THE FACTORS CONTRIBUTING TO POLICE VEHICLE DAMAGE IN FINLAND

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Abstract: This article presents the findings in the project *From Surveying Police Vehicle Damage towards Improving the Driver Education and Training*, and discusses the factors that increase the risk of a crash. Based on the police vehicle damage forms that were filed in 2013 it is easy to pinpoint the most common places and types of accidents that occur to police vehicles. These results can help determine how to improve driver education during police training.

Keywords: police vehicle; police training; accident; driver inattention; driver education.

INTRODUCTION

The project, *From Surveying Police Vehicle Damage towards Improving Driver Education and Training*, funded by the Ministry of the Interior in Finland and carried out by the Police University College in 2015. This paper discusses some of the key findings regarding the incidents that have caused damage to police vehicles, and based on other studies, suggests which factors could be the most crucial when trying to prevent the accidents.

Traffic safety in Finland is on a good level in general. The road fatality rate was slightly lower than the EU average in 2014 (European Commission, 2015). Fatal road accidents in Finland have decreased since the 1970s but the numbers have been fluctuating in recent years. All road traffic accidents recorded by the police peaked later than the fatal accidents, but have also seen a long downward trend that has now slowed down. The accidents for which claims have been paid by traffic insurance, however, have increased in recent years. (Central Organization for Traffic Safety in Finland, 2014)

In 2013 damage to police vehicles in Finland cost a little over 300 000 euros according to the police vehicle fleet management system ( ). The numbers, however, do not include the vehicles that have been totalled or the damages that have been repaired during regular maintenance. In addition, the time the vehicle is out of use and the possible injuries sustained by people involved come with a cost of their own. Therefore it is difficult to estimate the full cost of these types of damages. There are multiple factors that account for accidents involving police vehicles and understanding them is the first step towards preventing them.

METHOD

This is the first study in Finland that gathers data from all accidents involving police vehicles that have been reported using the vehicle damage form. It does not take into account any possible injuries sustained in the crash, but instead focuses solely on the damage to the police vehicles. This will also include any mischief a passer-by or a non-officer travelling inside may have caused to the vehicle as well. Therefore, as not all cases can be referred to as accidents, they will all be referred to as incidents from here on.

A quantitative method was used in this study. All of Finland's Police units were asked to deliver all the vehicle damage forms for police cars, motorcycles and scooters from 2013 to the Police University College. Out of the 14 units, 11 of them contributed to the study. The number of forms

that were received in total was 693. In addition to the general vehicle and driver information as well as the time and location, the following details were enquired in the form: the incident type, the weather conditions, engagement, place of incident, a description of the incident, a description of the damages and finally, counter side, which refers to any object or being that has damaged the vehicle. All this information was collected into tables for further analysis.

The forms had mostly the same structure in every unit. The only difference was with 'engagement' which is the type of driving activity the vehicle was involved in at the time of the incident. Some units had forms that only included two options which were 'Routine patrol/en route to' and 'parked'. The first option therefore covered all possible engagements in which the car was moving, which means that option might have a slightly higher percentage than it should.

RESULTS

The most common places where police vehicles were damaged were streets and roads as shown in Table 1. However, it should be noted that the parking garages and parking areas together made up almost half (46 per cent) of all places of incident.

Table 1. The type of place where the vehicle was damaged.

Place of incident	Number	%
Street/road	224	32.3
Parking area/yard	189	27.3
Parking garage	130	18.8
Walk/cycle path	47	6.8
Junction	30	4.3
Gravel road	11	1.6
Terrain	8	1.2
Other	7	1.0
Unknown	47	6.8
Total	693	100.0

The incident types as collected from the forms are shown in Table 2. In some cases more than one option was applicable but only one was option from each form was chosen for the study. The choice was made based on which type had the most to do with causing the incident. The

most common type of incident was reversing (25 per cent) followed by collision with a fixed or a moving object (21 per cent). This included other vehicles but left out animals as that was a separate option.

Table 2. The type of incident during which the damage occurred.

Incident type	Number	%
Reversing	173	25.0
Collision with a fixed or a moving object	147	21.2
Mischief	69	10.0
Turning	63	9.1
Tactical stop manoeuvre	42	6.1
Rear-end collision	23	3.3
Animal collision	22	3.2
Derailing from the road	19	2.7
Changing lanes	3	0.4
Other	92	13.3
Unknown	40	5.8
Total	693	100.0

Table 3 summarises the weather conditions during the incidents. The weather was mostly dry (39 per cent) and if the incidents that happened indoors (18 per cent) are added up, the conditions in which the surface was dry make up 57 per cent of the incidents. In 17 per cent of the cases the conditions were unknown.

