



Accident involvement of stolen cars in 1997 and 1998

Prepared for Crime and Policing Group, Home Office

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Executive Summary

Approximately 400,000 cars were stolen per year in 1997 and 1998. Previous claims from various pieces of research have suggested that stolen cars are much more likely to be involved in road accidents than vehicles driven legitimately. In 2000, the Police and Reducing Crime unit of the Home Office commissioned TRL Limited to carry out research into the involvement of stolen cars in the accidents that occurred in these two years.

The main aim of the research was to estimate the accident rate per year of exposure of stolen cars and compare it with the known rate for the complete car fleet. This was achieved by using the Vehicle Registration Mark to link the details of stolen cars from police records, DVLA files and the national road accident database. The analysis used details of stolen cars from two sources:

- national details downloaded daily from the Police National Computer (PNC), although this source suffers from the drawback that it does not include cars that are stolen and recovered on the same day, overnight or during a weekend;
- complete records of stolen cars provided by four police forces, Greater Manchester, Northumbria, Dorset and Dyfed-Powys.

Comparative analysis of the two sources reveals the shortcomings of the PNC stolen vehicle data for this type of research. Consequently, the main conclusions of the research are based on the complete records from the four police forces. On the other hand, the areas covered by these four police forces account for only 9 per cent of road accidents in Great Britain, and the results are dominated by data from Greater Manchester and Northumbria because of the high number of thefts relative to the other two areas. Thus, the conclusions have been strongly influenced by the accidents and thefts recorded by the police in Greater Manchester and Northumbria, and may not be nationally representative. Complete records of stolen cars would be required from a larger number of police forces to provide a fuller national picture.

It was found that stolen cars were around *four* times more likely to be involved in an injury accident than a legitimately driven car. The relative risk was particularly high for stolen cars driven by men less than 20 years old and in accidents occurring at night. Accidents involving stolen cars were more likely to involve serious injury than accidents generally. This may be partly explained by the fact that stolen cars involved in accidents are more likely to be old, since new cars tend to have better secondary safety features than older cars. In addition, accidents tended to be more serious at night than during the day.

1 Introduction

Car crime has been a subject of major concern for many years. Between April 1999 and March 2000, 1,043,918 vehicle crime offences were recorded by the police, accounting for 20 per cent of all crime. Theft of a motor vehicle accounted for about 36 per cent of these offences. The Home Office is concerned to establish the extent to which stolen cars are involved in road accidents, and in 2000 commissioned TRL Limited to examine the extent to which stolen cars were involved in injury accidents during the years 1997 and 1998.

Previous research cited by the government, police and others had identified car thieves as being between 47 and 200 times more likely than legitimate drivers to be involved in road accidents, although the research has never been validated. More recently, unpublished research reached a more conservative estimate of the scale of this problem using media analysis, concluding that stolen vehicles were at least four times more likely to be involved in a serious injury accident than legitimately driven vehicles.

The aim of this research was to produce a more reliable estimate of the extent of the involvement of stolen cars in injury accidents. In particular:

- to examine the accident rate of stolen cars compared with the accident rate of cars in general;
- to indicate the nature of accidents involving stolen vehicles.

This report presents the results of the research. Section 2 describes the methodology, Section 3 presents the results and Section 4 discusses the conclusions that can be drawn.

2 Methodology

The main source of information on stolen vehicles in Great Britain is the Police National Computer (PNC) which holds details of vehicles reported as stolen by police forces throughout the country. A vehicle's record is deleted from the PNC once its recovery has been reported, so at any one time the computer only holds details of unrecovered vehicles. In order to have a fuller record of stolen vehicles, rather than a snap shot at a particular point in time, a download of stolen vehicles from the PNC is made each working day. This download shows each vehicle that has been added to or removed from the PNC since the previous working day. From this information, a file is created which contains for each stolen vehicle:

- its Vehicle Registration Mark (VRM);
- the theft date (i.e. the date the record was added to the PNC);
- the recovery date (i.e. the date the record was removed from the PNC);
- the police force area from which the vehicle was stolen.

The VRMs from this file are then matched to DVLA vehicle records to get the vehicle make, model and variant and the date of first registration. The Home Office

supplied these files for 1997 and 1998 to TRL as part of a contract under which TRL prepared the national Car Theft Index (Home Office, 1999). Since the source of this file is the Police National Computer, it will be referred to as the PNC file in this report.

