SUBMISSION TO

THE ACT STANDING COMMITTEE ON PLANNING, ENVIRONMENT AND TERRITORY AND MUNICIPAL SERVICES

INQUIRY INTO VULNERABLE ROAD USERS

August 2013

The Centre for Accident Research & Road Safety – Queensland
is a joint venture initiative of the Motor Accident Insurance Commission
and Queensland University of Technology

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1. INTRODUCTION

This submission from the Centre for Accident Research and Road Safety-Queensland (CARRS-Q) has been prepared in response to the call for submissions for the ACT Standing Committee on Planning, Environment and Territory and Municipal Services *Inquiry into Vulnerable Road Users*. It is understood that the scope of the Inquiry will include:

a. an examination of national and international best practice approaches to protecting and encouraging vulnerable road users, including through regulation, infrastructure, design, education and funding arrangements;
b. gathering evidence from the community and experts about issues faced by vulnerable road users and potential improvements;
c. recommending changes to be made in the ACT to better protect and encourage vulnerable road users; and
d. any other relevant matter.

The submission begins with an outline of the expertise of CARRS-Q in Vulnerable Road User safety. Given that the Centre's research spans many of the Terms of Reference of the Inquiry, the approach that is taken in this submission is to identify the research projects and publications of CARRS-Q that are relevant to each of the Terms of Reference. Instead of providing a lengthy submission that details the findings of each of these research projects, the Committee can access the relevant reports. If the Committee wishes, CARRS-Q is happy to meet with them to present or discuss findings.

Motorcycles, scooters and mopeds are referred to collectively in this submission as powered two-wheelers (PTWs). Where the collective term PTW is not appropriate, the terms motorcycle, scooter and moped are used. The distinction between mopeds and scooters is based on the Australian Design Rule (ADR) classification of LA and LC category vehicles, wherein a moped (LA) has a limited engine cylinder capacity of 50cc or less and a top speed of 50 km/h, while a scooter (LC) has an engine cylinder capacity of more than 50cc or a top speed of more than 50 km/h.

1.1 CARRS-Q expertise in safety of Vulnerable Road Users

CARRS-Q is one of the leading centres in Australia dedicated to research, education and outreach activities in road safety. It exemplifies an approach to

shaping and informing public debate that works through long-term partnerships with key government and industry bodies. The Centre was founded by Professor Mary Sheehan, and is currently headed by Professor Barry Watson, with a strong support team of leading academics.

CARRS-Q builds new scientific understanding that enables regulatory authorities, policy makers, educators and communities to frame strategic choices about applied future actions. Clear proactive input to relevant national research priorities is a key element of the research strategy, which has been assisted by staff membership of all major road safety policy groups including at the state and federal level.

The impact of the research is recognised in state and national policy development, and CARRS-Q takes a lead role in road safety advocacy. As well as working closely with local agencies to develop road safety strategy, CARRS-Q has actively contributed to road safety research, policy review and development in Queensland and across Australia.

Vulnerable Road Users is one of the six research themes at CARRS-Q, and this area is headed by Professor Narelle Haworth, with input from researchers across the Centre. In recent years, CARRS-Q research has examined a large range of issues affecting the safety of pedestrians, bicycle riders and motorcyclists. Relevant CARRS-Q reports are referred to in the submission and a list is provided in Appendix 1.

2. NATIONAL AND INTERNATIONAL BEST PRACTICE APPROACHES TO PROTECTING AND ENCOURAGING VULNERABLE ROAD USERS

This section provides some information about the findings of CARRS-Q research in relation to national and international best practice approaches. It focuses on speed management for VRUs, licensing and training for riders of Powered Two Wheelers (motorcycles, mopeds and scooters), footpath cycling and bicycle helmet legislation.

