

THE USE OF SEAT BELTS AND CONTRIBUTING FACTORS - AN INTERNATIONAL
COMPARISON

R-91-30

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SUMMARY

The purpose of this study was to define factors that contribute to the use or non-use of seat belts. Legislation prescribing compulsory seat belt usage is one of the most important factors.

Promotion of the use of seat belts without this legislation is very difficult and time-consuming. So far, the most effective means of promoting voluntary use has been the implementation of incentive programmes. They have been shown to increase seat belt use, also under compulsory conditions.

In countries with the highest rates of seat belt use, such as Germany, Great Britain and the Scandinavian countries, the best results have been achieved through legislation, making non-use punishable, and through intense information and publicity campaigns.

Till now most studies focused on the effects of separate measures to improve seat belt use. This study stresses that a whole package of measures, designed as an "optimal mix", offers the best results. The exact contents of this mix depend on the specific target behaviour, as well as on target groups and situations.

In recent years promotion of seat belt usage on rear seats has become a topic of interest. It is important that the experience gained in the promotion of seat belt use on the front seats, is used. In most countries however, -as in the Netherlands- belt use on rear seats is not yet obligatory. Such a legislation prescribing compulsory usage is an important condition for an increase of seat belt use.

Future attempts in the promotion of seat belt use in the Netherlands as well as in other countries should be directed primarily at rear seats and at improving the use of child restraints, thereby aiming indirectly at a "radiation-effect" on improving the use of seat belts on front seats.

It is recommended to concentrate the exertions of promoting belt use in the Netherlands, by using the new law on belt use on rear seats. The law should then apply to every car occupant and get an immediate grand campaign

of long duration. This seems to offer better perspectives for results than if the law is only applicable to new cars. An evaluation study should be started at the same time. On the one hand it is meant to find out who were reached with the campaign, and on the other hand to check which different behaviour, new knowledge, and new insights and attitudes have grown on this basis. On this information a possible new campaign can be based.

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PREFACE

This report is the result of a joint project of VTT, the Road Research Institute in Finland and the Dutch SWOV Institute for Road Safety Research. A comparison of seat belt use in different countries is made, keeping in mind that rates for seat belt use in the Netherlands are lower than in most other European countries. The fact that Tapani Mäkinen visited SWOV as a guest researcher in 1990 made it possible to gain access to a great deal of literature on this topic, published in the Scandinavian languages. His contributions are important parts of this report. The Dutch Ministry of Transport funded the SWOV contribution to this study, the Finnish Road Research Institute VTT funded the contribution of Dr. Mäkinen.

1. INTRODUCTION

1.1. History

Seat belts for the protection of drivers and passengers have been developed since the 1920s; by the 1950s, seat belts had become recognised as an important safety measure (OECD, 1986). Thereafter the number of traffic accidents rose very fast in most European countries, and was at its peak in the beginning of the 70s. The seat belt had long been known, but was rarely used as a passive means of safety. The legislation process took long in many countries and went through several phases; it has not even been completed for seat belt use on rear seats.

It took indeed almost half a century in most western countries before legislation was comprehensive enough to enable the effective promotion of belt use through enforcement. Attempts to increase belt usage prior to making their use compulsory have apparently not been very fruitful. Now seat belt use legislation has been enacted in more than 30 countries (Reinfurt et al., 1988).

1.2. Effectiveness

The protection given by correct belt use has been proven beyond doubt and is known all over the world. It has been calculated for the USA that seat belts have saved the lives of 11,000 passengers over 4 years old on front seats of private cars between 1983 and 1987 (Partyka, 1988). In general the effect of legislation on seat belt use has been estimated to diminish the percentage of fatal accidents: between 6-21% in Australia; 10-12% in Sweden; 15-21% in the United Kingdom; 7-10% in the United States; and 25-30% in Germany (Reinfurt et al., 1988).

According to a recent and careful analysis the effect of belts appears to be about 40% (Evans, 1988; Wegman et al., 1989).

The effects of seat belts on rear seats have not been studied so extensively yet. They will possibly be somewhat smaller than on front seats, because passengers on rear seats are better protected on the front side. In an accident they might be landed on the front seat passengers however, which makes them more vulnerable.

Possibly rear seats are thought to be safer than front seats (Dejeammes et al., 1986). In Great Britain drivers still seem to have a better opinion of compulsory protective means for children on rear seats than for grown-ups (Quimby & Drake, 1989). Injury risk has been proven to be almost equal on every seat, if the age factor is not considered (Huelke & Lawson, 1978; Norin et al., 1980; Eriksson, 1986). It has also been shown that head injuries are the most common injuries inside the car (Nordisk Trafiksikkerhedsråd, 1984). Head injuries make up some 60% of all injuries. Drivers and front seat passengers who do not use seat belts suffer almost the same percentage of head injuries as non-users in rear seats (ibid).

It is possible that high wearing rates in rear seats have a positive effect on the casualty rates for front seats as well, because passengers in rear seats will not be thrown forward in collisions. Empirical studies focusing on this matter are scant. Unrestrained rear seat occupants were reported not to affect the risk and severity of injury for belted front seat occupants, but did influence this factor for unbelted front passengers (see Dejeammes et al., 1986).

1.3. The use of seat belts and (traffic) behaviour in general

Basically, traffic behaviour does not differ from human behaviour in general, which is motivated by a striving for pleasurable experiences and the wish to do things with the minimum amount of effort. Safe driving often requires restrictions in freedom, and because the chance of being hurt in an accident is relatively low, behaviour in traffic often conflicts with the principles of safe driving. For the same reason, it is not always easy to channel traffic behaviour into a safer direction. Indeed, experiences from various countries show that this is true for the use of seat belts. On the other hand, long term efforts and the gradual development of methods to influence driver behaviour have led to excellent results.

1.4. Objective of the study

The present situation in the Netherlands is that rates for seat belt use for both front and rear seats are clearly lower than in most surrounding countries, such as Germany, Great Britain and the Scandinavian countries. Dutch authorities are therefore in need of new methods to improve user

rates. Experiences from abroad could give direction to new policies. Moreover, since January 1, 1990, new cars must be standardly equipped with rear seat belts and so the Dutch government is looking for methods to improve their use as well.

The objective of this study was to determine which factors contribute to the increased use of seat belts. The methods used to maintain the established rates are surveyed as well. This study compares the development in the use of seat belts, with particular emphasis on the following countries: Finland, Great Britain, the Netherlands and Germany. Reference is also made to research findings and data on seat belt use in Australia, Canada, Denmark, New Zealand, Norway, Sweden and the USA.

1.5. Structure of this report

The report consists of the following chapters:

In Chapter 2 various methods to measure belt use are briefly described and usage data of some European countries are presented for a series of years. Front seat use gets most attention, because most information is available. As far as possible figures are given for rear seat belt usage as well.

In Chapter 3 factors are studied that have possibly influenced usage figures, as given in Chapter 2. Discussed are legislation and enforcement, publicity and information campaigns, and the use of incentives.

Important factors seem to be the situational factors. They are discussed in Chapter 4; also discussed in Chapter 4 are the role of attitudes towards belt use and motives for use or non-use.

After reviewing the various factors increasing seat belt use "by themselves", a general strategy should ideally be formulated. In such a general strategy, individual methods (such as information, enforcement etc.) should be optimally combined to render the greatest effect, i.e. more effect than each method by itself. Understanding the causes of non-use of seat belts is a prerequisite to theoretically sound seat belt promotion programmes.

In Chapter 5 possible measures are discussed that may be taken in one programme to stimulate seat belt use, and it is attempted to formulate such a general strategy, the factors discussed in the earlier chapters being the basis.

Chapter 6 finally, contains the conclusions and motivated recommendations.

2. RATES OF SEAT BELT USE IN SOME COUNTRIES

2.1. Measurement of belt use on front seats: data collection methods

Methods of measuring seat belt use in Finland, Germany, Great Britain, and the Netherlands have been almost exclusively observational in character. Observation can be unobtrusive or obtrusive (by stopping cars). In the last case, the condition and the correctness of usage can also be checked (see Oranen & Koivurova, 1980; Ciccone & Wells, 1988. Schoon & Van Kampen, 1990; TRR, 1990). The correct wearing of seat belts increased rapidly when dynamic belts came into general usage. Most frequent errors found in a Dutch small scale (N=102) study (Schoon & Van Kampen, 1990) were twisted belts (64%) and lap belts worn too high (21%). The proper use of belts has an essential bearing on the consequences of accidents. Niederer et al. (1977) studied the accidents of 410 restrained vehicle occupants who suffered severe or fatal injuries in 304 crashes. In almost every fifth (54) (heavy) injury accident with little or no passenger compartment intrusion, excessive belt slack was found to be an important contributor to the consequences of the accidents. Without a seat belt the consequences would have even been more severe, however.

2.2. Reliability of observations

There is little data available on the accuracy of unobtrusive observations, probably because of the obvious simplicity of the observation task. An indication is given by a Swedish study, in which the reliability of seat belt use observations was checked (Fhaner & Hane, 1973); the slight degree of underreporting measured only about 0.5% (see also Mohlin, 1973; Hagenzieker, 1991).

2.3. Situational factors

Situational factors, like time of day, day of the week, place of observation, etcetera, are of great influence on observed seat belt use figures. There is a lot of variation in the representativity of the time of day and the place of observation. Sometimes this variation is also found inside one country. Figures of belt use are mostly based on daytime observations.