One consequence of the way in which this file is compiled is that it does not include records of stolen vehicles that were recovered on the same day, overnight or over a weekend. This deficiency was likely to affect the research, and the issue was addressed by using additional data from four police forces. In order to prepare the national Car Theft Index, the Greater Manchester, Dyfed-Powys, Northumbria and Dorset forces supply the Home Office with details of all stolen vehicles, irrespective of when they are recovered. This information was used to assess the extent to which cars stolen and recovered promptly are involved in accidents.

TRL maintains a database of the STATS19 records of injury accidents that are provided to the Department of the Environment, Transport and the Regions (DETR, now the Department for Transport) by all British police forces (DETR, 1999). The police complete a STATS19 report form for all road accidents known to them that involved at least one vehicle and resulted in personal injury. This form records details of the accident, the vehicles involved and the casualties. Since 1989, the police have also recorded the VRM of each vehicle involved.

The STATS19 database maintained by TRL does not include VRMs, but they were made available for this project under a special arrangement so that the STATS19 records of accident-involved vehicles could be linked to the PNC file. It was then possible to determine whether the vehicle was stolen at the time of the accident by checking whether the date of the accident fell between the dates of theft and of recovery (if applicable). The vehicle classification system that had been developed for the Car Theft Index was used to determine whether a stolen vehicle was a car.

The involvement of stolen cars in injury accidents can be compared to the accident-involvement of 'legitimate' cars, using the linked files and taking account of the accident details provided by the STATS19 reports. To do this meaningfully, the length of time that a stolen car was exposed to the risk of being involved in an accident must be taken into account. Section 3.4 compares the rate of accident-involvements per year of stolen cars to the rate for cars in general.

3 Results

This section presents the results of various analyses of the linked files. Section 3.1 describes the results of examining the complete records from the four police forces and Section 3.2 extends this to include all police forces using the PNC file. Section 3.3 involves a simple analysis of the nature of accidents involving stolen cars and Section 3.4 presents a more detailed analysis to establish the relative accident rates of stolen cars in 1997. The relative accident rates for 1998 are presented in Section 3.5.

3.1 Complete records of stolen vehicles from four police forces

As mentioned in Section 2, the PNC file of stolen vehicles does not contain details of vehicles that were stolen on the same day, overnight or during the weekend. This issue was addressed by examining the complete records for 1997 for four police forces (Greater Manchester, Dyfed-Powys, Northumbria and Dorset) which had co-operated with the Home Office by recording all stolen vehicles on their computer systems. These records included the stolen vehicle's VRM, the date it was stolen and the date it was recovered (if applicable). Further information about the vehicle was obtained from files previously prepared by TRL in order to calculate the Car Theft Index.

A total of 45,237 stolen cars with valid VRMs were recorded in 1997 in the four police force areas. These were matched to the STATS19 file, and it was found that 887 of them had been involved in an accident sometime during the same year. This number includes cars that had been involved either before they were stolen or after they were recovered. To determine whether an accident occurred whilst the car was stolen, the accident date was compared to that car's theft date and recovery date. The resulting numbers of cars that were involved in accidents whilst stolen are included in Table 1, together with the numbers of stolen cars. One noticeable feature of the table is the predominance of data from Greater Manchester and Northumbria, because of the relatively low number of thefts in the other police force areas.

Figure 1 compares the accident date with the theft and recovery dates for each stolen car. The spike at 0 shows the number of cars that were involved in an accident whilst stolen (314). The columns to the left of this spike show the number of cars which were involved in an accident before they were stolen while the columns to the right show the number of cars which were involved in an accident after being recovered. The figure suggests that any minor errors in recording dates would not affect the results significantly.

Table 1 Cars stolen in the four police force areas, 1997

<i>Police force area</i>	<i>Number stolen</i>	<i>% of total</i>	<i>Number in accident whilst stolen</i>	<i>% of total</i>
Greater Manchester	29,905	66	215	68
Northumbria	13,112	29	85	27
Dorset	1,909	4	12	4
Dyfed-Powys	311	1	2	1
Total	45,237	100	314	100

In total, only $314/45327=0.7$ per cent of stolen cars in the four areas were found to have been involved in an injury accident whilst stolen. Similar proportions were found in the individual police force areas.

The VRMs of the accident-involved stolen vehicles from the four police files were cross-referenced to those on the PNC file. This identified the stolen cars that were recovered sufficiently quickly that there was no record on the PNC file. Of the 314 accident-involved stolen vehicles, only one fifth were recorded in the PNC file. This suggests that cars that are stolen and recovered so quickly that they do not appear on the PNC file are about five times as likely to have been involved in an accident than those that took longer to recover or were never recovered. This demonstrates that the results from the PNC analysis to be presented in Section 3.2 will be incomplete.

