforcement

The different decrees adopted in France concerning the wearing of seat belts implied the setting up of a system of checks and penalties to enforce the regulations and, to a certain extent, to change offenders' behaviour by the use of dissuasion and fines. More than the amount of the fine (in France, failure to wear seat belts is a second-level infringement punished by an automatic fine of 230 francs), it is the knowledge that the law exists that modifies behaviour, plus the psychological impact of the checks and the way they are carried out.

The intensity of the checks can be measured by the number of infringements reported by the police and gendarmerie (Table 2) which have been available on a reliable basis since 1983.

Table 2. Infringements reported annually by law enforcement officers (Source: Interior and Defence Ministries). \* Estimated figures.

	CRS	Gendarmerie	Police	Total
1983	14,485*	117,300	38,072	169,857
1984	15,989*	138,995	32,512	187,496
1985	18,412*	163,692	33,804	215,908
1986	28,816*	225,384	83,710	337,910
1987	32,927	223,383	129,808	353,191
1988	32,418	238,583	122,490	361,073
1989	36,155	289,192	124,290	413,482
1990	37,750	381,895	126,922	508,817

Since 1983, there has been an almost-constant increase in the number of seat belt infringements reported, with a very sharp rise since 1988. This does not mean that fewer people are wearing seat belts but reflects rather a sustained effort by the police and gendarmerie to make increased roadside checks. This interpretation is confirmed by other data on the number of hours devoted to speeding checks (this type of data is not unfortunately available for operations to check seat belt use), and the number of tickets issued for failing to observe speed limits or for driving with excess alcohol in the blood, and the total number of preventive breathalyser tests.

### 4. Assessing the impact of operations

In order to follow up on the major 1973 road safety measures (enforcing seat belt use, speed limits and restrict-

ing alcohol abuse at the wheel), a tool for assessing the impact of these regulations - the Road Safety Dashboard - was devised (Biecheler, 1976). Indicators of driver behaviour are based on estimates using information drawn from roadside surveys organized according to a sampling plan. Analysing the data from different waves of surveys provides annual time series of the estimators of the percentage of occupants wearing belts in the front seats of private vehicles with high precision, given the size of the samples (see par. 6.: Technical Annexe).

An adjustment between movements in the percentage of occupants using seat belts and the time-scale of the reinforcement operations described above will be used to evaluate their impact on seat belt utilization.

Three distinct periods stand out (Figure 1). In country areas, between 1972 and 1979, the wearing of belts in the front seats followed a logistic curve linked to the rate of installation of the equipment in private vehicles. The turning point came in June 1975 with 45% of occupants using seat belts. The rapid increase in belt-wearing during the first four years after the decree making their use obligatory was sustained by a first wave of campaigns which was intended to make buckling the seat belt a reflex action. A slowing-down appeared in 1977 and a saturation threshold was reached in 1979 despite campaigns justifying the regulations.

A peak came in 1980 with a percentage of 78% of occupants wearing seat belts following the October 1979 decree extending their use over the whole road network and the introduction of inertia-reel belts. Between 1981 and 1986 there came a second period, during which the utilization rate slipped steadily back to 67%. This progressive disinclination to wear seat belts seems to go hand in hand with a slackening in the intensity of information campaigns. To counteract this trend a large-scale campaign was launched in the autumn of 1986 stressing the dramatic effects of not wearing belts. Following these shock tactics the slide was halted and the proportion of occupants wearing their seat belts rose by 15 percentage points in four months. Since 1987 the rate has been rising gently by one or two points a year. This advance seems to have been achieved by the roadside checks and the penalties handed out by the forces of law and order in this period, during which the information campaigns have been less strident.

The swings noted in rural areas are even stronger in urban areas. From 1980 to summer 1986, the user rate fell sharply from 55% to 23%. This erosion of respect for seat belt regulations, rapid at first and then slower, was reversed in the autumn of 1986 thanks to a national campaign and by 1987 the rate was back up to its 1980 starting point. Between 1987 and 1991, the proportion of occupants wearing seat belts sagged slightly in 1988 and 1989, but pulled back up in 1990 and 1991, to register 56%.



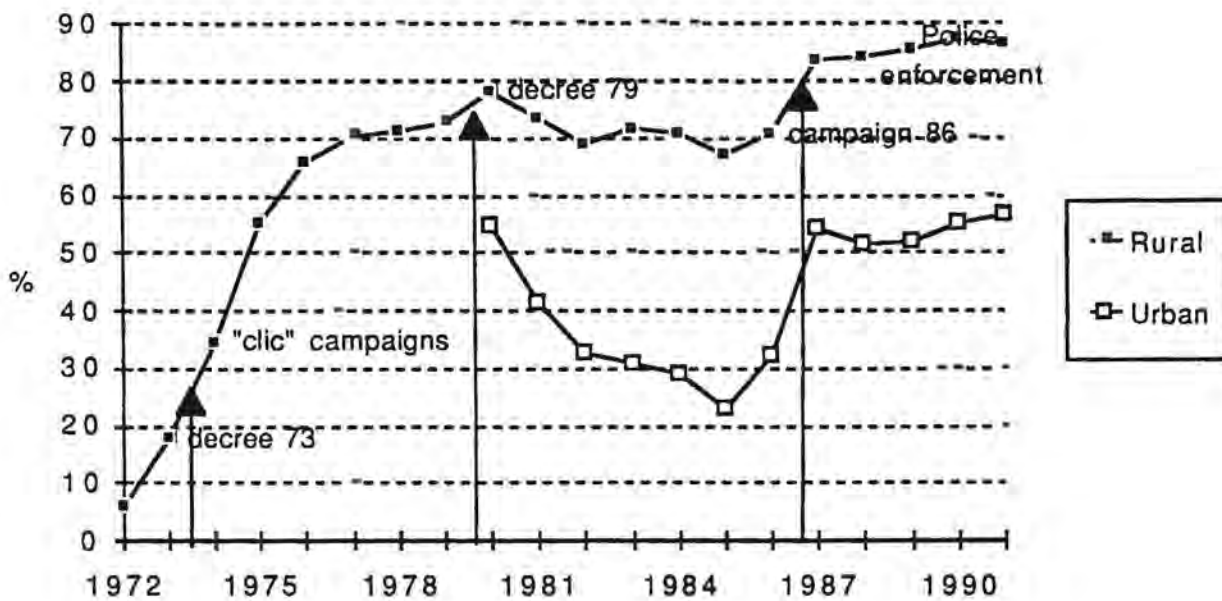


Figure 1. Rate of occupants wearing belts in the front seats of private vehicles in rural and urban areas.

### 5. Future lines of action

A high proportion of front-seat occupants in private vehicles wear seat belts in country areas. The utilization rate in urban areas over short distances remains low. Regional differences modify this view, with a diminution in seat belt use following a North-South axis. Incomplete figures suggest that the use rate in the rear seats is very low, between 10% and 30% according to road category.

Efforts still have to be made to identify the reasons which make persistent offenders fail to buckle their seat belts. Research is now being carried out (Dejeammes and Alauzet, 1990) into the use and the comfort of vehicle protection systems by using questionnaires distributed to drivers at the wheel.

In January 1992, equipment in vehicles to restrain children less than 10 years old will become obligatory. Consciousness-raising and information campaigns are planned to induce vehicle owners to use these new systems and to reinforce utilization of rear-seat belts. A system to observe the wearing of this rear-seat equipment, which is lacking now and which poses data-gathering problems, should be set up to monitor these new measures.

### 6. Technical Annex: Methodology of roadside sampling surveys to estimate the rate of seat belt use

The principle of gathering seat belt data is based on roadside observation of the number of vehicles equipped with belts, and their use by the front-seat occupants, using investigators spread over a number of observation points and time periods according to a sampling design.

Working with raw data on the presence or absence of seat belts and whether or not they were being worn, three indicators are estimated: the rate of utilization, the rate of installation and the proportion of occupants wearing belts, which is equal to the product of the first two indicators and to the ratio between the number of front-seat occupants wearing belts and the total number of occupants of private vehicles, equipped with seat belts or not.

#### 6.1. Roadside sampling surveys

The methodology of surveys has evolved over time and differs according to the category of road network: national and departmental, motorway, urban.

### 6.1.1. Surveys on national and departmental roads

The design is in three levels: the department, the sector of road with which a checkpoint and a time period drawn by chance are associated, and the private vehicle and its occupants.

The survey is carried out in a sample of 20 departments which are typical for their consumption of different grades of fuel and their geographical spread throughout the country.

From February 1972 to December 1982, the survey was carried out first every three months, then every four, over a panel (Biecheler, 1978) consisting of:

- 120 checkpoints (from May 1975) on high traffic-density roads including 70 on national roads in the master plan (27,300 km) and 50 on departmental roads (30,700 km),
- 60 checkpoints on less-used departmental roads.

Half-hour survey periods are drawn by chance between 6am and 8pm with an even balance between the days of the week. Observation points can be located either in open countryside or in urban areas of less than 5,000 inhabitants.