2.1 Best practice in speed management for VRUs

The Safe System approach to road safety endorsed by Australian governments recognises human error is inevitable, and the protection of road users is best provided by a combination of safer roads, safer speeds, safer vehicles and safer road users (Australian College of Road Safety, 2010). One of the underlying principles of the Safe Systems approach to road safety is that of separating road users with vastly different levels of kinetic energy. The Vision Zero philosophy, on which the Safe Systems approach is based, states that vulnerable road users should not be exposed to motorised vehicles at speeds exceeding 30 km/h (Johansson, 2009). Given the vulnerable nature of cyclists, the Vision Zero road safety philosophy argues that separation needs to be more tangible than that offered by a one-metre rule. It states that pedestrians and bicyclists should not be exposed to motorised vehicles at speeds exceeding 30km/h, and if this cannot be satisfied then separate, or reduce the vehicle speed to 30km/h (Johansson, 2009). Separation is always a physical separation, typically a barrier. "Where driving speeds are 50km/h... pedestrians and bicyclists do not cross between crossings and vehicle speeds are reduced to 30km/h where vulnerable road users cross....In 50+ km/h environment vulnerable road users are never mixed with cars" (Johansson, 2009). While this recommendation is not widely followed by Australian road authorities and is not attractive to those wishing to promote cycling participation, it implies that a one-metre rule is not sufficient separation to provide a safe system.

2.2 Best practice in PTW rider licensing and training

Licensing and training requirements for motorcycle, moped and scooter riders vary across Australian jurisdictions. As arguably the most prominent PTW safety countermeasure, rider licensing and training is a key concern in PTW safety research undertaken by CARRS-Q.

Over the years, CARRS-Q has undertaken several research projects that attempt to identify best practice in motorcycle rider licensing and training. Many of these reports have identified a need to increase the amount of attention to higher-order skill such as hazard perception and risk management in training and to create a licensing system that encompasses multiple opportunities (or requirements) for training.

The most recent reports relevant to this issue by CARRS-Q were undertaken as part of a major program of research into motorcycle safety for the Queensland Department of Transport and Main Roads. The reports can be accessed on the TMR website (http://www.tmr.qld.gov.au/Safety/Motorcycle-safety/Motorcycle-safety-initiatives.aspx#carrsq).

Other relevant publications include:

Challenges in improving the safety of learner motorcyclists (Haworth & Rowden, 2010) http://eprints.qut.edu.au/37849/

A preliminary examination of the effects of changes in motorcycle licensing in Queensland (Haworth, Rowden & Schramm, 2010) http://eprints.qut.edu.au/37985/

Moped and motor scooter licensing and training: current approaches and future challenges (Haworth, Greig & Wishart, 2008). http://eprints.qut.edu.au/17775/

Teaching old dogs new tricks: training and older motorcyclists (Haworth, Mulvihill, & Rowden, 2007) http://eprints.qut.edu.au/16882/

In the past, CARRS-Q, in collaboration with industry partners, has developed and trialled an intervention to address attitudinal issues within a motorcycle rider training program. With some positive results in early evaluation of the program, this is seen as a potentially important new countermeasure in the area of rider training and licensing, which has historically focused on developing and testing skills while largely overlooking behavioural issues. Relevant publications authored or co-authored by CARRS-Q researchers include:

Changing motorcycle rider safety attitudes and motives for risk taking: Process evaluation of a rider training intervention (Rowden, Watson, Wishart, & Schonfeld, 2009) http://eprints.qut.edu.au/28756/

2.3 Footpath cycling

It is important to point out that the ACT should maintain some current approaches because they represent best practice. The practice in the ACT (and Queensland) of allowing adult cyclists to ride on the is one way of separating cyclists from motor vehicle traffic but it is prohibited in most Australian jurisdictions for adults except when accompanying a child of 12 years of age or younger. In Queensland (under Rule 250), Tasmania and the Australian Capital Territory it is legal for adults to ride a bicycle on the footpath. The legislation requires cyclists to give way to pedestrians on the path, but is vague about "safe passing". The prohibition against cycling on the footpath appears to be based on concerns about dangers to cyclists associated with motor vehicle crashes at driveways and intersections and cyclists posing a threat to pedestrians on footpaths. Research has identified that older pedestrians are particularly intimidated by the presence of cyclists on footpaths (Bernhoft & Carstensen, 2008).