Table 2 relates the date of theft to the date of the accident. The majority (54 per cent) of accidents occurred on the day of the theft and over 80 per cent within 1 day of the theft. Predictably, the pattern differed for the stolen cars that were or were not recorded in the PNC file. The stolen cars recorded in the PNC file were much more likely to have been involved in an accident at least two days after the car was stolen, whereas the converse was true for those not in the PNC file.

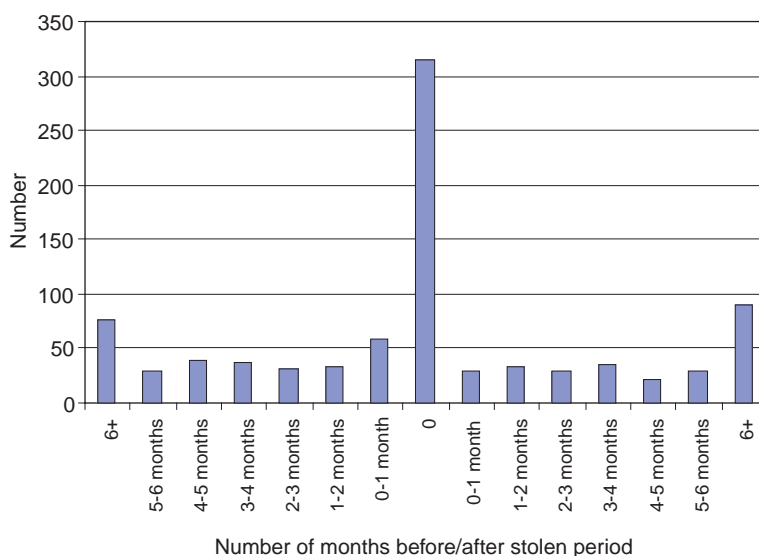


Figure 1 Time between the accident and the theft period

Table 2 The period between theft and accident

<i>Number of days from the theft until the accident</i>	<i>All accident -involved stolen cars</i>	<i>Cars recorded in PNC file</i>	<i>Cars not recorded in PNC file</i>
Same day	54%	22%	62%
1 day	31%	33%	30%
2 or more days	16%	44%	8%
Total (N=100%)	314	64	250

Table 3 relates the date of the accident and the date of recovery. 80 per cent of the accident-involved stolen cars were recovered on the same day as the accident. Stolen cars not recorded on the PNC file were much more likely to be recovered on the day of the accident, while cars recorded on the PNC file were much more likely to be recovered two or more days after the accident. It is interesting to see that 6 per cent of the accident-involved stolen cars were not recovered: presumably they drove off after the accident but the police were able to record the VRM.

3.2 Incomplete records of stolen vehicles from all police forces, 1997

The previous section presented results from the complete records from four police forces. This section analyses the 1997 PNC file, although it should be remembered that the results may well present a biased view of the national picture.

The theft date recorded in the PNC file is the date when the record was input to the Police National Computer and the recovery date is the date when it was removed. Assuming the record was added (or removed) on the day of the theft (or recovery), then the accident-involved stolen cars can be identified reliably as those whose accident date fell between these two dates. A date sensitivity analysis was carried out to test this assumption. It was found that 2,641 of the cars stolen in 1997 were also involved in an accident

Table 3 The period between accident and recovery.

<i>Number of days from the accident to recovery</i>	<i>All accident -involved stolen cars</i>	<i>Cars recorded in PNC file</i>	<i>Cars not recorded in PNC file</i>
Same day	80%	53%	87%
1 day	5%	3%	6%
2 or more days	9%	25%	5%
Not recovered	6%	19%	2%
Total (N=100%)	314	64	250

during that year, but that only a quarter of these accidents (656) happened whilst the car was stolen. The PNC file does not contain information on vehicles stolen and then recovered quickly, however, as mentioned in Section 2.

Figure 2 relates the date of the accident to the stolen period for these 2,641 cars. The spike at 0 shows the proportion of cars that were involved in an accident during the stolen period (25 per cent). The columns to the left of this spike show the proportions of cars which were involved in an accident before being stolen while the columns to the right show the proportion which were involved in an accident after being recovered. It can be seen that when the accident did not occur whilst the car was stolen it was more likely to have occurred before the car was stolen, with 10 per cent occurring less than 1 month before the car was stolen. This may suggest that there was some delay between the theft and the record being added to the PNC, perhaps because owners did not report their car as stolen for several days (e.g. they were on holiday) or the car was stolen over the weekend and the details were not recorded until the next working day.

