Submission
No 15

MOTORCYCLE SAFETY IN NSW

Organisation: Motorcycle Council of NSW Inc

Name: Mr Christopher Burns

Position: Vice Chairman MCC of NSW

Date Received: 9/09/2015

Staysafe Inquiry into Motorcycle Safety in NSW

8th September 2015

MOTORCYCLE COUNCIL OF NEW SOUTH WALES INCORPORATED

Staysafe (Joint Standing Committee on Road Safety)
Parliament House
Macquarie St
Sydney NSW 2000
Fax: (02) 9230 3309

Motorcycle Council of NSW

PO Box 517 Parramatta CBD BC 2124

Burns/De Rome/Stanford/Wood et al

Contents

Final version for submission

About the MCC of NSW

The Motorcycle Council of NSW Inc. (MCC of NSW) is an internationally recognised umbrella group for motorcycle clubs, associations and ride groups, in the state of New South Wales, Commonwealth of Australia.

Established in 1982, the MCC of NSW is recognised as the peak motorcycle representative body in NSW and Subject Matter Experts on many complex issues dealing with motorcycling including crash data and statistics, traffic data and congestion information.

The MCC of NSW has published documentation that has been referenced worldwide by overseas motorcycling and traffic bodies and has produced video training films that have been utilised and referred to by many overseas trainers, researchers and ride associations.

The MCC of NSW has appeared before several standing commission of inquiries in NSW including the Standing Committee on Law and Justice. The MCC is often consulted on all things motorcycling by the Roads and Maritime Services (RMS), Transport for NSW and Centre for Road Safety.

MCC of NSW is the peak representative body for motorcycling in the state of NSW representing over 50 clubs, with more than 41,000 riders.

We wish to thank Staysafe (The Joint Standing Committee on Road Safety) for the opportunity to present this submission and the views of our member clubs on the subject "Motorcycle Safety in NSW"

Should you require further information on the information contained within this submission please feel free to contact the undersigned.

Yours sincerely,

[redacted]

Christopher Burns

Vice-Chairman MCC of NSW

[redacted]

[redacted]

[redacted]

Introduction

According to the available research motorcycling has never been safer in NSW. While the fatality and serious injury rate of motorcyclists in NSW has declined over the past 20 years and numbers of registered motorcycles and scooters have increased significantly, there is always room for improvement to enhance the current road safety campaigns and to provide better health outcomes for riders and pillions.

The Motorcycle Council of NSW (MCCofNSW) is committed to enhancing safety for riders in NSW as demonstrated by our close working relationship with Transport for NSW's Centre for Road Safety and the documentation prepared by the MCC of NSW and training videos listed below:

- Positioned for Safety , Road Safety Strategic Plan 2002-2005
- Positioned for Safety 2010, A Motorcycle Safety Strategic Plan 2007-2010 copy available from http://roadsafety.mccofnsw.org.au/
- Rider Risk Videos http://www.mccofnsw.org.au/a/332.html

Terms of Reference

That the Committee inquire into and report on motorcycle safety in New South Wales with particular reference to:

a. Trends of motorcycle usage, injury and fatality in NSW;

b. Crash and injury risk factors including rider (and driver) behaviour, conspicuity and vehicle instability;

c. The effectiveness of the current action plan to enhance motorcycle safety including communications and education campaigns, road environment improvements, regulation of safety equipment and gear;

d. Strategies of other jurisdictions to improve motorcycle safety;

e. Licensing and rider training; and

f. Any other related matters

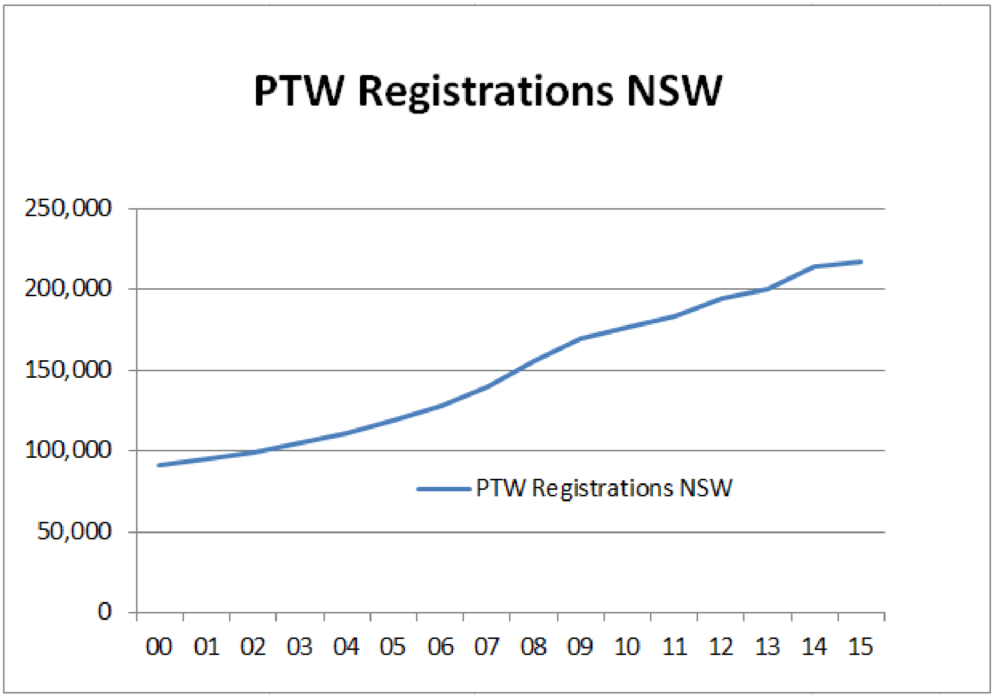
Trends of motorcycle usage, injury and fatality in NSW;

Over the past 10 years motorcycling has become more and more popular for a variety of reasons. Cheap transport, tougher economic conditions, a growing awareness of environmental issues, mid-life crisis, a sense of belonging and as a general pastime. Motorcycles and scooters are referred to internationally as Powered Two Wheelers or PTWs.

Australia wide motorcycle registration numbers have increased and are just over the 800,000 mark as people realise what an enjoyable, inexpensive and economical form of transport PTW's can be.

The trend is also reflected in the motorcycle and scooter registration numbers in NSW which have increased markedly since 2000:

- 88,157 registered motorcycles and scooters 2000
  - 87,157 Motorcycles
  - 945 scooters
- 216,833 registered motorcycles and scooters 2015
  - 202,157 Motorcycles
  - 14,676 Scooters.



Data RMS and graph courtesy of CJ Burns MCC of NSW.

This is an increase in PTW registrations of 145% in 15 years.

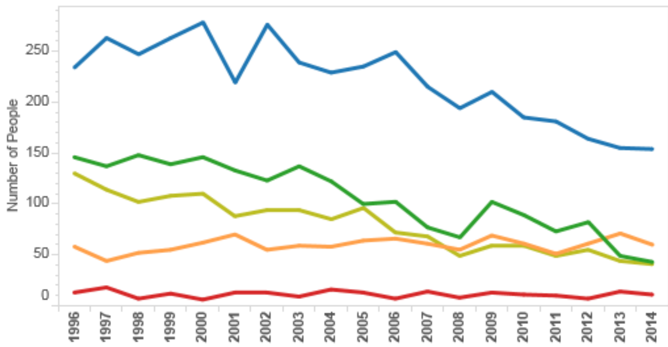
Source RMS: http://www.rms.nsw.gov.au/cgi-bin/index.cgi?fuseaction=statstables.show&cat=Registration

One could reasonably assume that the rate of fatalities in NSW would have increased with the massive increase in registrations but this is not the case as demonstrated below.

People | Behaviour | Crash Type | Environment | Fatality Trends | Location | Density

Fatality Trends by Road User, 1996 to 2014 (provisional)
(Age Group = All)

Display By: Road User
Select Age Group: (All)

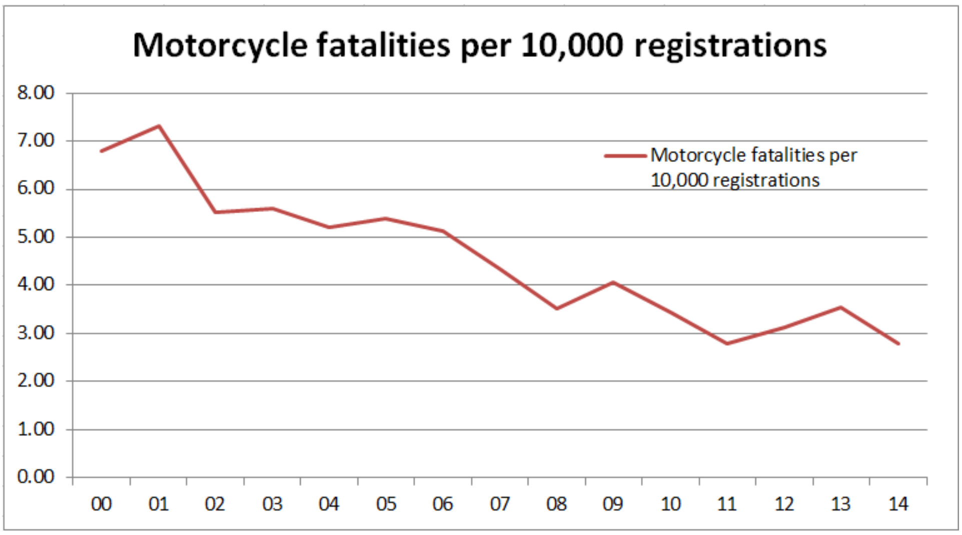


	Driver	Passenger	Motorcyclist	Pedestrian	Pedal Cyclist	Grand Total
2014	154	43	60	41	11	309
2013	155	49	71	44	14	333
2012	164	82	61	55	7	369
2011	181	73	51	49	10	364
2010	185	89	61	59	11	405
2009	210	102	69	59	13	453
2008	194	67	55	49	8	374
2007	215	77	61	68	14	435
2006	249	102	66	72	7	496
2005	235	100	64	96	13	508
2004	229	122	58	85	16	510
2003	239	137	59	94	9	539
2002	276	123	55	94	13	561
2001	219	133	70	88	13	524
2000	278	146	62	110	6	603
1999	263	139	55	108	12	577
1998	247	148	52	102	7	556
1997	263	137	44	114	18	576
1996	234	146	58	130	13	581

Help Last published date: 07 January 2015

Transport for NSW

The yearly fatality rate for motorcycles has stayed reasonably steady with a 10 year average of 62 motorcycle fatalities per annum. When this is compared to the increase in registration numbers one can see that rate of fatalities per 10,000 motorcycle registrations in NSW has dropped from 7.3 deaths per 10,000 registrations in 2001 to 2.8 in 2014 which is a 60% decrease. This could be attributed to the Learner Licensing scheme implemented in NSW, more modern motorcycles and education campaigns similar to the “Ride to Live” campaign from NSW Centre for Road Safety.



Data Source RMS, graph courtesy of CJ Burns MCCofNSW

There are currently 569,308 Motorcycle licence holders in NSW 2015 so one can reasonably assume that the upward trend of motorcycle registrations will continue.

Source RMS: http://www.rms.nsw.gov.au/about/corporate-publications/statistics/registrationandlicensing/tables/table212_2015q2.html

Table 2.1.2 Licence class by licence type as at 30 Jun 2015

Licence type	TOTAL	Licence class						
		Class C	Class LR	Class MR	Class HR	Class HC	Class MC	Class R
Learner	309,721	283,601	0	0	0	0	0	26,120
P1	175,368	154,716	0	0	0	0	0	20,652
P2	293,192	281,304	128	1,165	991	0	0	9,604
Unrestricted	5,032,388	3,964,913	93,057	130,642	200,719	106,026	24,099	512,932
TOTAL	5,810,669	4,684,534	93,185	131,807	201,710	106,026	24,099	569,308

Note: A person may hold a rider licence class as well as a driver licence class.

Class R being the classification for Motorcycle Licence.

The average age of a motorcycle rider in NSW is 43 years old. Based upon this figure one again could reasonably assume that half the licenced riders in NSW have not completed any learner training what so ever but according to surveys carried out by the Motorcycle Council of NSW many older riders have indeed completed post licence training or advanced training.

Motorcycle injury and fatality trends in NSW

The fatality rate of riders per 10,000 registrations has fallen by two thirds over the past twenty years from 8.5 fatalities per 10,000 registrations in 1995 to 2.8 fatalities per 10,000 registrations in 2014. Based upon the previous registration figures, had the fatality rate been maintained at 8.5/10,000 registrations then the current rate of fatalities in NSW should be in the region of 185 fatalities per year, fortunately it is much lower maintaining an average of 62 fatalities per annum. This alone highlights that current programs of rider education and training are working in conjunction with better braking and handling of modern motorcycles.

The number of single vehicle crash (SVC) fatalities for Powered Two Wheelers (PTW) are at the same ratio per 10,000 registrations as cars. Unfortunately more riders are injured from single vehicle crashes than car drivers, as riders do not have the benefit of a protective cocoon wrapped around them and are more likely to require towing compared to cars. This is probably due to impacts with roadside furniture and highlights the need for frangible roadside furniture and fitment of under run/rub rails on W Beam barriers where the supporting posts are the main cause of death or injury for riders running into W Beams.