We have reviewed the international evidence related to the safety of footpath cycling (Haworth & Schramm, 2011) and concluded that many of the studies reporting concerns for cyclist safety on footpaths were based on low-severity crashes, while there is little evidence that footpath cycling contributes to serious injuries to pedestrians. Indeed, it may provide cyclists with an option to avoid collisions with motor vehicles. The challenge occurs when cyclists are riding on the footpath in the opposite direction to traffic and not be noticed by drivers when the cyclists leave the footpath to cross intersections.

Australia-wide hospital separations data for land transport accidents (Henley & Harrison, 2009) provides limited but more recent information on injuries associated with footpath cycling. In the financial year 2006-07, 103 (2.3%) hospitalised pedal cyclists were coded as injured on "footpath next to road", compared with 105 on a cycleway, 2,248 on a roadway, and 1,548 with unspecified place of occurrence. In the same year, 27 pedal cyclists were hospitalised for a total of 59 days as a result of a traffic accident where the counterpart in the collision was a pedestrian or animal (whether on the footpath or on the road). This corresponds to 0.5% of hospitalised cyclists and 0.4% of cyclist bed-days from traffic accidents. There were 42 pedestrians hospitalised for a total of 230 bed-days as a result of a traffic accident where the counterpart was a pedal cyclist (whether on the footpath or on the road). This corresponds to 2.8% of hospitalised pedestrians and 1.0% of pedestrian bed-days from traffic accidents. Data from the Queensland Trauma Registry from 2005 to 2009 (Queensland Trauma Registry, 2010) showed that of the 2,300 cyclists admitted to hospital or died in hospital, only 22 (1.0%) were coded as having collided with a pedestrian or animal.

A CARRS-Q survey of Queensland riders (Haworth & Schramm, 2011) found that a third of the respondents reported riding on the footpath, with about two-thirds of them doing so reluctantly. New riders and utilitarian riders rode more on the footpath. The frequency, and particularly distance ridden, on the footpath was less than for urban roads and bicycle paths, suggesting that the footpath was used in locations where the urban road was considered unsafe or inconvenient (e.g. one-way streets), rather than being used for the entire trip. It was not surprising that new riders spent a larger proportion of their riding on footpaths than more experienced riders, but the interesting finding was that the mean distance ridden on footpaths per week was greater for experienced riders. This shows that, like bicycle paths, footpaths are an important facility for riders of all levels of experience.

The percentage of most serious crashes reported in the survey that occurred on the footpath was similar to the percentage of total distance ridden on the footpath, suggesting that riding on the footpath did not increase crash risk. Footpath crashes were less likely to require medical treatment than crashes on roadways which is consistent with the Safe Systems principles of separating vulnerable road users from motorised vehicle traffic. Almost 10% of footpath crashes did involve pedestrians, however, and the survey did not collect information about their injuries. Surprisingly, the percentage of crashes involving pedestrians on bike paths was double that on footpaths, suggesting that shared paths may be a greater challenge for cyclist-pedestrian interactions than footpaths. The reluctance of cyclists to travel on the footpath may provide a clue here. Perhaps cyclists are more careful of pedestrians and travel more slowly on footpaths than on shared paths (as reported by Kiyota et al. 2000).

CARRS-Q also conducted an observational study of cycling in the Brisbane CBD in 2010, and repeated it in 2012 which examined interactions between cyclists and pedestrians (Schramm & Haworth, 2013, http://eprints.qut.edu.au/58550/). Of the 2552 cyclists observed in 2012, 98.4% had no conflict with another road user, 1.1% had a conflict with a pedestrian, and 0.6% had a conflict with a motor vehicle. No collisions between cyclists and pedestrians or cyclists and motor vehicles were observed. When a cyclist was travelling on the footpath, and there was 1 or more pedestrian within 1m of the cyclists (252 observations), only 16 (6.3%) resulted in a conflict. When a cyclist was travelling on the footpath, and there was 1 or more pedestrian 1m-5m from the cyclist (303 observations), only 12 (4%) resulted in a conflict.

From a public health perspective, the opportunity to ride on the footpath may act to encourage cycling (particularly among new cyclists) because it is perceived to be less dangerous than riding on the road.