2.3.1. Working days versus weekends

Usually, measurements were taken during working days. Measurements conducted during weekends gave an increased rate, as the number of occupants is greater during weekends than during working days; when the number of occupants increases, the rate of belt usage increases (Lacko & Nilsson, 1988). In addition to this so-called audience effect, the reason for the trip and the trip duration also play a role.

In Norway, one weekday per year was selected for observations (Marburger, 1986). In Finland, observations took place some years on working days only, while other years Saturdays and Sundays were also covered.

In Germany, the Netherlands and Sweden, Saturdays and Sundays were also included. Usually, variations in data collection procedures within most countries occurred in the 1970s.

2.3.2. Urban and rural areas

The differences in belt use are greatest between urban (streets) and rural areas or motorways. The results are normally presented by that distinction (in Sweden, however, no difference is made between rural and urban areas etc.). There has been shown to be regional variation in seat belt use, but it has not been systematic (Oranen, 1977). An English study suggested that regional differences may be less important than those differences attributable to class of road and type of journey in predicting use rate (Farr, 1970). In a Norwegian study, the variation between Southern Norway and the country as a whole was very small, both in built-up and non-built-up areas (Christenssen et al., 1978). There are also studies which have found great variations in usage rates based on location. In general, it would seem that the higher the overall wearing rates, the smaller the variation between locations - as might be expected.

2.3.3. Day and night

It has been shown that during night-time driving, the belt use rate is somewhat lower than during the day-time (March, 1984 quoted from Marburger & Meyer, 1986; Marburger, 1986; Noordzij et al., 1988). This probably does not lead to large deviations of the casualty reduction figures, because of the low traffic volumes during the night-time, as Wegman et al. (1989)

pointed out. On the other hand, when the rate of belt use is generally high, it seems that differences are smallest between daytime and night time usage. When the rates are at a level of about 50%, then night-time wearing rates are about 10% below that of during day-time rates in urban areas. In rural areas, this difference is about 5% (March, 1984, quoted from: Marburger & Meyer, 1986).

2.4. Self-reported behaviour

Over the years, some discussion has been raised about the method of gathering data: Should it be based on observations, which require a lot of effort to collect data and organize a representative sampling procedure, or are self-reported usage figures adequate. Many studies show that self-reported usage figures are not accurate enough for describing usage rates (see NHTSA, 1986; Streff & Wagenaar, 1989; Marburger & Meyer, 1986). Overestimates varied from 9% to 19% (Streff & Wagenaar, 1989) or more than 100% (Marburger & Meyer, 1986), which means by a factor from 1.2 to 2.0.

2.5. Comparison of figures from some countries

2.5.1. General

Strictly speaking, direct comparison between figures from various countries is not possible, or should be made with caution because of variations in the data collection methods. However, relative comparisons between figures from various countries over time may reveal important trends.

2.5.2. Belt use on front seats

The front seat wearing rates of some countries are surveyed briefly (Figure 1; data are combined from the following references: Friedel et al., 1978; Oranen & Koivurova, 1980; Mackay, 1987; Forsten, 1986; Koivurova, 1986; Valtonen, 1989; Radscheit, 1989; Broughton, 1990; Verhoef, 1991a). Presenting figures in comparative graphs or tables is problematic; firstly, for the above mentioned reasons and secondly, because the way the data are presented in the research literature varies almost from country to country. Data may be either in figures or in graphs without exact numer-

ical information, total figures may be missing, distinction between urban and rural areas is not available, some countries even have a three class grouping, there are several data presented for one year, some present data about drivers only and some relate to both drivers and front seat passengers, etc. For these reasons, the number of countries compared in Figure 1 is small. The minimum requirement when presenting data about seat belt use is to deliver total figures and describe the measurement method, in particular the representative character of the figures. Germany serves as a good example in the presentation of figures illustrating seat belt use (see Radscheit, 1989).

In Figures 1A and 1B the depicted data represent belt use rates for drivers in case of Great Britain (GB) and the Netherlands (NL), while for Germany (D) and Finland (SF), the data represent the combined rates for drivers and front seat passengers. Sometimes, it was not possible to find distinctive figures for inside and outside built-up areas respectively. Therefore, for GB the 1982-1989 figures are in fact mean overall figures, as is the case for the SF data 1986-1988; this therefore leads to many lacking data points in Figure 1B. In data on locations outside urban areas, motorways are included for SF and NL, but excluded for GB and D.

The graphs show clearly that the rates are not accelerated until a change in legislation, making belt use on front seats mandatory, has taken place (Finland, 1975, Germany, 1976, Great Britain, 1983, the Netherlands, 1975). It can also be seen that introducing sanctions increased the rates even more (Finland 1982, Germany 1984). Factors affecting user rates are surveyed in greater detail in the following chapters.

2.5.3. Belt use on rear seats

When rear seat belt use is not mandatory, user rates have not exceeded 20% (Sweden) so far. Rather, the rates have varied between 5% and 15%.

Belt use for rear seats became mandatory in Finland at the beginning of 1988. One month before the law became effective, the usage rate was 27% nationwide; one month after the law was enacted, the rate had jumped to 66% for those who had rear seat belts in their cars. The installation rate in passenger cars was 68% one month after the law became effective

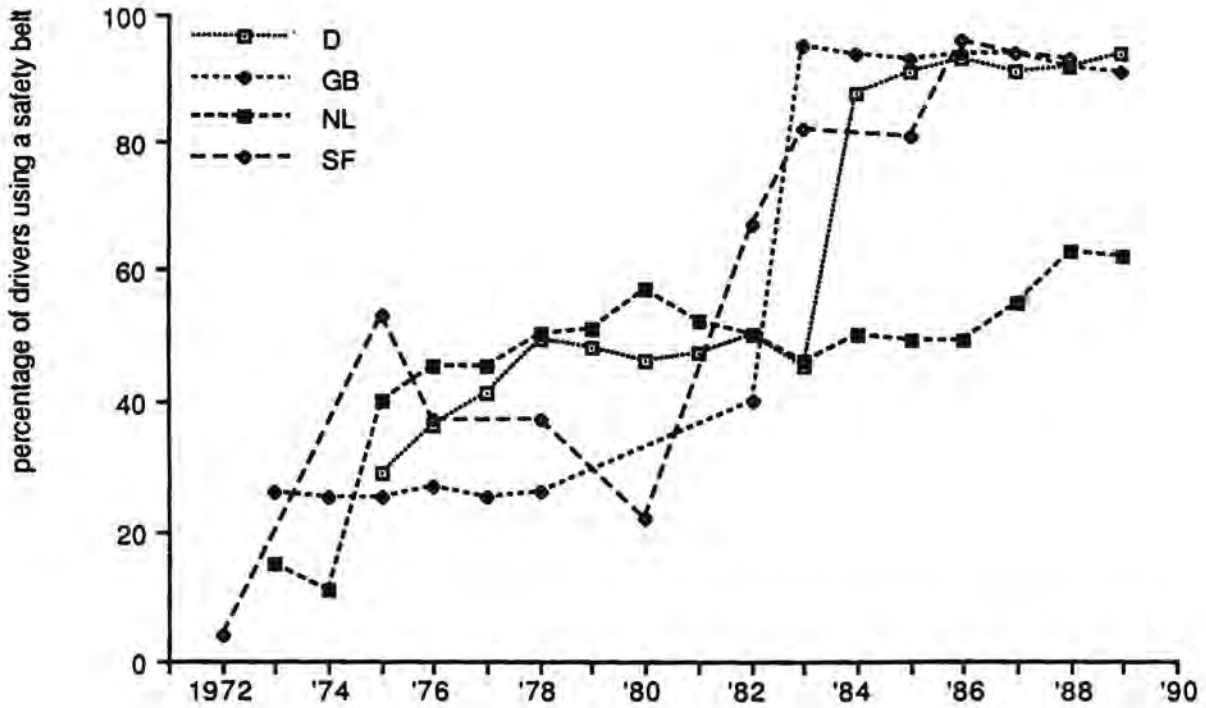


Figure 1A. Belt use on front seats of cars inside urban areas in Germany (D), Great Britain (GB), The Netherlands (NL), and Finland (SF) from 1972 to 1990.

