

Summary

ENFORCEMENT ACTIONS INFLUENCE COMPLIANT BEHAVIOUR IN ROAD-USERS THIS HAS BEEN SHOWN AT ENFORCEMENT LOCATIONS WITH OBJECTIVE STATISTICS FOR SPEEDING VIOLATIONS AND IGNORING RED LIGHTS. IN THE QUESTIONNAIRE SURVEY, ROUGHLY HALF OF THE ROAD-USERS INDICATED HAVING MADE LASTING CHANGES TO THEIR BEHAVIOUR FOLLOWING A PENALTY BEING IMPOSED. IN THE CASE OF COMPLYING WITH SPEED LIMITS, ROAD-USERS WOULD APPEAR TO HAVE LESS INTRINSIC MOTIVES, MEANING THAT ENFORCEMENT ACTIONS FORM AN IMPORTANT REASON FOR COMPLYING WITH THE SPEED LIMIT AND IMPOSING A PENALTY HAS ONLY A TEMPORARY EFFECT.

Introduction

MuConsult was asked to research the extent to which traffic law enforcement actions are effective in the area of Traffic teams' national priorities.

The main question of the research is: ***What is the effect on compliance with traffic regulations by motorists and motorcyclists of the various enforcement actions which take place within the national priorities?***

This provided the following research questions:

1. To what extent are motorists and motorcyclists familiar with locations of enforcement actions?
2. Is compliance higher on routes or at locations where enforcement measures are in place compared to those routes or locations without such measures?
3. Does having had a warning or a penalty imposed following a traffic violation influence compliant behaviour in motorists and motorcyclists?
4. Does compliance differ according to whether a road-user is caught by means of a mobile speed trap, speed check zone, speed camera or being pulled over?
5. Which future developments could have consequences for enforcement actions and compliance of motorists and motorcyclists?

The research is limited to the national priorities for enforcement of traffic regulations as defined by the Dutch Public Prosecutor's Office for the period 2016-2018 (guidelines for enforcement in Leidraad Handhavingsplan 2016-2018). These priorities are: maximum speed limit, ignoring red lights, alcohol, distraction and habitual offenders. 'Distraction' has been defined, in agreement with the supervisory group, as phoning with a hand-held phone, or using the hand-held phone for other purposes while driving. The term 'habitual offenders' describes drivers who habitually commit traffic offences governed by the Mulder Act. This

might involve committing the same offence multiple times or committing several different offences. We have restricted the research to motorists and motorcyclists. The research consisted of a number of interviews and a literature scan to explore the field. Subsequently, two empiric lines of research were set up side by side: the practical research and the questionnaire survey. These components will be briefly described below.

Developments

We spoke with police, the public prosecutor's office and TNO (Netherlands Organisation for Applied Scientific Research) about social and technological developments which affect the enforcement of traffic regulations. The current developments affecting enforcement of, and compliance with, traffic regulations mainly concern information being provided to the road-user. Due to the use of apps and amenities in the vehicle, the road-user is much more aware of their own speed and the situation on the road than they used to be, which means that unintentional mistakes occur less frequently. In addition, more information is available about the locations of enforcement actions on the road which on the one hand increases the subjective chances of being caught (since you hear more about the enforcement efforts) and on the other hand, increases the possibility of avoiding checks or adjusting behaviour (which in turn reduces the subjective chances of being caught). Current legislation will have to be looked at closely with the introduction of the self-driving car and the partially self-driving car.

Technological developments can also increase the effectiveness of enforcement actions on the one hand, carrying out automatic checks at more locations (the use of a black box or smart cameras which can detect the use of hand-held telephones, for example) and on the other hand, improve police registration processes freeing up time for officers to spend on the street.

Literature scan

In this research, we are interested in the effects of enforcement actions on compliance with traffic regulations by motorists and motorcyclists. The literature shows no clear picture of the effects of enforcement actions on the use of hand-held telephones. In the case of the remaining priorities however, a connection was found, and it would appear to contribute positively to enforcement. Still, this is difficult to look at separately from information, given that information campaigns and extensive checks are often carried out at the same time.

The effects of enforcing speed limits are documented best. Multiple instruments can be used in the enforcement of speed limits. Most studies conclude that speed check zones have more influence on compliance than enforcement through number plate identification by way of speed cameras and mobile speed traps. Speed check zones ensure better traffic flow and a steadier speed. Speed cameras can result in stop-start movements (kangaroo jumps) which do not aid traffic flow or contribute to steady speed. In the case of being pulled over, the pressure of enforcement and with that, the objective chances of being caught and the visibility of the enforcement actions seem to contribute to the extent of compliance with the speed limit.

Practical research

Ignoring red lights

The effect of enforcement actions on the offence of ignoring red lights was researched on local roads with a maximum speed limit of 50 km/h. Enforcement actions on this category of road led to a reduction in the number of motorists ignoring red lights.

The local roads researched are in Nijmegen. We have no reason to suppose that the effects on this type of road would be any different in other municipalities than the results shown in Nijmegen.