In January 1983, the panel of observation points was revised on the basis of a new sample of 20 departments (Biecheler, Lassarre, and Tan, 1982). Only high traffic-density roads were chosen, falling into four categories:

- national roads:
  - . 2 or 3 lanes in country areas
  - . 2-lane dual carriageways in country areas
  - . 2 or 3 lanes in small urban areas
- departmental roads

The numbers of observation points per two-month period were 49, 28, 49, 42, with half-hour survey periods in one direction per observation point from 9am to 5pm, leaving aside high traffic-density days and weighting the distribution evenly over the days of the week.

### 6.1.2. Surveys on motorways

These surveys started in April 1974 on two categories of motorway (Biecheler, 1976):

- toll roads or inter-urban links,
- non-toll roads, bypasses or ring roads.

From May 1975 to December 1987, vehicles were observed every three months, then every four months, for one-hour periods in one direction at nine points on toll roads and at three points on non toll roads. Since January 1983, the number of points used was reduced from 42 to 28 with 10 minutes of observation per lane in one direction, and at one-month intervals until 1985, then at two month intervals, with an equal distribution over the days of the week (Biecheler, Lassarre, and Tan, 1982).

### 6.1.3. Surveys in urban areas

A survey on the main roads of cities of more than 100,000 inhabitants was set up starting in 1980 (Filou and Gourlet, 1988). Cities falling into two categories were chosen, with an even North/South balance and observation points drawn by chance:

- Paris + suburbs: Paris (5), St-Denis (1), Malakoff (1), Levallois-Perret (1),
- Provinces: North: Lille (6), Metz (6), Nantes (6),  
South: Avignon (6), Lyon (6), Toulouse (6).

The frequency of observation was every four months from January 1980 to December 1981, then every six months. Half-hour surveys were taken at the observation points on weekdays between 8am and 7pm.

### 6.2. Analysis of the statistics on seat belt utilization

The aim is to use the statistics from these disparate surveys to establish the two annual series of the rates of seat belt utilization in country and urban areas, with the basic problem being how to homogenize, then to adjust the results of the two main survey periods, 1972-1982 and 1983-1991, following the restructuring of the observation points in 1983.

For high traffic-density roads, the annual rates of seat belt use by front-seat occupants are available from 1972 to 1977 (Lassarre and Gourlet, 1978) and from 1978 to 1982 (DES, 1983). From 1983 to 1991 it is necessary to aggregate the annual rates for the three categories of national roads with a weighting according to their annual mileage. The series of rates on high traffic-density roads from 1972 to 1982 is adjusted with that of rates on national roads from 1983 to 1991 by applying a ratio calculated on the turning-point years 1980 to 1984 (Table 3).

For departmental roads, for the period 1972 to 1977 we use rates estimated for the former departmental minor roads, from 1978 to 1991 estimated rates for high traffic-density minor roads (DES, 1983) (ONSR, 1991). The adjustment between the two periods 1972 to 1982 and 1983 to 1991 is made as above.

Using the same sources, two homogeneous series relative to the panel are available from 1974 to 1982 and from 1983 to 1991 on link and bypass motorways (Table 3) and easily lend themselves to an adjustment between the first and second periods.

An annual rate of occupants using seat belts in country areas can be calculated by weighting the annual rates obtained for each category of road network: link motorway (AL), bypass motorway (AD), national roads (RN) and departmental roads (CD) according to the number of vehicle-kilometres. The annual mileages for the first three networks are provided by the SETRA (CSTR, 1991). Mileage on 320,000 km of departmental roads was

estimated in 1984 at 145.9 billion vehicle-kilometres (Lassarre, 1989). Mileages for other years are calculated by applying the rates of mileage increase on national roads.

Working with the results of the survey carried out using the sample of six provincial cities plus Paris and three suburban areas (Filou and Gourlet, 1988; ONSR, 1991), it is possible to establish an annual series of the rates of occupants wearing seat belts in urban areas, using a weighting of 1/5 Paris and 4/5 provinces, which is valid for weekdays on main roads (Table 3).

Table 3. Rates of seat belt use by front-seat occupants of private vehicles in country and urban areas from 1972 to 1991 (Source: ONSER, SETRA, ONSR).

Year	AL	AD	RN	CD	Country	Urban
1972	14.4	12.9	9.2	3.8	5.85	
1973	42.2	37.8	27.0	12.0	17.8	
1974	72.2	64.7	46.2	26.4	34.5	
1975	87.4	83.7	62.4	50.0	55.4	
1976	87.4	87.4	69.3	63.2	65.7	
1977	88.3	88.3	75.0	68.6	70.5	
1978	91.7	87.2	76.0	69.3	71.4	
1979	89.4	91.6	77.4	70.4	72.5	
1980	93.9	94.0	82.6	77.1	78.3	54.8
1981	91.4	83.2	78.7	72.1	73.6	41.4
1982	89.3	83.1	74.2	66.2	68.9	32.6
1983	80.8	66.2	73.0	70.1	71.6	31.0
1984	80.4	66.9	72.1	69.5	71.0	29.0
1985	75.0	60.5	67.3	66.6	67.1	23.0
1986	75.5	62.1	69.4	71.5	70.7	32.2
1987	89.1	80.9	84.1	83.1	83.8	54.4
1988	88.9	79.4	84.0	83.8	84.1	51.5
1989	89.9	82.0	85.3	85.0	85.4	51.9
1990	91.2	83.0	87.0	87.2	87.3	55.4
1991	89.0	83.1	86.2	86.4	86.4	56.4

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Annexe 1: Chronology of national seat belt campaigns. Period, content, media used and type of messages in communication campaigns on seat belts. Source: "Communication and road safety: campaigns from 1973 to 1987" (DSCR, 1987).

Year	Period	Message	Media	Type of message	Comments
1973		'What about your belt?' 'Yes, I wear my belt'			
1973/74	October 31-January 15	'Those who know that 2 out of 3 accidents happen in towns ALWAYS BELT UP IN TOWNS, HOW ABOUT YOU?' 'Drive slower, belt up' 'Let's wear our belts'	2,550 roadside posters, 99 TV ad spots, 150 radio spots, 500 posters in towns, 1,700 adverts on buses		campaign linked with messages about speeding and fog dangers
1974	May 30-September 2	'Clic, let's wear our belts'	115 TV ad spots, 450 radio ad spots, 1,200 roadside posters and in Paris region press adverts		European seat belt year
1975	January-February	'A little clic is better than a big crash'	5 TV adverts run on 40 TV spots, 200 radio ad spots, magazine and bus shelter adverts	dramatic, emotional humorous scientific informative	
1976	April-May-June	'It saves lives' 'In town too, it saves lives'	2 TV films and 3 spots, 87 broadcasts of 13 radio adverts, 750 roadside posters, 16,000 urban posters	informative dramatic eyewitness	
1978	January-February	'20,000 lives saved in 5 years, let's keep it up: A little clic is better than a big crash'	100 showings of 4 TV spots, 120 broadcasts of 10 radio spots, weekly and daily press, 700 roadside posters	scientific film	campaign summing up 5 years of road safety efforts on alcohol abuse, speed limits, wearing belts
1979	June 27-August 5	'Three golden road rules: The main thing is to get there'	700 posters on national road network, on 3 themes 200 radio adverts, 25 TV adverts	cartoon posters	raising awareness on alcohol, speeding and belts before summer
1979	October	'Belt buckled, face protected'	750 roadside posters, TV programmes and spots, radio programmes, daily press	scientific stunts	campaigns about new regulations on using belts at all times
1982	Summer	'Don't get a nose full of glass: Even for 100 yards belt up' 'Make both ends meet: Clic, even for 100 yards, belt up'	3 TV fictional films, road and bus posters, pamphlets on seat belts		
1986	February 18-March 13 October 24-November 23 Summer	'If we want to, we can' 'With belt' 'Without belt' (comparative photos)	TV films, bus and urban posters, small posters, stickers, radio adverts		campaign extended overseas, 3 summer campaigns linked with speeding and drinking
1987	May 15-31 Summer	'Not buckling your belt: 2,000 deaths a year'	TV films (6 channels), 900 radio adverts, 1,800 roadside posters		rounding off the 1986 summer campaign
1990	November-December	'One life, one belt'	TV, radio, posters, local broadcasts	informative	belt use obligatory in rear seats



# Strategies to increase the use of restraint systems: Report about Germany

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The usage rate for seat belts in front seats has reached a level in Germany (old states) which can hardly be increased any further. It has reached 99% on autobahns, 97% on rural roads and 94% in urban areas, i.e., an average of 96% (1990 figures).

The basis of all figures about the usage rate for seat belts are observations in the western part of Germany. These unobtrusive observations have been carried out two times each year during day-time in each case for one week in four selected regions, which are representative for whole Germany regarding socio-demographic aspects.

The extraordinarily high usage rate in Germany, however, has been observed since 1984 only when non-compliance with this law became subject to a fine of DM 40. But it would be a misinterpretation of the situation, if we assumed that the introduction of the fine was the only factor leading to the present usage rates. This development was preceded by a decade of public discussions presumably already effecting a decisive change in the basic attitude toward the seat belt so that the introduction of the fine just served to push drivers still a little further in the direction they had been heading for anyway.