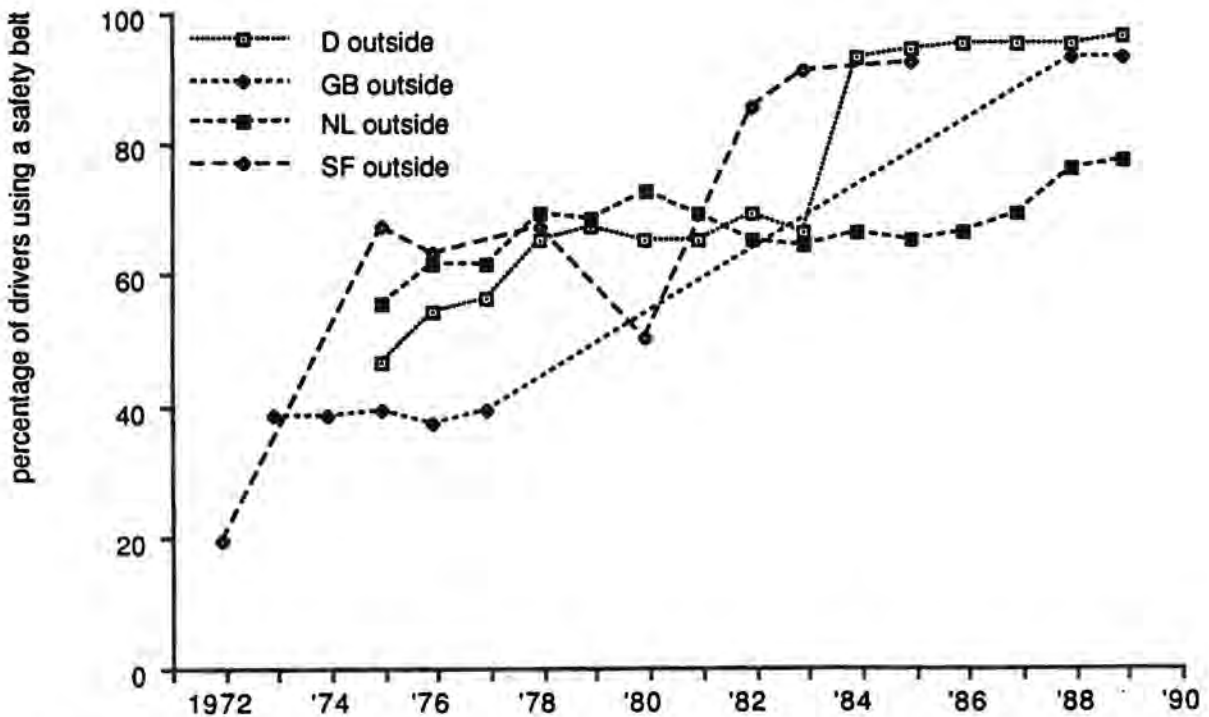


Figure 1B. Belt use on front seats of cars outside urban areas in Germany (D), Great Britain (GB), The Netherlands (NL), and Finland (SF) from 1972 to 1990.

(Valtonen, 1989). The latest figures for summer 1988 are based on a small-scale study, which is not representative of the whole country; the sample was taken outside urban areas and shows a user rate of 82% in cars equipped with rear seat belts (Tekniikan Maaailma, 1988). A representative sample would probably have produced a somewhat lower figure. Belt use in taxi-cabs was measured in Finland in 1989. The user rates in rear seats were very low, however, ranging from 5% to 12% (Pajunen, 1989). Belt use by front seat passengers was also low, about 50%.

From March 1, 1985, usage of rear seat belts for passengers above the age of 15 (in cars taken in use 1984 or later) became mandatory in Norway. Among these passengers, the usage rate increased from 20% in February to 46% in September 1986. One year later, in September 1987, this figure was 45% (Fosser, 1988).

In Sweden, rear belt usage rates were at a level of 8% in 1983. The usage rate on rear seats among adults increased to 54% (Lacko & Nilsson, 1988), after legislation was enacted making seat belt use on rear seats compulsory from 1 July 1986.

The fitting of mounting points for rear seat belts was made compulsory in 1981 in Great-Britain. The next step included the requirement that cars manufactured after October 1986 or first registered from 1987 onward should be fitted with rear seat belts. The most recent legislative step taken on 1 September 1989 was to compel rear seat passengers under 14 years of age to wear seat belts where available (Broughton, 1990). In a fairly short period of time, the usage rates among those younger than 14 reached a level of 78%. Figures from 1990 show a slight decrease to 70% in rear seat belt use among passengers under 14 years old (Lynam, 1991). Seat belt use of passengers over 13 years old was 22% in April 1990 in Great Britain, for cars fitted with belts on rear seats (ibid.).

In the Netherlands 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 this device in only 18% of cases (Verhoef, 1991b). Recently, a law was enacted in the Netherlands which requires all new cars manufactured from January 1, 1990 onwards to be equipped with rear seat belts. The use of rear seat belts is not yet mandatory in the Netherlands, but there

are plans to make their use compulsory in 1992. As a result, the use of rear seat belts is very rare in the Netherlands. Roughly 10% of persons aged 18 years old or above use rear seat belts when available (Verhoef, 1991b). It was also shown that user rates decreased as the age of rear passengers increased (ibid). The use of rear seat belts for children between 5 and 12 years old was about 27%, for children between 12 and 18 years old 23%, whereas only 19% of passengers aged 50 years or older used rear seat belts in 1990.

No graph is given to indicate belt use on rear seats, simply because no systematic observations over time are available for the various countries. In general, however, seat belt use for rear seats is much lower than for front seats (despite legislative measures in this regard for some countries).

3. APPROACHES IN THE PROMOTION OF FRONT SEAT BELT USE

3.1. Introduction

For a programme to promote the use of seat belts it would be ideal to have an insight into factors predisposing to belt use and into factors making this behaviour possible and strengthening it (Nelson & Moffit, 1988). These behaviour antecedents can be defined as follows: predisposing factors providing a motivation for behaviour (knowledge, attitudes, opinions, values); factors making it possible to realize this motivation (capabilities, presence of belts); strengthening factors providing a continuous motivation for this behaviour (enforcement or incentive).

Traditionally the first condition for a change in behaviour was considered that people get conscious and have knowledge of the (new) behaviour. Information campaigns often were considered such a condition or predisposing factor. Programmes on the media can give information and arouse interest for new behaviour. It is then important to direct the information on new behaviour at the specific wants and cognitive capacities of members of the target groups (Bandura, 1986).

Campaigns meant to change behaviour often fail because they do not get beyond the point of giving information and changing attitudes. Many theories on changing behaviour use an approach directed at a change of attitude to change behaviour. In these theories it is suggested that if the attitude changes by means of persuasion the corresponding behaviour will be adopted in agreement with the changed attitude (e.g. Ajzen & Fishbein, 1980). This stress put on the change of attitudes as one of the most important means to change behaviour assumes that attitudes determine behaviour. This opinion however, is no longer generally held, and nowadays it is acknowledged that a change of behaviour does not always have to follow a change of attitude, but can also precede it.

Characteristic elements of methods to raise belt use are: information campaigns, legislation, and sometimes incentive actions to make people really put on the belt and continue to do so.

3.2. Information campaigns

3.2.1. General

In a discussion of the effects and approaches of public information campaigns Rooijers (1988) concludes that many public information campaigns which stress arguments in order to influence attitudes lead to little or no behavioural change; often, even the actual influence on attitudes is disappointing. The greatest behavioural changes were found to result from campaigns which were either accompanied by a considerable increase in law enforcement or the implementation of incentive programmes.

3.2.2. Front seats

Before the use of front seat belts was made mandatory, the influence of public information does not seem to have had much effect on wearing rates. Phaner & Hane (1972) describe the situation as follows: "Campaign effects generally seem to have been small or nonexistent". During the early years of belt wearing history (between the 1960s and early 1970s), the rates usually remained below 20%.

In the United States, it has also been realized that voluntary seat belt use is generally low, 15% or less (Goryl & Cynecki, 1984). Persuasive systems like public information have had practically no effect (NHTSA, 1977).

Before the use of belts was made mandatory in Great Britain, the maximum for voluntary user rates appeared to be in the range of 30% up to 1983 (see also Figures 1A and 1B, page 15). This rate remained relatively stable between 1975 and 1982, despite large-scale information campaigns, which cost about 2 million dollars annually (Mackay, 1985).

Some studies suggest that it was, indeed, possible to raise the wearing rates somewhat through campaigns preceding legislation, but these rates tended to drop to the previous level after the campaigns had ended (Berard-Andersen, 1978; Sutton & Hallet, 1989).

An OECD report (1986) concluded that the availability of seat belts is not enough - it is very rare for seat belt use in the general population to exceed 30%, without a law stipulating the use of seat belts.

It has been suggested that information campaigns can have a significant influence on politicians and decision making bodies, which might be a more important effect than direct small behavioural changes (Spolander, 1983). Consequently a circle-like relation may exist between campaigns and legislation.

3.2.2. Rear seats

In Finland, an integrated traffic enforcement and publicity campaign was organized in 1985 to reduce speeding and driving under the influence of alcohol and to promote seat belt use in front and rear seats. The effects of this campaign on speeding, driving under the influence of alcohol and seat belt use in front seats were minor. The most important finding was that rear seat belt use increased from 19% to 51% in the campaign area in the northern county of Oulu during the campaign even though it was not mandatory at that time! However, in the mass media, speed reduction received three times as much publicity during the campaign as belt use (Mäki, 1987).

After the campaign "No elephants in the car" (This message was meant to describe the forces acting upon persons in front seats in an accident situation, if fastening of seat belts is neglected in the rear) following legislation to make rear seat use mandatory in Sweden, the usage rates in rear seats went up to 54% (Lacko & Nilsson, 1988). This campaign was regarded as important also because "An unbelted rear seat passenger is a potential killer of the front seat occupants", as Eriksson (1986) put it. It also became apparent that when the number of persons travelling in a car increases, belt usage rates for rear seats increases as well. In some cases where the total number of persons in cars was four, the usage rate in rear seats was 66% (Lacko & Nilsson, 1988).

In Great Britain great information campaigns have been organized directed at the promotion of the presence of belts suited for children and their proper use, but less attention has been paid till now to the adult passengers on rear seats (Lynam, 1991).

3.3. Legislation and enforcement

3.3.1. General

The effects of legal sanctions are based on opinions about chances, or on the so-called subjective risk of being caught and punished for a violation. If this threat of legal consequences, - or certain chances of these consequences -, is to have a discouraging effect then they have to be credible. The objective risk of being caught for a violation is small, generally speaking. The fact that the risk of being caught and punished is so small raises an intriguing question: not so much why violations are made, but why they are not made more often. A difference should be made between the objective and the subjective risk of being caught and punished. Infrequent checks to which a lot of attention is paid, can cause the public to overestimate the chances of being caught or the consequences. Created expectations by several information sources regarding checks are for most people, - in the short term -, possibly more important than direct experience. A legal discouraging policy therefore demands a widespread publicity.