We recommend that any follow-up research also includes regional roads with maximum speed limits of 80 or 100 km/h.

Maximum speed limit

On all the types of roads studied, local, regional and motorways, enforcement actions lead to a lower average speed compared to situations without enforcement actions. The reduction in speed driven is greatest on local roads, a drop of 10%. This could be due to the fact that a single motorist who adjusts their speed is followed by motorists who cannot easily overtake and are therefore forced to adjust their speed too.

On regional roads, the reduction in speed driven where enforcement actions are in place is between 2% and 4%. One possible explanation for this modest effect is that speeding violations on this type of road are relatively few and a slight lowering of speed will therefore result in no more offences being committed.

The drop in speed driven on motorways is 1%. The effect is relatively small.

The difference in effect of enforcement actions on the various types of roads can be explained by the attitude of other road-users and the perceived road safety risks involved with the behaviour: driving too fast on local roads leads to unsafe situations more quickly than on more major roads.

Questionnaire survey

Compliance with national priorities

Exceeding the speed limit is the most common traffic violation committed by road-users. This applies both to motorists (27% of the motorists breaks the speed limit regularly or even more often) and to motorcyclists (37% of the motorcyclists breaks the speed limit regularly or even more often). Few road-users regularly, or more often, ignore red lights but a great many road-users ignore a red light now and then (44% of the motorists and 34% of the motorcyclists).

The offence least often committed in this category of violations is that of driving under the

influence of alcohol. Motorcyclists drive under the influence of alcohol more often than motorists do.

Motives for compliance

Intrinsic motives (road safety and other intrinsic motives such as embarrassment at being caught or habit) play a part in all types of behaviour. The influence of intrinsic motives is less strong in compliance with speed limits. This is probably due to the fact that driving too fast is less strongly connected to road safety in the public's mind. Extrinsic motives such as enforcement actions are therefore particularly important to compliance with speed limits and less so to other behaviour. This goes together with the high degree of violations of speed limits. The risk of a fine is by far the most frequently mentioned motive in the cluster of enforcement-related motives.

Looking up information about the locations of enforcement actions

In total, 22% of motorists and 40% of motorcyclists look up information about enforcement actions on the roads. They do this more often for familiar roads than unfamiliar ones. In addition, motorists in particular look up information about the location of speeding checks more often than about red light and alcohol checks. This difference is less significant in the case of motorcyclists. This can be explained, as far as roadside alcohol checks are concerned, given that motorcyclists more often drive under the influence of alcohol than motorists do.

Penalties imposed

Motorists and motorcyclists more often have penalties imposed on them for speeding violations than they do for the other types of offence in this research. Of the motorists, 42% has had one or more penalties imposed for exceeding the speed limit compared to 44% of the motorcyclists. For ignoring a red light, 6% of the motorists and 14% of the motorcyclists has had one or more penalty imposed. In the past 5 years, 5% of the motorcyclists has had one or more penalties imposed for driving under the influence of alcohol. Only 2% or less of the motorists has had one or more penalties imposed for driving under the influence of alcohol or using a hand-held telephone while driving (whether for phoning or other use).

There is a correlation between the number of penalties imposed for the various national priorities in this study. This means that motorists who had a penalty imposed for using a hand-held telephone while driving also often had a penalty imposed for driving under the influence of alcohol (correlation of 0.66). The smallest correlation can be found between the number of penalties imposed for speeding violations and the other types of offence (correlations of between 0.20 and 0.49 were found for motorists and between 0.36 and 0.43 for motorcyclists).

Speeding violations, penalties and motives

We concluded that speeding violations were committed relatively frequently (compared to other offences) and that less intrinsic motives are given for keeping to the speed limit than for

the other types of offence. If avoiding committing the remaining offences is more intrinsically driven, that would explain why there is a strong correlation between the number of penalties imposed for these types of offences: the road-users who attribute less importance to road safety or who are not aware of the connection between their own behaviour and road safety will commit violations more often and will therefore more often have penalties imposed.

Whether or not a person has had a penalty imposed for exceeding the speed limit is dependent on exposure (the number of kilometres a person drives each year) and the frequency with which the person commits such offences. The number of penalties imposed for each kilometre driven is higher for the motorists and motorcyclists when more kilometres are driven than less. In the case of ignoring a red light, the correlation between the number of kilometres driven and the number of penalties imposed is not so strong. The number of penalties a person has had imposed is related to the frequency with which the person commits the offence; the more often a person violates the regulations, the more often they will have had a penalty imposed. Taken together with the fact that the offence of ignoring a red light is committed less often indicates that this is not dependent on the chances of being caught for the offence.

Complying with traffic regulations following penalties or warnings

The lasting compliance with the various types of traffic offence reported is shown in Table S.1.

Table S.1.: The percentage of motorists and motorcyclists who indicated that they had made lasting changes to their behaviour following a penalty.