Table 4 shows the number of days from the date the car was stolen to the date of the accident (but note that the analysis excludes accidents that occurred in the following year, 1998). Only one quarter of the accident-involved stolen cars had their accident on the same day as the car

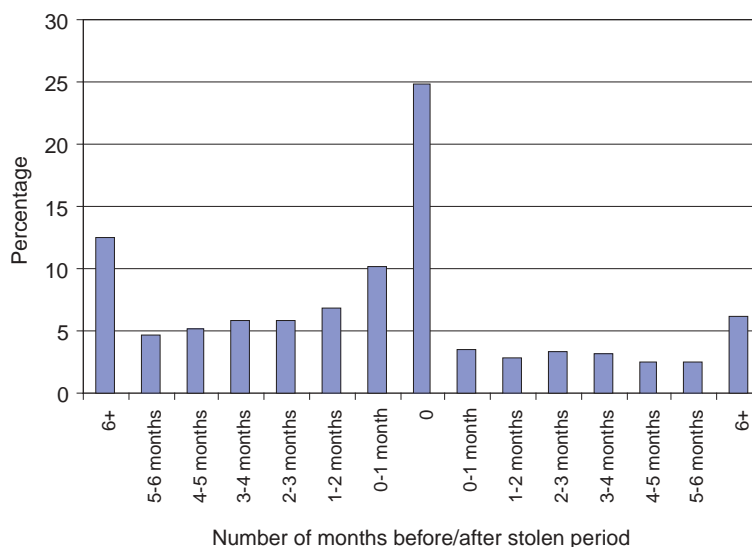


Figure 2 Time distribution between the accident and the theft period

Table 4 The proportion of accident-involved stolen cars by the period between theft and accident

Number of days from the date the car was stolen until the accident	Percentage of accident-involved stolen cars
None	25
1 day	18
2 days	8
3 –5 days	10
6 – 30 days	14
31 – 180 days	15
181 - 365 days	10
Total (N=100%)	656

was stolen, which differs considerably from the results of Section 3.1. This is to be expected since those cars that were recovered on the same day or overnight are missing from the PNC file. 10 per cent of accident-involved stolen cars were involved in an accident more than 6 months after the car was stolen.

3.3 The nature of accidents involving stolen cars

This section examines the nature of the accidents in which the stolen cars were involved, compared with the general range of car accidents. Results from the four forces are presented wherever possible since the previous sections have shown that the picture provided by the PNC data is incomplete.

The Car Theft Index publication (Home Office, 1999) classifies cars into seven main ranges that are broadly based on the car market segments defined by the Society of Motor Manufacturers and Traders. Table 5 presents the distribution of accident-involved stolen cars by range using this classification (the numbers of stolen cars are too small to use any more detailed classification). The distribution of accident-involved stolen cars (all forces) closely matches the distribution of stolen cars (all forces), which suggests that no car range was more or less likely than any other to be involved in an accident while stolen.

Stolen cars involved in accidents were more likely to be driven by a young man than accident-involved cars in general. 88 per cent of accident-involved stolen cars were driven by men compared with 66 per cent of all accident-

Table 5 Stolen cars by car range, 1997

Car range	Accident-involved stolen cars (four forces)	Accident-involved stolen cars (all forces)	All stolen cars (all forces)
Minis and superminis	23	25	25
Small saloons	38	40	39
Medium saloons	30	25	26
Large saloons	5	6	6
Luxury saloons	..	<1	<1
Sports	..	2	2
4x4 and people carriers	..	2	2
Total (N = 100%)	314	656	199,538

.. Sample too small for reliable analysis

involved cars. This increases to 95 per cent when looking at the four force files, suggesting that the stolen cars involved in accidents on the same day or overnight are much more likely to be driven by men than women. Figure 3 compares the ages of drivers of stolen cars involved in accidents and of all accident-involved drivers in the four police force areas: the former are much more likely to be less than 21 years old than the latter.

Table 6 shows the distribution of these accidents by time of day, and it can be seen that almost one half occurred between 9pm and 6am compared with 13 per cent of all accidents. As a consequence, the majority of these accidents occurred in darkness, whereas the reverse is true for accidents in general. These differences are less marked

Table 6 The percentage of accidents by time of day and daylight/darkness

	Four forces		All forces	
	Accidents involving stolen cars	All accidents	Accidents involving stolen cars	All accidents
6-9am	4	11	6	12
9am-6pm	35	59	49	58
6-9pm	14	17	19	17
9pm-6am	47	13	26	14
Daylight	38	73	55	73
Darkness	62	27	45	27