In general, the role of public information (and perhaps other forms of persuasion as well) before the law changes can be seen as a modifier of public opinion, to prepare the way for effective legislation in terms of achieving a high level of compliance (Downing, 1990). It is stated that in Great Britain, the extensive campaigns prior to legislation shifted public opinion sufficiently to make the legislation acceptable to the majority of drivers and passengers (Ibid). German experiences point in this direction as well (Kroj, 1990). According to Kroj, the most effective way of promoting belt use is the combination of road traffic publicity measures and legal regulations. The role of the police is not seen as a particularly decisive factor, especially when police activity is confined to routine checks.

3.3.2. Front seats

Usually extensive campaigns and publicity are coupled to changes in the legislation. Together these measures succeed in strongly raising the usage rates.

1. Non-use of belts (not) to be punished

In Finland, Norway and Germany, the law did not prescribe punishment for non-use until several years later. In Finland, belt use rates increased drastically when the law came into effect in July 1975, but started to drop in the course of time (see Oranen & Koivurova, 1980). The rates went up again immediately after non-use was made punishable in April 1982, reaching a level of 93% in 1988 (Valtonen, 1989). In Germany, a similar development was noted. After the law was passed, user rates went up steeply to 50% in 1978, but final seat belt usage did not reach the high level (about 97% wearing rate in 1989) that was reached after non-use was made punishable in August, 1984 (Krupp et al., 1978; Marburger & Meyer, 1986; Vaaje, 1986; see also Figures 1A and 1B). In Norway, the rates also increased (by 10-15 %-points) after belt usage had been made compulsory in September 1975. The increase was not as sharp, however, as in countries where punishment was also connected to non-usage (TÖI, 1978).

The mere possibility of punishment for non use seems to raise user rates, as the real level of enforcement and its selectivity did not appear to have much effect on belt use in Finland and Germany. No experimental data are available to prove this statement however.

In the Netherlands, a law prescribing compulsory wearing of seat belts and making non-use punishable came into effect in June 1975. National usage rates for belts increased from around 25% in 1974 to around 50% in 1975. Since then, no steep increases have been recorded, despite several mass media campaigns. The use of seat belts stabilized to around 60% inside built-up areas and 78% outside built-up areas (Verhoef, 1991a). However, belt use rates are still much lower when compared to those in e.g. Great Britain, Germany, and the Scandinavian countries, where steep increases in belt use occurred during the 1980s (see Figures 1A and 1B). In Great Britain the use of belts on front seats became mandatory in 1983 and non-use punishable.

Experiences from various countries, e.g. Germany, Finland and Norway, show quite conclusively that the best results were not achieved through merely changing the law. It was equally important to show drivers that compliance with seat belt law is an important aspect of safety-oriented traffic behaviour, by making non-usage punishable. It was seen that during the

latter half of the 1970s, belt wearing rates in these countries, which connected sanctions to non-use, varied from 75% to 85% outside built-up areas and from 60% to 70% inside built-up areas. In countries with compulsory belt use laws without sanctions, the rates were at a lower level, ranging from 40% to 63% and from 15% to 35% respectively (TÖI, 1978).

In Denmark, the law of compulsory usage came into effect in January 1976, and was followed by sanctioning non-usage some months later. The usage rates increased from an average rate of 25% to 85%. It was also seen that whereas previously, the use of belts was rather unevenly distributed when considering the type of road and part of the country, their use after the new law was introduced was fairly homogeneous (Danish Council of Road Safety Research, 1977).

In Sweden, the gradual increase in belt use after the law change in January, 1975, has been ascribed mainly to publicity and the renewal of the passenger car fleet (Lacko & Nilsson, 1988). In Sweden, the fine was connected directly to the compulsory use of belts, unlike in Finland, Norway and Germany. Several publicity campaigns were launched during the period 1971-1974 before the new law was introduced. The user rates increased from 15% to 36% during this time. Part of that change could be ascribed to publicity, but also the manufacture of cars on the road nationwide was changing during that time, which brought more dynamic belts. Immediately after the law change, user rates went up to 85%.

In New Zealand, a seat belt law prescribing compulsory usage and making non-use punishable came into effect in June, 1972. Since then, usage rates have been increasing, reaching a level of 83% in January 1987 and 86% in January 1989 (TRR, 1990).

2. Primary and secondary enforcement

In the United States, Campbell (1987, 1988) conducted a study on two groups of states:

- Eight states with primary enforcement policies in which a policeman may stop a driver solely on the basis of a seat belt law violation.
- Twelve jurisdictions with secondary enforcement policies under which a belt law violation may be addressed only if a motorist is stopped for some other violation. A strong association between enforcement and belt use was

found. The regression slope for the primary enforcement states was steeper than for the secondary ones. The intercept values, i.e. baseline belt use rates were 45% and 32% respectively. Therefore, primary enforcement states have 13% greater belt use at any level of enforcement observed.

3. Combination of enforcement and publicity

A seat belt law in Texas resulted in a very strong increase in belt usage from 16% to 67% in 1986. Since then, the rates started to drop to a level of 56% in 1988 (Mounce & Hinshaw, 1988). The drop in the Texas figures was explained in part by inconsistent enforcement practices of the police.

Williams & Lund (1987) demonstrated that compliance can be raised considerably through a combined enforcement and publicity campaign. Belt use rates increased in Elmira, New York from 49% before the campaign to 77% immediately after the campaign and settled at 66% two months later. In Glens Falls, New York, a control city without such a programme, belt use declined from 43% to 37% during the respective period. It should be noted that the baseline level from which the increase was achieved was rather low.

In New Zealand over the 1988-89 Christmas holiday period, a publicity and enforcement campaign was undertaken to reduce the holiday road toll (TRR, 1990). Part of the campaign involved stopping and breath testing drivers who were not using seat belts. The user rates increased with 2-13 %-points (the smallest increase occurred in areas with the highest user rates) and the effect was to be seen at least 16 weeks after the preliminary measurements. The overall usage rates in the experimental areas ranged from 74% to 88%.

Studies investigating the effects of a combination of enforcement and publicity in various regions in the Netherlands show increases in seat belt use of 20-25 %-points, with initial baseline levels of around 60-65% (Gras & Noordzij, 1987; Gundy, 1986; 1988; Vissers, 1989a). During the campaigns, an average of 15-25 cars per hour were stopped and seat belt use checked by the police (Gundy, 1986; Gras & Noordzij, 1987). A year after the end of the campaigns, belt use was still 10-15 %-points higher than before the campaigns (Gundy, 1988; Vissers, 1989b). Similar effects of comparable programmes were also shown in Canada by Jonah et al. (1982).

Another example of the effects of enforcing seat belt laws comes from Alberta, Canada (Transport Canada, 1990). Because of a Court decision the law was temporarily not being enforced. Seat belt use in Alberta fell sharply to a level of 45% in 1989, from a figure of 83% in the previous year. In the other states, user rates remained mainly on the same level. The Court decision was overturned after the results of the survey had been published, and the legislation is now back in force.

In the United States, it was generally found that states with mandatory laws applicable to seat belts showed an average usage rate of 48% in 1987. Usually, there was a decline in use after the initial period of implementation and enforcement. The increase represented, however, a 2-3-fold raise in usage rates (Campbell & Campbell, 1988).

The more concrete the possibility of being detected for non-compliance is put forth, the better the effects of enforcement will be. This becomes apparent when comparing two studies conducted to promote seat belt use among those visiting drinking-establishments (Malenfant & Van Houten, 1986; Grant, 1989). In both studies, publicity to highlight the efforts of police and other authorities was given. The effects of STEP (Selective Traffic Enforcement Programme) in the study of Malenfant & Van Houten were considerably better than in that of Grant's, probably because the message was also directed through roadway signs which stressed that the seat belt law would be enforced both during the day and at night (when people leave the drinking-establishments), as Grant interpreted the difference in results.

4. Optimal combination of measures

It appears plausible that it becomes progressively more difficult to achieve a change in behaviour after a first group of people (early adopters) have adopted the target behaviour. That is why the effects of an intervention with high baseline levels of belt use can not be expected to be great (Simons-Morton et al., 1987).

The success of seat belt legislation in countries with legal mandates for seat belt use does not have to mean that stringent enforcement results in high compliance (Nichols, 1982). The experiences of Great Britain and Germany - as was seen earlier, the two countries with the highest wearing

rates in the world (around 95%) - show that these high rates cannot be explained solely by the role of enforcement. Nor can the systematic and massive publicity before and after the legislation solely account for these high rates. Instead, the specific combination of various measures (legislation, enforcement and publicity) seems to be responsible for the high belt use rates.

In Chapter 5 more attention will be paid to this subject.

3.3.3. Rear seats

The process of legislation usually starts by making the installation of belts mandatory; after an interval of some years, their use is made compulsory as well. With regard to seat belts on rear seats, the experiences gained in promoting belt use in front seats can be used.

Compulsory use of rear seat belts became mandatory for the first time in the state of Tasmania in Australia. The law became effective in October 1970, with a restrictive clause, i.e. the use of rear seat belts became mandatory once belts were installed in rear seats. Since then, not much has happened in the promotion of rear seat belt wearing through law enforcement.