2.4 Bicycle helmet legislation

Similarly, the requirement for cyclists to wear helmets when riding both on- and off-road is an important safety measure that is international best practice in reducing head injuries among cyclists. A CARRS-Q report in 2011

Haworth, N., Schramm, A., King, M. & Steinhardt, D. (2010). Bicycle helmet research. CARRS-Q Monograph 5. Queensland: CARRS-Q.

examined many of the issues surrounding helmet legislation. It concluded that current bicycle helmet wearing rates are halving the number of head injuries experienced by Queensland cyclists. This is consistent with published evidence that mandatory bicycle helmet wearing legislation has prevented injuries and deaths from head injuries. It is reasonably clear that it discouraged people from cycling twenty years ago when it was first introduced. Having been in place for that length of time in Queensland and throughout most of Australia, there is little evidence that it continues to discourage cycling. There is little evidence that there is a large body of people who would take up cycling if the legislation was changed.

Cycling does have significant health benefits and therefore should be encouraged in ways that reduce the risk of the most serious of injuries. Head injuries not only have the potential for death but they are among the most disabling of non-fatal injuries (in some ways more than spinal injuries). Infrastructure and speed management approaches to improving the safety of cycling should be undertaken as part of a Safe System approach, but protection of the individual by simple and cost-effective methods such as bicycle helmets should also be part of an overall package of measures.

3. ISSUES FACED BY VULNERABLE ROAD USERS AND POTENTIAL IMPROVEMENTS

In 2006, Haworth presented a paper on "Integrating policy approaches for vulnerable road users" (http://eprints.qut.edu.au/13024/). This is one of the few papers that considers the extent to which there are similarities and differences in the issues faced by the three types of vulnerable road users and how policy and countermeasure approaches differ among the three groups. The paper points out that there many similarities among the three groups of vulnerable road users as well as real differences. All three serve as both recreation and transport, have poor data and similar contributing factors to injury. Certainly pedal cycling and motorcycling are passions for many of their proponents. In addition, most adult pedestrians, pedal cyclists and motorcyclists are also car drivers. Walking, cycling and motorcycling are discretionary activities.

3.1 Recreation as well as transport

Walking, cycling and motorcycle riding are recreational activities as well as modes of transport. The multiple purposes of these activities plus the variety in the types of infrastructure that suit these purposes has a number of consequences.

Firstly, treatment of the needs of vulnerable road users becomes fragmented among different agencies with responsibility for sports and recreation, for transport, for environmental issues etc. This can lead to conflicting goals and approaches.

Secondly, particular activities may "fall between the cracks" of institutional responsibilities. For example, because of a perception that motorcycles are for transport, it is often perceived that all of the issues related to motorcycling will be handled by transport agencies. Thus, no agency will take leadership for the safety of off-road motorcycling. Road safety agencies will state that they are not responsible for safety beyond the public road network, Police and local councils and parks authorities may try to prevent illegal riding, and environmental agencies will respond to public concerns about noise pollution from off-road riding but any safety programs or initiatives will be largely left to rider groups themselves.

The phenomenon of activities falling between the cracks also affects the collection of data. Agencies are only likely to collect data that relates to their areas of responsibility.

3.2 Poor quality of data

Good policy requires good data for development and evaluation of programs. Unfortunately the safety data for vulnerable road users is patchy, particularly for off-road use or for comparing the relative safety of different groups. Measures of the raw numbers of persons killed and injured are not adequate to compare the safety of the three groups or to assess whether this has changed over time. While rates are commonly used, in the area of vulnerable road users, there are substantial problems with rates both in terms of numerators and denominators. The issues related to the scope of data to be included in the numerator have been discussed above. The denominators used in road safety (which may not be adequate here) often relate to per head of population, per licence or per registration or per distance travelled. Rates per head of population can be easily calculated but is not very meaningful since not all members of the population ride a pedal cycle or a motorcycle. Licensing and registration data are relevant for only one group (and then only for on-road riding). Distance travelled appears to be conceptually a better denominator, but the availability of this data is patchy at best. A number of studies from around the world have shown that on the basis of deaths per kilometres travelled, the risk of fatal injury from a motorcycle crash is about thirty times greater than that of other vehicles (Haworth & Mulvihill, 2005). There are disputes about the reliability of estimates of distances travelled by motorcycles (see Haworth, 2003), but data regarding the distances travelled by pedal cyclists and pedestrians are very sparse. The most recent rates that comparing the three groups were based on survey data collected in 1985-86.