Table 3. The weather conditions at the time of the incident.

Weather conditions	Number	%
Dry	268	38.7
Indoors	127	18.3
Wet	62	9.0
Snow	56	8.1
Ice	54	7.8
Slush	9	1.3
Unknown	117	16.9
Total	693	100.0

As previously mentioned, the proportion of incidents that happened during routine patrol (63 per cent) might be slightly higher than it should be due to the different forms that were used in some units. The incidents that happened while the vehicle was parked (12 per cent) were

mostly cases of mischief that were not witnessed by the driver when they occurred. The cases where the siren was on made up 14 per cent of all incidents, as shown in Table 4.

Table 4. The engagement type that the vehicle was involved in at the time of the incident.

| Engagement	Number	%
Routine patrol/en route to	437	63.1
Parked	84	12.1
Responding to an emergency call (lights/siren)	52	7.5
Pursuit (lights/siren)	47	6.8
Routine patrol/en route to (lights)	15	2.2
Following a suspicious person/vehicle	9	1.3
Training	1	0.1
Unknown	48	6.9
Total	693	100.0

The most common counter side was another vehicle (25 per cent) as shown in Table 5. Almost one in five (19 per cent) of the incidents were collisions with a tall object such as a traffic sign, tree or a pole. Indoor structure was not an option on the form but as there were several cases where police vehicles collided with the structures in garages; the cases were sorted into that separate category during the study.

Table 5. The counter side is the object or a being that damaged the vehicle by itself or by having the vehicle crash into them.

Counter side	Number	%
Other vehicle	171	24.7
Traffic sign/tree/pole	134	19.3
Paving/snow bank, etc.	88	12.7
Indoor structure	84	12.1
No counter side ([1])	41	5.9
Other street user	38	5.5
Suspect in vehicle	32	4.6
Police vehicle	20	2.9
Animal (other than elk)	19	2.7
Elk	4	0.6
Other	16	2.3
Unknown	46	6.6
Total	693	100.0

The time of the incident was mentioned in 660 cases. The following graph in Figure 1 shows how the number of incidents varies depending on the time of the day. There is no data on how many vehicles are being used at any given time and therefore no crash/ number of vehicles ratio can be calculated. It can however be seen that the number of incidents starts to grow rapidly between 8:00 and 9:00 in the morning, leading to a peak between 14:00 and 15:00 in the afternoon.

Figure 1. Graphs depicting the 660 incidents that have caused police vehicle damages, sorted by the hour of the day they occurred.
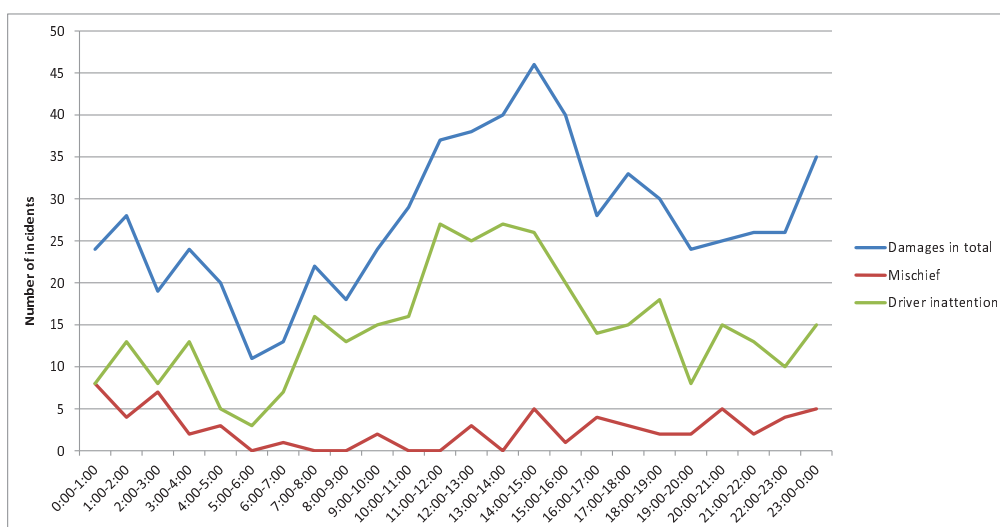
([1]) No counter side is considered to exist when the officer or another person in possession of the vehicle damages it themselves during situations other than driving, such as during maintenance or simply by breaking something by hand.