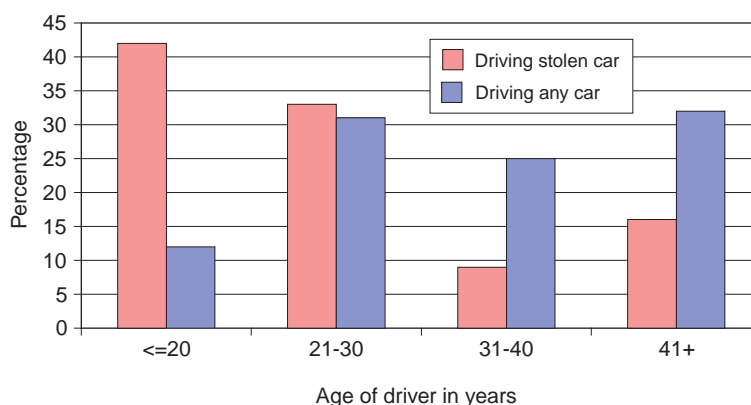


Figure 3 The age distribution of accident-involved drivers (four forces)

when the national data are analysed, probably because many cars stolen and recovered on the same day are missing from the PNC file.

Figure 4 compares the age distributions of accident-involved cars in the four police force areas. From this it is clear that stolen cars involved in accidents tend to be relatively old. This may well be explained by the fact that theft rates are higher amongst older cars: for example, cars that are twelve or thirteen years old are at least five times more likely to be stolen per year than cars less than three years old.

It is of interest to see how far the stolen car had been driven before the accident occurred. This was examined by looking to see if the accident occurred in the police force area where the car was stolen. This was the case with 92 per cent of the accidents in the data from the four forces, and is probably explained by the finding in Table 2 that the majority of accidents occurred on the day that the car was stolen. Conversely, only 10 per cent of the accidents linked to the PNC file had occurred in the police force area where the car was stolen. This may well be explained by the omission from this file of vehicles that were recovered soon after they were stolen, and the high proportion of stolen cars that were involved in an accident several months after being stolen (Figure 2).

This section has not taken into account the variable length of time between theft and recovery (if applicable), i.e. the time for which stolen cars were exposed to the risk of being involved in an accident. The next section considers the accident rate of stolen cars per year of exposure.

3.4 Accident-involvement rates of stolen cars, 1997

The question that remains to be answered is 'how much more likely are stolen car to be involved in an accident than cars in general?' To do this, the length of time that the stolen car was exposed to the risk of being involved in an accident (i.e. the exposure) must be taken into account. This is done by considering the rate of accident-involvements per year of exposure for stolen cars and for cars in general. For the latter, the available period was one year (i.e. the car could have been involved in an accident at any time during the year). For stolen cars, however, the period was invariably

less than one year, with a minimum of one day for a car that was recovered on the day it was stolen.

656 accident-involved stolen cars were recorded on the PNC file in 1997. If each of the 199,580 stolen cars in 1997 had been stolen on 1 January 1997 and not recovered then each car would have had an exposure of 1 year, giving a total exposure of 199,580 car-years. However, the available accident period for the stolen cars was often much shorter than this, and the total exposure was calculated to be 54,513 car-years when the dates of theft and recovery were taken into account. The rate of accident-involvements per year for stolen cars was $656/54,513=0.0120$.

The rate of accident-involvements per year for the full car fleet can be calculated in the same way. The number of cars involved in accidents in 1997 is known, as is the number of cars currently registered for use on the road from DVLA statistics. Virtually all of the cars registered in 1997 had an exposure of 1 year, and the overall accident rate in 1997 was 0.0128. Comparing this with the national stolen car rate suggests that stolen cars are no more likely to be involved in injury accidents than legitimately driven cars.

However, the estimate of relative risk calculated in this way is conservative. The exposure calculation assumes that the stolen car had a minimum exposure of 1 day, but if the accident occurs on the same day as the theft then the actual exposure is less than one day. In fact, if a car is stolen at 11pm on a Thursday night and is involved in an accident at 1am on the Friday morning, the calculated exposure is 2 days whereas the actual exposure is only 0.1 day. The exposure period was re-calculated taking this into account so for example cars stolen and recovered on the same day had an exposure of zero days (instead of 1 day). This had only a minimal effect, raising the rate of accident-involvements per year for stolen cars to 0.0122, which still suggests that stolen cars are no more likely to be involved in injury accidents than legitimately driven cars.