What we should not forget is that at the beginning of the 1970s only a fraction of all cars had been equipped with belts:

- Since 01 January 1974, the front seating positions of all cars admitted to traffic for the first time have been required to be equipped with seat belts.
- Since 01 January 1976, the legal requirement of equipping the front seats of cars with seat belts has been extended to all cars (supplementary equipment law).
- Since 01 May 1979, this has also applied to rear seating positions.

On the dates below, legal regulations applying to the usage of belts (or restraint systems) were introduced:

01 January 1976: Compulsory belt usage in the front seats of cars (without the imposition of a fine in the case of not complying with this law).

01 August 1984: Compulsory belt usage in the rear seats of cars.

01 August 1984: A fine of DM 40 for car occupants in front seats not complying with the law.

01 July 1986: A fine of DM 40 for car occupants in rear seats not complying with the law.

Aside from that, there were various events and measures likely to influence usage behaviours in the direction desired:

- A total of four campaigns were launched calling upon drivers to use the belt, i.e.:
  - . June-December 1974
  - . March-September 1975
  - . June-December 1977
  - . June 1983-March 1984.
- There have been two leading decisions of the highest courts in Germany with respect to the seat belt:
  - . In March 1979, the Federal Supreme Court decided that the failure to fasten one's seat belt amounts to contributory negligence in the case of injuries suffered in an accident.
  - . In October 1981, the highest German labour court decided that an employee not using a seat belt cannot make any claims for the continuation of his wage payments should an accident cause his inability to work.

At those times these decisions caused lively responses in the press and a wide public discussion.

If we consider the usage rates over time, two sudden increases in the rates will be found, in both cases in connection with the introduction of legal regulations, i.e. the introduction of compulsory belt usage at the beginning of 1976 and the introduction of the fine for non-compliance in 1984.

Ernst and Brühning (1990) undertook an extensive and careful re-analysis of the 1978-88 accident data in order to estimate the effectiveness on the number of fatalities and injured parties of the introduction of the fine for non-compliance on 01 August 1984. They arrived at the following results:

- Owing to this single measure, a total of 98 car occupants less were killed; "based on the period of a year, this amounts to a reduction of 1,176 killed car occupants" (p. 12). This means for the year of 1985 that without this measure 28% more car occupants would have been killed.

- In addition, 10,764 car occupants less were injured within the span of a year. For 1985 this means a reduction of 21%.

- Evidence of a statistical reduction of slightly injured car occupants could not be found. However, it can be assumed that persons who would have suffered minor injuries without the belt remained uninjured and that persons who otherwise would have suffered major or even fatal injuries became the victim of slight injuries only.

- The overall effectiveness of the belt, as was finally determined, amounted to approx. 3,000 to 4,000 fatalities per year. That means that without any belts 3,000 to 4,000 fatalities more would have been deplored per year.

The introduction of the fine for non-compliance with the belt usage law therefore was amazingly effective. The campaigns as such appear to have been of only moderate effect. On the other hand, however, the 1975/75 and 1983/84 campaigns did serve to consciously prepare the ground for the legal regulations and thus probably also helped reinforcing their effectiveness.

There is one point deserving attention in this connection: in 1971, an extensive motivation study was commissioned by the Federal Highway Research Institute (BAST) to clarify the question of the *reluctance* of drivers to buckle up -- despite the fact that it seemed the reasonable measure to take. The main results of that study was that buckling up reminded drivers of the possible dangers of car driving, a thought they rather cared to suppress -- obviously some magical notions are partially also involved here. The consequence was that in none of the later belt campaigns anxiety or any other sort of negative appeal was used, paying attention instead to strictly neutral and even positive forms of addressing the public, depicting belt usage or buckling up as a good habit and making every effort to avoid arguments possibly causing emotionally undesirable reactions.

We obviously seem to have succeeded. Belt usage has become a natural habit with the vast majority of car drivers, no longer requiring any thought. The act of buckling up in front seats no longer needs a conscious decision. It is now a natural part of car driving in most cases like closing the door.

The development of the replies to four questions asked 1,000 car drivers, respectively, in three representative surveys undertaken in 1985, 1988 and 1990 also confirms this assumption:

Question	Year (f%)		
	1985	1988	1990
The positive benefits of seat belts are exaggerated	27	21	10
Seat belts are not necessary for cautious drivers	18	14	7
The belt confines the driver and you can't do anything in an accident	30	23	9
Without belt I would have the feeling to miss something	51	64	72

(according to EMNID, 1985, 1988; Haas, Pfafferott, and Schulze, 1991) (see also Figure 1 on page 32).

And drivers' attitudes toward seat belt usage continued to improve, even beyond 1985.

All the findings reported thus far refer to belt usage in front seating positions. As regards the use of restraint systems in rear seats, both by adults and children, there still is no cause for satisfaction. Seat belt usage in rear seats has been compulsory since 01 August 1984. A fine for non-compliance with this regulation was introduced on 01 July 1986. The data available on the use of seat belts in rear seats for the years of 1984-90 show the following (see also Figure 2 on page 33):

Year	Use of Restraint Systems in %		
	Adults (Drivers)	Adults (Rear Seat)	Children (Rear Seat)
1984	92	13	32
1985	93	17	31
1986	95	41	51
1987	94	42	49
1988	94	44	57
1989	96	53	58
1990	96	47	60

These numbers are regarded to the passengers observed on back seats. It was not under consideration whether the seats were equipped with belts or not. Because of the legal requirements of equipping the back seats of cars with belts since 1979 nearly all cars are actually equipped.

The table shows that, in this case too, the introduction of the fine for non-compliance resulted in a clear increase in the use of rear seat restraint systems but by far not to the same extent as for front seat belts in 1984.

On the whole, the following conclusions suggest themselves:

- Campaigns alone have only a slight effect on belt usage rates.
- Legal measures, especially the fine for non-compliance, have a much clearer effect.
- A maximum effect can be achieved if information campaigns and appeals are used to prepare the ground for the introduction of the legal measures.

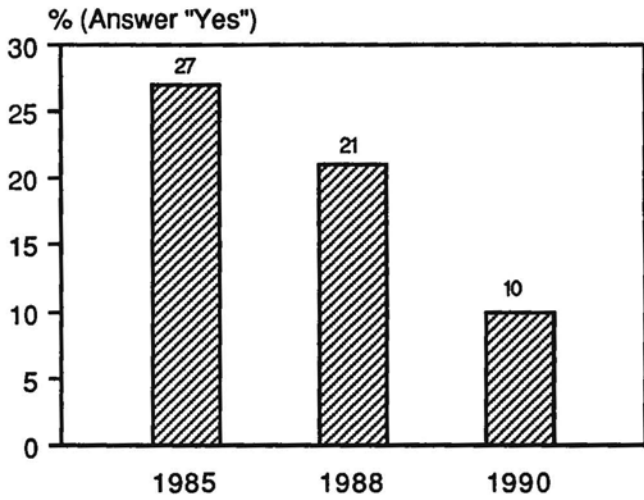
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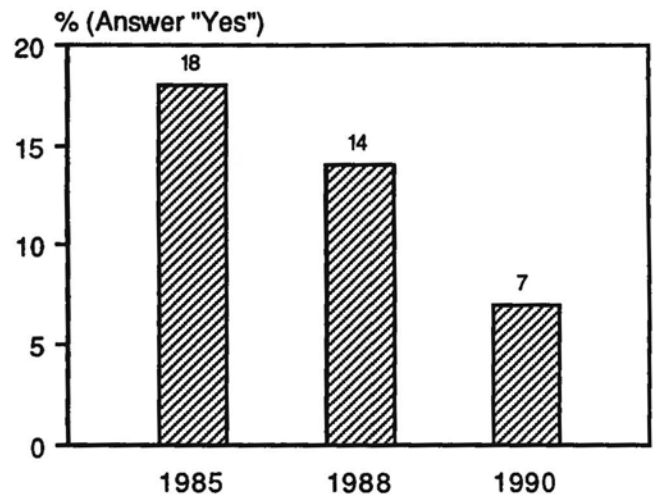
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"The positive benefits of seat belts are exaggerated"



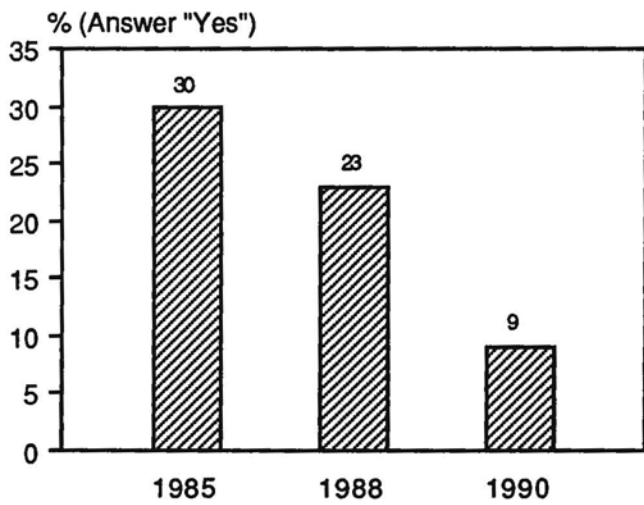
N=1000

"Seat belts are not necessary for cautious drivers"



