

## **Motor vehicle theft and road crashes in New South Wales 1999/00 – 2006/07**

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### **Abstract**

The link between motor vehicle theft and crashes on Australian roads has not been examined in great detail previously. This study was the second in a series and matched New South Wales road crash data with vehicle theft data, to identify crashes involving vehicles reported stolen at the time of the incident.

In 2006/07 there were 560 crashes involving vehicle theft, accounting for 1.2% of all road crashes. During the same period, six fatalities and 146 injuries were linked to crashes involving a stolen vehicle. An estimate of the cost of crashes involving vehicle theft was \$43.6 million or an average cost of \$53,600 per crash (based on 2003 data).

Speed was considered to be a factor in 38% of crashes where the stolen vehicle controller was considered to have played the major role in the crash, which was more than double the proportion found in crashes not involving vehicle theft (16%). Furthermore, three quarters of the vehicles stolen were manufactured prior to 2000. A lack of security features in these vehicles was evident with nearly three-fifths of the stolen passenger/light commercial vehicles not having any form of immobilisation.

Findings revealed in this study may help in development of effective strategies to reduce the impact of motor vehicle theft and improve safety on our roads.

### **Keywords**

Vehicle, crash, theft, cost, trends, Australia

### **Introduction**

Motor vehicle theft remains a challenging crime to address. It not only affects the vehicle owner and those involved in the industry, but also stretches the resources of the government and community who are left to carry the financial burden of this crime. Its impact is not only economic however; the most significant cost associated with vehicle theft is the injury and loss of life suffered as a result of crashes involving stolen vehicles.

A number of overseas studies have examined the incidence of road crashes involving stolen vehicles (Marshall, Boyd and Moran, 1996; Miceli, 2002; Livingston, Merritt, Callori and Vanek, 1998). These studies have either used newspaper clippings or hospital records to determine who is involved in these crashes and try to measure the human and economic costs of these crashes. Until recently, there has been no research carried out in Australia on the incidence of road crashes involving vehicle theft. This paper is the second in a series which is unique in its methodology in that it links road crash data with vehicle theft data in an attempt to examine this relationship.

The first study in this series was based on South Australian data and found that over a 12-year period, 1.5% of road crashes involved a stolen vehicle resulting in 835 casualties, of which,

24 were fatal (Ziersch and Ransom, 2008). It also found that despite a significant decline in vehicle theft since 2000, the incidence of road crashes involving stolen vehicles over the same period fell only slightly. A number of identifying characteristics emerged amongst stolen vehicle crashes, amongst these the finding that stolen vehicles were more likely to involve property only damage, in part because the majority of the crashes occurred at night reflecting when motor vehicles are commonly stolen. Not surprisingly, in nearly all cases the stolen vehicle was considered at fault in the crash with inattention the most common cause of these crashes (64.0%). Of greatest concern was the finding that stolen vehicle crashes were significantly more likely to be caused by excessive speed and dangerous driving (each accounting for approximately 9% of crashes) than crashes not involving stolen vehicles (accounting for <1%).

The South Australian study estimated that the cost of property damage in crashes involving vehicle theft in 2006 was \$2 million with an average cost of \$7,330 per crash and a rough approximation of the additional human, vehicle and general costs associated with stolen vehicle crashes put the cost at around \$17 million per year.

The present study is the first of its kind for New South Wales which, not surprisingly, has the highest incidence of road crashes and motor vehicle theft in Australia as a result of its population size. Improving road safety is the number one target listed in the New South Wales Roads and Traffic Authority's Corporate Plan under Community Outcomes (Roads and Traffic Authority, 2003). It is committed to reducing road crashes and encouraging responsible road use and aims to halve the number of fatalities on NSW roads by 2010 compared to the 1999 figures.

With this in mind the objectives of the current study were to:

- Examine the relationship between motor vehicle crashes and vehicle theft in New South Wales and compare it to the findings for South Australia.
- Report on the number of fatalities and injuries for all crashes involving motor vehicle theft.
- Assess the economic and social costs of crashes involving stolen vehicles.

## **Methodology**

The study was based on data from the New South Wales Roads and Traffic Authority's Traffic Accident Database System on vehicle crashes that occurred between the 1999/2000 and 2006/2007 financial years. This data comprised all crashes that; (1) were reported to the police, (2) occurred on a road open to the public, (3) involved at least one moving road vehicle, and (4) involved at least one person being killed or injured or at least one motor vehicle being towed away.