This result is likely to be misleading. The examination of the four police force files in Section 3.1 suggested that about 80 per cent of accident-involved stolen cars were missing from the PNC file. When allowance is made for this, it appears that stolen cars were in fact 4.9 times more likely to be involved in an accident than cars driven

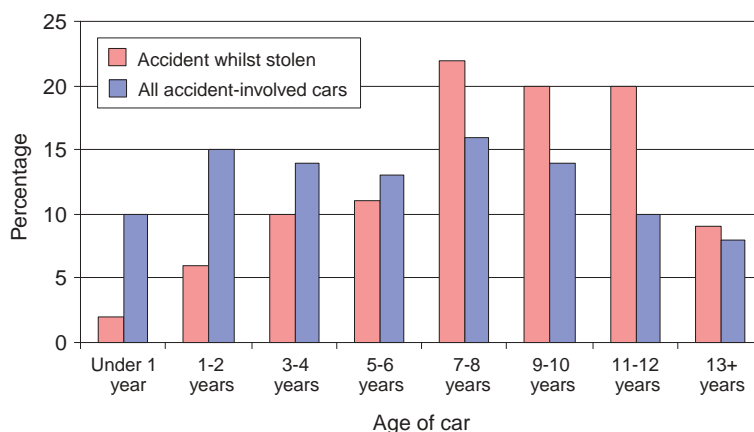


Figure 4 Percentage of accident-involved cars by age (four police force areas)

legitimately. This suggests that a more realistic estimate of the relative accident risk of stolen cars can be made using data from the four police forces.

The rate of accident-involvements for stolen cars per year calculated using the complete data from the four police forces is $314/5,525=0.0568$. This exposure calculation assumes that each stolen car had a minimum exposure of 1 day, and recalculation with the lower exposure figure (as for the national data) gives a slightly higher rate of 0.0582.

Comparing these rates of accident-involvements for stolen cars from the four areas with the rate of 0.0128 for the full car fleet that was calculated earlier gives a relative rate of about 4.5, suggesting that stolen cars are around 4.5 times as likely to be involved in injury accidents as legitimately driven cars.

It is not strictly correct to compare the rate from the four police force areas with the national rate since the accident pattern in these areas may differ from the national pattern. Thus, the next step was to calculate the rate of accident-involvements for cars in the four force areas. This could not be calculated directly and therefore was estimated in the following way.

The number of cars involved in accidents in 1997 in the four police force areas is known from the STATS19 accident database. This is not the same as the number of accident-involvements for cars registered in the four areas but is likely to be a close approximation. The number of cars registered in the four police force areas was estimated from vehicle licensing statistics (DETR, 1997) which gives details of all cars currently licensed in 1997 by county/unitary authority. These administrative areas do not match police force areas exactly, so the following approximations were made:

- Dyfed-Powys police force area was approximated by Powys UA, Ceredigion UA, Carmarthenshire UA and Pembrokeshire UA.
- Dorset police force area was approximated by Dorset, Bournemouth UA and Poole UA.
- Greater Manchester police force area was approximated by Greater Manchester metropolitan county.
- Northumbria police force area was approximated by Northumberland.

Table 7 presents the results. The rate of accident-involvements per year for cars registered in the four areas was 0.0154, rather higher than the national rate of 0.0122. Comparing this with the rate of accident-involvements for stolen cars per year in these areas suggests that stolen cars were about 3.8 times more likely to be involved in an injury accident than cars in general. This is slightly lower than the figure calculated above using the national rate, but should be more reliable because it takes account of the relatively high accident rate in Greater Manchester and Northumbria.

Table 8 examines the national rate of accidents per year of exposure by type of accident. The national results are based on data from the PNC file, and these are compared with results from the four police force areas.

Table 7 The accident-involvement rate for cars registered in Dyfed-Powys, Dorset, Greater Manchester and Northumbria, 1997

Police Force Area	Number of accident-involved cars (A)	Number of registered cars (exposure = 1 year) (B)	Accident-involvements per year of exposure (A/B)	Rate for stolen cars
Dyfed-Powys	1,617	192,700	0.008	..
- Powys UA		52,300		
- Ceredigion UA		27,400		
- Carmarthenshire UA		67,500		
- Pembrokeshire UA		45,500		
Dorset	3,965	307,800	0.013	..
- Dorset		179,700		
- Bournemouth		65,100		
- Poole		63,000		
Greater Manchester	17,191	1,007,200	0.017	0.07
Northumbria	6,933	420,500	0.017	0.04
- Northumberland		113,900		
- Tyne & Wear		306,600		
- Met County				
Total	29,706	1,928,200	0.0154	0.0568

.. Sample too small for reliable analysis

The results from the four forces show much clearer differences than the national results and are likely to provide the more reliable picture. They suggest that:

- 1 Accidents involving stolen cars as much as six times more likely to be fatal or serious than accidents in general. This is partly explained by the fact that stolen cars involved in accidents are relatively old (point 4), since older cars tend to have less good secondary safety features so that the accidents in which they are involved are more likely to be serious.
- 2 Stolen cars involved in accidents are as much as five times more likely to be driven by a male driver and about 13 times more likely to be driven by someone aged 20 or under than accident-involved cars in general.
- 3 Stolen cars involved in accidents are as much as seven times more likely to have the accident in darkness and about 14 times more likely for the accident to be between 9pm and 6am than accident-involved cars in general.
- 4 Stolen cars involved in accidents tend to be older than other cars involved in accidents. This is partly explained by the fact that theft rates are higher among older cars; for example, the theft rate for 12-13 year old cars is more than five times the theft rate for cars less than three years old.