Even though Victoria, Australia, introduced a rear seat belt law in 1970 for persons over 8 years of age, the wearing rate remained at a level of 19%, compared to 85% for front seats. This rate of 19% was reached after 10 years! After this result was publicized in Australia, a campaign was organized while at the same time, the protection of children between 0 to 8 years of age was made compulsory. Eight months later, the belt use rate for rear seats was 80% (Dejeammes et al., 1986).

Also in Finland, the use rate of rear seat belts increased after the law was passed on belt use in 1988. One month before the law became effective, the usage rate was 27% nationwide; one month after the law was enacted, the rate had jumped to 66% for those who had rear seat belts in their cars. The installation rate in passenger cars was 68% one month after the law became effective (Valtonen, 1989). The latest figures from summer 1988 show a users' percentage of 82% for cars equipped with rear seat belts (Tekniikan Maaailma, 1988).

In the middle of the 1980s, compulsory belt use for rear seats finally became a reality in Germany, Norway and the USA (New York State). In Germany non-use is not punishable.

3.4. Incentives

Actions which bring rewards are generally repeated, whereas those with unrewarding or punishing outcomes tend to be avoided. The fact that actions are influenced by their effects is acknowledged in most theories that attempt to explain and predict behaviour (e.g. Bandura, 1986; Skinner, 1938; Deci & Ryan, 1980; Bem, 1972). In modern cognitive theories, the role of behavioural feed-back in creating internal models and expectations is essential (see Neisser, 1976; Näätänen & Summala, 1974; Mikkonen & Keskinen, 1980). These theories, however, differ in how great a role they assign to this determinant and in the mechanisms through which it operates.

3.4.1. Implementation of incentives

Behaviour that has favourable consequences is more likely to be repeated and at higher rates than behaviour that does not lead to favourable effects. Using the operant learning model, favourable consequences of a behaviour serve as positively reinforcing incentives. This and other learning models have been applied successfully to promote the use of seat belts. Incentives (rewards) serve to encourage people to use seat belts; it is then hoped that they will eventually develop a habit of always using seat belts.

In fact, incentives for promoting seat belt use have been tried in Sweden as early as in 1972 (so-called Bingoveckan = Bingo week; see Spolander, 1983), but their effects are not known precisely, because "Bingoveckan" was part of a large information campaign. Almost all studies evaluating the effects of incentive programmes to promote seat belt use have been performed in the United States.

Six types of worksite incentives to increase seat belt use have been identified (NHTSA, 1984):

1. work-related privileges (such as days off)
2. immediate valuables (such as pens or flowers)
3. promotional items (such as stickers)
4. exchangeable tokens (cash)
5. chance to win contests (lottery tickets)
6. social attention (name in newspapers).

Incentive programmes have been, indeed, successful in increasing seat belt use (e.g. Elman & Killebrew, 1978; Cope et al., 1986; Geller, 1984, 1988; Geller et al., 1987, 1990). In most incentive programmes, the rewards were given for actual, i.e. observed, seat belt use. In the majority of the incentive programmes the direct and immediate handing over of rewards to those using seat belts plays a role. In most cases, vehicles already stopped before the reward presentation, e.g. at entrances to industrial complexes or parking lots. A "direct but delayed" method is an alternative strategy, in which a lottery system is usually applied. The owners of winning lottery tickets can subsequently claim their prizes. Sometimes incentive programmes were "delayed and indirect" reward strategies. That is, vehicle occupants were not rewarded directly for using a seat belt, but received opportunities to win prizes by signing a seat belt pledge card, thereby making a written commitment to use a seat belt for a certain period of time. This strategy is referred to as "indirect", because winning a prize is not directly dependent on actual seat belt use: all who signed the pledge card can win the prize (including persons who in fact didn't use belts). All the above listed strategies can be labeled "individual" incentive programmes. On the other hand, "group-dependent" incentive programmes have been used, where the behaviour of the entire group determines whether individuals win a prize.

In general, all incentive programmes (immediate, delayed, direct, indirect, individual, group) have resulted in significant increases in the use of seat belts. However, these findings must be tempered by the fact that all the experiments were carried out in the absence of a seat belt use mandate, and therefore baseline use rates in each of these programmes were very low (10-20%). Unfortunately, usage rates have typically decreased within a few weeks following withdrawal of the incentive programmes. Cope et al. (1986) describe one of the few studies finding no decrease in post-intervention use rates after six months. Incentive programmes have also

been successfully applied to promote seat belt use among children (e.g. Roberts & Turner, 1986; Geller, 1989; Lehman & Geller, 1990).

Sleet & Geller (1986) offer recommendations regarding the use of incentives in seat belt promotion programmes. These include: rewards are more effective than punishments; low-cost incentives result in cost-effective increases in seat belt use; intermittent rewards have longer-lasting effects; incentives are more effective in combination with education; delayed rewards can be as effective as immediate rewards; family involvement leads to higher seat belt use; and finally, a combination of individual and group rewards yields the best results (see also Geller, 1988).

Incentives encourage participation in activities that people would otherwise disregard and in which they would thus never develop any interest. To reward people materially for activities that already hold a high interest for them, or that they would pursue for symbolic rewards, is not only inappropriate but contra-indicated by the incentive theory. The introduction of superfluous or excessive rewards invites unnecessary difficulties when the time comes to phase them out (Bandura, 1986).

When studies dealing with incentives and other experimental programmes are conducted, it would be worthwhile to incorporate totally unobtrusive observations, in order to assess the importance of the so-called Hawthorne effect on the results of studies, as Johnson & Geller (1984) rightly point out. The studies dealing with incentives are usually conducted in more or less "closed" societies, such as companies and military bases, where the personnel is actually the focal point. A good list of possible targets for incentive programmes including contributors and beneficiaries is given by Streff & Geller, 1986. In particular, strictly unobtrusive long-term observations might shed more light on this question.

In the United States, various techniques of persuasion in addition to rewards have been used to promote seat belt use. One of these is the use of a sticker with a message "Seat belt use required in this car" attached to the dashboard of a car (Thyer & Geller, 1987). During a two-week baseline period, the belt use of front seat passengers (n=476) use was found to be 34% in 24 test cars. Subsequently, after "buckle-up" stickers were attached to the dashboards of test cars, the user rates increased to 70%

(n=448). Two weeks later, the stickers were removed, and the rates dropped back to 41% (n=406). Replacement of the stickers for two final test weeks resulted in a 78% (n=392) usage rate. The long-term effects of the stickers were not measured. In addition, the baseline rates were very low, around 40%. It remains to be seen what would have been the effect if starting from a baseline level of about 80%.

In another study (Williams et al., 1989), an attempt was made to stimulate the use of belts by posting "Fasten Safety belt" traffic signs and using prompters at a parking lot exit. The posted signs increased belt use from 40% to 47% at one location and from 50% to 59% at another. If someone draws the attention to the sign, belt usage rates increased even further.

3.4.2. Comparison of the effects of incentives and enforcement

Direct comparisons of the relative efficacy of enforcement and incentive programmes are rare. In a recent experiment, Kalsher et al. (1989) studied the relative effects of incentives and enforcement ("disincentive") under conditions of mandatory requirement of seat belt use on two U.S. naval bases. Hagenzieker (1991) studied the relative efficiency of incentives and enforcement on some military bases in the Netherlands. Both studies show that incentive programmes can be effective in increasing seat belt use under mandatory conditions, i.e. with relatively high baseline levels. Individual incentive programmes in particular proved to be effective (ibid): an increase of 20 %-points in user rates was established. Group-dependent incentives showed at best a short-term effect. In both studies, the mean effects of enforcement and incentives were of the same magnitude, a medium to long-term mean increase of 10-15 %-points for both treatment types. Also, the baseline levels were comparable, i.e. a rate of about 60% for both studies.

Mortimer & al. (1990) evaluated the effects of incentives alone, enforcement alone and a combination of incentives and enforcement on seat belt use by drivers in different cities in Illinois. They found that all treatments produced significant increases in the use of seat belts. The greatest effect was attributed to the combined treatment. The effect of enforcement alone had largely decayed in about six weeks, whereas incentives retained their effect for up to 2-3 months (when measurements ended). It

should be noted that the baseline level of belt use was very low in the experiment, 25-30%, as is often the case in USA studies.

3.4.3. Acceptance of incentives

There has been some reluctance, both within professional circles and among the public, to acknowledge the influential role that extrinsic incentives play in the regulation of behaviour. Some believe that behaviour should be performed for its own sake and not be "tainted" by reward. Concerns are voiced that incentive practices may impede development of self-direction and diminish inherent interest in activities (Bandura, 1986).

A survey was conducted in Canada in which subjects were asked to rank about 40 different measures for accident prevention. This revealed that incentives (rewards) were ranked as one of the most popular means of promoting safety (Wilde et al., 1975). In another survey (Hagenzieker, 1990), about 25% of (Dutch) respondents found incentives an original idea to promote seat belt use. On the other hand, about 25% also stated that belt use should not be rewarded, because seat belt use is a legal requirement. Enforcement as a measure to increase belt use was more accepted: the majority agreed that the police should punish violators of the seat belt law. In contrast to Canadian opinion Dutch respondents do not seem to rank incentive programmes among the most popular measures.

4. ATTITUDES TOWARDS SEAT BELT USE

In this chapter the influence of attitudes on seat belt use will be discussed.

The motives for non-use as given by road users will be summed up, though use is determined by situations for a great deal. This fact complicates the linking of attitudes with behaviour. The relation gets even weaker because in many cases there is no strong motive for use or non-use of the belt. Behaviour is partly determined by "forgetting" or, on the other hand, by the habit of using the belt.