The data was matched with CARS data on motor vehicle thefts in New South Wales based on the following conditions:

- a match on registration plate, and
- a recorded crash date/time between the earliest possible theft incident date/time (minus 10 minutes to allow for differences in time estimates) and theft recovery date/time (plus 10 minutes), or
- a recorded crash date/time on or after the earliest possible theft incident date/time (minus 10 minutes) where the stolen vehicle remained unrecovered.

The Roads and Traffic Authority also provides CARS with data on all motorised vehicles currently registered in the state biannually. This study was based on the data at 31<sup>st</sup> December 2006. In addition, to be consistent with the Roads and Traffic Authority’s terminology, the word controller is used in this report and encompasses all road vehicle users including drivers and riders.

**Limitations**

There are several limitations to be noted. Approximately 2.2% of the motor vehicles in the crash data did not have a valid registration plate to allow a join with the CARS vehicle theft data. This means that the number of stolen vehicles involved in road crashes may be slightly under-represented in this study. Manual checks of the crash data were also carried out. Three crash incidents which resulted in a join with the stolen data were removed from the stolen vehicle group due to a match on an invalid registration plate (e.g. registration plate ‘000’) or because the stolen vehicle was reportedly recovered following the first of two crashes. Additionally, a high proportion of data on the age and sex of individuals in crashes involving stolen vehicles was missing due to individuals fleeing the scene of the crash thus impossible to obtain the data. This also impacts injury numbers in crashes involving stolen vehicles. This makes some comparisons with crashes not involving a stolen vehicle difficult.

**Findings**

*Crashes involving stolen vehicles*

Since the 1999/00 financial year, the number of road crashes in New South Wales has fallen by approximately 15.3% (53,331 crashes in 1999/00; 45,161 in 2006/07). The proportion of crashes involving a stolen vehicle also shows a downward trend over the period with the majority of the decline occurring between 2000/01 and 2003/04, after which the proportion remains relatively stable. In 1999/00, approximately 2.0% of road crashes involved a stolen vehicle with the proportion falling to 1.2% by 2006/07. Over the entire eight-year period, 1.7% of crashes involved a stolen vehicle.

Figure 1. Number of road crashes and percentage involving a stolen vehicle, 1999/00 – 2006/07

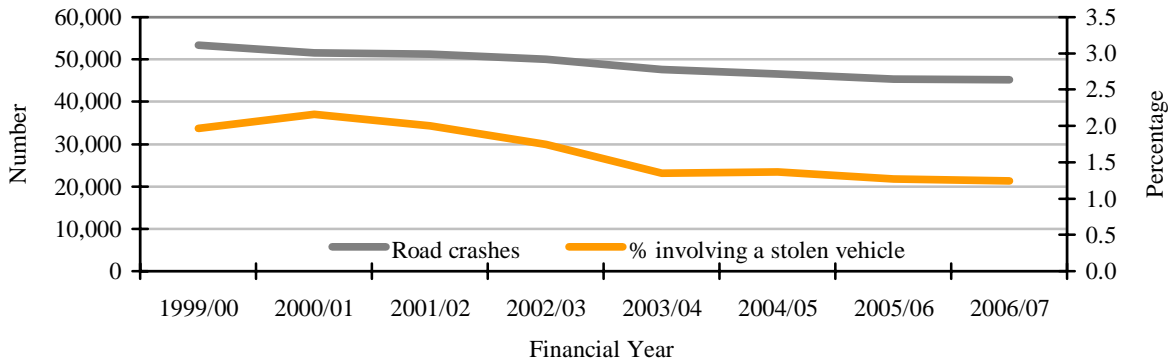
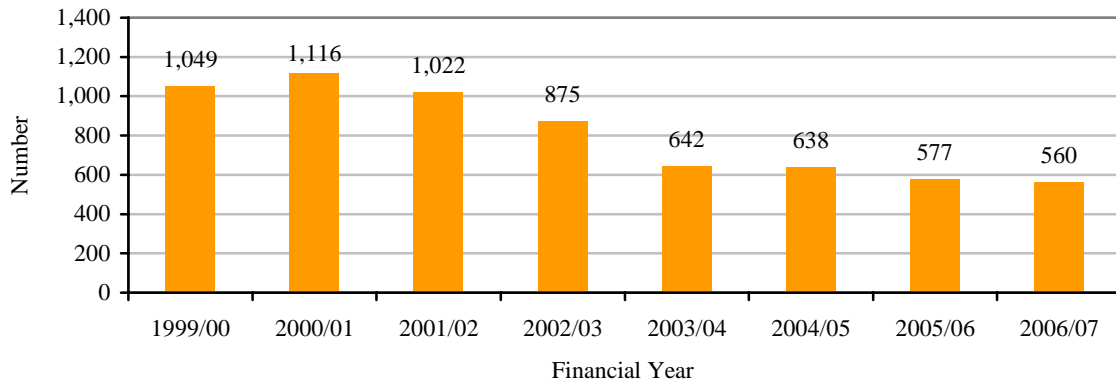