Crashes involving motor vehicles are a major contributor to the most severe outcomes for bicycle riders. They represent 63.3% of cyclist fatalities (Australian Bureau of Statistics, 2013), 39.4% of cyclists admitted to hospital (Henley & Harrison, 2012b), and 6-8% of cyclist Emergency Department presentations (Queensland Injury Surveillance Unit, 2005) on public roads. Of the bicycle crashes that result in injury or fatality, only those that occur on the public road network and involve a motor vehicle are required to be reported to Police and thus become part of the Police-reported crash data.

Unfortunately, many of these crashes which are required to be reported are not actually reported. US and European studies indicate that only 11% (Stutts et al., 1990) to 13% (Veisten et al., 2007) of bicycle crashes are recorded in police statistics and the data are skewed to serious injury crashes and those that involve motor vehicles (Stutts et al., 1990). The extent of under-reporting is greater in less serious bicycle crashes in many countries (see ITF, 2012). In a

CARRS-Q survey of Queensland cyclists, only 3.9% of self-reported crashes that met the requirement for reporting to police (occurred on a public road, and resulted in at least one person being injured or killed) were reported to police. While 45.5% of bicycle-motor vehicles were reported, only 4.8% of multiple bicycle crashes, 16.7% of bicycle-pedestrian and 18.8% of bicycle-animal crashes were reported. The survey results indicate that single vehicle, and multiple bicycle crashes are severely under-reported in official police data. Thus the Police-reported crash data is incomplete for bicycle crashes. In addition, the severity of injury recorded in the Police-reported crash data is not always accurate.

Australia has not conducted national travel surveys since the early 1970s (Garrard, Greaves & Ellison, 2010). The Exercise, Recreation and Sport Survey conducted by the Australian Bureau of Statistics provides some limited long-term data on participation in cycling (Australian Sports Commission, 2011). In this survey, people who said that they had participated in any physical activities for exercise, recreation or sport during the last 12 months, were asked which activity they had participated in (which included cycling). The percentage of people reporting cycling increased from 2001 to 2010 by 45% across Australia. The increase in cycling has been evident mostly in persons aged 35 and older. The participation rate was also roughly double for males, compared to females.

The Australian Bureau of Statistics collects information on travel to work as a cyclist as part of the Census held every five years. However, this data is restricted to travel to work (and not other forms of cycling) and the reliability of comparisons is questionable given that it is based on one day only and weather conditions can markedly affect the number of people cycling on that day.

Many general household travel surveys contain very few cyclist trips and so their data is not very reliable for calculation of trends. Garrard, Greaves and Ellison (2010) report that the bicycle kilometres of travel in the Sydney Household Travel Survey increased by 29% from 2002-2005, but this was based on only about 250 bicycle trips per year.

3.3 Similar factors contributing to injury

While the factors contributing to injury for the three groups of vulnerable road users are not identical, there are significant overlaps.

The factors that have been identified as contributing to the over-representation of motorcycles in serious road crashes include (Haworth & Mulvihill, 2005):

1. Vulnerability to injury

2. Inexperience or lack of recent experience

3. Driver failures to see motorcycles

4. Instability and braking difficulties

5. Road surface and environmental hazards

6. Risk taking

Of these factors, numbers 1, 3, 4 and 5 (and arguably 2 and 6) are also relevant to cycling. Numbers 1 and 3 are also relevant to pedestrians (see paper below).

King, J.M., Wood, J.M., Lacherez, P.F. & Marszalek, R.P. (2012). Optimism about safety and group-serving interpretations of safety among pedestrians and cyclists in relation to road us in general and under low light condition. *Accident Analysis & Prevention*, 44(1), 154-159.

Issues related to protective clothing (which address the first factor) are thus relevant to both motorcyclists and pedal cyclists.