Transport for NSW and Centre for Road Safety implemented a program of testing rub rails for retro fitment to W Beam barriers and have approved two types for installation. There is a current program of works rolling out these barriers on RMS and Council roads that are popular with riders.

Installation of under run/rub rails on W Beam barrier on the Old Pacific Highway

The number of single vehicle crash fatalities and injuries also highlights the need for adequate protective clothing and is also very effective in multi vehicle crashes.

Any crash where you have an impact where you have impact protectors in your clothing or end up sliding along an abrasive surface will see a lessening of injuries through the use of adequate protective clothing.

The Motorcycle Council of NSW are keen to implement a national 5 star rating scheme for protective clothing similar to the ANCAP 5 Star rating scheme used on cars in order to enable riders to make a more informed choice of quality and protection afforded by items of protective clothing. Ultimately the clothing worn should be up to the rider.

Crash and injury risk factors including rider (and driver) behaviour, conspicuity and vehicle instability

Crash and Injury Risk Factors

Please refer to Appendix 1 for a detailed analysis of motorcycle crashes.

Major highlights include;

- Single vehicle crashes per 10,000 registered motorcycles have dropped by 23% since 2009
- Rider key vehicle per 10,000 registered bikes down by 13%
- Other vehicle key vehicle per 10,000 registered bikes down by 14%
- All crashes per 10,000 registered bikes down by 18%
- Animals on the road identified in 6% of single vehicle crashes but only if there was evidence.

Driver Behaviour

It is not that drivers do not see motorcycles, they do not look for motorcycles. The best way to manage the risk from a rider's perspective is to place yourself in the safest position on the road and ride defensively.

Most SMIDSY (Sorry Mate I Didn't See You) crashes are rarely due to drivers not physically able to see riders. They fail to see what they don't expect to see and they don't perceive a motorcycle as a threat. Combine this with not taking the time to check properly and you have a recipe for disaster. Better education and training of drivers will prove effective in reducing the number of multi vehicle collisions involving motorcycles.

Education is the key to solving this issue, drivers need to be educated to physically look twice for bikes as the brain picks up the difference between the two images. Riders need to be educated to position themselves in the safest zone, to think for others and to manage the risk as best they can.

There is also a disturbing number of hit and run incidents involving car drivers and motorcycles and particular attention needs to be paid to driver distractions.

Conspicuity

There is an oft used phrase by all vehicle operators after a collision,

"I didn't see him/her/it/ the other car/the motorcycle/the cliff"

This is a natural human reaction to absolve oneself of blame.

Comments from a Sydney Bus driver:

"I have had 21 vehicle collisions over the years and every single time the driver of the car says;

"I didn't see you." It's a big blue bus!!!!!"

A NSW STA bus is 12.5m long, 3.2 metres high and 2.4 metres wide and Blue.

Source: interview

A similar comment from the MAG Ireland website;

Being a bus driver i (sic) can safely say a hi-vis vest won't stop or even help with people that don't look and pull out in-front of a bike, I mean the bus is 2 story's high and bright yellow and you still get people pulling out in front of that and claiming they didn't see it…

Source: http://www.righttoride.eu/2011/12/13/mag-ireland-high-viz-survey/

Hi Visibility (Hi Viz) clothing has often been proposed as a solution to making motorcycles more conspicuous but the colour of a rider and bike is relative to its position on the road and the background.

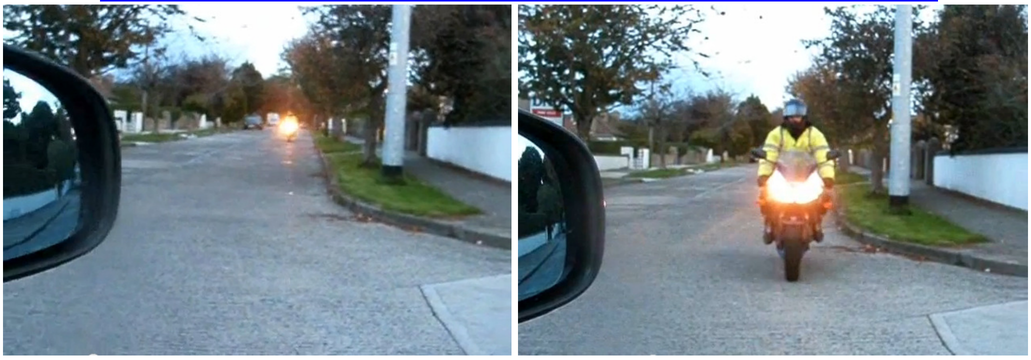
Photo's courtesy of Burns/Clements

As one can see from the pictures above, visibility is highly relevant to an ever changing background and with the increase in both yellow and green road signage in NSW it becomes harder to differentiate a motorcycle rider in Hi Viz from the background scatter. Solid colours seem to differentiate riders from the background by virtue of a complete silhouette as opposed to smaller blocks of colour that could have the effect of camouflaging the rider by breaking up the silhouette.

Hi Viz clothing is more often associated with stationary road workers or slow moving cyclists and has the potential to give the impression that a motorcycle is moving far slower than its actual speed with consequential higher risk of collisions.

Hi-Viz jackets are next to useless on a large modern motorcycle due to the fact that they are obscured from view by the headlight and then the fairing and often from behind by a backpack or top box. The first perception of a motorcycle will be the head light and by the time the Hi Viz vest takes effect it is too late to avoid the collision.

Effect of headlight on Hi Viz jacket courtesy MAG Ireland
https://www.youtube.com/watch?v=1ODGEN-vG-g&feature=youtu.be



With Hi Viz

With no Hi Viz

MAG Ireland have also quoted statistics from the MAIDS report 2004 which highlights the fact that nearly 90% of multi vehicle collisions between a PTW and a car occur from the front. This is the angle from which the headlight is most effective and Hi Viz least effective.

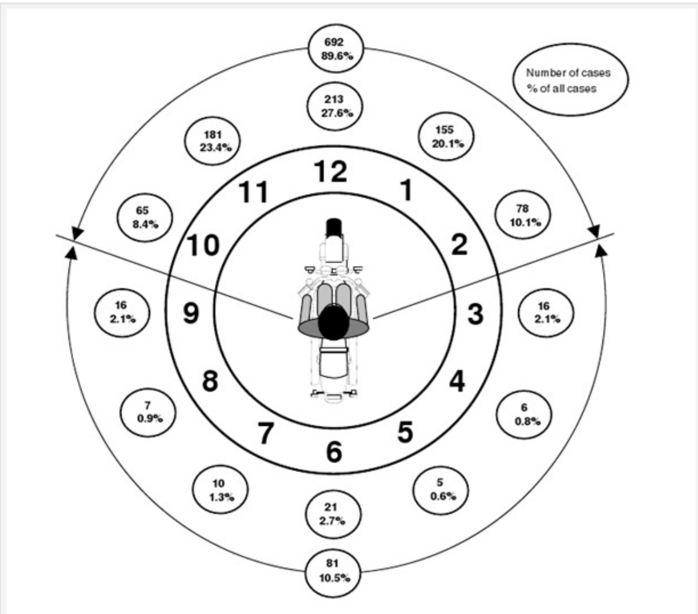


Figure 5.6: PTW line of sight to OV
(Note: There are 5 cases in which the line of sight to the OV was unknown)

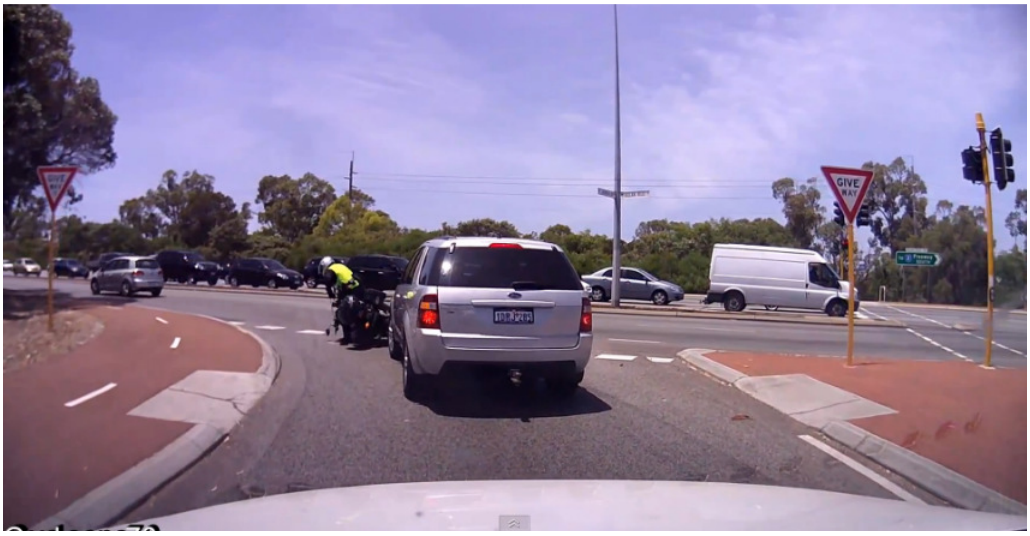
Source: http://www.magireland.org/2011/campaigns/hiviz/drivers-eye-view/

Comment from a MCC member;

"I did my 'P's test just last week with 7 other guys. Only one of the guys arrived wearing a fluoro safety vest. So, guess which one of us was stationary at traffic lights when a car hit him from behind and knocked the bike out from under him? Yep, you guessed it, it was the guy in the safety vest.

Thankfully, he was OK (shaken but not stirred) and the bike OK too luckily. The comments others have made about distracted and careless drivers are spot on!! A bit of reflective piping on clothing seams is a good idea (and not too in your face)

I have also put a little reflective tape on my helmet however none of these measures help if car drivers are not paying attention."



Motorcycle Policeman being knocked off his bike in Western Australia by an inattentive driver.

Source Youtube: https://youtu.be/1wlhAnVFoq8

In short, visibility has more to do with positioning yourself on the road than colour. As has been highlighted by the previous photos, colour is only as good as the background and the attention being paid by the driver to the surroundings.

Vehicle Stability

"Riding a motorcycle requires a high level of balance, coordination and concentration, and not everyone has these skills." Source RMS http://www.rms.nsw.gov.au .

Speed criteria utilised by and Transport for NSW for database indexing is as follows;

Speeding

The identification of speeding (excessive speed for the prevailing conditions) as a contributing factor in road crashes cannot always be determined directly from police reports of those crashes. Certain circumstances, however, suggest the involvement of speeding. The Centre for Road Safety has therefore drawn up criteria for determining whether or not a crash is to be considered as having involved speeding as a contributing factor.

Speeding is considered to have been a contributing factor to a road crash if that crash involved at least one speeding motor vehicle.

A motor vehicle is assessed as having been speeding if it satisfies the conditions described below under (a) or (b) or both.

(a) The vehicle's controller (driver or rider) was charged with a speeding offence; or

the vehicle was described by police as travelling at excessive speed; or

the stated speed of the vehicle was in excess of that permitted for the vehicle controller's licence class or the vehicle weight (introduced 1 January 2010); or *the stated speed of the vehicle was in excess of the speed limit.*

(b) The vehicle was performing a manoeuvre characteristic of excessive speed, that is:

while on a curve the vehicle jack-knifed, skidded, slid or the controller lost control; or

the vehicle ran off the road while negotiating a bend or turning a corner and the controller was not distracted by something or disadvantaged by drowsiness or sudden illness and was not swerving to avoid another vehicle, animal or object and the vehicle did not suffer equipment failure.

The MCC has been advised that when processing data from the NSW Police COPS data system to the RMS system at least 25% of the entries are changed to "Speed Related Crash" in order to fit with the RMS data set.

This then presents the issue of a motorcycle being dropped by the rider whilst he takes his bike of the centre stand which fits the definition of a speed related crash.

The RMS criteria for "Speeding" make a considerable number of assumptions. The first ***assumption*** is that motorcycle loss of control must be due to excessive speed alone. It is an historical artefact of the car-centric structure of the database and historical Police reporting methodology which was established for car crashes, not motorcycle crashes. In a "loss of traction" type crash, the Police will record the presence of a road surface hazard if it is brought to their attention. Due to RMS data coding practices as noted above, this factor becomes diluted to insignificance if not completely removed and the untrained or those who simply do not understand what they are reading may leap to misleading conclusions from the RMS data.

As a consequence,

- significant crash causation factors are overlooked
- misinformation arises
- inappropriate interventions and safety strategies arise

Police reported data that is supplied to the RMS database for re-interpretation, is not causal data, it is merely descriptive. Police are prosaic and simply looking to identify the controller of a vehicle involved in a crash. What is defined as a crash can be variable, particularly so for a single track vehicle.

A motorcycle, like a bicycle, is a single-track vehicle. It is sensitive to falling over in circumstances that are not "speeding". These include incidents that are virtually stationary, for example:

- A rider putting their foot down after stopping at traffic lights and placing their foot on a slippery patch of air conditioner water and oil, causing the rider's foot to slide without gaining traction on the road surface and the resulting imbalance causing both rider and motorcycle to fall to the ground.
- A rider stopping to park and in the process of reversing their motorcycle by paddling on a side-slope, falls over due to loss of balance.

In both of the above, the rider was charged by Police with Negligent Driving, simply because the motorcycle fell over, constituting "a crash" that fits the speed criteria.