Figure 2 shows the number of crashes involving stolen vehicles per year since 1999/00. Over the past eight years an average of 810 crashes per year have involved stolen vehicles. In 2006/07 there were 560 such crashes. As a proportion of all vehicles stolen in New South Wales, in 2006/07, one in every 48 vehicles stolen was involved in a road crash.

Figure 2. Number of crashes involving a stolen vehicle, 1999/00 – 2006/07



### Severity of crashes

A severity rating of either non-casualty (tow-away), injury or fatal is applied by the Roads and Traffic Authority to all recorded crashes and they are defined as follows:

- Non-casualty refers to a crash in which at least one motor vehicle involved in an accident is towed away from the scene, but where no person is killed or injured.
- Injury involves a non-fatal crash in which at least one person requires medical treatment (i.e. treatment administered by a medical officer such as doctor, nurse, paramedic or ambulance person) or is admitted to hospital.
- Fatal refers to a crash for which at least one person is killed or dying within 30 days of the accident where death is attributable to injuries sustained during the road vehicle accident.

The majority of all road crashes were casualty free. As Figure 3 indicates, over the eight-year period, 79.1% of 6,479 crashes involving stolen vehicles simply involved a vehicle being towed away compared with 56.4% of 216,780 crashes which did not involve a stolen vehicle. These crashes recorded a larger proportion of injuries (42.6% compared to 20.1% for stolen vehicle crashes) and in both crash types, fatality crashes made up around 1% of crashes. While stolen vehicle crashes were less likely to result in casualties it should be noted that in some cases an offender may have been injured but not remained at the scene of the crash for assistance or did seek medical help but did not admit that it related to a road crash. Therefore the proportion of injuries in casualty crashes involving stolen vehicles may be underestimated.

Figure 3. Crash severity rating of road crashes, 1999/00 – 2006/07

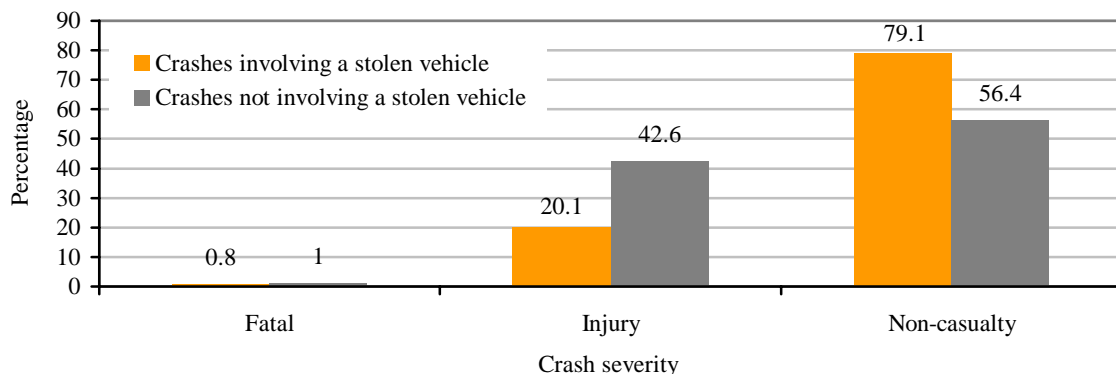
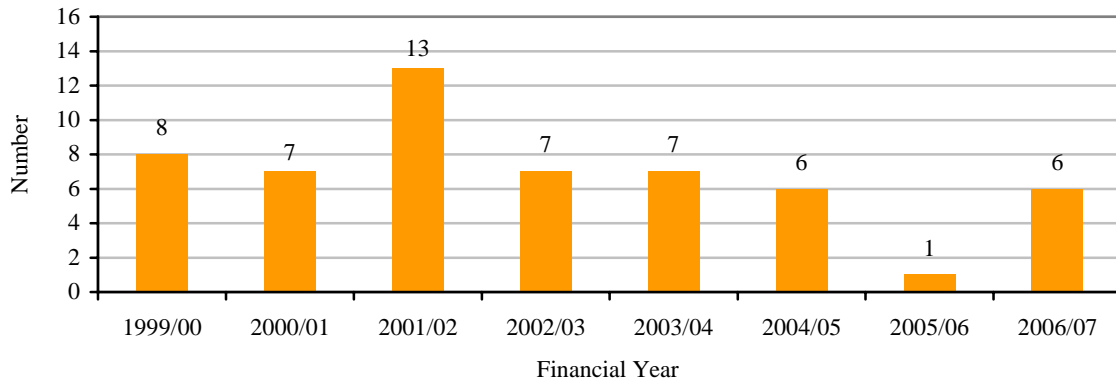