Then the question is discussed whether persons not using the belt attract the attention on account of a greater risk in other ways as well. In other words is non-use an expression of a more general attitude towards risk? On the other hand there is the theory that belt use is compensated by taking more risk in other behaviour.

Finally the attention is drawn at the fact that behaviour is not always a consequence of attitudes. Behaviour can also cause the building of (other) attitudes.

4.1. Motives against use

The following reasons against belt use have been reported in literature (see Cliff, 1980; Bylok et al., 1983; Gundy, 1986; Mackay, 1987; Plaizier, 1987a; Hunter & Geissinger, 1988; Pajunen, 1989):

- indifference,
- forgetfulness,
- fear of being trapped or being drowned in an accident,
- fending measures reckoning with an accident
- disbelief in the accident risk
- disbelief in the injury-reducing effects of the belts,
- discomfort
- diminished driving pleasure
- social norms
- acceptance of risk
- freedom of choice,
- low subjective risk of detection for non-use.

When asked about motives for certain behaviour people do not always reveal their motives clearly. Possibly they do not have strong motives and invent them on the spot, or answer what they think the examiner wants to hear, or even try to find an answer consistent with their behaviour.

In a survey in the Netherlands, (Zeilstra et al. 1990) people were asked what reasons they have for not wearing seat belts. The most common response was "I forgot". Even if the opinions and ideas about belt use and the effects are positive among road users (Oranen & Koivurova, 1980; Jonah & Dawson, 1982) it does not have to mean according to Jonah & Dawson, that the belt is always used. They found a disparity between the positive opinions and the fairly low observed user frequency (60%) among drivers. On the other hand non-use might be partly due to not having developed a habit of buckling up (Heron, 1975). In accordance with this are the findings on the role of habituation to use the belt. Mittal (1988) defined habituation as automatic and unconscious behaviour, to distinguish it from conscious behaviour. He found that with a relatively low use, when use of a belt was not mandatory, habituation was positively correlated to the use of safety belts and not dependent on a positive attitude. There was a stronger correlation with habituation than with attitude, even though attitude had a predictive value.

So the conclusion can be drawn that attitudes are not (longer) important when habituation has taken place.

Some motives against use will now be discussed.

4.1.1. Discomfort

Attitudes related to the non-use of seat belts were explained during the earliest years of its history by the discomfort related to their use (Fhaner & Hane, 1972). In the 1970s, belt use increased in cars equipped with dynamic belts when compared with cars fitted with manually adjustable belts (Oranen & Koivurova, 1980), due to greater comfort.

A more recent study confirms that discomfort still plays an important role in belt use (Svenson et al., 1985). It was conducted in both Sweden and the United Kingdom, in which subjects judged their own driving skills and safety in relation to other drivers. The degree of optimism in relation to their own driving skills was weakly (positively) correlated with reported seat belt usage and concern about traffic accidents. Seat belt usage was

more strongly related to opinions about the convenience and popularity of belts. The authors suggest that providing more information about the effectiveness of seat belts may not be as useful as emphasizing other factors, such as comfort and social norms.

In the next chapter possible improvements are discussed.

4.1.2. Fending off measures reckoning with possible accidents

Some discussion has also been raised about the anxiety-arousing effects of belts, because wearing them might be connected to the possibility of an accident (Fhaner & Hane, 1971). The conclusion was that it probably had no effect on use. Some psychoanalytically-oriented scientists still maintained that reaching for the belt often calls to mind an accident (Berger et al., 1974). In contrast to this notion, it has been reported that 40% of drivers thought that wearing belts increases the feeling of security and driving confidence (Oranen & Koivurova, 1980). Although psychic factors have relevance to wearing behaviour, the significance of these interpretations might have been exaggerated at times (see Praxenthaler et al., 1978).

4.1.3. Situational influences

In a recent study in the Netherlands (Zeilstra et al., 1990) people were asked what reasons they have for (sometimes) not wearing seat belts. The most common response was "I forgot" (24%). "Inconvenient" was given as reason by 16%, 7% found it "unnecessary for short trips" and 7% was afraid of wearing seat belts while driving along a canal. It appears from this study that situational factors are often mentioned. 80% of the respondents said they use seat belts, while measurements show user percentages to be less than 70% on average. Therefore, the percentages recorded with regard to the reasons why seat belts were not worn might be an underrepresentation.

Fockler & Cooper (1988) also stressed the influence of situational factors. They conclude that the division in users and non-users is faulty. They think that behaviour cannot be explained in this way. Of the self-reported non-users 82% was actually observed not wearing a belt; 77% of the self-reported users, was actually observed wearing the belt. A comparison between self-reported and observed seat belt use revealed that as many as

69% of observed non-users claimed to be irregular users, while only 3% of observed users claimed this. According to Fockler and Cooper, this finding suggests that an understanding of seat belt use cannot be based solely on classifying individual drivers as observed users or non-users, but that the opinions of drivers are also dependent on situations. An investigation of the situational factors revealed that self-reported users admitted that they sometimes omitted belt wearing during short trips, when riding as a passenger in the rear seat, or in a taxi. The self-reported irregular users claimed to wear a belt most often when suspecting police checks (30%), when riding as a passenger in some-one else's car (26%), and (22%) when travelling on high-speed highways (ibid).

The interpretation of this kind of data is made more difficult by the possibility of giving social desirable answers. Fockler and Cooper found that 43% of the observed non-users stated that they always used seat belts. These respondents were observed not to have used their belts on two consecutive days. Moreover, 35% of the observed non-users who claimed to be regular users said that they were unlikely to use seat belts on short trips.

When determining the influence of situational factors the general level of belt use has to be taken into account. If that is very high, like in countries with user frequencies of 90% to 95% (Germany, Great Britain and Scandinavian countries), the distinction between users and non-users may be more significant and the situational factors less so. In Fockler and Cooper's study the general users' percentage was 72%.

4.1.4. Acceptance of risk

It has been suggested that at present, when non-use is more uncommon than buckling up in most western countries, those not wearing belts also differ in some other safety-related aspects from those using belts (Wasielowski, 1984; Wilson, 1985; Grant; 1986; Hunter et al., 1988). These findings show that non-users have more violations on their driving record and are more likely to have been involved in a traffic accident than those using a belt. Jonah & Lawson (1986) interpret these findings to mean that the non-use of seat belts may be connected to a life-style characterized by a general disregard for safety due to deeply rooted underlying motivational factors, rather than a failure to perceive risk in the traffic environment.

Voigt & Krantz (1977) came to the same conclusion when they found that non-users involved in accidents were often under the influence of alcohol; they also seemed to have other social problems. Evans (1987) has made calculations of the accident involvement rates of unbelted and belted drivers. He found that the accident involvement rates were 1.5 times higher for unbelted than belted drivers.

It has been shown that drivers leaving drinking-establishments were relatively unaffected by a Selective Traffic Enforcement Programme (STEP). In a campaign to promote seat belt use among Canadian drivers, these drinkers were also selected as a target group (Grant, 1989). The baseline level of wearing was rather low, 60%. The STEP increased the rate of this group to 64%, whereas across all the groups, the rates increased from 79% to 87%. In another study, however, the results were more promising (see Malenfant & Van Houten, 1988).

Hunter et al. (1988) found that when self-reported belt use categories were used, driver records became progressively worse with decreasing frequency of belt use. The difference of users and non-users could partly be explained by the differing demographic variables in that study. However, the differences were still statistically significant even though factors such as sex, age, and estimated annual mileage were controlled.

In the study of Fockler & Cooper (1988), non-users drove older cars, did not use headlights and had a violation record with a significantly higher number of traffic offences than seat belt users. Again, the authors pointed out that this description was successful in making a correct categorization in only 60% of cases; they feel that the concept of a typical "wearer" and "non-wearer" may not be a very useful one.

Opposite the theory that non-users show a more dangerous driving pattern also in other respects, the opinion is established that belt users feel safer and so take more risk in the other driving aspects.

It has been argued that the effects of belts could be compensated for in driving: Protecting car occupants from the consequences of bad driving encourages bad driving (Adams, 1985; Milosevic & Pajevic, 1988; OECD, 1990). The so-called theory of risk homeostasis presented by Wilde (1982) has not received wide empirical support (Evans et al., 1982; Mackay, 1985; O'Neill, 1985).

In some areas of driver behaviour it is, indeed, possible to demonstrate some compensation, but not in the sense Wilde puts it. Seat belt wearing to date has not been shown to be related in any way to increased risk-taking. On the contrary: Non-use predicts other risk behaviour to a certain extent, as was seen earlier.

4.2. Attitudes resulting from behaviour

Numerous studies have been conducted to examine the various factors influencing the voluntary and compulsory use of seat belts and the attitude of drivers towards seat belt usage in general (e.g., Fhaner & Hahne, 1972, 1973, 1988, Jonah & Dawson, 1982; Bragg & Finn, 1985; Svenson et al., 1985; Plaizier, 1987b; Gundy, 1988; Milosevic & Pajevic, 1988). It is generally found that the attitudes of drivers changed when legislation was passed to make the use of seat belts compulsory. Change of behaviour as a consequence of legislation is the cause of and not the consequence of a more positive attitude towards belt use.

The attitude is becoming more favourable in accordance with the newly adopted behaviour. The latest survey from Great Britain confirms this notion (Quimby & Drake, 1989). During the past 10 years, there has been an increase in the number of people who thought that seat belts were "very effective" in providing protection in accidents. The authors conclude that "this is not surprising, given the extensive publicity campaigns and legislation making seat belt use compulsory in front of the cars which had occurred between the two surveys" (ibid).