While vulnerability to injury is the defining characteristic of vulnerable road users, it receives relatively little emphasis in countermeasure development. Human biomechanical tolerance to impact is a popular concept in road safety at the moment, but most often it is applied to setting appropriate speed limits in environments where cars can be involved in particular types of crashes (e.g. head-on, side impact). It has been used to assess suitable speed limits for areas where there are large numbers of pedestrians (e.g. Tingvall & Haworth, 1999) but has had little application to pedal cyclist and motorcyclist safety, at least in Australia.

From the point of view of human biomechanical tolerance, pedal cyclists and motorcyclists are unlikely to be substantially different. One can speculate that a motorcyclist is similar to a pedestrian with huge kinetic energy. The difference when it comes to the level of energy that has to be dissipated in a crash is where it comes from. For pedestrians, it is not their kinetic energy but the kinetic energy of what hits them. With pedal and motorcyclists, we assume that their own kinetic energy becomes important, particularly in single vehicle crashes, because that determines the amount of energy to be absorbed by the human body when it impacts with the road or a fixed object.

Numerous studies of crash injuries to pedestrians have demonstrated that the risk of serious injury or death is relatively low when the speed of an impacting vehicle is below 30 km/h but that death is likely for speeds above 50 km/h (McLean et al, 1994). It would be interesting to assess whether the curve

showing the probability of fatality or serious injury would be similar for pedal cyclists and motorcyclists.

Two major issues in motorcycle and bicycle safety are poor quality of data and driver failure to see riders. These are both discussed in the following recent publication by CARRS-Q researchers:

How similar are two-unit bicycle and motorcycle crashes? (Haworth & Debnath, 2013) http://eprints.qut.edu.au/60123/

3.4 Truck involvement in VRU crashes

An analysis of fatal cyclist crashes across Australia between 1996 and 2000 (ATSB, 2006) found that 33% of all fatal crashes involving another vehicle involved an articulated or rigid truck. The ABS Survey of Motor Vehicle Usage (ABS, 2013) notes that rigid trucks and articulated trucks together only accounted for approximately 7% of all kilometres travelled on Australian roads between 2005 and 2012. In the United Kingdom, heavy goods vehicles are involved in 4% of cyclist casualty crashes (killed and seriously injured), but 18% of fatality crashes (Knowles et al., 2009). Taken together, these figures indicate a substantial over-representation of heavy vehicles among fatal cyclist crashes. In our analysis of Queensland bicycle-car crashes reported to police, drivers of utilities and panel vans were more likely to be at fault (compared to car drivers) in bicycle crashes with a corresponding increase in odds by 95.4% (Haworth & Debnath, 2013).

3.5 Child cyclists

CARRS-Q research has demonstrated that child riders are more likely than adults to be at fault in bicycle-motor vehicle collisions (Schramm, Rakotonirainy & Haworth, 2010; Haworth & Debnath, 2013). The most commonly coded crash types for children were 'vehicle leaving driveway' and 'intersection from adjacent approaches'. The children were coded as at fault in about 90% of both of these types of crashes, while the at-fault rate was much lower for adult bicyclists.

Since children are mostly at fault in these scenarios and adults are generally not, educational approaches such as improving child riding awareness (e.g., education from school or parents) are needed for the children. Structured educational programs like the Bikeability scheme (UK) and Cycling certificates and Great Cycling Exam (Belgium) could improve the skills of children as well as older cyclists (Steriu, 2012). Furthermore, since the severity levels of these child bicyclist crashes were high, implementing measures to reduce injury severity (e.g., helmet use, lower speed limits or traffic calming measures to reduce travel speeds) could be beneficial for them (as well as adults). It may be more effective

to adapt the riding environment to the needs of children, particularly in the low speed areas where children usually access roads from footpaths, rather than attempting to make children behave more like the adults.