Figure 4 shows the number of fatalities in crashes involving stolen vehicles over the eight-year period. During the peak of 2001/02 there were 13 deaths associated with crashes involving stolen vehicles.

After a low of one fatality in 2005/06, the graph shows that 2006/07 recorded a similar number of fatalities to other years with six recorded. In total, 55 fatalities were recorded over the eight-year period.

Figure 4. Number of fatalities in crashes involving a stolen vehicle, 1999/00 – 2006/07



Historically, fatality rates for crashes involving stolen vehicles have varied widely due to the small numbers involved. In the eight-year period to 2006/07, the fatality rate was 8.5 deaths per 1,000 crashes involving stolen vehicles. In comparison, road crashes which did not involve a stolen vehicle had a rate of 10.9 fatalities over the eight-year period and have remained quite stable despite a reduction in crash numbers over time.

Casualties refer to crashes in which either an injury or a fatality were recorded. In 2006/07 there were 152 casualties associated with stolen vehicle crashes. In total, 1,869 casualties were recorded over the eight-year period. The rate of casualties per crash type has not changed dramatically over the eight-year period. Stolen vehicle crashes recorded 288 casualties per 1,000 crashes over the entire period, with 271 casualties recorded in 2006/07.

Casualty rates for crashes not involving vehicle theft were much higher but also remained quite stable with 569 casualties per 1,000 crashes recorded over the eight-year period and 582 casualties recorded in 2006/07. Once again, it is not clear whether these differences are true or are possibly the result of a reporting bias.

In most crashes involving stolen vehicles from 1999/00 to 2006/07, the occupants of the stolen vehicle were more likely to record a casualty (55.3%) than occupants of the other vehicle involved. Of those casualties outside the stolen vehicle, on average, 89.2% were occupants in another vehicle, 9.5% were pedestrians and 1.3% were cyclists.

#### *Property damaged*

The table below outlines the types of objects first hit by the ‘key’ vehicle in crashes in 2006/07. The key vehicle was generally the vehicle considered primarily responsible for the crash. In 2006/07, nearly half (48.1%) of the key stolen vehicles did not hit an object but instead hit either another vehicle (including bicycles) or a pedestrian, which is much lower than the proportion recorded in crashes not involving stolen vehicles (76.5%).

Where the key stolen vehicle hit an object first, Table 1 shows that it was most likely to be a guardrail or fence (15.7%) followed by trees or bushes (11.2%). Stolen vehicles were also more likely to hit utility poles (9.7%) than vehicles in crashes not involving theft (3.1%). Animals managed to escape injury from stolen vehicles with none recorded hit by stolen vehicles in 2006/07 compared to 325 animals hit in crashes not involving vehicle theft.