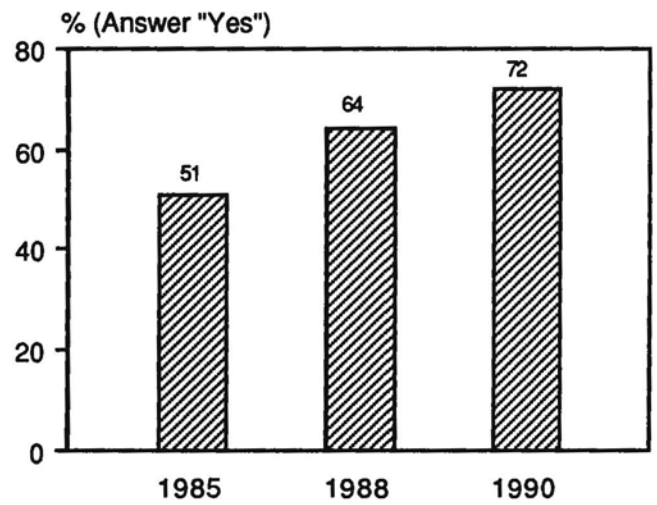
N=1000

"The belt confines the driver and you can't do anything after an accident"



N=1000

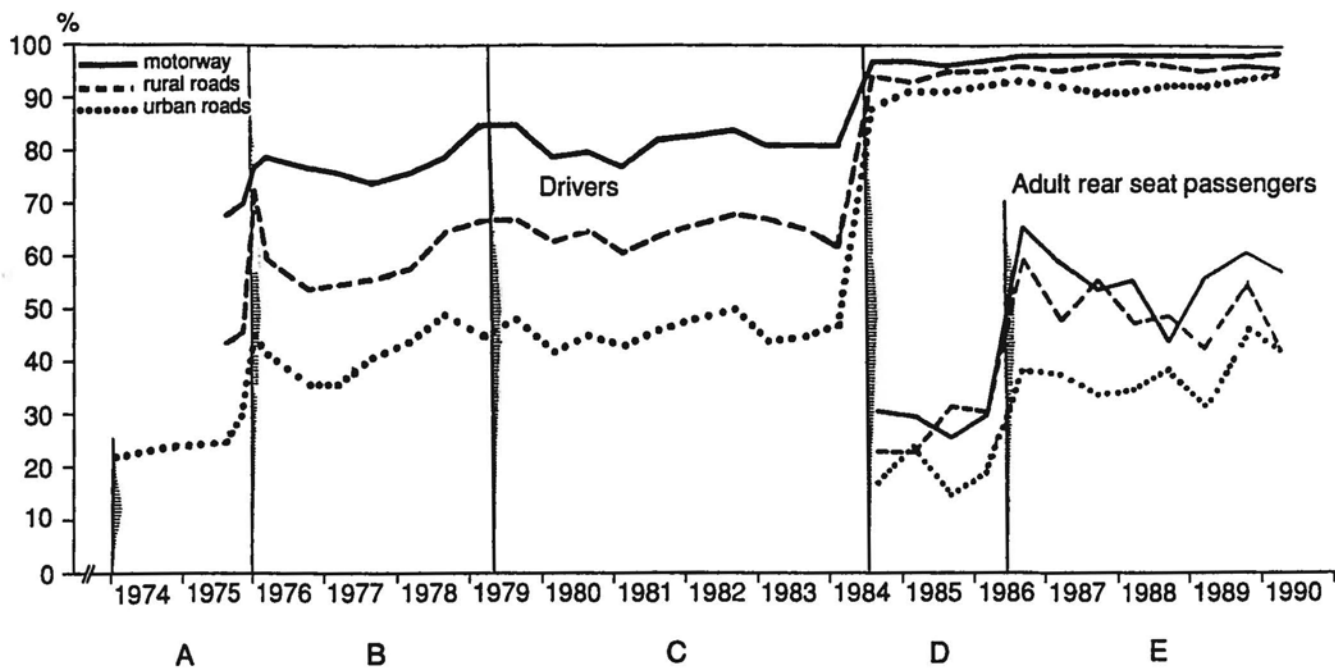
"Without belt I would have the feeling to miss something"



N=1000

Figure 1. Development of replies to four questions in 1985, 1988 and 1990.





**Legend:**

- A. Since 1-1-1974: The front seating positions of new cars are required to be equipped with seat belts.
- B. Since 1-1-1976: Legal requirement of equipping the front seats of cars with seat belts extended to all cars; compulsory belt usage in the front seats of cars.
- C. Since 1-5-1979: Rear seats are required to be equipped with seat belts.
- D. Since 1-8-1984: Compulsory belt usage in the rear seats of cars; a fine of DM 40 for car occupants in front seats not complying with the law.
- E. Since 1-7-1986: A fine of DM 40 for car occupants in rear seats not complying with the law.

Figure 2. Development of the use of restraint systems 1974-1990 (Source: BASt).

# Restraint use by car occupants: Great Britain, 1982-91

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TRRL, England

## 1. Introduction of seat belt regulations

The use by car occupants of seat belts and other restraint systems has developed gradually in Great Britain, as the protection that they offer has become generally recognised. The fitting of seat belts was made compulsory in the front seats of new cars in 1965 (1967 in vans), and successive publicity campaigns were mounted in subsequent years to educate the motoring public as to the advantages of seat belt wearing. From 31 January 1983, under the provisions of the 1981 Transport Act, it became compulsory for the drivers and front seat passengers of cars and vans to wear seat belts.

Once high wearing rates had been achieved among those travelling in the front seats of cars, attention turned to those in the rear. Provision of mounting points for seat belts in the rear of cars was made compulsory in October 1981. This was followed by the requirement that cars manufactured since October 1986 or first registered since April 1987 should be fitted with rear seat belts. The next legislative step was to require any rear seat passenger less than 14 years old to wear a seat belt or alternative restraint system, *where available*; this took effect on 1 September 1989. Finally, on 1 July 1991 this requirement was extended to all rear seat passengers in cars. Thus, it is now required in Great Britain that each car occupant shall travel restrained where a seat belt or another suitable restraint system is available. There is no requirement that older vehicles without rear seat belts should have them fitted retrospectively.

## 2. Measuring seat belt wearing rates

The generic term 'wearing rate' will be applied to the proportion of drivers or passengers who travel restrained, although some types of child restraint cannot literally be worn. It is clearly important to measure these rates accurately, to see how well the various regulations have been observed by the motoring public and to determine whether any remedial action, such as publicity campaigns, may be required to raise the rate.

The first surveys of seat belt wearing were made in the mid-1970's, and these found rates of about 0.3. There was then a gap until February 1982, when a monthly national

survey was begun in preparation for the forthcoming regulations. The new survey used over 50 sites, on all types of road and spread throughout Great Britain. Drivers and front seat passengers of cars and vans were observed: the only detail recorded was whether or not a seat belt was worn. Thus, overall wearing rates can be calculated, but the data do not permit any detailed study of the rates, for example by age and sex of occupant. As the wearing rate quickly stabilised after the regulations came into force, the survey frequency was reduced to six times per year from June 1984 and to twice yearly (April and October) from 1986.

Between November 1982 and July 1986, TRRL carried out four surveys of restraint use in the rear (TRRL, 1987). Only children were included, but the type of restraint used was recorded in some detail.

From these four surveys developed the current series of TRRL surveys, covering car occupants of all ages and seating positions. Its main objectives are to measure the extent to which car occupants use seat belts and other restraints, and to see whether children use appropriate restraints. Consequently, extensive data have to be collected for each car occupant: age, sex, whether a restraint was being worn and if so of what type. An experiment carried out on the TRRL Small Road System showed that it was possible for experienced observers to reliably record this level of detail, provided that vehicles were stationary or very slow moving. Consequently, it was decided to carry out the survey at suitable junctions in two study areas where suitably experienced staff were available to TRRL: around its main site at Crowthorne, Berkshire and around Nottingham. The alternative of using a national sample of sites was rejected, as it would have provided national coverage of unknown reliability: any inter-regional differences that were found could have been the result of technical factors such as site selection, rather than genuine differences in restraint use. A report has been published which describes the survey methodology and presents detailed results from the first three surveys (Broughton, 1990).

The first of the new TRRL surveys was made in October 1988. The first three were run in parallel with the national survey, but by October 1989 it was clear that the wearing rates for drivers and front seat passengers provided by the two surveys were very similar. Accordingly, the national survey was terminated.

### 3. Wearing rates

There has been regular monitoring of front seat belt use in Great Britain since February 1982, whereas regular monitoring in the rear only began in October 1988. The two sets of wearing rates will be discussed separately.

#### 3.1. Front seat wearing rates

The national wearing rates of drivers and front seat passengers found by the national survey and, more recently, the TRRL survey are shown in Figure 1 (on page 38). It will be recalled that the surveys in the mid-1970's had found rates of about 0.3; these had risen to almost 0.4 by early 1982 when the regular national survey began. They rose to over 0.5 in January 1983, and to over 0.9 in February; a 'plateau' of about 0.95 was achieved in March. It may be noted that the police stated that there would be no prosecutions for seat belt offences during the first three months of the new law (i.e. February-April), so this marked rise was achieved at a time when many drivers were aware that there was no threat of prosecution.