Other slow-moving incidents create the same data artefacts that have little to do with speeding, for example:

- A motorcyclist enters a roundabout and encounters a small spill of building sand from a tradesman's utility that has been spread thinly by passing traffic. The resultant loss of traction causes the rider to crash.

- A rider proceeding west down Hunter Street in the Sydney CBD is confronted by a car darting out of Phillip Street to go east, the rider attempts to brake and swerve behind the car to avoid a crash and partly makes the turn into Phillip St and crashes. The car continues and leaves the scene.

In both the above, the rider was injured and charged with negligent driving and both fit the RMS criteria for "speeding".

Of concern are more serious incidents classified as "speeding" where other causal factors have been ignored.

A rider travelling on Bells Line of Road at night is blinded by oncoming lights and simply cannot see the bend in the road, brakes hard and crashes. The rider is charged with negligent driving. This crash meets the RMS "Speeding" criteria and the causal factor is totally ignored, as it is lost in the re-coding for "speeding". As a result, road safety policy requires enforcement of speeding instead of use of lights on cars.

These processes simply create self-serving statistics for "speeding". Inherent assumptions about the data it collects and the use of that data to establish road safety interventions are often faulty.

Policy decisions based on assumptions lead to failure and waste. Whilst useful for collection of descriptive data, the RMS database is poorly used.

The following quotes indicate that the view expressed above is recognised by a number of researchers in the road safety area.

> *"In effect, the quality of decision making in road safety is dependent on the quality of the data on which these decisions are based and by which these policies will ultimately be judged."*
> *Source:* AUSTROADS, (1997) *A Minimum Common Dataset for Reporting of Crashes on Australian Roads, Pub No.* AP-126/97

> *"Due to the role of excessive speed in crash severity and the difficulty in identifying low-range speeding, data need to be interpreted carefully and treated as an indicator rather than as quantitatively accurate*."
> Source: ATSB (2004) *Road Safety in Australia: A Publication Commemorating World Health Day 2004*

> *"Existing road crash databases in Australia appear to be useful in estimating the magnitude of the road crash problem, albeit in terms of minimum crash numbers and outcomes. However these databases are deficient in two ways. Firstly, they have limited use in definitively identifying crash causation, such as vehicle, driver and road environment features that are most likely to result in particular outcomes. Secondly, crash information for the purpose of introducing specific crash prevention and injury reduction strategies appears to be limited, at best, or unreliable, at worst*."
> Source: Giles M.J., (1999) Primary and Secondary Data Sources for the Study of Road Crashes in Australia, Road Safety Research, Policing and Education Conference, Canberra

We are forced to conclude that the manner of use of crash data is misleading as to Causal factors of motorcycle crashes. Greater effort needs to be expended in order to determine root cause of motorcycle crashes and to provide a useful data set to manage the issues.

Crash investigators need to have an in depth knowledge of motorcycle dynamics in order to be able to understand what the definitive cause of the motorcycle crash is. This means using crash investigators that ride motorcycles and have in depth knowledge of what is required to operate a motorcycle, not a two hour training session that explains that a motorcycle has two wheels and a nut holding the handle bars.

This has been highlighted by the TAC Motorcycle Crash reconstruction advertisement that was roundly criticised by subject matter experts across Australia for failing to identify that the eventual crash was caused by poor braking technique on the part of the rider and at the given speed the rider should have stopped in half the distance suggested. https://youtu.be/HT666XwJR2s

Use of witnesses has also proven to be unreliable. As an example in Melbourne 6 witnesses advised that a motorcyclist was speeding and lane splitting prior to a collision with a car that failed to give way. A review of the helmet camera footage from the rider showed that he was well under the speed limit and in the middle of his lane on a clear day, the driver just failed to give way resulting in a broken leg for the rider.

The speed criteria is a useful tool but it has been based upon issues and causes perceived for dual track vehicles and it has been assumed that single track vehicles are affected by the same set of issues. In fact single track vehicles are dynamically different to cars and trucks and are affected by many more issues than speed alone.

This is highlighted by the data available for bicycle crashes were 52% of emergency department admissions for bicycle riders involved no other vehicle or pedestrian, they are single vehicle accidents and would fit the definition of "Speed Criteria" from RMS. Results from research by De Rome has shown that the number of single vehicle accidents involving cyclists is almost on a par with those for motorcycle riders which show that single track vehicles need to be examined differently to dual tracked vehicles. Source: *de Rome, Bicycle Crashes in Different Riding Environments in the Australian Capital Territory*

Motorcycles also face the issues of road conditions when braking or turning. Something as simple as a flattened aluminium can is enough to bring a motorcyclist into contact with the bitumen, yet the driver of a car would not even think twice about it let alone list it as a hazard.

Poor road repairs, raised bitumen ridges often seen in the centre of lanes parallel to the lane lines and raised bitumen ridges perpendicular to the lane lines in both urban and regional areas all have the ability to bring even a skilled rider down whilst travelling under the speed limit, yet by applying the factors listed above from RMS the crash would be attributed to speed.

More often than not Single Vehicle motorcycle crashes are attributed to speed alone and this may not be the case. Inappropriate braking techniques whilst mid corner are a sure to bring a bike down on the road. This rider notices the police car mid corner and uses incorrect braking technique and crashes the bike.

Full video available at: https://youtu.be/oBTGgT_V5F8

This type of scenario can happen on any corner with any perceived threat including vehicles on the incorrect side of the centre line, animals, roadkill, spilled gravel etc and often there will be no apparent cause for the crash.

This is a hazard encountered by motorcyclists on a daily basis.

Currently RMS are running a project of mapping crash zones for motorcycle incidents and areas of concern by using local knowledge of riders. This is another great example of stakeholder engagement that leverages the knowledge of subject matter experts, the riders themselves, in order to obtain accurate data with real world experiences and knowledge.

***RMS Motorcycle mapping tool**.*

The purpose of the mapping tool is to improve understanding of motorcycle crashes which are typically underreported and often inaccurately reported in locations such as mountainous passes where reference points are problematic.

This methodology aligns with the NSW Motorcycle Strategy 2012-2021: 'Identify high motorcycle crash locations for road safety treatment including road engineering improvement and review of speed zones'.

Qualitative data is compared with crash data to develop a list of treatment priorities. Typically the reported crashes/hazards/near misses are unique to motorcyclists as they use the road differently to cars.

Projects like this will enhance the base knowledge of crash causation and lead to a better understanding of same.

The effectiveness of the current action plan to enhance motorcycle safety including communications and education campaigns, road environment improvements, regulation of safety equipment and gear;

Road Environment Improvements

Poor implementation of roadside furniture and poor road repairs by RMS/Councils

In today's modern world where there is an emphasis on "Safety in Design" in working environments. Why do local councils insist on installing infrastructure that fails to consider motorcycle riders?

Various examples of this can be seen in the photo's below.


Doncaster Avenue West Pymble

The installation of the bricks in the photo above pose a risk to riders by virtue of the fact that a single tracked vehicle will lose control when coming into contact with them where as a dual tracked vehicle will not. This is further exacerbated by the fact that the bricks collect and pool sand, dirt and debris close to the centre line which produces a slippery surface close to the hazard and effectively increases the chances of a single tracked vehicle coming into contact with the bricks and losing control, quite possibly sending a motorcycle into the path of an oncoming vehicle from a position that might have been recoverable if not for the bricks installed by Council.


Photo of Booth St divider. Booth St Annandale a post planted in the middle of the road.

Example above of failing to implement “Safety in Design” with the same inherent safety issues as listed earlier for Doncaster Avenue. A post installed in the middle of the road is just plain silly, even more so when it is very difficult to see at night and poses a risk for cyclists and motorcycle riders as well as the risk of damage to cars.


Pedestrian Crossing Booth St Annandale.

Example of poor design of pedestrian crossing Booth St Annandale. The pedestrians are masked on the approach on the right by the trees and poles and then by the safety sign until the pedestrian actually steps onto the road. The effect is worse at night due to the high reflectivity of the safety sign which increases glare to the driver and riders approaching the crossing. Add the white painted bicycle symbol in the braking zone and wet weather and you have the perfect recipe for motorcycles losing control on the approach to the pedestrian crossing. The poor design is also highlighted by the fact that the road narrows at this point and Bicycle riders are forced into the path of traffic. The combination of Safety Signage, poles etc also mask the approaching traffic from the side street.

Poor visibility due to roadside furniture and signage, the signs can hide a car let alone a bike.

Poor road repairs in braking area of round about that could bring a rider unstuck in an emergency braking situation, Booth St Annandale.


Poor road repair in braking areas on approaches to Collins St.

All of the examples except Doncaster Avenue West Pymble were taken in a one block radius of Annandale Police Station.

Putty Road, ridge in centre of lane at exit of bend, firmly placed in the line of travel for a motorcycle.

Recent improvements to Putty Road, installation of arrows. This corner was the scene of multiple crashes due to an optical illusion under certain lighting conditions that made the road look like one continuous section across the gully resulting in multiple crashes into the W Beam. (Photos, Clements)

Whilst Centre for Road Safety released an excellent document in 2013 entitled: "Making roads more motorcycle friendly, a Guide to Road Maintenance and Design" councils are failing to implement the guidelines. This document was adapted from a Vicroads publication (http://roadsafety.transport.nsw.gov.au/downloads/motorcyclists/makingroads_motorcyclefriendly_oct2013.pdf),.

The MCC feels that there should be a greater mentoring program for road designers in local councils and a move to monitor and sign off on standard styles of design.

Road repairs need to be inspected as the current system has contractors certifying their own work, certifying that it complies with standards and is fit for purpose. In many cases not this is not the case and whilst ever the works are awarded to the contractor with the cheapest price and no checks and balances are put in place through quality assurance this scenario will continue.

Mentoring and education combined with QA processes would ensure that various items are not installed in a manner that poses a threat to life and limb of all road users. The way the system currently works council are installing equipment and infrastructure that is potentially dangerous to motorcycle riders, cyclists and drivers alike.

Shellharbour Council is an exception to the rule having implemented a “Report a Road Hazard” application for use on mobile phones by residents and travelers. This gives road users the ability to be proactive and has the added benefit of Council staff being able to group issues that require remediation and allocate the work to a repair crew that can target multiple repairs in close proximity thereby improving efficiency and generating subsequent cost savings. This type of initiative should be used as a model for other Councils and should be encouraged.
http://www.shellharbour.nsw.gov.au/default.aspx?WebPage=1532

Roadside Crash Barriers

All existing crash barriers have been designed to reduce the severity of a crash when cars and trucks leave the roadway. Until recently there has been little consideration given to the welfare of motorcyclists who collide with these barriers. In many cases the safest barrier for a motorcyclist is ‘no barrier’. This is also highlighted by the fact that implementing a barrier to save someone from a single post introduces multiple additional posts to the roadside and thereby increases the chances of colliding with an object and causing injury or death.

Crash barriers can be classified into three types, rigid, semi rigid and flexible. Concrete barriers are classified as being ‘rigid’, W-beam (Armco) as ‘semi rigid’ and wire rope as ‘flexible’.

Wire rope barriers are very effective in reducing the severity of crashes when cars and trucks impact with them as they absorb energy. Rigid barriers are less effective as more of the energy of the impact is transmitted to the vehicle occupants resulting in greater injuries. This is why wire rope barriers are installed instead of W-beam (Armco) or concrete barriers.

While the classifications of rigid, semi rigid and flexible have meaning in car and truck crashes they are meaningless in motorcycle impacts. To motorcyclists, all barriers are ‘rigid’.

There has been little research into what constitutes a motorcycle friendly barrier nor how to make existing barriers less aggressive in causing injury to motorcyclists.

Research has shown that in about half of crashes the rider is still upright on the bike when it impacts a barrier and that it is very likely that the rider will then slide along the top of the barrier with the possibility of impacting the tops of posts. If the rider has separated from the bike and is sliding along the road before impacting that barrier, it is very likely that they will impact the lower part of a post.

There are a number of products available that are designed make crash barriers less ‘aggressive’ which are designed to prevent riders sliding under the barrier or coming into direct contact with posts or sharp edges.

Just about all of these products are designed to make W-beam more motorcycle friendly. Cushions to cover the lower part of a wire rope barrier post are the only product designed to reduce injury to riders who collide with wire rope. These cushions are only effective at low speed.

The potential to make W-beam more motorcycle friendly is far greater than that of wire rope barriers.

A Swedish research paper *Hawzheem Karim “Road Design for Future Maintenance, Life Cycle Cost for Road Barriers”* has studied the ‘whole of life’ costs of barriers and found that wire rope barrier is the most expensive, due to repair costs after minor impacts. Other barrier systems suffer less damage that requires repair than wire rope, notably concrete that rarely has to be repaired. In the recommendations at the end of this paper future studies are recommended into the high rate of under run, over run and roll over incidents that are apparent with the use of Wire Rope barriers.

As a tensioned system, it is important that the tension in the wires of a wire rope barrier are within specification. After an impact wire rope barriers need to be repaired promptly and the tension checked so the barrier will function as designed. Casual observation shows that these repairs can take months to complete in NSW.

Currently relatively few riders impact wire rope barriers, this is generally thought to be a result of wire rope barriers not being installed on corners of a radius less than 200 metres in most cases, where riders are more likely to crash and less wire rope barrier installed as compared to W-beam. As more wire rope barrier is installed the likelihood of motorcycle impacts will increase.

Studies have shown the issues with Wire Rope Barriers to motorcyclists, particularly the risk of amputation and subsequent loss of life due to blood loss.