Table 1. Top significant objects first hit by the key vehicle in road crashes, 2006/07

First significant object hit	Stolen motor vehicle		Motor vehicle in crashes not involving vehicle theft	
	Number	%	Number	%
Another vehicle, bicycle or a pedestrian	257	48.1	33,804	76.5
Guardrail or fence	84	15.7	2,761	6.3
Trees or bushes	60	11.2	2,080	4.7
Utility pole	52	9.7	1,369	3.1
Signpost or parking meter	12	2.2	594	1.3
Building	12	2.2	170	0.4
Traffic island/roundabout /medial strip etc.	11	2.1	605	1.4
Any other fixed objects	11	2.1	185	0.4
Embankments /rocky outcrops/boulders etc.	10	1.9	1,029	2.3

### Costs of crashes

Connelly and Supangan (2006) produced a paper on the estimated costs of road traffic crashes in Australia broken down by jurisdiction. The paper, based on the methodology used by the Bureau of Transport Economics (2000), included an estimate of the ‘human costs’ (e.g., lost labour, ambulance, coroner), ‘vehicle costs’ (e.g., repairs, towing) and ‘general costs’ (e.g., police, non-vehicle property damage) associated with road crashes based on 2003 crash data.

Based on the average cost by casualty/crash type, they estimated the total cost to be approximately \$5.7 billion in New South Wales of which fatalities comprised approximately \$987.6 million, serious injuries comprised \$3.5 billion, minor injuries comprised \$260.9 million and property damage only crashes made up the remaining \$925.6 million.

Unfortunately the data on crashes involving stolen vehicles does not separate out serious and minor injuries so in order to breakdown the costs by casualty type an estimate has been made based on the proportion of minor and serious injuries reported in the Connelly and Supangan paper for New South Wales. Table 2 shows that in 2003, crashes involving stolen vehicles incurred an estimated cost of around \$43.6 million. This was made up of a fatality cost of \$9.2 million, a serious injury cost of \$28.0 million, minor injury cost of \$2.1 million and a property damage only cost of \$4.3 million. The table also shows the minimum and maximum cost, which is based on the number of injuries being 100% minor (the minimum cost) or 100% serious (the maximum cost) with the cost of crashes involving stolen vehicles sitting somewhere in between these extremes.

Table 2. Total estimated cost of crashes involving stolen vehicles, 2003

Casualty/crash type	BTE average cost in 2003 AUD*	Number in stolen vehicle crashes, 2003	Percentage of minor and serious injuries	Estimated cost (millions)	Minimum estimated cost (millions)	Maximum estimated cost (millions)
Fatality	\$1,832,310	5		\$9.2	\$9.2	\$9.2
Injury (total)	\$411,183	217	100.0	\$30.1	\$3.1	\$58.0
<i>Serious injury</i>	\$397,000	71 <sup>^</sup>	32.5 <sup>^</sup>	\$28.0 <sup>^</sup>	\$0	\$58.0
<i>Minor injury</i>	\$14,183	146 <sup>^</sup>	67.5 <sup>^</sup>	\$2.1 <sup>^</sup>	\$3.1	\$0
Property damage only	7,329	592		\$4.3	\$4.3	\$4.3
Total	-	814		\$43.6	\$16.6	\$71.5

\*Bureau of Transport Economics (2000) estimates of average cost by casualty/crash type, expressed in 2003 Australian dollar values. <sup>^</sup>Estimated cost based on the proportion of injuries in New South Wales that were reported as minor (67.5%) and serious (32.5%) in the paper, “The economic costs of road traffic crashes: Australia, states and territories” by Connelly and Supangan (2006).

### *Individuals involved in crashes*

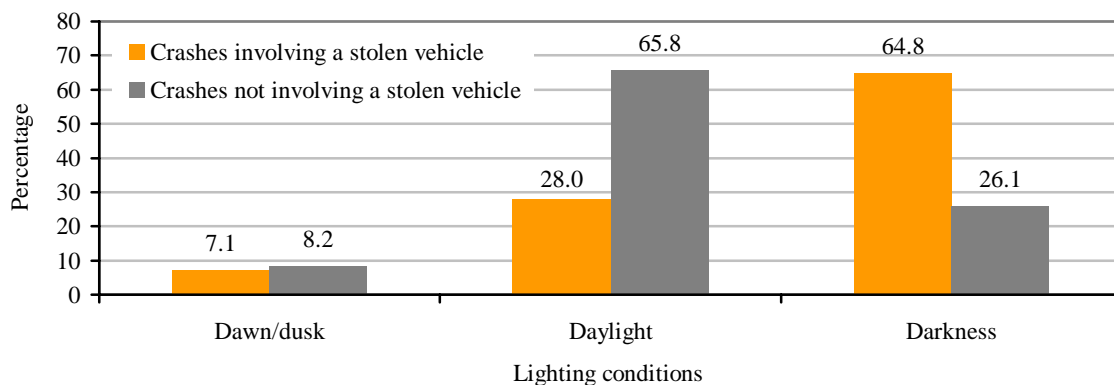
Analysis of the sex of individuals (the controller in each traffic unit) in crashes that did not involve vehicle theft revealed that 62.0% of the vehicle controllers in 2006/07 were male. Just over one-quarter (27.0%) of the controllers were aged 25 years or under with 19.5% aged 30 to 39 years. Vehicle controllers aged 60 and over made up 10.4% of crashes not involving vehicle theft.