The conclusions from this chapter are summarized:

- Many, different motives may lead to non-use of seat belts
- The influence of forgetting on the non-use and that of habituation on the use suggest that the motives do not have to be "strong".
- Situational factors play an important role.
- There are some indications that non-use of belts is connected with other risk raising behaviour, but they are weak.
- Attitudes and behaviour are weakly interdependent; the connection can be partly explained on the basis that seat belt use is a reason to change an attitude.

5. POSSIBLE MEASURES

In the earlier chapters factors influencing belt use have been indicated and which reasons are given not to use them.

5.1. Conditions for effectiveness

Most remarkable is that some countries have succeeded in making seat belt use almost general (over 90%), for which further motivation does not seem necessary. Buckling up can become a habit. Then a strong motivation is not longer necessary. This result was only reached after belt use had become mandatory and this obligation had been enforced. This may have happened when all cars had to have belts available. In the Netherlands in 1975 only passengers of cars sold in 1971 or later had to use them. In those cars mounting points were built in mostly. So the obligation to use belts was not general, which weakens the credibility of a campaign a great deal.

For the introduction of belts on the rear seats it can then be concluded that the legal obligation has to be general and needs a strong enforcement policy. This is the best basis for a campaign.

5.2. Stimulation of habit forming

In the accompanying education and publicity campaigns the actual action of buckling up might be shown to stimulate habit forming, for belt use does not seem to happen on the basis of strong motives. Non-use also does not seem based on strong motives. Habits can be an answer to "forgetting". Possibly it has to be recognised that the advantages of belt use are not very appealing, even if the decrease of injuries is quite obvious. Belts only get functional in an accident. Other choices of behaviour (like driving at a certain speed, keeping a distance, or giving the right of way) often prove to be effective and so show their effects more often.

5.3. Information on injury risks

Even so information on the effect of belts can underline the reasons for the Government to find their use so important. For the introduction of new legislation on belt use on rear seats this information is necessary, and

it seems inevitable to stress the importance of their use on front seats at the same time.

This information by itself will not have much effect, however. The question of manipulating the subjective perception of danger as a motivating factor for belt use was studied by Slovic et al. (1978). They showed that drivers' response on belt use was dependent on the fact of risk-informing every ride or at certain time intervals. For an individual driver the risk of a fatality is 0.00003; the risk to be fatally hurt in 50 years 0.01 (Kunreuther, 1985). Slovic et al. (1978) found in a laboratory test that persons informed about their probability of an accident during lifetime had a more positive response to safety belt use than persons informed by ride-statistics. They concluded that non-use can be partly explained by the low probability of an accident, which is confirmed by safe experiences (i.e. rides without accidents), in combination with the inability of drivers to estimate the frequency of occurrence of rare events.

It is clear that the subjective accident risk is a difficult basis to bend behaviour to a safer direction. Moreover, drivers underestimate the physical forces hitting them in accidents (Näätänen, 1972).

Attention is drawn at the facts that belts are often used in the wrong way, or at least not in the best way. If this is a consequence of not-knowing, information at this point might arouse new interest.

5.4. Relation between seat belt use on front and on rear seats

The new legislation on belt use on rear seats can be used in general to stimulate belt use on the front seats. In the recent years stimulation policy has barely had any success. A good campaign combined with enforcement and information has a short-term effect, but it is very hard to raise belt use structurally. A stalemate seems to have grown. New legislation might break it.

The campaign directed at belt use on rear seats can use the results from the campaigns for front seats. Summarized again: a general obligation, also for old cars, going together with enforcement must be the basis for an information campaign.

Possibly such a great campaign may also enhance belt use on front seats. Every new possibility must be used and non-use on front seats is an obstacle for the achievement of optimal effects by campaigns directed at belt use on rear seats. Parents must explain to their children that belt

use is necessary, children can on the other hand tell their parents that it also goes for front seat passengers.

5.5. Comfort

Discomfort plays an important role in, or is used as an argument for, non-use of the seat belt. It can partly explain why the belt is less used in short rides. Improvements should get more attention in the campaigns. Industry and researchers stay active to find technical improvements. International teams have been formed for this purpose. The improvements can be considered an increase of the effectivity in the first place, and an increase of comfort in the second place.

For the front seats attention is paid to:

- the better fitting of the shoulder-part of the belt by making the higher mounting point adjustable;
- the fastening of the belt mounting point to the seat, instead of to the floor, to prevent the being shifted from under the belt in a collision;
- tension holders to keep the belt in place in a collision;
- the decrease of the pressure of the belt in normal use, not in a collision;

For the rear seats most attention is paid to:

- a better location for the mounting points to prevent the being shifted from under the belt in a collision;
- better comfort by a better design and application of the three-point seat belt to decrease the pressure of the belt in normal use, not in a collision.

5.6. Segmentation of target-groups

Every means should be used to promote belt use, because it is so difficult to get it on the level wanted. Various measures can enforce each other: police enforcement is a means of pressure, more comfort is more inviting, information stresses the importance, etcetera. For the whole non-users group, however, the motives are different and it is not very effective to give the same arguments to this whole group.

Information which is irrelevant or fills people with aversion can be the reason to lose all interest in the subject.

Because of the motives for non-use of belts there is every reason to fight

prejudice: discomfort is not very great, the chance of a positive effect is much greater than that of a negative effect (if the car ends up in water), and the effect of belts is also good when driving less fast. A study has to be made of which prejudice is held by whom.

Information directed at the backgrounds of non-use must be given with tact and force, because there is a natural inclination to selective observation of information. In general information is looked for that is known and confirms one's opinion. Especially campaigns through the mass media of television, radio, or newspapers can hardly avoid selective observation. Therefore a target group segmentation is necessary to reach people. The question is which homogeneous groups exist regarding interest, reading, or listening behaviour, and norms and values etc. The limitations discussed mean that it is important to apply the information instrument with care.

Hereafter a possible target group segmentation will be given.

5.6.1. Youth

An important target group is the youth. They become even more important when belts on rear seats become mandatory. In traffic education in primary schools at least one lesson should be given on the importance of belt use. In secondary education it is necessary to repeat it, because in adolescence all behaviour, opinions and the basis of habits are under discussion. Use can be much more stressed on arguments than in primary school in different subjects, like physics, biology and health science.

During driving education as well attention has to be paid to the legal obligation to use belts, and the reasons why. It should be possible to put questions about them in the oral exam. Besides, the driving lessons give the opportunity to habituary use. It is necessary even more, because young male adults use the belt less often than young females and older adults. In order to reach this a campaign among driving instructors does not seem superfluous. They have a model function. One of the advantages of the framework of education is that information and experiences can be discussed in small groups. This is also possible if informative/educational campaigns are held in companies at work. Information in smaller groups is more directly effective on the behaviour than that for the general public.

5.6.2. Connection with enforcement

Generally enforcement is not directed at a certain target group. All road users may be stopped and checked for belt use. Generally, motivation in the police force to check for belts is not so strong as it is in case of other risk raising behaviour. The police in itself is a target group in this way.

Persons influenced by a campaign may also form an other target group. Short-term effects have to be transformed into long-term effects. Behaviour may induce a change in attitude. This way the behaviour may get more durable. It might be useful to give arguments to start this process or to intensify it.

Feedback on the effects of the campaign with police enforcement can give a stronger motivation to hold on to the new behaviour, and for persons not having adapted their behaviour, it might be a reason for consideration. This way the influence of social norms is used.

5.6.3. Incentive campaigns

Rewarding seems a good alternative to punishment. Use of a reward for applying a legal measure really is open to question, but intermediaries, like companies, do not feel this problem as much as legal authorities do. For a company belt use may save expenses and a campaign does not need much investment. Combined with an information campaign good results can be achieved.

Geller (1985) recommends to approach people with the request to participate in a campaign in which they promise to use a belt and may be rewarded, to enhance their involvement. In an experiment the participants received car stickers as lottery tickets. These stickers served to influence other drivers not using a belt. A study has to be made to determine which groups are receptive towards incentive measures and in which social setting.

5.6.4. Information on health

In various regions in the Netherlands a market in second-hand childseats was organized, e.g. in sanitary organizations. That is a very concrete way of reducing the costs of safety means for small children. More-over the relationship of parents with small children to sanitary and health

problems is still close. So sanitary organizations and parents with small children appear to be target groups.

5.6.5. Social group

If people think they make a good impression on their peer group when they do not use the belt it may be worthwhile to support them to resist this. If someone thinks that it is not "fitting" to use a belt or knows many other persons not using one, modelling (through persons he is identifying with) can play a role. In films and advertisements (especially for cars), and in pictures of politicians driving off, belt use should be clearly shown; on the other hand people can be used with whom the target group gladly identifies itself.

A campaign can also be based on certain values, attitudes, and opinions of the social group the target group is identifying with. Rooijers & De Bruyn (1988, see also Rooijers, 1986) state that many persons are inclined to continuously compare themselves to others and want to adapt to the majority. Therefore it is important to inform people on the positive developments in belt use.

5.6.6. Discomfort

Discomfort plays the most important role for short rides. Especially certain professional groups making many short rides are sensitive to this motive. When technical improvements have been made information should primarily be directed at this group. The car making industry with its marketing departments, and this professional group of drivers are the target groups then.