Extract from *Berg, Grzebieta, MOTORCYCLE IMPACTS TO ROADSIDE BARRIERS – REAL-WORLD ACCIDENT STUDIES, CRASH TESTS AND SIMULATIONS CARRIED OUT IN GERMANY AND AUSTRALIA.* From Page 11 onwards,

"Wire rope barrier

Figure 23 shows the kinematics for an upright rider on a motorcycle impacting a wire rope barrier. The calculated injuries from the simulations suggest that serious injury would result regardless of speed and impact angle.

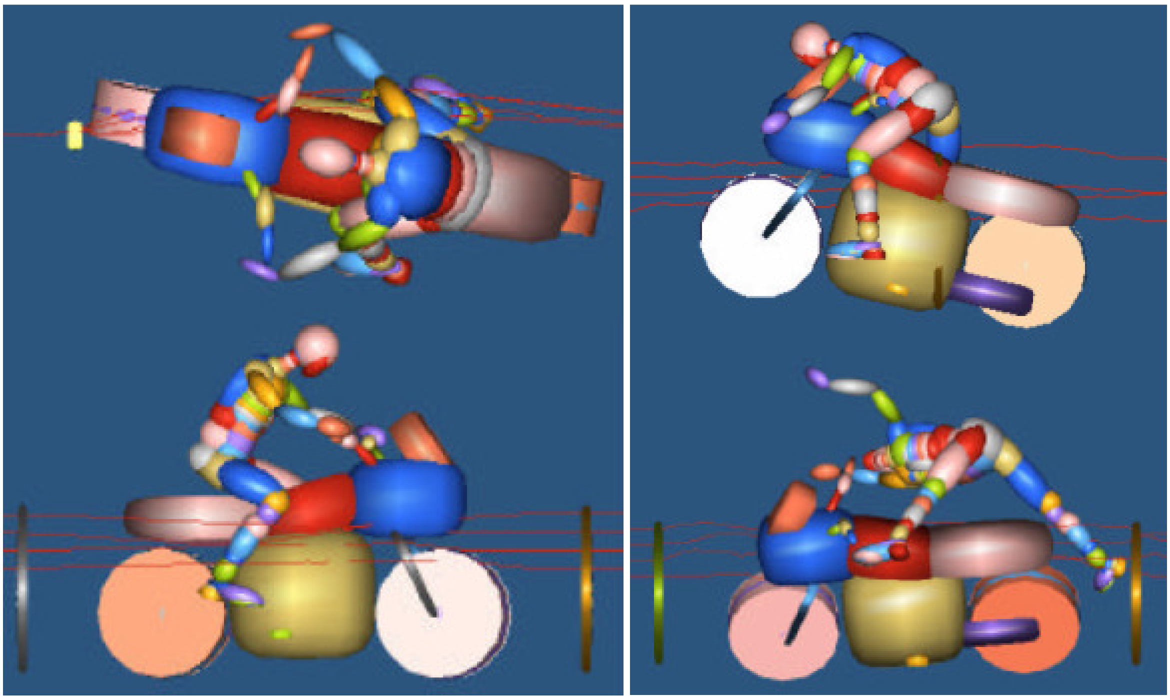


Figure 23 MADYMO simulation showing an upright seated rider on a motorcycle crashing into a wire rope barrier at 60 km/h and 12º

In all simulations the motorcycle slides along the wires until it hits a post, squeezing and trapping the rider's leg against the wires as it does so. The post contact causes the motorcycle's front wheel to snag lifting the front of the motorcycle up and throwing the rider's torso and head forward. Because the rider's leg is trapped between the motorcycle and the wire ropes and the foot snags in the ropes, the head and torso slap into the front of the rising motorcycle. Eventually the leg becomes free as the motorcycle rotates and the rider is then catapulted over the barrier. This is a different result to the concrete barrier where the rider was thrown over the barrier with relatively little snagging or deceleration.

In both the 60 km/h and 80 km/h impact speeds at an angle of 25º, the motorbike throws the rider into the air with the rider hitting the ground head first. Hence the high HIC……..

……The concrete barrier simulations seem to indicate that a motorcyclist impacting such a barrier in an upright position will sustain survivable injuries because of low decelerations during impact.

Simulations of the wire rope barrier collisions showed that regardless of angle or speed it is unlikely that the motorcyclist will clear the barrier very cleanly. In many cases the motorcyclist's extremities became caught between the wires. This results in the rider being subjected to high decelerations and possible high injury risk secondary impacts into the road.

In all the simulated wire rope barrier collisions, the wires guided the motorcycle into the posts leading to heavy contact with the post. The motorcycle and the rider were subjected to large decelerations because of this snagging effect and hence elevating the injury risk for the rider."
Source: National Highway Traffic Safety Administration http://www-nrd.nhtsa.dot.gov/pdf/esv/esv19/05-0095-O.pdf

In another study in 2010 by University of NSW entitled "Motorcycle Crashes into Roadside Barriers, Stage 2" states on page 36:
"Thus of the five wire rope barrier fatalities in Table 11, it is unlikely that four would have survived if a W beam barrier had been deployed in place, as a result of the severity of these crashes "

This can also be interpreted to mean that replacing Wire Rope Barriers with W Beams would have resulted in a 20% reduction in fatalities and quite likely an even greater reduction had rub rails been fitted or Concrete Barriers been used.

Source: http://www.tars.unsw.edu.au/downloads/Stage2_report.pdf

Extract from; Universta degli Studi di Firenze, **D1.1 – REPORT ON THE CHARACTERISTIC OF MOTORCYCLE ACCIDENTS**
Extract from "Summary" page 2;
"The most dangerous aspect of guardrails with respect to motorcyclists is the exposed guardrail posts: An impact on a post can, depending on the part of the body involved, cause fatal injuries at an impact velocity of as low as 20km/h.

Extract from page 22:

"10.3 Wire Rope Safety Barrier
In a study performed by the Australian Transport Safety Bureau (ATSB, 2000), safety implications of wire-rope safety barriers were analysed. The main roadside objects involved in fatal motorcycle crashes are trees, poles or signposts (70%). The study concluded that an increasing use of wire and exposed poles by the roadside will continue to cause the rise of serious casualties as more riders hit this fence system with potentially deadly results. According to Carlsson (2009) a number of motorcyclists have been killed when colliding with cable barriers in Sweden. In Norway, a cable sliced the helmet of a rider. The motorcyclist died. In Sweden, four motorcyclists have been killed when colliding with cables on the 2+1 roads. Nine motorcyclists have been killed on the 2+1 roads in total. 17 have been severly injured

Source: http://www.transport-research.info/Upload/Documents/201204/20120405_221808_37222_D_1_%201_version2.pdf

Major injuries from a W Beam barrier are sustained through hitting the posts. Why would we continue to install Wire Rope Barriers that have a greater number of exposed posts than W Beams? Once again this comes down to "Safety in Design".

There is a school of thought amongst some researchers that suggests barrier fatalities in motorcycles are "only 6%"of the total, yet this equates to 4 lives per annum and 40 for the last decade.

Road Authorities need to consider the special needs of motorcyclists before installing crash barriers, these include:

- The 'no barrier' option
- Locating the barrier as far away from the road way as possible
- Use of energy absorbing sign supports to remove the need for crash barriers
- Installing products that make barriers less 'aggressive'

Communications and education campaigns

Centre for Road Safety has implemented a number of awareness and education campaigns to good effect in NSW. Motorcycle Awareness Week has been run in conjunction with CRS and the Motorcycle Council of NSW for a number of years and is a statewide campaign aimed at drivers and riders to raise awareness of motorcycles in the minds of drivers and road safety strategies in the minds of riders.

Further to this, Centre for Road Safety recently launched a rider awareness and education campaign entitled "Ride to Live" http://ridetolive.nsw.gov.au . This campaign has met with rave reviews from riders and riding associations across Australia and met with praise at the recent Australian Motorcycle Council (AMC) annual seminar which had representatives from every state rider association in attendance.

Part of the success of this campaign was due to Centre for Road Safety involving the MCC of NSW and other stakeholders at the concept stage in order to create a campaign that was believable to riders and would not fall foul of criticism as some interstate campaigns have received.

Over the past four years the stakeholder engagement model utilised by Transport for NSW and Centre for Road Safety has proven to be an excellent system and the NSW Government should use this model across the board as the results have been extremely positive for both the riding community and the Departments themselves.

Regulation of Safety Equipment and Gear

Protective Clothing

Riders have sought better information on protective gear than available from advertisements. We do not seek compulsory riding gear, as this will ensure minimalist compliance and confound development of better protective equipment.

Much of the recent research into the effectiveness of motorcycle protective clothing has taken place in Australia. The Gear Study, a major Australian study by Dr de Rome was a 12 months cohort study of injury and non-injury crashes in the Australian Capital Territory. Source: (*de Rome L, Ivers R, Fitzharris M, et al. Motorcycle protective clothing: Protection from injury or just the weather? Accid. Anal. Prev. 2011;43(6):1893-1900)*

This study established that protected riders were less likely to be injured particularly when wearing gear fitted with impact protectors. The injured were less likely to be admitted to hospital or spent fewer days in hospital and were more likely to have returned to pre-crash work six months post-crash than unprotected riders. Source: *(de Rome L, Ivers R, Fitzharris M, Haworth N, Heritier S, Richardson D. Effectiveness of motorcycle protective clothing: Riders' health outcomes in the six months following a crash. Injury. December 2012 2012;43(12):2035-2045)*

There have also been a number of published journal papers relating to the effectiveness of protective clothing and how this relates to the European Standards for motorcycle protective clothing. The conclusions of the Australian researchers are:

1. Motorcycle protective clothing is associated with reduced risk and severity of crash related injury and hospitalization, particularly when fitted with body armour.

2. There are strong associations between motorcycle protective clothing and post-crash health and wellbeing.
3. A quarter of the motorcycle designed clothing failed under crash conditions indicating a need to review the performance requirements particularly in relation to abrasion resistance.
4. Substantial proportions of the motorcycle protective clothing currently in the market fail the current European standards for abrasion resistance. Source: *(de Rome L, Taylor NAS, Troynikov O, et al. Motorcycle protective clothing: physiological and perceptual barriers to their summer use. Australasian Road Safety Conference; 14-16 October 2015, (in press); Southport, Queensland*)
5. Mandating usage of protective clothing is not recommended as it would be counter-productive. Instead, consideration could be given to providing incentives for usage of protective clothing, such as tax exemptions for safety gear, health insurance premium reductions and rebates.

In 2010 the Motor Accidents Authority of NSW (MAA) commissioned a study into how to improve consumer information on protective clothing. The report on the findings of the study is available at http://www.amc.asn.au/web/sites/default/files/maa_motorcycle_clothing_report.pdf

The report recommends that a 5 Star system similar to ANCAP for cars be introduced. This scheme would have two ratings, one for 'protection' and the other for thermal comfort.

The rating for 'protection' would be based on tests used in the European Standards EN 13595 jackets, pants & one piece suits, EN 13594 Gloves and EN 13634 Footwear.

This approach will allow garments to be ranked in order of performance allowing riders to make informed decisions. It will also ensure continuing competition between manufacturers.

A 5 Star scheme will allow riders, when purchasing protective clothing, to make informed choices as to:-

- The level of protection they are purchasing,
- The level of thermal comfort they are purchasing.

The MCC does not support the introduction of a Standard as this is inappropriate and unworkable due to Australia's diverse climate. Also, a Standard provides no incentive for the continual improvement in the quality of protective clothing being offered for sale, it will only set a minimum quality that has to be achieved.

The MCC does not support mandating protective clothing but rather it supports the introduction of a 5 Star rating scheme that will provide riders with better information so they can make an informed choice. Combine this with removal of GST on Safety Equipment as an incentive.

Anti-locking Braking Systems (ABS)

An Action of the National Road Safety Strategy 2011 – 2020 is to prepare a Regulation Impact Statement (RIS) on the mandating of ABS for motorcycles. This work has been progressing without consulting rider groups. The MCC is concerned that not all factors influencing the costs and benefits of motorcycle ABS will be considered in the RIS. In particular:-

- the effectiveness of ABS in reduce crashes
- the ability of ABS to cope with rough surfaces
- the costs involved in training riders to use ABS to best effect

At a February 2012 meeting of the European working group on motorcycle brake testing, the US National Highway Transport Safety Administration (NHTSA) gave a presentation on NHTSA's research into the effectiveness of motorcycle ABS, this research found that "Using a case-control comparison methodology for motorcycles with and without ABS, and using two sets of data (fatal crashes and,

separately, all police-reported crashes), we did not find statistically-significant results to suggest that ABS affects motorcycle crash risk”.
Source: *http://www.unece.org/fileadmin/DAM/trans/doc/2012/wp29grrf/GRRF-72-25e.pdf Slide 17*

NHTSA’s research which was done in 2010 has been heavily criticised by the US Insurance Institute for Highway Safety (IIHS) which claims ABS will result in 37% less crashes. The NHTSA presentation claims there are a number of confounding factors in IIHS’s research.
Source: http://www.iihs.org/iihs/sr/statusreport/article/45/10/2

At the same 2012 working group meeting on motorcycle brake testing the Japanese Automobile Manufacturers Association (JAMA) gave a presentation stating that it has been found that in Japan there is no statistical evidence that ABS is effective in reducing crashes, Slide 4.