The wearing rates observed in mid-1983 were largely maintained during the subsequent years, although there has been a slight fall from 0.94-0.95 to 0.93-0.94. It was rather disturbing, then, to find a sudden drop in the passenger rate to 0.90 in the latest survey (April 1991). This cannot be explained by technical factors, and it will be of great interest to see in the next survey (October 1991) whether this rate returns to its earlier level.

There has been considerable speculation about the reason for the sustained high wearing rates since 1983. British motorists are not notably law-abiding, and few motoring laws are as widely obeyed as the 1983 seat belt law. One important factor was the succession of publicity campaigns in the 1970's, at a time when the Government was averse to compulsion but was keen to raise wearing rates by persuasion. The various failed attempts in Parliament to pass seat belt legislation also served to maintain public interest. Consequently, when the law finally came into effect, many motorists who had not previously worn a seat belt were already persuaded of its value and were ready to comply with it.

##### 3.1.1. Variations in front seat wearing rates

Wearing rates decline with road class, and are lower on built-up roads (those with speed limits of at most 40 mph) than on non-built-up roads (speed limits of more than 40 mph). The rates shown in Table 1 come from the TRRL survey of October 1989: a similar pattern is shown by the other surveys. When the results from individual sites are used to calculate the national rates (as shown in Figure 1), greater weight is given to the major roads and the non-built-up roads (to reflect the greater traffic volumes on these roads), so the means of the wearing rates by road class are slightly lower than the corresponding national rates.

Table 1. Wearing rates by road type, October 1989.

Road Type	Driver	Front seat passenger
A	0.93	0.95
B	0.92	0.92
C/Unclass	0.89	0.88
Built-up	0.91	0.92
Non-built-up	0.94	0.95

Wearing rates also vary with the age and sex of the car occupant. Table 2 compares rates from the April 1991 survey; this was the first survey to record the age of adult passengers, but the ages of car drivers had been recorded by all six surveys and a similar pattern was found in each. It is clear that men are less willing than women to wear seat belts, and that wearing rates increase with age (among adults).

Table 2. Wearing rates by age and sex, April 1991.

Age	Driver			Front seat passenger			
	17-29	30-59	60+	0-13	14-29	30-59	60+
Male	0.90	0.91	0.94	0.94	0.80	0.85	0.88
Female	0.95	0.96	0.97	0.94	0.87	0.91	0.94

#### 3.2. Rear seat wearing rates

During each of the current series of seat belt surveys, very many cars are observed, so the wearing rates for drivers are based on many observations and are relatively precise. Far fewer front seat passengers are observed, so their rates are rather less precise; rates calculated for child rear seat passengers are much less precise. Consequently, small differences among the rear seat wearing rates presented below may well not be statistically significant. Table 3 shows the numbers of car occupants observed in the most recent survey, using the age groups from the survey form.

The child rear seat wearing rates found in the six surveys are compared in Figure 2 (on page 38). The four age groups are paired, and the rates for 'newer' cars are presented separately from those for 'all' cars. Newer cars are those which, according to their registration prefix, were first registered since August 1987 and so must be fitted with rear seat belts: the child restraint regulations introduced on 1 September 1989 apply to all of these cars, but not to those older cars with no rear seat belts.

Table 3. Number of Observations, April 1991.

	Driver	Front seat passenger	Rear seat passenger
0		108	231
1-4		82	1142
5-9		157	975
10-13		227	492
14-29	5694	2179	780
30-59	12405	3247	579
60-	3253	1528	379
n.k.	24	25	8

The figure shows that about five-sixths of 0-4 year old children travelling in newer cars are restrained, either wearing a seat belt or using another type of restraint. The proportion for all cars is a little lower, but is slowly converging: the new regulations had no discernible effect on wearing rates that were already relatively high. The proportion of 5-13 year olds who are restrained is rather lower, but did rise significantly in response to the new regulations: the wearing rate has since fallen back slightly.

The TRRL surveys make detailed observation of the type of restraint that children use. These show that the type used is appropriate to the age of child in the great majority of cases; Table 4 shows the figures from the latest survey. In addition, the number of unrestrained children is included, according to whether they were travelling seated or carried on the lap of another passenger.

The wearing rate for older rear seat passengers has varied somewhat erratically between successive surveys. Among newer cars it has ranged from 0.12 to 0.24, the latter rate being achieved in the latest survey. The wearing rate for all cars has ranged from 0.07 to 0.17, with the lowest rate being recorded in the first survey and the highest in the latest survey. Hence, there has been a gradual upward trend in adult rear seat wearing rates from a very low level in October 1988. The next survey will measure the response to the extension of the rear seat belt regulations to adults, from 1 July 1991.

The small numbers of adult rear seat passengers that are observed (Table 3) make it difficult to compare their wearing rates precisely by age and sex. Rates are overall higher for women than for men (0.17 and 0.13 in the latest survey), and tend to increase with age.

#### 4. Casualty reductions

The three sets of seat belt regulations were introduced because of the widespread appreciation that car occupants who wear seat belts face lower risks of death and injury than those who do not. What effect have the new regulations had on casualty totals?

The 1981 Transport Act introduced, in addition to compulsory seat belt wearing, two other sets of regulations: one aimed at reducing drink/driving and the other at improving the safety of trainee motorcyclists.

Table 4. The types of child restraint used, April 1991.

	Seat belt	Child seat	Rear fac-ing seat	Carrycot-secured	Unrestrained-uns'd on lap	Unrestrained-seated
<b>Front seat</b>						
Age:						
0	0	6	91	2	0	7
1-4	28	32	5	0	0	11
5-9	139	8	0	0	0	1
10-13	207	8	0	0	0	0
<b>Rear seat</b>						
Age:						
0	7	132	38	3	7	36
1-4	285	611	4	2	0	32
5-9	510	28	1	2	0	28
10-13	231	1	0	0	0	0

All took effect over a short period, so it is difficult to disentangle the separate effects. Broughton (1990) published the estimates contained in Table 5; to provide a context, the table also includes the national casualty totals for 1982, the calendar year which preceded the implementation of the new regulations.

Table 5. First year casualty reductions due to the 1981 Transport Act.

	Killed	Killed or seriously injured	All casualties
Combined effect	490	11,400	36,000
Compulsory seat belt wearing alone	370	6,100	24,000
1982 casualty total	5934	85,673	334,296

Much concern was expressed before seat belt wearing became compulsory that other groups of road user would suffer increased casualties as a result. The so-called 'risk compensation hypothesis' predicted that previously unbelted drivers would feel more secure when wearing a belt, would drive more riskily and would consequently cause extra accidents. There is no indication of any increase in casualties among 'vulnerable' road users: in particular, the number of pedestrian casualties did not rise in early 1983.

No analysis has yet been made of the effects of the rear seat regulations. It will only be possible to assess the effects of the adult regulations in 1993, when complete casualty data are available for the period July 1991-December 1992. It should shortly become possible to assess the effects of the child regulations: unfortunately, the completion of the 1990 accident database for Great Britain has been delayed.

## 5. Conclusions

One of the major developments in road safety in Great Britain during the last decade has been the increasing use of seat belts by people travelling in cars. This has been achieved by three pieces of legislation, with supporting publicity:

(i) from 31 January 1983 it has been compulsory for drivers and front seat passengers in cars and vans to wear seat belts: the wearing rate rose from its earlier level below 0.4 to 0.95, but has since fallen marginally to 0.93-0.94,

(ii) from 1 September 1989 it has been compulsory for any child up to 13 years old to be restrained when travelling in the rear of a car fitted with rear seat belts, or other child restraints: the wearing rate for 0-4 year olds in such cars continued at about 0.8, the rate for 5-13 year olds rose to 0.8, but has since fallen slightly,

(iii) from 1 July 1991 it has been compulsory for any person to be restrained when travelling in the rear of a car fitted with rear seat belts, or other child restraints: it is too early to judge how the adult wearing rate may have changed, but it had previously been less than one quarter.

## 6. Acknowledgements

The work described in this paper forms part of the programme of the Transport and Road Research Laboratory and the paper is published by permission of the Director.