Table 5 found that no range of stolen cars was more or less likely to be involved in an accident than any other. This took no account of exposure, but it is not possible to compare relative risk by car range since this information was only known for accident-involved cars that had been stolen. Instead, the issue was examined further by analysing the data from the four forces to see whether the mean period of exposure for stolen cars varied with car

Table 8 Rate of accidents per year of exposure by accident details, 1997

Accident details	National			Four forces		
	Accident -involved stolen cars (A)	All accident -involved cars (B)	Relative rate (A/B)	Accident -involved stolen cars (C)	All accident -involved cars (D)	Relative rate (C/D)
Severity						
Fatal & serious	0.0022	0.0018	1.2	0.0087	0.0014	6.2
Slight	0.0098	0.0110	0.9	0.0481	0.014	3.4
Male drivers	0.0094	0.0083	1.1	0.0479	0.010	4.8
Female drivers	0.0026	0.0045	0.5	0.0090	0.005	1.8
Drivers aged						
20 and under	0.0039	0.0017	2.3	0.0261	0.002	13
21-30	0.0044	0.0039	1.1	0.0212	0.0049	4.3
Over 30	0.0037	0.0072	0.5	0.0095	0.0085	1.1
In darkness	0.0054	0.0043	1.3	0.0349	0.0050	7.0
In daylight	0.0066	0.0085	0.8	0.0219	0.010	2.2
Time						
6-9am	0.0008	0.0016	0.5	..	0.0018	..
9am-6pm	0.0059	0.0075	0.8	0.0201	0.0093	2.16
6-9pm	0.0023	0.0021	1.1	..	0.0025	..
9pm-6am	0.0031	0.0016	1.9	0.0264	0.0019	13.9
On built-up roads [®]	0.010	0.0091	1.1	0.050	0.012	4.2
On non-built-up roads	0.002	0.0038	0.5	..	0.003	..
Age of car						
Less than 5 years	0.0027	0.0047	0.6	0.0107	0.0059	1.8
5-8 years	0.0035	0.0038	0.9	0.0185	0.0046	4.0
9+ years	0.0058	0.0043	1.4	0.0276	0.0049	5.6

[®] Roads with a speed limit of 40 mph or less

.. Sample too small for reliable analysis

range, and Table 8 presents the results. These show that luxury saloons, 4x4s and people carriers are stolen for longer periods than minis/super-minis, small saloons and medium saloons, so these ranges are exposed to the risk of an accident while stolen for longer periods than the other ranges. If the rate of accident-involvement per year of exposure were independent of car range then this longer exposure should lead to relatively many luxury saloons, 4x4s and people carriers being involved in accidents. Table 5 showed that this is not the case, so these car ranges are less likely to be involved in an accident per year of exposure while stolen than the 'smaller' ranges.

Table 9 Mean exposure to the risk of accident-involvement, by car range

Car range	Mean exposure (days)
Minis and super-minis	43
Small saloons	42
Medium saloons	46
Large saloons	55
Luxury saloons	76
Sports	52
4x4 and people carriers	97
Total	45

3.5 Accident-involvement rates of stolen cars, 1998

The previous sections considered the accident-involvement of cars stolen in 1997. As explained earlier, the fact that 80 per cent of accident-involved stolen cars in Greater Manchester, Dyfed-Powys, Northumbria and Dorset were not recorded on the PNC file in 1997 means that results from an analysis of only the 1998 PNC file will be incomplete. However, the accident-involvement rate of stolen cars per year of exposure was also calculated for 1998 for comparison with the 1997 results.

621 stolen cars from the 1998 PNC file were involved in an accident whilst stolen, slightly fewer than in 1997. The total exposure for these cars was 53,510 years, giving an accident-involvement rate per year of stolen cars of 0.0116 (very similar to 1997). The rate of accident-involvements per year 1998 was 0.0128, the same rate as in 1997. Table 10 presents the rate of accident-involvements per year of exposure by accident circumstances for the stolen cars and the complete car fleet. These relative rates are very similar to the 1997 rates in Table 8.