Source: http://www.siamonline.in/siamjama2014/4th%20SIAM%20JAMA%202W%2031102014%20-%20Goa/ppts%20JAMA/ppts%20JAMA/3-1%20Brake%20regulation.ppt

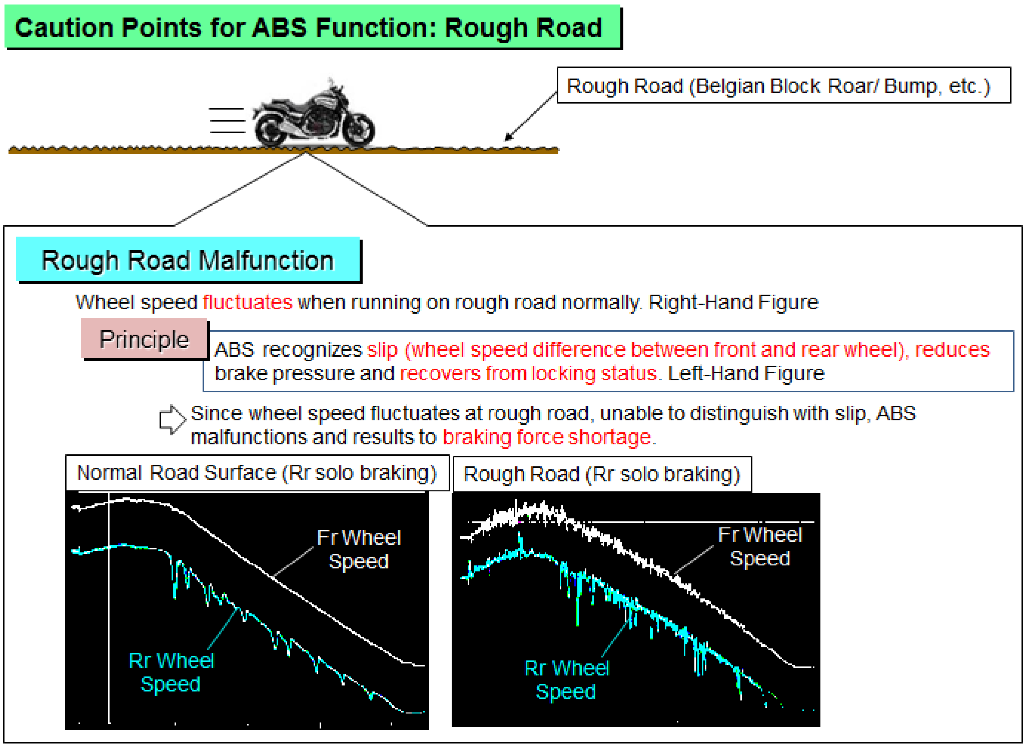
Given the findings of NHTSA and those in Japan, the RIS will need to consider the worst case that ABS has no effect in reducing motorcycle crashes.

When ABS was introduced on cars it was predicted it would be the next silver bullet in reducing road trauma, this prediction hasn’t eventuated. If ABS has been in-effective for cars it may well prove be in-effective for motorcycles.
Source: *ACRS Journal May 2014 “Navigating toward zero fatalities: the role of NCAPs”*

In 2001 the Nevada Automotive Test Center undertook testing of motorcycle ABS on rough surfaces comprising of Belgian Blocks (slide 7), The purpose of the research was to evaluate the ability of FMVSS 122 (Motorcycle Braking Systems) to provide regulations that result in motorcycles having safe and usable braking systems. On page 108 “It is recommended to include a braking on a rough surface event with the current requirements for compliance.” However, the 2006 revised version of FMVSS 122 doesn’t include a rough surface test.

Source: *http://www.satai.com/MemberOnly/ConfMat/Spring2009/G-8-Motorcycle-Braking-tests-NHTSADocket11950.pdf*

The 2012 JAMA presentation includes test results on rough surfaces (Belgian Blocks)[3] Slide 15 showing that the ABS is unable to distinguish wheel fluctuations due to the rough surface from slip resulting in the ABS malfunctioning.



JAMA Slide 15

To ensure that motorcycle ABS systems introduced into Australia will operate satisfactorily on real world road surfaces, a rough surface tests needs to be introduced into the Australian Design Rules for motorcycle braking (ADR 33)

When ABS was first introduced on cars it was found that due to the pulsing of the brakes which was a characteristic of these early systems, drivers would lift their feet off the brake pedal believing there had been a mechanical failure.

If motorcycle ABS is made mandatory, riders need to be taught how to use the ABS to best effect. Practicing on their own, on public roads would be less than ideal. They need to be taught in a controlled environment by trainers who can demonstrate how ABS works. On rough surfaces the ABS, the suspension and weight of the rider interact so riders need to practice on real world road surfaces on the motorcycle that they own.

The cost of this training needs to be included in the cost of mandating ABS.

Furthermore ABS on Enduro style trail bikes is not being considered in Europe for various reasons but mostly due to Enduro bikes being on rocky terrain and the added weight on both the front wheel and the entire bike making ABS detrimental instead of an improvement.

Whilst ABS systems on motorcycles have improved markedly in the past few years, these systems are only available on top of the line models and would not be financially viable on modest priced scooters. Mandating ABS on Powered Two Wheelers would lead to provision of very low end ABS on lower priced bikes. This of course could be circumvented by introducing a minimum standard for ABS but in the end would prove cost prohibitive to both the regulators and the industry as whole.

As the European Economic Union have mandated ABS in the EU, models available to Australia will come fitted with ABS in any case therefore mandating ABS in Australia could well prove to be a great cost burden on the governments to implement.

Licensing and rider training

The NSW scheme is quite robust but as Victoria and Queensland are currently reviewing their schemes, this is an opportunity for NSW to compare the revised Vic & Qld schemes against ours.

Training needs to be a whole of career experience not just at the novice stage, however the take up of post licence training is low. There is an opportunity to research why the take up is so low and to introduce initiatives to improve the take up rate so that riders in NSW can continue to improve their skills and hazard management abilities.

The NSW pre learner and pre provisional training program implemented in 1990 need to have their subsidies maintained. There is also scope to have RMS continue with the Rider Training unit in order to maintain compliance of service providers and professional development of rider trainers. Just because a system is working well does not mean it no longer needs maintenance.

Any Other Related Matters

First and Last Parking as a solution to visibility issues

"First and Last" parking is the practice of allocating parking to motorcycles in locations that will improve visibility for the average driver at intersections, entry and exit points for carparks and loading docks. The principle is simple: the form factor of a motorcycle has a lower height than other vehicles thus allowing drivers to have a clearer view over the top of the bikes and increasing the visibility of pedestrians on footpaths and approaching vehicles when entering and exiting buildings. "First and Last Parking" also gives a pedestrian a better view of turning or approaching vehicles when crossing at intersections or building entry points.

As a safety initiative, "First and Last Parking" ticks a lot of boxes and could lead to a reduction in pedestrian fatalities and serious injuries by giving all users a clearer view of their surroundings. This principle has already been put to good use in a number of City of Sydney areas, and this opportunity to expand it can only make the roads within the Sydney CBD safer and would align with the recently announced initiative by the Honorable Duncan Gay, Minister for Roads and Ports, to reduce pedestrian fatalities and serious injuries.

Progress reports of injured persons to at fault drivers.

Implement a scheme of injured party reports to the driver that caused the collision and injury. Presently at fault drivers have no communication with any injured parties from a collision, in fact the at fault driver only has to fill out his/her own insurance paperwork and they have no further dealings with the persons they have injured. Implementing a system of progress reports or even face to face meetings would highlight to the errant drivers what an impact they have had on the other person and their family. This then could set the trend for instilling a more road safety conscious attitude within drivers as a whole and make them aware of the consequences of their actions.

Automatic loss of licence for at fault drivers causing injury.

There is instant loss of licence for speeding offences that injure no one yet when an errant driver causes an injury to another party they often receive a minimal fine and lose 3 points. Introduction of a mandatory 3 month licence suspension would increase driver road safety awareness and would have a suitable penalty for causing injury to another person.

Recreational Registration for Trail bikes.

At current estimates there could be as many as 80,000 unregistered trail bikes in NSW. Many of these are ridden illegally as highlighted by the Hunter Illegal Trail Riding Working Group's report. These riders are not contributing to the system and implementation of a Recreational Registration scheme similar to the Victorian scheme would see riders contributing to insurance and state revenue streams.

Reporting of traffic and road issues.

At this point in time there is not a centralized system of road hazard reporting available to riders in NSW. It has been suggested that issues be reported to the Traffic Management Centre (TMC) on 131-700 but to date this has not been effective. Issues such as diesel spills have received the response that the caller should get in contact with the local council or the fire brigade or any other of a host of different parties, meanwhile the hazard remains for days without rectification.

NSW needs a central reporting authority that these issues can be lodged with and the caller to receive a reference number so that they can follow up on the issue if needs be. Using the Shellharbour project as an example would be beneficial to all road users. As has been highlighted earlier in this submission riders and motorcycles are subject to a greater range of issues than car drivers and in effect motorcycles are the canary in the coalmine for other road users.

Use of Helmet cameras.

Helmet cameras have proven useful in providing correct evidence of motorcycle crashes and are useful as a training tool to improve rider skills and future education campaigns.

Crash Mapping Project

Expand the current RMS Crash Mapping Project with a view to increasing the knowledge base relating to motorcycle crashes and hopefully leading to better understanding of crash causation.

Instrumented Motorcycle and Naturalistic Studies.

Use of instrumented motorcycles and naturalistic studies of riding habits would prove beneficial in documenting the complex nature of riding a motorcycle and would assist in determining root causes of crashes. Qld currently use an instrumented motorcycle for road audits of popular motorcycle routes.

From; "Motorcycle Road Audits Using an Instrumented Motorcycle, M Eveleigh Qld Transport"

"to enable better understanding of the risks encountered by motorcycle riders, an instrumented motorcycle has been developed. The data collected from the bike will be used to improve knowledge of the dynamic behaviour of motorcycles, rider's behaviour, as well as to assist with the development of countermeasures. In the longer term, it may also have potential to assist with development of design standards that are more cognisant of motorcycle performance characteristics."
Source: http://casr.adelaide.edu.au/rsr/RSR2010/EveleighM.pdf

Summation

Whilst this submission in no way aims to absolve riders of all blame, it does endeavor to inform the reader that motorcycles are a highly dynamic vehicle which readily becomes unstable in adverse riding conditions. It is difficult to explain the nuances and complexities of motorcycle riding and unless one has firsthand experience of riding a motorcycle it can be difficult to grasp. The issue of motorcycle crash causation is a complex one and cannot be solved by speed enforcement alone nor can the causes of motorcycle crashes be explained by applying a formula based on dual tracked vehicles to single track vehicles. A motorcycle is not a car and reacts very differently to a car. Further detailed research is needed in order to determine the true causes of motorcycle crashes, preferably by researchers that ride, not just licence holders, but riders.

Motorcyclists come from every walk of life and every profession and trade, we are ordinary everyday human beings first and motorcycle riders second. The average age of a rider in NSW is 43 years old, we are mums, dads, brothers, sisters, grandparents, Doctors, laborers, Lawyers, truck drivers, CEO's and administration assistants. Every life lost in a crash is a tragedy and we hope that this paper assists in finding the right answers to reduce these tragedies.

MCC of NSW Recommendations:

1. Increased opportunity for rider training for all riders.
2. Encourage rider training through a dedicated communications strategy.
3. Maintain existing subsidies for pre permit and pre provisional rider training in NSW.
4. Rebuild the RMS Rider Training Unit to ensure compliance of service providers through audits and professional development.
5. Continue implementing under run/rub rails on W Beam barriers.
6. Investigate options for injury mitigation for the tops of W Beams.
7. All proposed barrier implementations to take into account the needs of motorcycle riders.
8. Review the implementation of Wire Rope Barriers based on cost and public health outcomes compared to other forms of barriers.
9. Dedicated research into crash causation of single track vehicles.
10. RMS to oversee council installations of traffic calming and lane dividing infrastructure to mitigate risks to all road users.
11. Councils to take responsibility for the works implemented by their contractors by implementing quality assurance programs in line with world's best practice.
12. Continued education programs to enhance drivers awareness of riders on the road.
13. Continued education programs to give riders the tools to position themselves on the road with the least risk.
14. Implement a 5 Star Protective Clothing scheme.
15. Introduction of incentives for protective clothing, eg removal of GST for safety equipment.
16. Do not mandate protective clothing.
17. Do not mandate ABS.
18. Implement a dedicated road hazard reporting system that disseminates information to Councils and RMS.
19. Implement a 3 month loss of licence system for drivers that cause injury to another party.
20. Implement a system of injury reporting to at fault drivers in order that drivers become aware of the consequences of their actions.
21. Subject matter experts to investigate motorcycle crashes.
22. Develop an instrumented motorcycle for use in road audits in NSW

Appendix 1

Motorcycle crashes in NSW, 2009-2013 - Some Facts

A report prepared by Liz De Rome for the Motorcycle Council of NSW.