Age data on individuals in crashes involving stolen vehicles was not summarised due to a high proportion of missing data (58.4%). Nearly three-quarters (71.4%) of the missing age data related to the controller of the stolen vehicle which may not have been possible to collect due to the offender fleeing the scene of the crash. This is also the case with data on sex. In half (51.4%) of crashes involving stolen vehicles the sex of the controller was unknown with 63.9% of the unknown data on sex relating to the controller of the stolen vehicle. This missing information makes it impossible to determine whether age and sex were factors in these crashes.

### *When crashes occur*

In 2006/07 crashes involving stolen vehicles were most likely to occur on Saturdays (19.5%) and Sundays (18.4%). Figure 5 shows that nearly two-thirds (64.8%) of crashes involving a stolen vehicle occurred at night with 46.9% of the vehicles stolen between the hours of 8pm and 7am. The time period for crashes not involving vehicle theft was almost the opposite with nearly two-thirds (65.8%) taking place during daylight hours.

Figure 5. Lighting conditions for road crashes, 2006/07



In 27.8% of crashes involving stolen vehicles, the vehicle crashed within one hour of being stolen and half (51.0%) crashed less than five hours after the vehicle was taken. This suggests that the potential risk to road users is apparent from the minute the vehicle is stolen.

### *Where crashes occur*

An examination of the distance between the theft and crash suburbs for stolen vehicles involved in crashes in 2006/07 was undertaken. The analysis was based on the Euclidean (or 'straight-line') distance between the centroid of the theft and crash location suburbs. Therefore a vehicle that was stolen and crashed within the same suburb was recorded as having crashed 0 kilometres from the theft location. This gives an indication of the distance between the two locations, but it does not take into account any driving that occurred between the vehicle being stolen and the crash. The analysis revealed that the vehicles were most likely to crash close to the suburb from which they were stolen with three-fifths (59.5%) crashing three kilometres or less from the theft suburb.

Only a small proportion (4.8%) of vehicles crashed more than 50 kilometres from the theft suburb and of these half (52%) crashed over 100 kilometres from the suburb from which they were stolen.

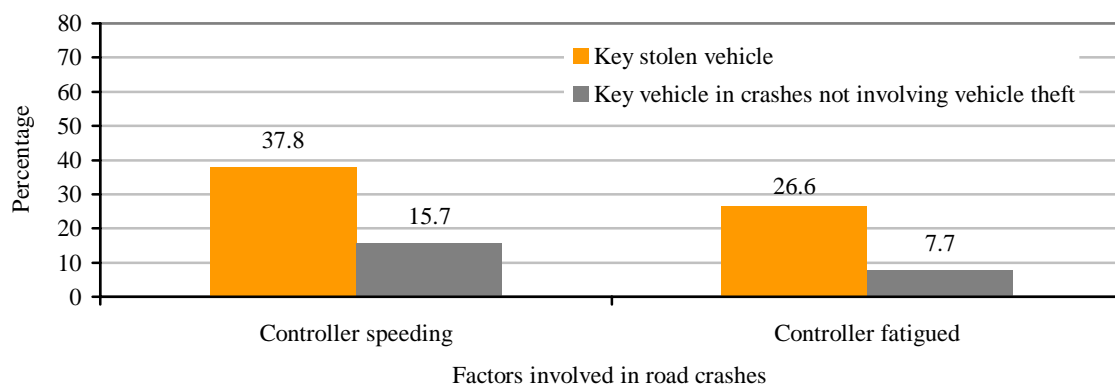
#### *Why crashes occur*

In 95.4% of crashes involving stolen vehicles in 2006/07, the stolen vehicle was recorded as the key vehicle primarily responsible for the crash. The factors involved in the crash for these cases were compared with the key vehicle in crashes not involving vehicle theft.