Type of offence	type of road-user	range lasting compliance
Ignoring a red light	Motorist	51-78%
	Motorcyclist	35-56%
Exceeding speed limit	Motorist	39-51%
	Motorcyclist	37-46%
Driving while under the influence of alcohol	Motorist	41-85%
	Motorcyclist	45-54%
Phoning with a hand-held phone	Motorist	52-69%
Hand-held phone for other use	Motorist	25-59%

In the case of motorists, enforcement actions for ignoring red lights and phoning with a hand-held phone while driving result in a more lasting change in behaviour than enforcement actions for speed limit violations. This difference between ignoring a red light and speed limit violations is not present in the case of motorcyclists. The statistics for driving while under the influence of alcohol are based on very few respondents but do indicate that motorists have a lasting reaction to receiving a penalty for driving under the influence of alcohol. However, the question is whether this can be explained fully or in part by the driving bans and other penalties which can be imposed.

No significant differences were found between the behavioural effects as a result of the various enforcement instruments. The warning does, however, appear to have a slightly greater effect than a penalty (for example: 51% of the motorists indicated having experienced a lasting influence on their behaviour after a warning for a speeding offence while this is 39-48% for the other instruments). So contact with the police officer, without actually being punished by a fine or other penalty, seems to have a greater influence on the motivation to better comply with the regulations than the automatic, number plate-based imposing of a penalty.

The questions about the effect on compliance of penalties imposed reveal that a penalty imposed for ignoring a red light mostly affects behaviour at the red light concerned and results in very little halo effect. In the case of speeding offences, having a penalty imposed does have a halo effect on other roads but this effect is not long-lasting.

Answers to research questions

To what extent are motorists and motorcyclists familiar with locations of enforcement actions?

A total of 27% of the motorists and 47% of the motorcyclists indicated that they were aware of the locations of enforcement actions or looked up this information before or during the journey.

Is compliance higher on routes or at locations where enforcement measures are in place compared to those routes or locations without such measures?

Compliance with traffic regulations in the areas of speeding and ignoring a red light increases at locations where there is enforcement by way of cameras.

The research shows that a smaller percentage of road-users drives through a red light on local roads if there are enforcement actions than if there are no enforcement actions. There is a great range in the decrease: the percentage of road-users that ignores a red light drops by 7% to 54%. Enforcement actions led to a decrease in the average speed driven on all the roads studied. The effect of enforcement actions is greatest on local roads (-10%). Effects of -2 to 4% were recorded on regional roads and -1% on motorways.

The literature scan reveals that speed check zones (particularly when combined with a lowering of the speed limit) and being pulled over had a positive effect on compliance with the speed limits.

Research, including Dutch studies, shows that enforcement actions in the area of driving under the influence of alcohol (in combination with educational campaigns) have a positive effect on compliance.

American research shows that in regions where traffic regulations prohibit the use of hand-held phones while driving, this actually happens less frequently. The question is whether this is an effect of enforcement actions or rather a good projection of the prescriptive norm

expressed by such a regulation. Direct studies into the effect of enforcement actions do not give a clear picture of the effects of such actions on compliance.

Does having had a warning or a penalty imposed following a traffic violation influence compliant behaviour in motorists and motorcyclists?

According to the respondents of the survey, receiving a warning or having a penalty imposed for a traffic violation leads to a lasting change in behaviour in some road-users. More than half of the motorists said they had made lasting changes to their behaviour on the road after a penalty or a warning for ignoring a red light or using a hand-held phone while driving. In the case of the remaining types of traffic offences, for motorists and motorcyclists, less than half of the respondents said that they had made lasting changes to their behaviour.

Does compliance differ according to whether a road-user is caught by means of a mobile speed trap, speed check zone, speed camera or being pulled over?

There were no significant differences between the reactions by respondents to the various enforcement actions indicated in the questionnaire. A slightly stronger effect of the warnings was visible, compared to number plate-based enforcement by the other enforcement systems. This indicates that personal contact with the police officer is important.

Which future developments could have consequences for enforcement actions and compliance of motorists and motorcyclists?

According to the experts interviewed, future developments for the road-user which could influence the effectiveness of enforcement actions are further developments of current apps. For example, apps can make use of new data sources, allowing them to better respond to the situation at that moment (vehicle-to-vehicle communication), pass on information more quickly, collaborate with new applications (such as Adaptive Cruise Control or ACC) and they may well be able to use new technologies such as smart cameras (which recognise number plates of police cars). In addition, road-users could be offered financial incentives for improving their driving behaviour by means of discounts from insurers if the road-user installs a black box in the vehicle. Developments are also ongoing in the direction of the self-driving car. In the first instance (in which subtasks of driving will be taken over by the car), this development will ensure a reduction in the number of unintentional errors (such as unintentionally exceeding the speed limit). If in the future the car drives completely autonomously, this will be accompanied by an appropriate legal framework.

Technologies which influence the use of enforcement actions include the digital registration by the police of offences and accidents, technological applications allowing more types of checks to be implemented automatically (such as cameras which detect whether or not a seat belt is being worn), making checks portable and the use of the black box in the car as enforcement.