Motorcycle crashes in NSW, 2009-2013 - Some Facts

The MCC commissions this annual report to provide up to date information on motorcycle crashes to help riders understand and manage their risks. The following information is based on analysis motorcycle crashes reported to police in NSW between 2009 and 2013. The data has been provided by NSW Roads and Maritime Services (RMS) from the NSW Crash Link database.[1]

Summary 2009-2013

1. Over the five years (2009-13), there were 14,144 motorcycle crashes in NSW, including 309 which resulted in the death of a rider or pillion.
2. The number of crashes per year has not changed since 2009, despite a 22% increase in the number of registered motorcycles and scooters. When the riding population is taken into account, the number of motorcycle crashes has decreased from 177.8 to 145.9 per 10,000 registered motorcycles.
3. The number of fatal crashes has also remained constant with an average of 62 per year between 2009-2013 compared to 61 between 2004 and 2008. The fatal crash rate per 10,000 registered motorcycles has dropped from 5.0 to 3.4 for those periods respectively.
4. The proportion of motorcycle crashes that involved only the single vehicle 41%, has remained constant for the past 15 years.
5. Excess speed for conditions was associated with 47% of all single vehicle crashes. More than half of these excess speed crashes were on curves (58%), and 20% involved a road surface hazard such as loose gravel, diesel spill or a pothole. Road surface hazards were involved in more of the crashes on curves (26%) than straight (14%) sections of road.
6. Where alcohol involvement was known it was associated with 18% of all rider fatalities and 4% of motorcycle casualties compared to 23% and 5% of car drivers. However relative to registration numbers, the alcohol-related fatality rate for riders was six times that of car drivers (0.6 vs 0.1).
7. The other driver was the key vehicle in 62% of all multi-vehicle crashes with a motorcycle and 70% of those at intersections. Whereas riders were more likely to be the key vehicle in rear end (58%) and head-on crashes (80%).
8. Head-on motorcycle crashes, where the rider was the key vehicle, were mostly due to the rider crossing or leaning over the centre line while cornering (82%) and not while overtaking
9. Across all multi-vehicle crashes, almost a third (31%) occurred at T-junctions with the key vehicle being the other driver in 70%. T-junctions account for 54% of all intersection crashes with a further 34% occurring at cross-roads.
10. Young riders (17-25) were more likely to be involved in multi-vehicle crashes than were older riders (40+), and more likely to be the key vehicle.
11. While fully licensed riders continue to represent over half of those who crash (53%), the proportion of novice riders has increased substantially since the period 2004-2008. In the current report the proportion of crashes involving Learners has increased from 10% to 15% and for Provisional licensed from 8% to 11%. Those whose licence status was unknown have reduced from 13% to 10%, other licences include overseas and interstate.

[1] Note: This analysis is based on data provided by RMS for crashes occurring during the period 2009-2013. It does not necessarily reflect the views of RMS.

12. Unlicensed riders continue to represent a relatively small proportion (7%) of all riders in crashes but 19% of those in fatal crashes and 35% of all riders with illegal blood alcohol when they crashed. Unlicensed riders were also more likely to be the key vehicle in a crash (59%) and more likely to be carrying a pillion who was injured in the crash, 6% compared to 4% of licensed riders.

THE CRASH RATE

The number of motorcycles registered in NSW has increased by 22% in just five years from some 162,000 in 2009 to over 197,000 in June 2013. Over the same period of time, the number of motorcycle crashes including fatal crashes have fluctuated but returned to similar numbers in 2013 (see Table 1).

Table 1. Number of crashes in NSW, 2009-2013

Severity of crash	2009	2010	2011	2012	2013	Total
Fatal	68	59	51	61	70	309
Injury	2555	2411	2494	2615	2539	12614
Non-casualty(tow away)	259	233	219	236	274	1221
Total	2882	2703	2764	2912	2883	14144

The proportion of crashes relative to the numbers of registered motorcycles provides a better indicator of trends than crash numbers. The overall crash rate per 10,000 registered motorcycles has decreased substantially over the study period (see Figure 1). In particular, the injury and total crash rates, at 128.4 and 145.9 respectively in 2013, are the lowest recorded in at least 15 years. The fatal crash rates in the 5 years under examination also reflect an increase in fatal crashes from 2011 relative to the motorcycling population.

Figure 1 illustrates the rate per 10,000 registered motorcycles for fatal, injury and all crashes over the past five years and compares this to the rates in 1995.

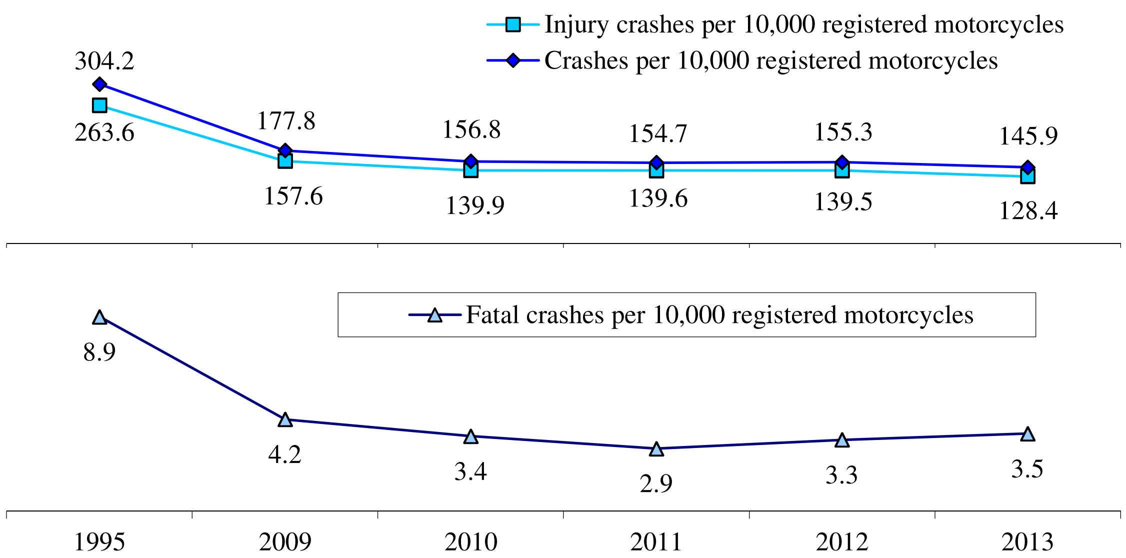


Figure 1. Number of crashes per 10,000 registered motorcycles in NSW, 1995 and from 2009-13

Note: The sections highlighted in grey are from 2010 as updated annual registration data by age is yet to be provided.

AGE AND EXPERIENCE

The average age of a motorcyclist in NSW has remained stable around 43 for the last 3 years since 2008 (42.8, 43.0, 43.3 respectively), whereas the proportion of registered owners who are aged over 40 has continued to increase. Riders aged 40 plus now represent 59% of all registered owners. There is a continuing but slight decline in the proportion of riders aged between 26-39 years. Figure 2 illustrates the changing trend in registrations.

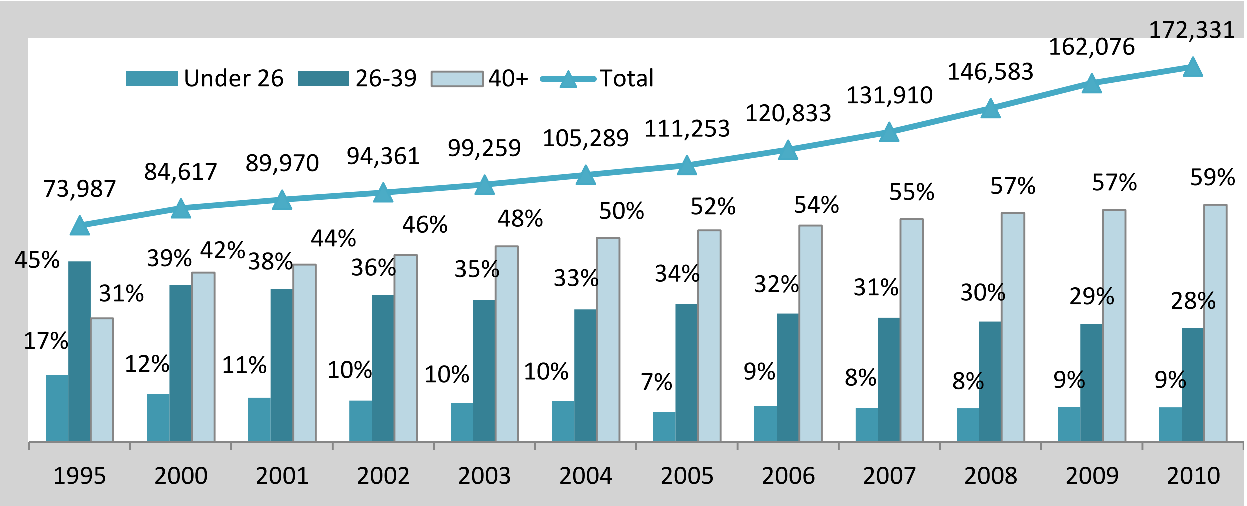


Figure 2. Age of registered owners of motorcycles in NSW, 1995-2010

Young riders

Although young riders (aged 17-25), are the registered owners of only 9% of motorcycles, they are involved in 28% of reported crashes. Figure 3 illustrates the crash rate in terms of the number of riders involved in crashes per 10,000 motorcycles registered to each age group in 1995, 2000 and 2006-10.

In 2010 the crash rate for riders was 159 crashes for every 10,000 registered motorcycles. The rate for young riders (under 26) was 536, compared to 189 crashes for riders aged 26-39 and 96 for those aged 40 or more. The young rider's crash rate relative to their presence in the rider population is extremely high when compared to either of the older rider age groups (189 & 96) but is substantially less than it was in 2006 (536 compared to 692).

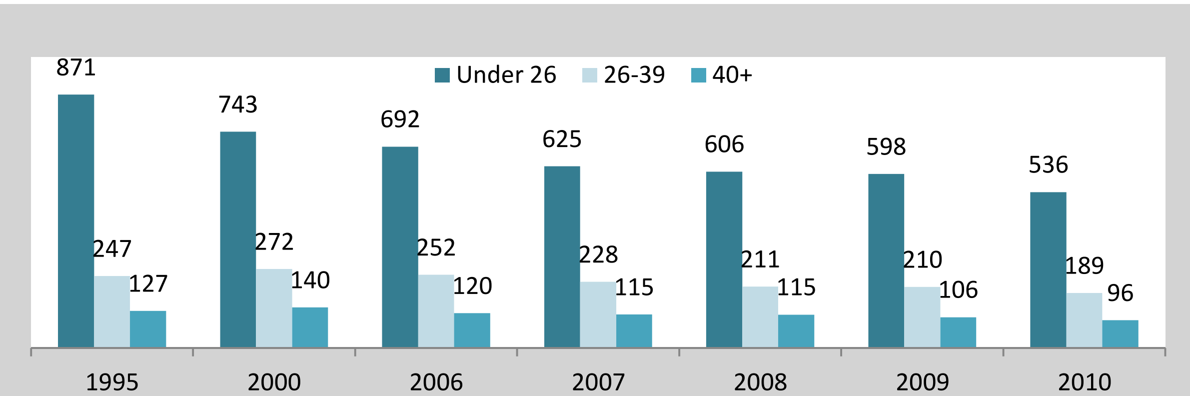


Figure 3. Crash rate – number of crashes per 10,000 registered owners by age group.

A higher proportion of crashes involving younger riders (i.e. under 26 years) are multi-vehicle crashes (62%) compared to 55% of older riders (40 plus) crashes. In addition, whereas multi-vehicle motorcycle crashes are more often due to the action of the other driver (63%), a higher proportion of the youngest riders (17-20) were the key vehicle in these collisions than all older riders combined (48% vs. 35%), including those aged 21-25 (36%).

Young riders are also more likely to be the key vehicle involved in an intersection crash. In the five years (2009-2013), riders aged under 21 years were involved in 1100 multi-vehicle crashes. They were the key vehicle in higher proportions of intersection crashes (41%) and of non-intersection crashes (57%) than were older riders. Riders over the age of 60 are also somewhat more likely to be at fault in intersection and non-intersection crashes (32% and 53% respectively), although the total number of crashes involving this age group was substantially smaller (n=347). See Figure 4.

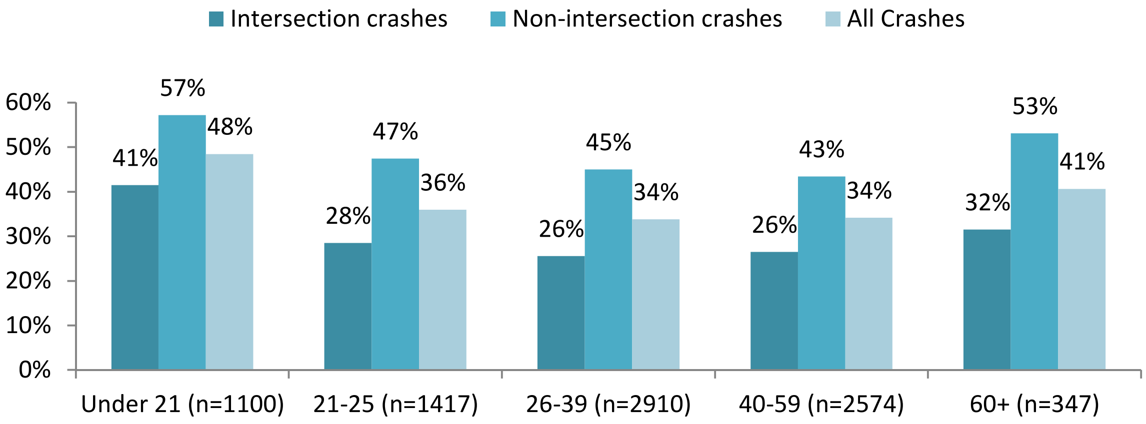


Figure 4. Proportion of riders by age group who were the key vehicle in intersection, non-intersection and all crashes, 2009-2013.