Key stolen vehicle controllers were more than twice as likely to have speed<sup>1</sup> recorded as a factor in road crashes in 2006/07 than key vehicles in crashes not involving vehicle theft (37.8% compared with 15.7%)(see figure 6). The involvement of police pursuits in crashes is not recorded in the data so it is not possible to establish whether high-speed chases were associated with findings on speed amongst stolen vehicles.

Similar findings were noted for the involvement of fatigue<sup>2</sup> in road crashes although the incidence of fatigue as a factor in crashes was more than three times higher for key stolen vehicle controllers than key vehicle controllers in crashes not involving vehicle theft (26.6% compared with 7.7%).

Figure 6. Involvement of speed and fatigue amongst key vehicles in road crashes, 2006/07



Other factors may have been involved in the road crash however these have not been reported on as either the overwhelming majority of crashes either had no identifying factor recorded or the factors included a response of fatigue and/or speed, identified separately in the data and therefore were not mutually exclusive.

The road user movement of the key stolen vehicles was also examined to determine how the vehicles crashed. In nearly two-in-five stolen vehicle crashes (38.2%) the key stolen vehicle veered off a straight road into an object or parked vehicle. A further 21.9% veered off a curved road into an object or parked vehicle. Amongst incidents which involved another moving vehicle, 5.6% collided with the rear of another vehicle or had a cross traffic (side-on)

<sup>1</sup> A motor vehicle is assessed by the Roads and Traffic Authority as having been speeding if the vehicle's controller was (a) charged with a speeding offence; or described by police as travelling at excessive speed; or the stated speed of the vehicle was in excess of the speed limit, and/or (b) the vehicle was performing a manoeuvre characteristic of excessive speed (eg, while on a curve the vehicle jack-knifed, skidded or slid).

<sup>2</sup> A motor vehicle controller is assessed by the Roads and Traffic Authority as having been fatigued if the vehicle's controller was (a) described by police as being asleep, drowsy or fatigued, and or (b) the vehicle performed a manoeuvre which suggested loss of concentration of the controller due to fatigue (eg, the vehicle travelled onto the incorrect side of a straight road was involved in a head-on collision (and was not overtaking another vehicle and no other relevant factor was identified)).



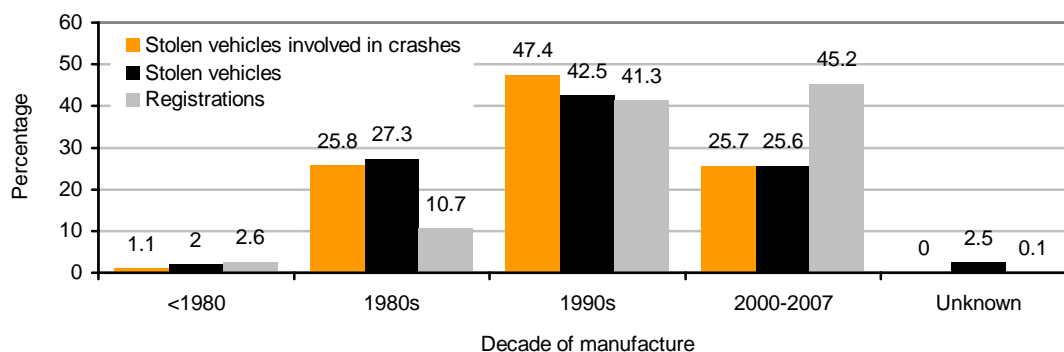
or head-on collision (3.6% each). In comparison, the most common impact for key vehicles in crashes which did not involve vehicle theft were rear end collisions (18.8%) followed by veering off a straight road into an object or parked vehicle (12.6%).

#### *Vehicles involved in crashes*

Of the 45,161 road crashes in 2006/07, 560 involved a stolen vehicle with one of these crashes involving two stolen vehicles. The characteristics of the 561 stolen vehicles involved in road crashes are outlined below and where appropriate, comparisons are made to stolen vehicles not involved in road crashes and the registered vehicle fleet in New South Wales.

Figure 7 shows that compared to the registered fleet, stolen vehicles involved in crashes were most likely to be manufactured in the 1990s. This decade accounted for nearly half (47.4%) of crashes involving stolen vehicles compared to 41.3% of the registered fleet. A bigger disparity was noted amongst even older vehicles with 25.8% of the stolen vehicles which crashed manufactured in the 1980s and yet this decade made up only 10.7% of registrations.