Table 10 National rate of accidents per year of exposure by accident details, 1998

<i>Accident details</i>	<i>Accident -involved stolen cars (A)</i>	<i>All accident -involved cars (B)</i>	<i>Relative rate (A/B)</i>
Severity			
Fatal & serious	0.0018	0.0017	1.0
Slight	0.0098	0.0111	0.9
Male drivers	0.0090	0.0083	1.1
Female drivers	0.0026	0.0046	0.6
Drivers aged			
20 and under	0.0038	0.0017	2.3
21-30	0.0045	0.0039	1.2
Over 30	0.0033	0.0073	0.4
In darkness	0.0050	0.0042	1.2
In daylight	0.0066	0.0087	0.8
Time			
6-9am	0.0007	0.0016	0.4
9am-6pm	0.0060	0.0075	0.8
6-9pm	0.0020	0.0022	0.9
9pm-6am	0.0029	0.0016	1.8
On built-up roads [@]	0.0098	0.0090	1.1
On non-built-up roads	0.0018	0.0038	0.5
Age of car			
Less than 5 years	0.0025	0.0049	0.5
5-8 years	0.0035	0.0035	1.0
9+ years	0.0056	0.0044	1.3

[@] Roads with a speed limit of 40 mph or less

.. Sample too small for reliable analysis

4 Conclusions

The first conclusion from this work is that an analysis based on the PNC dataset is likely to produce misleading results, since the data source excludes records of cars stolen and recovered on the same day, overnight or during a weekend. It is estimated that around 80 per cent of accident-involved stolen cars are excluded from this file. Thus, the conclusions presented here are based on the complete records for 1997 for four police forces that had co-operated with the Home Office by recording all stolen vehicles on their computer systems, irrespectively of how quickly the vehicles were recovered.

The four police forces were Greater Manchester, Northumbria, Dorset and Dyfed-Powys, with data from Greater Manchester and Northumbria dominating the results because of the relatively high number of cars stolen in these areas. Thus, the conclusions have been strongly influenced by the accidents and thefts in Greater Manchester and Northumbria. Moreover, only 9 per cent of accidents in Great Britain occurred in the areas policed by these four forces, so the results may not be nationally representative. Complete records from a larger number of police forces would be required to provide a fuller national picture.

It was found that only a small proportion of stolen cars were involved in an injury accident during the period while they were stolen, around 0.7 per cent. This proportion fails to take account of the length of time that the stolen car was exposed to the risk of being involved in an accident. When this is done, it is possible to assess the question of real interest: how much more likely stolen cars are to be involved in an accident than other cars.

This was answered by comparing the accident-involvement rate of stolen cars in the four police force areas with the rate for accidents in general in those areas. The results indicated that a stolen car was around *four* times more likely to be involved in an injury accident than a legitimately driven car.

More detailed analyses found that:

- 1 Accidents involving stolen cars were more likely to be fatal or serious than other accidents. This may partly be explained, however, by the fact that stolen cars involved in accidents were relatively old (point 4) and secondary safety tends to be worse in older cars.
- 2 Stolen cars involved in accidents were five times more likely to be driven by a male driver and about 13 times more likely to be driven by someone aged 20 or under than accident-involved cars in general.
- 3 Stolen cars involved in accidents were seven times more likely to have the accident in darkness and about 14 times more likely for the accident to be between 9pm and 6am than accident-involved cars in general.
- 4 Stolen cars involved in accidents were more likely to be older than cars involved in accidents in general. This is largely explained by the fact that theft rates were higher amongst older cars.

5 Acknowledgements

The work described in this report was carried out in the Safety Group of TRL Limited. The assistance of Fred James and Jeremy Broughton is gratefully acknowledged for providing advice and setting up the database of stolen vehicle and accident information. Thanks also go to Greater Manchester, Northumbria, Dorset and Dyfed-Powys Police forces who supplied complete stolen vehicle records for 1997.

6 References

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Abstract

The main aims of the research were to estimate the accident rate per year of exposure of stolen cars and to compare it with the known rate for the complete car fleet. This was achieved by using the Vehicle Registration Mark to link stolen car records, DVLA vehicle information and records of injury accidents from the STATS19 road accident database. The stolen car records from the Police National Computer suffer from one major limitation for this type of research – they do not include cars stolen and recovered on the same day, overnight or during a weekend. In the course of the analysis, it was found that this data set gave misleading results. To overcome this, complete stolen car records provided by four police forces in 1997 were analysed. Results showed that stolen cars were around *four* times more likely to be involved in an injury accident than a legitimately driven car.

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