Licence status

Learners and unlicensed riders were more likely to be the key vehicle when involved in an intersection crash with another vehicle (33% & 50% respectively), compared to provisional (26%) or standard licences (25%).They were also more likely to be the key vehicle in non-intersection crashes (50% & 67%) compared to those with provisional or standard licenses. Interstate and overseas riders were also more likely than NSW licensed riders (other than learners) to be the key vehicle in both intersection and non-intersection crashes. See Figure 5.

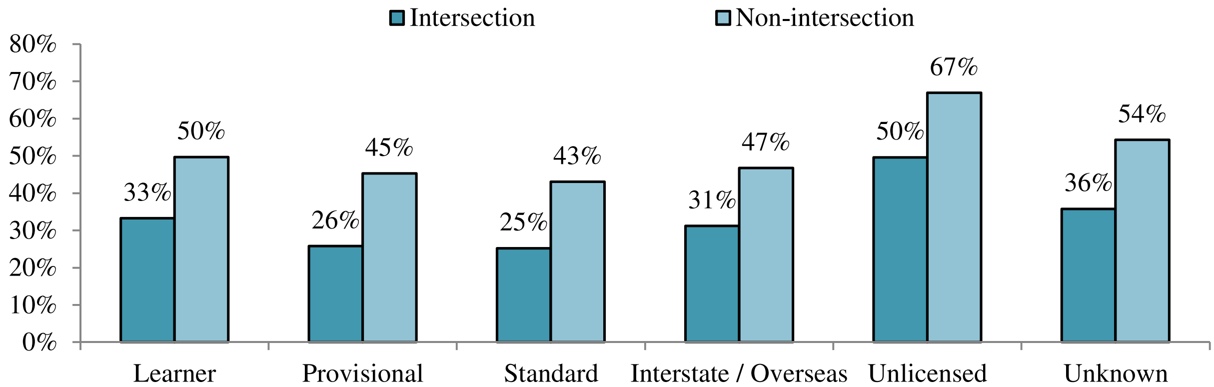


Figure 5. Proportion of Intersection and non-intersection collisions where rider was the key vehicle by licence status, 2009-2013

CRASH TYPES

Types of crashes

The characteristics and causes of motorcycle crashes can be best understood by distinguishing between three different types of crash: multi-vehicle collisions due to the rider's action (23%), multi-vehicle collisions due to the other driver (37%); and single vehicle crashes (40%).

Although it is difficult to determine fault from crash data, it is possible to identify the key vehicle whose movement was determined by police to have been primarily the cause of the first impact.[2] Figure 6 illustrates the distribution of motorcycle crashes by key vehicle between 2009-2013.

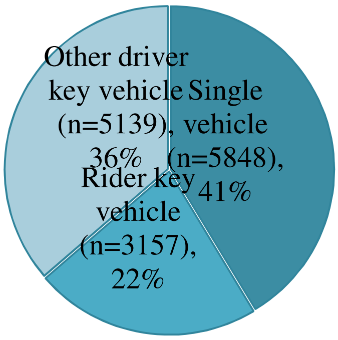


Figure 6. Types of crashes by key vehicle in NSW, 2013

Table 2 shows the relative proportions of riders as key vehicles in crashes which appear to have remained relatively stable over the 2009-2013 period.

Table 2. Trends in proportion of crash types by key vehicle in NSW, 2009-2013

Type of crash	2009 (N=2882)	2010 (N=2703)	2011 (N=2764)	2012 (N=2912)	2013 (N=2883)
Single vehicle	44%	40%	41%	41%	40%
Rider key multi-vehicle	22%	22%	23%	22%	23%
Other driver key multi-vehicle	34%	38%	36%	37%	36%

When examined in terms of crash rates per 10,000 registered motorcycles, it is apparent that substantial reductions have occurred in crash rates for each type of crash over that period. In particular there has been a 23% reduction in the crash rate for single vehicle crashes. See Table 3.

Table 3. Crash rates by types of crashes and key vehicle each year, NSW, 2009-2013

	2009	2010	2011	2012	2013	Change 2009/2013
Single vehicle	78.0	62.7	63.4	63.3	59.8	23%
Rider key vehicle	38.4	35.2	35.0	34.3	33.3	13%
Other driver key vehicle	61.3	58.9	56.4	57.7	52.7	14%
All crashes	177.8	156.8	154.7	155.3	145.9	18%

[2] The key vehicle is based on the Road User Movement (RUM) Code, which describes the movement that resulted in the first impact. The key vehicle is usually, but is not necessarily legally at fault. For example a vehicle turning across the path of another will always be defined as the key vehicle, even if they had right-of-way (e.g. green light arrow).

Single vehicle

Motorcycles have-higher incidence of single-vehicle crashes (41% vs. 24%) compared to cars. While the proportions of single-vehicle crashes resulting in fatality are similar for motorcycles (42%) and cars (41%), compared to car crashes, single-vehicle motorcycle crashes are much more likely to result in serious injury (43% versus 21%) (CRS, 2013). In considering the higher proportion of single-vehicle motorcycle crashes, it is important to note that this data only represents reported crashes. Single-vehicle crashes involving motorcycles are more likely than those involving cars, to be reported because they are more likely to result in serious injury or towing. Accordingly this data may not wholly represent the relationship between driver and rider errors that result in single-vehicle crashes.

Over the study period, single vehicle crashes account for 41% of all motorcycle fatalities. Single vehicle crashes are almost equally likely to occur on curves as on straight sections of road (48% vs. 52%), but most fatal single vehicle crashes (75%) are on curves.

Excessive speed for the conditions was identified as a contributing factor in almost half (47%) of all single vehicle crashes. Road surface hazards, such as potholes, diesel or loose gravel on a sealed surface, were a contributing factor in one in five single vehicle crashes (20%). Such hazards were more commonly associated with crashes on curves than on the straight (26% versus 14%) and were identified as a contributing factor in 11% of fatal single vehicle crashes. Animals on the road were identified as a contributing factor in a further 6% of cases. See Table 4.

Table 4. Summary of factors in single vehicle crashes by road alignment, 2009-2013

	All single vehicle crashes (n=5848)	Crashes on curves (n=2834)	Crashes on straight roads (n=3014)
All crashes	100%	48%	52%
Fatal crashes	100%	75%	25%
Excess speed for conditions	47%	82%	15%
Fatigue	13%	11%	15%
Road surface hazard	20%	26%	14%
Animal on the road	6%	4%	8%
Under 26 years	26%	24%	28%
Over 40 years	42%	47%	38%

Collisions with other vehicles

As noted earlier the proportion of single vehicle crashes and those involving other vehicles has remained constant for at least 15 years. Over the study period the other driver was in the key vehicle for 62% of all collisions between a motorcycle and another vehicle

The type of collisions where the rider is most likely to be the key vehicle include rear-end and head-on crashes. Over the 5 years there were 1615 reported rear end crashes involving a motorcycle, of these 58% were due to a motorcycle running into another vehicle. These crashes comprise 30% of all crashes where the motorcycle was the key vehicle.

There were 638 head-on crashes including 190 while overtaking and 448 not overtaking. The motorcycle was the key vehicle in 80% of all head-on crashes, including 88% of the overtaking crashes and 76% of the not-overtaking crashes. The majority of the not-overtaking crashes, where the rider was the key vehicle, occurred on corners (82%), and may be due to the rider running wide or even just leaning over the centre line while cornering. Figure 7 illustrates the distribution of types of crashes where riders were the key vehicle, compared to the distribution of those due to the other driver.

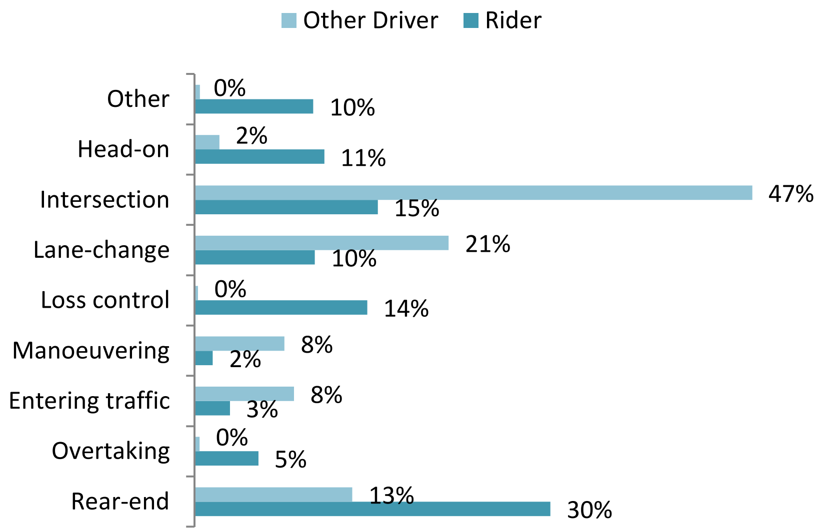


Figure 7. Key vehicle multi-vehicle collisions, 2009-2013

Intersections crashes

Over half (58%) of all multi-vehicle collisions occur at intersections, and over two-thirds (70%) of these crashes are due to the other driver. Motorcycles are the key vehicle at 30% of intersection collisions and 38% of all multi-vehicle crashes. Responsibility for non-intersection crashes is equally likely to be the rider or the other driver (50%:50%).

In NSW, T-junctions are the most dangerous type of intersection for motorcyclists accounting for 54% of all intersection crashes with a further 34% occurring at cross-roads. Across all multi-vehicle crashes, almost a third (31%) occurred at T-junctions with the key vehicle being the other driver in 70%. Cross roads accounted for 19% and roundabouts for only 7% of collisions. The other vehicle in intersection crashes was most likely to be in a car (79%) or light truck (9%).

Trucks in collisions with a motorcycle

Collisions with heavy vehicles such as trucks or buses represent only a relatively small (3%) proportion of all multi-vehicle motorcycle crashes, but a higher proportion of multi-vehicle fatal crashes (9%). Fatal crashes comprise 7% of all multi-vehicle crashes involving heavy trucks compared to 4% and 2% for light trucks and cars respectively. Crashes involving light trucks are also more likely to result in severe injuries. While light trucks were involved in only 10% of motorcycle crashes, these included 20% of multi-vehicle fatal crashes. By comparison, whereas collisions with cars are far more common (75%), they account for a comparatively lower proportion of fatal collisions (57%).

PATTERNS OF ERROR

Rider errors

As noted earlier, rear-end and head-on crashes represent 19% and 7% of all multivehicle crashes, and are more likely due to the actions of the motorcyclist. Motorcycles were the key vehicle in the majority of these crashes (rear-end 58% & head-on 80%). Rear end collisions appear to be generally due to the rider failing to maintain a sufficient space to the vehicle in front. Where head-on collisions are due to rider error, this is typically on corners where the rider crossed, or perhaps leaned over the centre line, into the head-on zone, it is less common to occur while overtaking another vehicle.

Driver errors

Where a crash was precipitated by the movement of a vehicle other than the motorcycle, the most common driver error (47%) was failure to see or give way at an intersection. Other common causes of crashes included drivers changing lanes (21%), colliding into the rear of the motorcycle (13%) and failing to give way when entering traffic (8%).

Speed

Compared to other vehicle crashes, a higher proportion of those involving motorcycles are assessed as having involved excess speed for the conditions, although this does not necessarily mean the rider was exceeding the posted speed limit. Figure 8 compares the proportions of casualties from motorcycle crashes with all road crashes where speed was deemed a contributing factor.

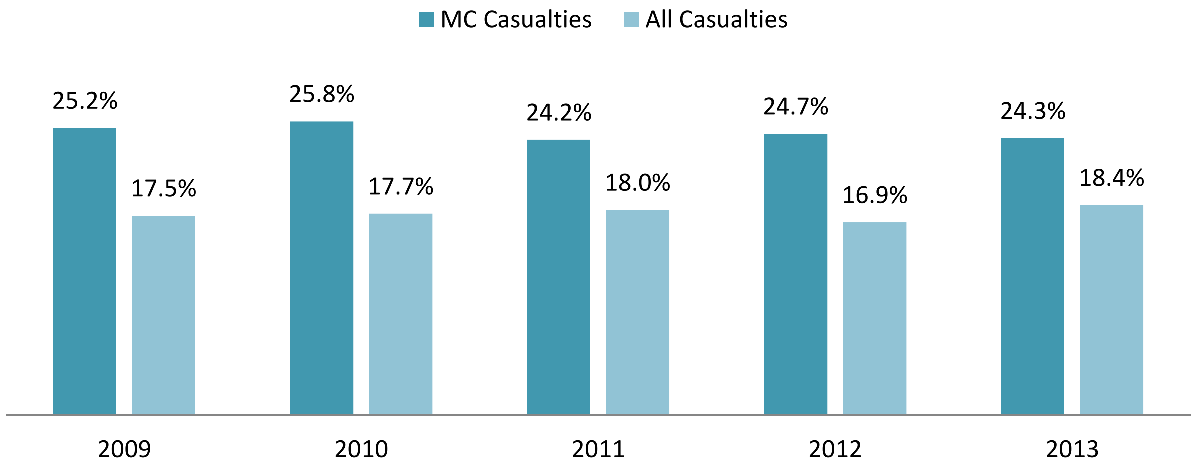


Figure 8. Relative proportions of motorcycle versus all casualties in crashes associated with excess speed for conditions NSW, 2009-2013

Most motorcycle crashes (70%) take place on roads zoned 60 km/h or less, only 11% of crashes take place on roads zoned 100 km/h or more. See Figure 9.