Figure 7. Motor vehicles by decade of manufacture, 2006/07



Security is another issue with vehicles manufactured in the 1980s. Very few of these models are likely to have any form of immobilisation to prevent a would-be thief from stealing the vehicle. In 2006/07 nearly three-fifths (58.8%) of the stolen passenger/light commercial vehicles involved in crashes did not have a factory-fitted immobiliser. Over time the proportion of immobilised vehicles in the registered fleet has increased and since July 2001 all new cars sold in Australia are required to be fitted with an Australian standard immobiliser under the Australian Design Rule (ADR). As at 31st December 2006, less than two-fifths (38.3%) of the registered passenger/light commercial fleet did not have a factory fitted immobiliser, which is much lower than the proportion noted amongst stolen vehicles involved in crashes in 2006/07 (58.8%).

An analysis of vehicle characteristics revealed that Holden Commodores were the most popular in 2006/07 accounting for 13.4% of the vehicles stolen and 18.5% of stolen vehicles that crashed. Motorcycles made up a greater proportion of stolen vehicles overall (8.1%) than those involved in a crash (2.5%) in 2006/07. This may be because, based on their poor recovery rate, motorcycle theft is more likely to be profit-motivated.

#### **Discussion**

The findings of this paper indicate that stolen vehicles contribute to the number of crashes on New South Wales roads each year. Over the eight-year period in the study nearly 6,500 road crashes involved a stolen vehicle resulting in 1,869 casualties, of which, 55 were fatal.

While the proportion of stolen vehicles involved in road crashes is small it is worth noting that the problem remains despite the significant decline in vehicle theft that has occurred since 2000. In 2006/07, one in every 48 vehicles stolen was involved in a road crash.

Stolen vehicle crashes had a number of distinguishing features when compared to road crashes generally. Stolen vehicles were more likely to involve property only damage, in part because of the time of day in which the crashes occurred, which was also a finding of the South Australian study. The reduced volume of traffic on the road at night may partly explain the lower casualty rate found in crashes involving vehicle theft. A possible reporting bias may also be a factor with offenders less likely to remain at the scene of a crash for assistance.

In nearly all cases, the stolen vehicle was considered the key vehicle primarily responsible for the crash. Where this was the case, in 2006/07 stolen vehicle controllers were more than twice as likely to have speed recorded as a factor in road crashes than key vehicles in crashes not involving vehicle theft. Excessive speed was also a significant factor in crashes involving stolen vehicles in South Australia, accounting for 9.1% of stolen vehicle crashes where the stolen vehicle was considered to be at fault.

Fatigue was also a distinguishing factor in this study. In 2006/07 stolen vehicle controllers were over three times more likely to have fatigue recorded as a factor in their crash than vehicle controllers in crashes not involving vehicle theft.

Stolen vehicles involved in crashes were most likely to be manufactured during the 1990s, accounting for nearly half of crashes in 2006/07. A further one-quarter were manufactured in the 1980s and yet this decade made up only 10.7% of registrations. These findings are similar to the South Australian study however due to South Australia's older vehicle fleet, 1980s vehicles accounted for an even greater proportion of the stolen vehicles that crashed. The over-representation of these older vehicles is concerning given they are less likely to have the safety and security features of more recently manufactured vehicles.

The estimated cost of crashes involving vehicle theft was at minimum \$16.6 million (based on 2003 data). A rough approximation based on the proportion of crashes by casualty type puts the cost at around \$43.6 million per year or an average cost of \$53,600 per crash.

As with the South Australian study, age and sex indicators were not available for the majority of these records and it is assumed that this is because the offender(s) fled the scene of a crash. Overseas studies on stolen vehicle crashes have revealed that the majority of the offenders are young males (Miceli, 2002; Livingston, Merritt, Callori and Vanek, 1998) and apprehensions data from South Australia on motor vehicle theft supported these findings (CARS, 2007). While these statistics do not represent all car thieves (only the ones who were caught) they do contribute to our understanding of this group of offenders, and suggest that targeting young males may be helpful in preventing stolen vehicle crashes.

Finally, any crime prevention approaches which are effective in reducing the number of vehicles stolen in New South Wales, while having a small impact on road crashes, will significantly improve community safety.

## Acknowledgements

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