5.7. Presentation

The presentation of a certain measure is also important. It has to be understood by the target group. A message not having a connection with existing interests, needs, or lifestyle bears little chance of success. In 1974 Kroj and Pfafferott indicated two completely different attitudes of people (see Plaizier, 1987a). One group had an orientation towards 'enjoyment driving worlds' the other towards 'safety driving worlds'. The first group experienced driving as a means towards freedom of self-expression,

while the second felt that danger was central to the experience. It is clear that the first group is not simply influenced by fear-arousing information, while the second certainly is. It is also important to determine to what degree fear arousal is effective. Plaizier found in the literature a U-shaped relationship between fear arousal and the wearing of seat belts. Relatively little and relatively great fear both led to less wearing of seat belts.

5.8. Evaluation

The evaluation study is an essential part of the public information strategy. An isolated information campaign is almost always insufficient to ultimately achieve the desired effect. Therefore, a strategy will usually include several campaigns. It is necessary to examine the effects of a campaign in order to determine the next step.

A clear specification of the aim of information campaigns and the target group is necessary. An indication would therefore have to be given of what one is trying to achieve: is the object to stimulate further involvement and positive attitudes, or is greater knowledge the focus of the campaign? Alternatively, is the intention to first stimulate behaviour in order to create a firm basis for the supply of further information?

Changes can be achieved in various ways. Therefore, the evaluation study should consider factors such as know-how, attitudes and behaviour.

Quantification of the campaign aim is necessary to arrive at a good assessment of effectiveness. When a campaign has been planned carefully, these aims, such as the number of persons that have been made aware of the campaign and the number of persons that have recognised the message, should be immediately apparent. In order to determine the effect, other influences must be excluded.

Aside from establishing this direct effect and ruling out any intervening effects, it is important to measure the effectiveness of a campaign. How do the efforts relate to the result, and is it possible to be more effective if a different approach were used?

In this way, it is possible to see whether the means have been well spent and in what ways a future campaign could be improved upon.

Evaluation offers an impression of the new situation, which can be used as starting point for the next phase of the strategy of change. Generally

speaking, a new campaign should not be a carbon copy of the old one. For example, when greater involvement has been realized, there is a greater probability that information will be better absorbed. Repetition of a campaign is of course not necessary when a campaign has had a disappointing result: a better approach must be found.

When changes in behaviour have been achieved, it is important to investigate how this effect can be sustained. Effects based on external pressures, such as reward and punishment systems, are in principle not permanent in nature. When, on the other hand, changes have taken place based on greater knowledge or greater involvement - perhaps initially stimulated by external pressure - the likelihood that the effect will fade in time is smaller.

The positive effect attained with a particular group can be used to advantage for persons that still persevere in the undesirable behaviour. They can be asked to follow suit. To persuade this group, they need feedback. The immediate experiences in traffic do not allow a road user to deduce that the number of seat belt users has increased.

As long as the desired behaviour is not yet automatic and the motivation to persevere not fully guaranteed, it is necessary to remind the public of the importance and the social norm from time to time.

It is recommended to always accompany measures that attempt to bring about a change in behaviour with a study, in order to clarify what the behaviour is based on, where the possibilities lie for improvement, how a measure can be achieved and whether further policy changes can be realized. The more problematic and persistent the existing behaviour is, the more extensive or complex the study will have to be. It is also true, however, that as the number of measures already attempted increases, the more specific the study will have to be to discover what possibilities still remain open for the application of policy.

6. DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS

6.1. The state of affairs

Seat belt use has grown all over the world, but remains far beneath satisfactory levels in a lot of countries. It is calculated that universal use of seat belts would save a lot of lives in traffic accidents.

At first, the policy of most governments that wanted to promote seat belt use was directed to inform people about the effectiveness. Only a minority of the public was sufficiently impressed by that. One of the drawbacks was the inconvenience of seat belts. This problem has been resolved to a great extent with more sophisticated belts, though further improvements are possible.

When it was clear that most car passengers still did not want to use a seat belt voluntarily, the usage became obligatory by law in many countries. This raised the wearing percentages, although they were still at an unsatisfactory level. Therefore, police enforcement and/or information campaigns seemed to be necessary. In some countries, e.g. the United Kingdom, Germany and Finland, the necessary preconditions seemed to have been fulfilled in this way, thus ensuring that seat belts are used by more than 90% of front seat passengers. Apparently, people viewed these conditions as being important enough; it seems to be a social norm now to use seat belts in these countries. Probably, most car passengers are not conscious of wearing them any more. Using a belt became a habit. It has been proven that habituation might also be evoked by modelling the behaviour. Therefore, an information campaign is not only dependent on educating the public about the reduction in fatalities and injuries. By demonstrating again and again that fastening seat belts is only a minor action that should be a standard part of preparation before driving away, it proved to be possible to raise the wearing percentages significantly.

6.2. A new great step

This report outlined that well-known measures remain effective. Especially when enforcement and information are combined or when incentives are offered, surveys and observations reveal that the wearing

percentages increase. In the long term, these effects diminish without completely fading away. But one might conclude that these results are marginal. Besides, the police seem not to be fully motivated to enforce the use of seat belts. When policemen integrate inspection of seat belt use in their routine controls, the risk of being caught would be many times greater than is the case now.

Technical developments of seat belts do not mean that further improvements are not possible. They may structurally contribute to the solution of the problem. The introduction of automatic devices, such as airbags, should also be considered. The industry seems to be interested.

To improve the effectiveness of campaigns, it is necessary to explore more intensively the motives of car passengers for not using a seat belt and to find arguments or appeals for which those persons are sensitive. First of all, target group segmentation is needed. Factors that have proven to have little convincing power with all car passengers might be crucial for a minority. For example, when a person fears that he or she might be trapped by the seat belts in case of an accident, it is not worthwhile trying to convince him or her with arguments about the overall effectiveness of seat belts. Another person might think that he is practically invulnerable or that he must pretend to be; for these people also, information offers many perspectives to stimulate the use of seat belts. For these people, pressure - perhaps through police enforcement, perhaps by relatives, friends or colleagues, an incentive programme or a non-rational information campaign - might be a first step towards enhancing involvement in the problem.

Car occupants with a lot of driving experience who have not used seat belts are harder to convince of the benefits than people with no experience. It seems that road users in general do not make much of a point of subjects such as seat belts. They are not eager to obtain information on the subject and are inclined to neglect it. So when the habit to 'buckle up' has developed, it might be strong; however, if this habit is not present, it is quite usual for people to forget them or to find a reason not to use them.

Two conclusions can be drawn from this observation:

One is that each opportunity must be used to influence people, from the moment they have the choice to use belts or not. This means that it is

very important to teach children that belt use is inevitable; when they are old enough, they should be taught about the effectiveness of seat belts. Of course, other car occupants should also use the belts consistently. Moreover, driving lessons are an excellent opportunity to drill usage until a habit has formed. Of course, driving instructors should be supervised to ensure they use belts as well (if they are careless in that respect).

The second conclusion is that opportunities must be used that might draw attention to an old problem. A continuation of the same information and enforcement campaigns is unlikely to achieve that. It is presumed that road users have got used to these campaigns. In the Netherlands and other European countries, laws have been prepared or are in preparation to make seat belt use compulsory for rear seats. In new cars, they have already been installed in many countries, including the Netherlands. But the usage percentage is still lower than for front seats, despite installation. A law making usage in all cars compulsory may offer a very good opportunity to draw the attention of the public. From the effects of policy relating to seat belts on front seats, it has been deduced that a step-by-step approach to enforce the law is not advisable. What is needed is a combined effort, starting from the moment a new law comes into operation. The public has to be bombarded with all suitable pressures: information, incentives and enforcement, in order to convince them, to promote the use of belts as the social norm and/or to realize habituation. When focusing on rear seats, front seats must be integrated into the campaign to lend it credibility, because seat belts are effective both in the front and in the rear, and because the effectiveness of belts in front will be enhanced when rear seat passengers also wear their belts. Besides, it may not only be parents occupying the front seats who influence their children riding in the rear -the reverse is also possible. The same might happen between friends and relatives. Some people may think that seat belts are especially important to children, because they will be propelled from the back to the front. Others may think that the front seats are most dangerous. Each argument should be used to discuss the importance of using belts, whether in the front or in the rear.

To involve people with little children, special child seats should also be incorporated in the campaign. Parents are most involved with the safety of their children; they have an even greater need for information, because of the many alternative ways of transporting children by car. Besides, it has

been shown that the fitting of child seats is most inadequate. In the Netherlands, some organizations have developed a rental system, which provides another opportunity to get the information across.

We therefore recommend that efforts are concentrated in promoting seat belt use, by taking advantage of a new law to enforce the use of seat belts for rear seats. It is necessary then to make the law applicable to all persons, and to guide this principle through a long term campaign, executed on a large scale. This approach seems to have more potential for significant results than the initial application of the law to new cars only. Such a measure does not convince people that seat belts for rear seats are very important, because in that case every car should have them fitted and everyone should use them. Besides, this does not motivate the police to enforce the law; they will first have to inspect the car to see in what year it was built. In England, where belt use on the front seats became mandatory late, but for everyone, there are virtually no problems now. For the rear seats, however, belt use became mandatory gradually, - for new cars only -, and only for children under 14 years old, which makes it hard for the police to check on belt use. Belt use for adults on rear seats is very low and for children much lower than on front seats. Finally it is recommended to start evaluation research with the enactment of measures. On the one hand it is meant to find out who were reached with the campaign, and on the other hand to check which different behaviour, new knowledge, and new insight and attitudes have been obtained. On this information a possible new campaign can be based.

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