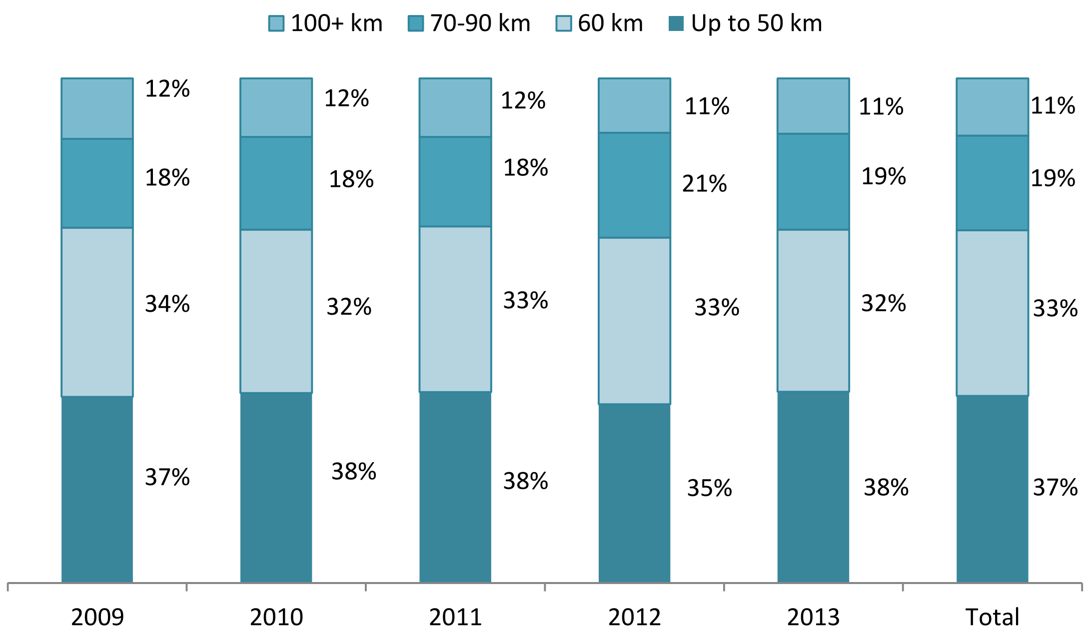


Figure 9. Proportion of motorcycle crashes by speed zone NSW, 2009-2013

Across the 2009-2013 period, 48% of all fatal motorcycle crashes occurred in areas zoned 60 km/h or less while 32% occurred in areas zoned 100 km/h or more. The small numbers involved (around 60 per year) mean that no clear trends can be identified. See Figure 10.

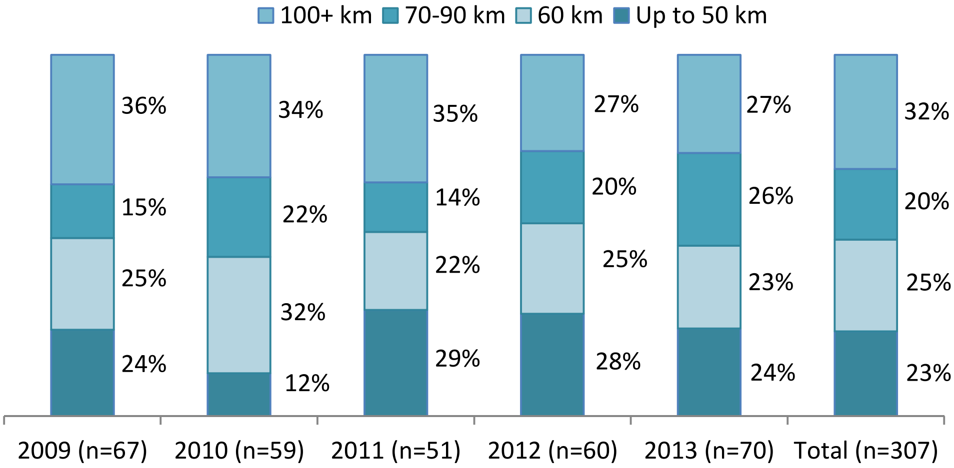


Figure 10. Speed zone at site of fatal motorcycle crashes in NSW, 2009-2013

Alcohol

Over the 2009-2013 period, where alcohol involvement was known, 4% (n=499) of motorcycle rider casualties and 18% (n=53) of rider fatalities had illegal blood alcohol levels (BAC), compared to 5% (n=2714) and 23% (n=163) respectively for all car drivers in crashes. The proportions of riders with illegal BAC reflects a constant trend for at least the past ten years. See Figure 11.

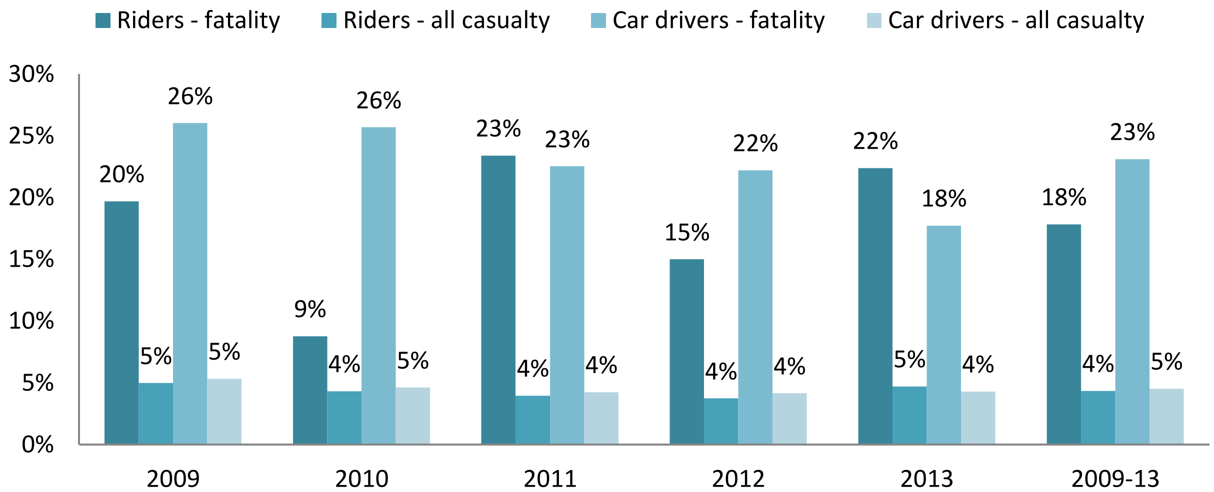


Figure 11. Proportion of motorcycle riders compared to all controllers with illegal BAC, 2009-2013.

When the number of alcohol related fatalities is considered in relation to the numbers of registered vehicles, the picture changes. Alcohol related crash rates for both riders and drivers have decreased, but riders have substantially higher alcohol-related crash rates than car drivers. For example, in 2013 riders had eight times the rate of alcohol-related fatal crashes and five times the rate of all casualty crashes compared to car drivers. It should also be noted that unlicensed riders account for 27% of riders in crashes with illegal BAC.

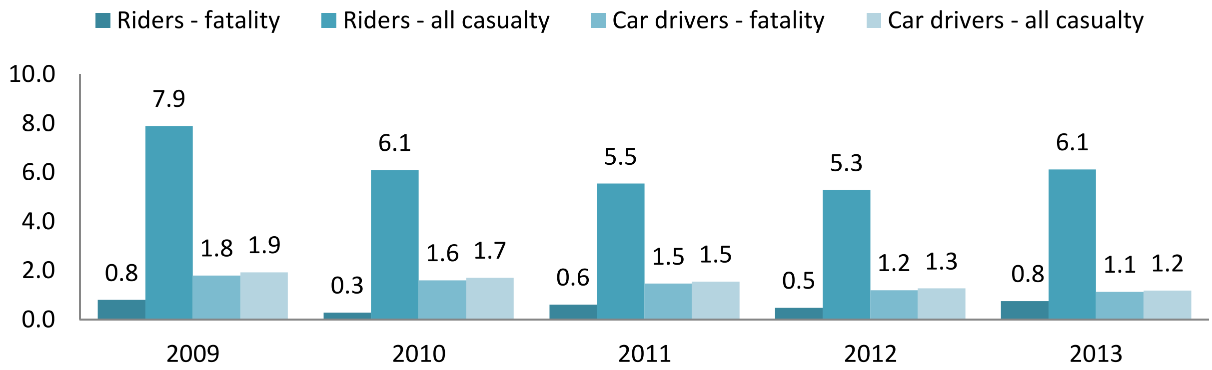


Figure 12. Proportion of motorcycle riders compared to all controllers with illegal BAC, 2009-2013.

Licence status

Riders and drivers who are unlicensed or whose licence status is unknown, constitute a substantial proportion of those whose crashes are associated with high-risk activities. Unlicensed riders include those whose riding license has been cancelled, suspended or disqualified and those who have never held a motorcycle license.

Over the past 5 years (2009-13), there have been 1038 unlicensed riders involved in motorcycle crashes in NSW. While these unlicensed riders comprised only 7% of all riders who crashed; they comprised 19% of the riders in fatal crashes, over half of whom were under 26 years (52%).

1. Unlicensed riders were more likely than licensed riders to be the key vehicle in a multivehicle crash (59% versus 35%), and while only 7% of all riders in crashes they represented10% of those who were the key vehicles in multivehicle crashes.
2. A higher proportion of unlicensed riders were involved in speed-related crashes (31% vs 23%) and alcohol related crashes (23% vs 2%) compared to licensed riders.
3. Unlicensed riders account for 10% of all riders involved in speed-related crashes and 35% of all riders in crashes who had illegal blood alcohol levels.
4. A fifth (21%) of all unlicensed riders who were injured were either not wearing a helmet, or wore a helmet that was not correctly fastened. They account for 59% of all un-helmeted rider casualties.
5. Crashes involving unlicensed riders were more likely to involve a pillion casualty than crashes involving licensed riders (6% vs. 4%). Pillion casualties on motorcycles ridden by an unlicensed riders account for 11% of all pillion casualties.
6. Pillion casualties were more likely not to have worn a helmet if they were on a motorcycle ridden by an unlicensed rider than a licensed rider (38% versus 2%). Unlicensed riders account for 53% of all crashes in which a pillion casualty was not wearing a helmet.

Learners had a higher proportion of speed related crashes (22%) compared to Provisional riders (20%). They were also more likely to be the key vehicle in crashes (40% vs 33%), including intersection (32% vs 27%) and non-intersection (49% vs 27%) multivehicle crashes. Their crashes involved in a higher proportion of single vehicle crashes than provisional riders (41% versus 35%).

Interstate and overseas riders represented 4% of all riders involved in crashes and were more likely to be at fault in multi-vehicle crashes than those with valid NSW licences (38% vs. 34%).

Interstate and overseas riders also had a higher proportion of crashes involving fatigue (8% vs. 5%) and speed (27% vs. 23%) than NSW licence holders and comprised a higher proportion of controllers involved in crashes with a pillion casualty than NSW licence holders (5% vs. 4%). Table 5

Table 5. Proportion of riders in crashes by their licence status and factors associated with their crash NSW 2009-2013

	All riders (n=14394) %	Learner (n=2131) %	Provisional (n=1518) %	Standard (n=7694) %	Unlicensed (n=1038)	Interstate/ Overseas (n=598) %	Unknown (n=1415)
All crashes	100	15	11	53	7	4	10
Casualty crashes	100	15	11	53	7	4	10
Fatal crashes	100	6	5	67	19	0.3	2
Proportion within license group							
Rider at fault (Multi-vehicle crashes only)	37	40	33	33	59	38	43
In single vehicle crashes	41	41	35	41	49	48	38
Under 26 years	6	6	4	5	12	8	7
Over 40 years	23	22	20	24	31	27	19
Fatigue	2.4	0.4	0.5	0.3	19.7	0.3	7.1
Speed	0.3	0.1	0.1	0.1	2.4	0.2	0.9
Alcohol	4.2	2.9	1.9	2.2	20.3	NA	7.0
Casualty without helmet	4.0	0.6	1.0	5.0	6.3	4.8	5.0
Pillion casualty without	28	67	55	9	54	21	29
Pillion casualty	38	10	12	54	16	46	27
Total licence status							

References

RTA (2015) Registration Data as at June 2013, Roads and Traffic Authority of NSW, Sydney.

NSW Centre for Road Safety (2013). NSW Road Traffic Accident Database. Roads & Maritime Services. Sydney, Transport for NSW.

NSW Centre for Road Safety (2013). Road traffic crashes in New South Wales: Statistical Statement for the year ended 31 December 2013. Sydney, Australia, Transport for NSW.

Acknowledgment

Prepared by Liz de Rome & Tom Brandon, LdeR Consulting
for the Motorcycle Council of NSW (MCC)
with support from NRMA Motoring and Services, Sydney