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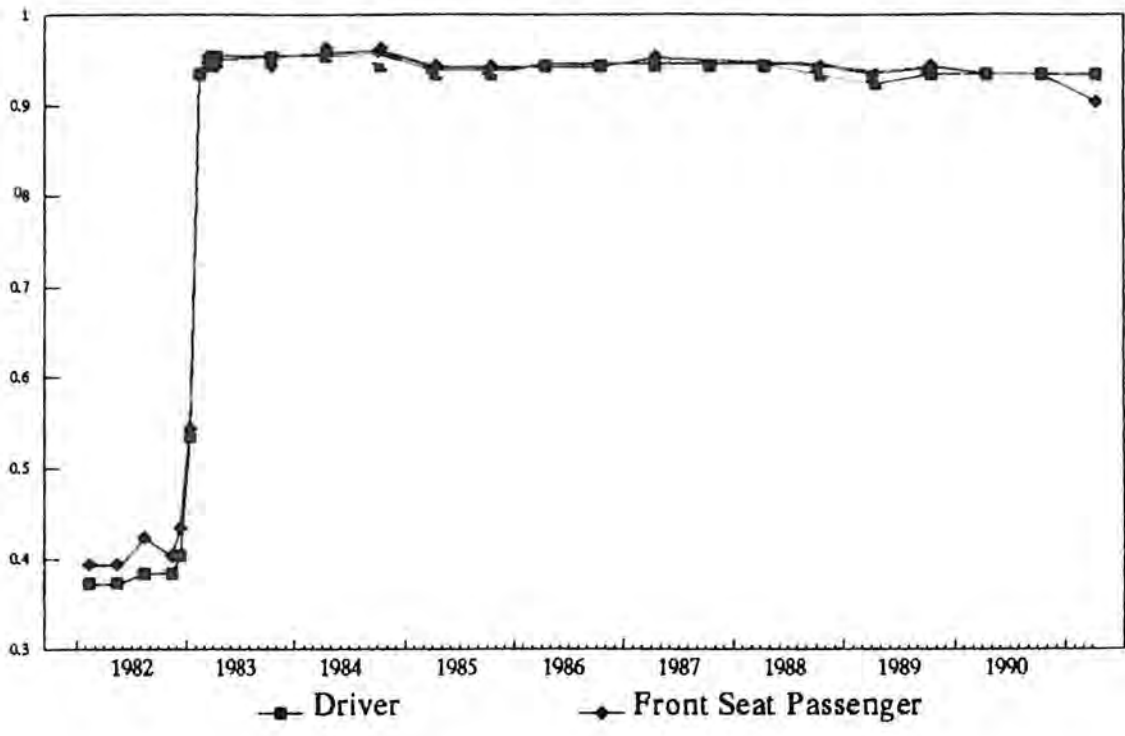


Figure 1. Front seat wearing rates, 1982-1991.

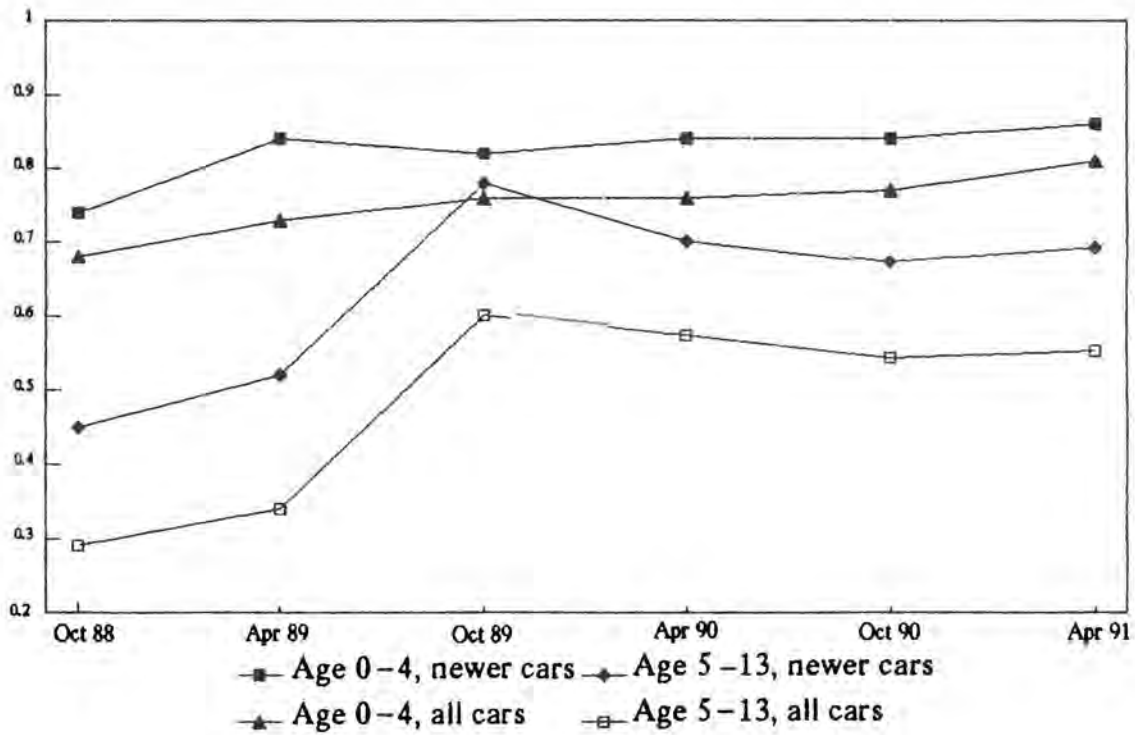


Figure 2. Child rear seat wearing rates, 1988-1991.



# Strategies to increase the use of restraint systems: The state of affairs in The Netherlands

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## 1. Introduction

In the background paper for this workshop it is stated that restraint use is still a current issue. Although about 40 countries have laws prescribing the compulsory use of seat belts, and while most drivers acknowledge that vehicle safety belts are effective in reducing or preventing injuries, many still do not use safety belts. This paper illustrates the state of affairs in The Netherlands.

### 1.1. User rates

Table 1 shows an overview of safety belt use rates in The Netherlands 1979 - 1990 for drivers and front seat passengers; since 1989 also for rear seat passengers (data from Verhoef, 1991a; b). The observations are taken each year in October on weekdays as well as on Saturdays and Sundays during daytime hours (7 a.m. - 6 p.m.) at 24 locations inside and outside built-up areas throughout the country. Sample sizes are usually around 2,000 both inside and outside built-up areas for drivers, around 1,000 for front seat passengers, and around 200 for rear seat passengers.

Table 1 clearly shows that belt use outside built-up areas is generally about 15 percentage points higher than inside built-up areas, for all passenger categories. In general, user rates for front seat passengers are slightly higher approx. 2-4 percentage points than for drivers. User rates on rear seats are much lower than on front seats (also when only cars fitted with rear seat belts are included in the sample), although in one year's time a dramatic increase of 16-17 percentage points in user rates was observed.

In 1990, 93% of new cars (less than one year old) were equipped with safety devices on rear seats, whereas cars of 8 years old or more had these devices in only 18% of the cases (Verhoef, 1991b). Only 10% of persons aged 18 years old or older use a rear seat belt when available. Usage of rear seat belts for children between 5 and 12 years old was 27% in 1990, and for children between 12 and 18 years old 23%; 93% of the children less than 5 years old were restrained in a special device for children (when present in the car).

Table 1. Percentages belt use for drivers, front and rear seat passengers inside and outside built-up areas in the Netherlands, 1979 - 1990.

	Percentage belt use					
	Built-up areas		Outside built-up areas			
	Driver	Front	Rear*	Driver	Front	Rear*
1979	51	54		69	71	
1980	57	56		73	73	
1981	52	54		70	70	
1982	50	50		66	68	
1983	46	48		65	66	
1984	50	53		67	68	
1985	49	53		66	68	
1986	49	54		67	70	
1987	55	60		70	72	
1988	63	66		77	77	
1989	62	66	19 (11)	78	80	33 (13)
1990	59	64	37 (18)	78	82	50 (22)

\* total average figure for all age groups (between brackets: including cars without rear belts installed)

## 2. Effectiveness of countermeasures

### 2.1. Legislation and sanctions

In The Netherlands, a safety belt law prescribing usage (on front seats of cars sold in 1971 or later) mandatory and punishable came into effect in June 1975. National belt use rates increased from around a 25% level in 1974 to around 50% in 1975. Since then, no steep increase has taken place, despite several mass media campaigns. Safety belt use has stabilized at around 60% inside built-up areas and around 80% outside built-up areas for the past few years (Verhoef, 1991a). However, belt use rates are still much lower as compared to those in other European countries, which all showed steep increases in belt use during the 1980's (see Figure 1, background paper of this workshop). Currently, the fine for not using a belt is in the range of Dfl. 35-65 (about \$17-30).

Recently, a law was enacted that requires all new cars manufactured after January 1, 1990 or later to be equipped with rear seat belts. The use of rear seat belts is not yet (in 1991) mandatory; however, there are plans to extend the required presence of rear seat belts to older cars as well and to make their use compulsory in 1992. Rear seat belt use is accordingly fairly rare (see Table 1).

## 2.2. Public information and enforcement

Exact knowledge about the application practices of the police with regard to enforcement as a regular or structural countermeasure to improve seat belt usage is lacking. However, our impression is that enforcement is not applied regularly in The Netherlands. Usually, enforcement, in combination with public information, is applied incidentally in the form of (local) campaigns of a relatively short duration (1-2 months).

Several studies were carried out investigating the effects of a combination of enforcement and publicity in various regions in The Netherlands. Campaigns in the provinces of Friesland (Gundy, 1986; 1988), Gelderland (Gras and Noordzij, 1987), and Noord-Brabant have been evaluated (Vissers, 1989) using both field observations and questionnaires. These studies all show substantial increases in safety belt use of 20-25 percentage points with baseline levels of around 60-65%. During these 2-month campaigns, on average, 15-25 cars per hour were stopped and seat belt use checked by the police (Gundy, 1986; Gras and Noordzij, 1987). Over one year after the end of the campaigns belt use was still 10-15 percentage points higher than before the campaigns (Gundy, 1988; Vissers, 1989).