The two lower graphs present the number of incidents that were due to mischief by non-officers and those that were due to driver inattention in the damaged police vehicle. While mischief is the cause of 1 in 10 police vehicle damages, it takes place mostly at night. During daytime driver inattention is a much more significant factor.

DISCUSSION

Based on the results, police vehicles mostly get damaged in low-stress situations and since almost half of the incidents took place in parking areas or garages, it is likely the speeds were low. A study focusing on officer-involved collisions in California shows that out of over 35 000 vehicle collisions over 80 per cent took place during clear weather and in almost 90 per cent of the cases the road surface conditions were dry (Wolfe et al., 2015). In Tom LaTourrette's (2015) study in the United States over a period of 1 year, driver distraction was mentioned as the main cause for law enforcement officer vehicle crashes where the officer was at fault. However, in lights and siren crashes driver distraction was less often the cause. In this study the lights and siren crashes made up only 14 per cent of all incidents as well, while the number of incidents in low-stress situations was much higher.

This study did not take into consideration how many people there were in the vehicle at the time of incident but according to LaTourrette in 83 per cent of the cases there was only one officer in the vehicle at the time. In Finland the policing strategy is focused on fast response to emergencies and not on visible police presence (Police of Finland, 2015). Therefore there are usually two officers in the car because an officer cannot respond to emergencies on their own due to safety reasons. It is mentioned that having two officers in the vehicle would reduce the risk of crash as the other person could operate the mobile data terminal and watch the passenger in case there is one. This kind of co-driving where the other officer supports the driver by handling the other details is something that could be taught during driver training. Special attention could be focused on how the risks differ when one person is driving as opposed to having two officers in the vehicle.

The risk factor in general is something that should be paid special attention to during training as the incidents show that the vehicles often get damaged in situations where accidents are not expected. The damages that happen in parking areas and garages and the number of crashes involving reversing do not necessarily mean that the driver is inexperienced in handling the vehicle. It could simply mean that they are not completely aware of the risks. The higher number of daytime crashes could indicate that there are more police vehicles at work during that time, hence increasing the risk of a crash. However, there is a decrease in the incidents after 15:00 when the afternoon traffic congestion usually begins, indicating that more traffic does not necessarily mean more crashes in this case.

A report from Klauer et al. (2006) analysed general driver inattention immediately prior to a crash and near-crash and the results indicated that there is a significant difference between different types of inattention to the forward roadway. Eye glances off the road that lasted longer than two seconds increased the crash/near-crash risk while those that were shorter than two seconds made no difference regarding the crash risk. Meanwhile driver-related inattention to the forward roadway, which means the driver was scanning the driving environment, increased safety as long as the eyes returned to the forward roadway in less than two seconds.

It was also found with urban drivers that while driver drowsiness, which includes eye closures, minimal movement of the body or eyes or repeated yawning, increases the risk of being involved in a crash or near-crash four to six times as opposed to attentive driving, the drowsiness levels vary greatly depending on the time and place. Drowsiness increased during darkness as opposed to daylight but also in less-demanding traffic situations such as free-flowing traffic or areas with no roadway junctions (Klauer et al., 2006).

CONCLUSIONS

Since damages tend to occur to police vehicles in low-stress situations, it is possible to prevent them by tackling the causes that lead to driver inattention. The key might not be in increasing the number of driving lessons but instead by focusing on issues that cause the inattention.

As mentioned previously, the time of the day, the traffic environment and the stress level all influence the driver alertness in different ways, and when it comes to the police profession that involves demanding situations, these factors could all have a slightly different effect on an officer as opposed to drivers in general.

Due to lack of driver information in this study it was difficult to determine the quintessential causes that led to the incident. More information on the driver is required in order to fully determine the causal factors for the incidents. Work experience, the type of driver education the person has received, work and sleep schedule among other things reveal something about the driver's level of experience and alertness, but also more details are needed about the specific time of the incident: if the person was on their way to lunch, leaving the scene or just starting their shift, if the traffic was free-flowing or if the garage was full or half-empty. All these small factors can help determine the risk for a specific type of an incident. This information can then be applied to training in different ways. The students can be asked to self-evaluate their solutions in different driving situations or the teacher can bring up particular risks during classes. There are unique aspects to the police work and that also reflects in the type of accidents they might get into. Therefore the society could benefit from a very detailed research on police vehicle crashes.

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