## 2.3. Incentives

In The Netherlands, incentive programs are not a common tool to stimulate seat belt use. Several studies, mainly conducted in the U.S., have shown that incentive programs can be successful in increasing safety belt use. However, these findings must be tempered by the fact that they were carried out in the absence of a safety belt use mandate; therefore, baseline use rates were relatively low (10% to 20%).

Recently, an experiment was conducted to investigate the relative efficiency of incentives and enforcement at some military bases (Hagenzieker, 1991). This study showed that incentive programs can be effective in increasing safety belt use under mandatory conditions, i.e. with relatively high baseline levels of about 60%. In particular so-called individual incentive programs turned out to be effective: an increase of 20 percentage points in user rates

was established. Group dependent incentives showed at best a short-term effect. The mean effects of enforcement and incentives were of the same magnitude, a medium to long-term mean increase of 10-15 percentage points for both treatment types.

## 3. Future action

Future attempts in the promotion of safety belt use in The Netherlands should be directed primarily at rear seats and at improving the use of restraints among children, thereby aiming at a 'radiation-effect' to improve the use of seat belts on front seats as well (see also Mäkinen, Wittink, and Hagenzieker, 1991). A law making usage in all cars compulsory may offer a very good opportunity to capture the attention of the public. From the effects of the policy with regard to seat belts on front seats, it is deduced that a step by step approach to ensure compliance with the law is not advisable. What seems to be needed is a combined effort exercised at the moment that a new law comes into operation. The public has to be bombarded with all suitable pressure: information, incentives and enforcement, in order to convince them, to promote the use of belts as the social norm and/or to realise habituation. When using back seats as point of focus, front seats must be integrated in the campaign. Besides, parents on the front seats may not only influence their children on the back seats, but the reverse is also possible and the same might happen between friends and relatives. To involve people with little children, special seats for them should also be incorporated in the campaign. Parents are most involved with the safety of little children and they have a still greater need for information because of the many alternative options available for transporting children in a car. The campaigns need not only be directed at children, however. Belt use on back seats should be obligatory for all people.

We therefore recommend that efforts in promoting seat belt use be concentrated on the new law for usage on back seats. It would be necessary then to make the law applicable to everyone at once, and to guide this with a long term campaign on a large scale. This would seem to offer more perspectives for substantial results than introducing the law at first for new cars, without a reasonable motive for an information and enforcement campaign, followed some years later by an obligation imposed on all cars and starting a campaign only then, meanwhile continuing to conduct the general information and enforcement campaigns for front seats from year to year.

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# 1991 national campaign to increase safety belt usage\*

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## 1. Background

Since 1980, our nationwide (19-city) estimate of safety belt use by front seat occupants has increased from 11 percent to 49 percent. Nearly all of this increase has followed the passage of safety belt usage laws, beginning in 1984.

However, progress has slowed in recent years. From 1984 to 1987, usage increased by about 28 percentage points but from 1987 to 1990, it increased by only 7 percentage points. This decline in progress is the result of at least two factors. First, there are now fewer States enacting safety belt usage laws each year. Second, and most important, most of the States which have passed safety belt (or child seat) laws are not actively enforcing these laws and/or providing public information which specifically supports these efforts.

The trend in most States with safety belt laws has been an initial significant increase in belt usage, followed by a modest decline (in the absence of enforcement), and stabilization at rates of 40 to 50 percent. Public information and education programs, without accompanying enforcement, have been ineffective in changing these "post-law stabilization" rates.

## 2. Enforcement can make a difference

We know that enforcement, coupled with public information, can make a difference. Projects conducted in New York (e.g. Elmira, Albany and Greece), Illinois (e.g. Danville, Galesburg and Rock Falls), and Texas (e.g. Beaumont, Brownsville, and Laredo) have demonstrated that gains of 10-30 percentage points can be achieved through highly publicized enforcement (see Table 1).

Furthermore, we know that "blitz" or "STEP" (Selective Traffic Enforcement Program) approaches are not the only approaches that will work. Integrated enforcement, which combines safety belt enforcement with other patrol activities, has been found to result in even greater and

Table 1. Some examples of demonstration results in U.S. cities.

Elmira, NY	49% to 77%	(STEP/blitz)
Albany, NY	52% to 64%	(STEP/blitz)
Greece, NY	49% to 66%	(integrated)
Danville, IL	38% to 50%	(integrated)
Galesburg, IL	32% to 50%	(integrated)
Rock Falls, IL	28% to 38%	(integrated)
Beaumont, TX	54% to 68%	(STEP + integrated)*
Laredo, TX	32% to 65%	(STEP + integrated)*
Brownsville, TX	40% to 57%	(STEP + integrated)*
Tyler, TX	61% to 78%	(STEP + integrated)*

\* driver-only rate

longer lasting gains in usage rates - when accompanied by supportive efforts to increase public awareness.

### 2.1. No additional resources needed

Demonstration projects conducted in U.S. cities have indicated that integrated enforcement does not require additional resources by police agencies because it does not require an increase in patrol hours. Safety belt citations are written as part of ongoing patrol activity. These findings are important since "integrated" enforcement can be conducted in secondary-law States as well as in primary-law States. Furthermore, these activities can be effective even in situations where resources have already been diminished.

### 2.2. The Canadian experience

Successful safety belt campaigns in Canada have also emphasized the use of enforcement, combined with enhanced public awareness. During the early part of the past decade, the Canadian Provinces, like most of our States, had been suffering from "post-law stabilization." As a result, the Canadian national usage rate was only about 55 percent. Beginning in the mid-1980's, most of the

\* excerpts from a paper with the same title presented in Denver, April 1991; used with permission.

larger Provinces initiated combined enforcement and public information efforts. As a result, the Provinces (e.g. British Columbia, Alberta, Saskatchewan, Ontario and Quebec) dramatically increased their usage rates and the Canadian national usage rate is now above 80 percent.

The Saskatchewan experience is particularly significant. Average usage rates prior to 1986 had fluctuated around 55 percent for nearly a decade. Following this long period with little progress, programs which combined public information with enforcement were initiated. These efforts increased belt usage in Saskatchewan to its current level of more than 90 percent in just a few years. Both British Columbia and Quebec implemented similar programs and now have usage rates greater than 90 percent, as well.

The common elements of these programs are increased enforcement, highly visible public information, and press conferences. The public information programs and press events have two objectives: (a) to make the public aware of the importance of wearing safety belts; and (b) to make the public aware of the fact that the police will be enforcing the law.

### 3. Our conclusions

Everything we have learned to date indicates that visible enforcement of existing laws offers our greatest potential for achieving our goal of 70 percent usage by 1992.

As a result of our experience, we have also concluded that:

- (1) "blitz" enforcement often results in the most rapid increases in safety belt usage;
- (2) techniques which "integrate" the enforcement of safety belt laws with the enforcement of other traffic safety laws may take slightly longer to increase belt usage but these techniques are more cost-effective than blitz approaches and they result in more sustained usage rates;
- (3) public information efforts must be present to focus attention on enforcement; but
- (4) public information, alone, will not increase usage.

### 4. A new NHTSA program plan

It has become clear that if we are to reach our goal of 70 percent safety belt usage by 1992, we must take some dramatic steps. Therefore, a major national campaign will be conducted in 1991 and 1992. During this two-year effort, maximum emphasis will be placed on a combined public information and enforcement program centered around the three summer holidays - Memorial Day, Independence Day and Labor Day.

#### 4.1. State and local efforts

The core activity of the national campaign will normally entail a 2-week safety belt and child seat *enforcement* effort surrounding each holiday. States without safety belt laws will be encouraged to enforce their child seat laws and to remind motorists to buckle up as part of their routine traffic stops and other contacts.

Prior notice and publicity about the enforcement effort is a must for public acceptance and program success. Therefore, one week before the enforcement effort begins, police (and/or other State and local officials) will be encouraged to conduct *press conferences* telling the public about the importance of wearing safety belts (and child seats) and warning them that enforcement will begin in the coming week.

In addition, for 2-3 weeks prior to these press conferences, participating States and localities will conduct *public information programs* that also point out the importance of safety belt (and child seat) use and the fact that enforcement will be emphasized throughout the summer, to reduce the holiday death toll.

Before Memorial Day, and after both the 4th of July and Labor Day, local jurisdictions will be encouraged to conduct simple, informal *observation surveys* to measure change in usage. They will also be encouraged to monitor and report the number of citations and warnings issues.

The purpose of the observational surveys is to provide information back to the police and to the local public regarding the success of their endeavors. This information also reinforces the concept that this is a non-punitive effort to safeguard the public's welfare.



# Conclusions and recommendations

## 1. Introduction

This chapter is prepared as a result of an international workshop at the conference: "Strategic highway research program and traffic safety on two continents" in Gothenburg, Sweden, September 18-20, 1991. The chapter is drawn up by the Secretariat of the work-shop as a synthesis of:

- the illustration of the background paper,
- national reports and related speeches on seat belt use and countermeasures,
- discussion based on national reports, and
- correspondence with speakers from Canada, Finland, France, Germany, Great Britain, The Netherlands and the United States) and other participants at the workshop.

Conclusions and recommendations are expressed in the form of separate statements which are printed in CAPITAL LETTERS.

## 2. Legislation and sanctions

Although voluntary campaigns have had some success in the promotion of seat belt use, the significance of legislation prescribing both installation and use of safety belts mandatory is unanimously agreed by traffic safety experts worldwide. Despite this fact the process of legislation has not yet been completed in some countries. This applies especially to rear seat belts.

There is also evidence (Finland and Germany) that the introduction of legal sanctions later for non-use increases the user rates even further. German experience points to the same trend regarding rear seat belt use as well, but not by nearly the same extent as for front seats. In Finland the simultaneous introduction of mandatory use and penalty for non-use in rear seats have resulted in user rates of about 70%.

**WITHOUT LEGISLATION AND SANCTIONS, THE EFFECTIVE PROMOTION OF SAFETY BELT USE WILL BE LARGELY INEFFECTIVE. THIS APPLIES BOTH TO FRONT AND REAR SEAT BELTS.**

In summary: The introduction of a law prescribing mandatory seat belt use (accompanied by publicity) always results in substantially increased belt use: until levels of over 60%. This applies to both front and rear seat belts. However, legislation alone is never sufficient to

reach very high usage levels of over 95%. In some countries the combination of legislation and the possibility of sanctions for non-use (again accompanied by publicity) was successful to reach user rates for front seat belts of over 95% (e.g., Germany, Great Britain, Finland). However, in other countries this combination of legislation and sanctions was not sufficient to reach these high user rates for front seat belts (e.g., Canada, United States, France, Netherlands), nor was it for rear seat belts (e.g., Germany). In these cases additional measures are needed; these will be reviewed in the next sections.

## 3. Enforcement combined with publicity

The role of police enforcement in the promotion of safety belt wearing combined with publicity about the enforcement action itself, has been largely neglected. In most countries with seat belt laws enforcement has been resorted to only occasionally. Sometimes enforcement was not necessary because legislation and sanctions already resulted in very high user rates (as was the case for front seat belts in e.g. Germany and Great Britain). But it seems that enforcement is still a largely untried resource in the seat belt use promotion. This applies especially to the possibility of increasing wearing rates in back seats.

So far enforcement has been used most intensively in so called Selective Traffic Enforcement Programs (STEPs) in Canada and the United States. Similar programs have been applied in The Netherlands, France, and New Zealand. Active enforcement of seat belt laws has proved to increase wearing rates substantially: increases of 20-25 percentage points are not rare, and one year after the enforcement campaigns ended user rates are usually still 10-15 percentage points higher than baseline levels. In general, surveillance and enforcement focused solely on belt use (primary or selective enforcement) has been shown to be more effective than enforcement on belt use in connection with other enforcement activities (secondary enforcement).

In general, seat belt enforcement has no high priority in the traffic safety work of the police in most countries. Motivating the police is a prerequisite if an increase in the effectiveness of enforcement is to be achieved.

**THROUGH ACTIVE ENFORCEMENT THE EFFECTS OF SEAT BELT USE LAWS ARE STRENGTHENED.**

#### 4. Information

One can distinguish between information that informs the public about specific measures and actions taken (e.g. announcement of new legislation, enforcement campaigns), and information that is intended to convince the public about the usefulness of wearing seat belts (e.g., they decrease or prevent injuries). Both types of public information, even though their individual effects cannot always be measured separately, are recognized as essential tools in the creation and maintenance of high safety belt wearing rates. Actually, the effects of various measures (law change, sanctions, enforcement, incentives) are always the result of a combination of these measures and informing the public about them.

Although direct effects on belt use of information on the benefits of belts have not been demonstrated (e.g. in Germany and France), it is considered that public information and discussions over the years before any legislative efforts, has been important in preparing drivers for the new behaviour.

Information which is irrelevant or leads to adverse reactions can be counterproductive. Research conducted in Germany (see Heinrich, this volume), for instance, showed that information about using safety belts reminded many people of the possible dangers of car driving, but perversely this led to a refusal to use a seat belt as a way of ignoring the threat. As a result of this study, in Germany none of the later belt campaigns was designed to arouse anxiety, but instead relied on neutral or positive forms of addressing the public.

For the whole group of 'non-users', however, the motives can vary markedly and it is not very effective to give the same arguments to this whole group. To be able to tailor the information to specific target groups it is recommended that the range of motives be studied, and to study which motives are held by whom.

Decision makers and other officials (e.g. police) are also important target groups of information and education, but this is generally not taken into account fully in the promotion of seat belt wearing. The activation of public health organizations may open up new possibilities for strengthening and targeting the message directed at public.

**WITHOUT INFORMATION DIRECTED AT DECISION MAKERS AND SPECIFIC GROUPS OF DRIVERS NO EFFECTIVE SAFETY BELT PROMOTION IS POSSIBLE.**

#### 5. Other measures

The use of incentive programs, especially by rewarding correct behaviour, also has potential for increasing user rates. Typically, the rewards in these programs are given for actual, observed, seat belt use; rewards vary from

immediate valuables and chances to win contests to work-related privileges and social attention. Experiments conducted so far have yielded promising results not only when the use of safety belts is voluntary (as was demonstrated in numerous studies in the United States; see for a review Geller et al., 1987, *J. Safety Res.*, 18, 1-17) but also under conditions of seat belt wearing laws (The Netherlands; see Hagenzieker, this volume). On the basis of these studies it is not, however, possible to judge the permanency and generalisability of the results. That is why large scale experiments are needed to realize the possibilities of incentives for the promotion of safety belt use.

**INCENTIVE SYSTEMS FOR THE PROMOTION OF SEAT BELT USE SHOULD BE TESTED IN CONDITIONS WHICH REACH MASSES OF DRIVERS.**

Displaying the percentage of seat belt use on a large sign is another technique for increasing seat belt use. Studies conducted in Canada and the United States typically show increases in seat belt use of about 10% at the locations where it was used (see Grant, this volume).

A promising way of 'targeted' stimulation of safety belt use is the application of employer based programs (e.g. Canada, United States). These programs usually consist of a combination of various measures as reviewed in the previous paragraphs, such as public posting, data collecting, information, and incentives.

**IT IS RECOMMENDED THAT 'NEW' MEASURES SUCH AS THESE ARE TRIED AND EVALUATED IN SMALL SCALE SETTINGS BEFORE THEY ARE APPLIED ON A LARGE SCALE.**

This also applies to emphasising the individual responsibility of car occupants who do not wear seat belts and are consequently more severely injured in the case of an accident. This change can be realized (partly) by insurance companies and/or legislative authorities. In Germany, however, no effects have found following two decisions in this field of the Supreme Court (relating to the responsibility for injury cost and to the right on wage payment in case of inability to work).

Besides stimulating the use of the 'traditional' safety belts, also further (technical) development of restraint systems is important. So far automatic seat belts are scarcely used outside the United States, Canada and Australia. Discussion and experiments regarding automatic restraint systems may be one solution for the problem of non-use.

#### 6. Concluding remarks and recommendations

The proper use of safety belts has an essential bearing on the consequences of accidents. Recent studies (e.g., in Canada, The Netherlands) have shown that incorrect usage is quite frequent.

Effective monitoring of user rates is a prerequisite for decision making in the promotion of safety belt use. The method of collecting data on safety belt use is almost exclusively observational in the countries considered. In most countries at least once a year such data are collected for front seat belts. However, more uniform methods of data-collection and ways of presenting the data would be helpful to benefit more from other countries' findings:

**THEREFORE, MORE INTERNATIONAL CO-OPERATION AND STANDARDIZATION IN DATA-COLLECTION METHODS IS RECOMMENDED.**

Safety belt observations should include:

- 1) continued monitoring for front seat belts;
- 2) measurements of the use of rear seat belts (which in some countries has already started);
- 3) checking the condition and the correctness of usage.

**IT IS RECOMMENDED THAT COUNTRIES IN WHICH SAFETY BELT USE ON FRONT SEATS IS NOT VERY HIGH (LOWER THAN 95%) MAKE USE OF THE EXPERIENCES HERE REPORTED TO STIMULATE USAGE ON FRONT SEATS.**

It is thereby recognized that the wearing rates in various countries may have been influenced by differences between national attitudes and culture, and/or by differences between the specific content and application practices of various measures. However, measures such as legislation and enforcement combined with information have proved to be effective to stimulate usage of safety belts on front seats in all countries considered.

**ALSO, IT IS RECOMMENDED THAT ALL COUNTRIES MAKE USE OF THESE EXPERIENCES TO STIMULATE SAFETY BELT USAGE ON REAR SEATS.**

Since the EC recently decided upon the general rule that practically *all* car occupants in member countries should use restraint systems, the conclusions and recommendations of this workshop are considered especially relevant to these countries.