Many of the bicyclist crashes involving children occurred at intersections with no traffic control on roads with speed limits of 60 km/h or less. Arguably, these are areas of low traffic volume (as evidenced by the lack of traffic controls) and therefore the economic value of installing on-road treatments or separated facilities at each of these sites is likely to be low. Therefore, measures that have a more area-wide effect, such as lower speed limits, and potentially rider or driver education, may be more appropriate than intersection improvements. It has been recommended that speed limits on access roads, which are shared by bicycles and motorized traffic, should be set at 30 km/h to minimize the risk of death and serious injury (Steriu, 2012). Enforcement of the speed limits and supplementing the signs by installing low-cost traffic calming measures were recommended to improve driver compliance with speed limits.

3.6 Protective clothing use

The use of protective clothing other than helmets by PTW riders is not mandatory in any Australian jurisdiction. Despite evidence that protective clothing can reduce injury severity and also prevent some minor injuries, usage rates are often low according to the limited research available. A wide range of factors appear to influence rates of protective clothing use, including (in no particular order) climate, riding purpose, PTW type, perceived risk and self-image. In addition to low usage rates of protective clothing among some rider groups, the absence of objective standards in Australia by which riders can discern between high and low quality items is also problematic. Relevant publications authored or co-authored by CARRS-Q researchers include:

Motorcycle rider protective apparel wearing: Observational study results from the Brisbane and Canberra regions (Wishart, Watson, & Rowden, 2009)
http://eprints.qut.edu.au/29299/

Motorcycle protective clothing: Are stars better than standards? (Haworth, de Rome, Varnsverry, & Rowden, 2007)
http://eprints.qut.edu.au/archive/00012949/01/12949.pdf

In the off-road riding environment, there appears to be a difference in the use of protective clothing (including helmets) between those riding for work and those riding for recreation, and between those riding on private property and those riding in public areas. Low rates of helmet use have been observed among those who ride off-road motorcycles and/or ATVs on private property. Protective clothing use varies among recreational off-road riders, but appears highest

among those who take off-road riding seriously as a sport or recreational pursuit. Relevant publications include:

Profiling off-road motorcycle and all-terrain riders in Queensland, Australia (Steinhardt, Sheehan, & Siskind, 2011). http://eprints.qut.edu.au/41915/

Rural and Remote Road Safety Study: Final report (Sheehan et al., 2008) http://eprints.qut.edu.au/26539/

At work or play: A comparison of private property vehicle crashes with those occurring on public roads in north Queensland (Blackman, Cheffins, Veitch, & O'Connor, 2009).

3.7 Crashes of learner motorcycle riders

The number of motorcycles is increasing in many developed and developing countries (Jamson & Chorlton 2009; Paulozzi et al., 2007). Across Australia, the number of motorcycles registered increased by 67% from 2005 to 2012 (ABS, 2013), the strongest growth of any vehicle type. This increase in motorcycling means that there are many new riders who lack experience. Inexperience has been shown to be a major factor in motorcycle crashes (Rutter & Quine, 1996; Mullin et al., 2000) and the common response by governments is to apply graduated licensing principles or systems that have been developed from learner driver research. Whilst the learner stage has consistently been shown to be much safer for car drivers than the subsequent provisional stage, the same is not true for motorcyclists. For example, in the Australian state of New South Wales during 2011, learner motorcycle licence holders were involved in more injury crashes than provisional motorcycle licence holders (16.1% and 10.9%, respectively) (TfNSW, 2012). In contrast, learner car drivers were involved in only 1.0% of all car driver injury crashes compared to 17.5% involving provisional car licence holders. In Queensland, newly licensed motorcyclists are found to be at considerable risk with more than 16% of motorcyclists in fatal crashes in 2006 having held a licence less a year, and a further 6% having held a licence for between 1 and 2 years. Only 2% had held a licence longer than 8 years (TMR, 2009). However, not all of the newly licensed riders were young: while 39% of first year licensed riders in fatal crashes were aged 17–24, 36% were aged 30–49 (where age and licence history was known). These data suggest that the current licensing system is not producing the same safety benefits for learner riders as for learner drivers.

Pre-learner training aims to ensure that the rider obtains a level of basic riding knowledge and skills in a relatively safe off-road environment before obtaining a learner licence and riding on the road. At present there is no requirement for pre-learner motorcycle rider training to be undertaken to obtain a motorcycle learner licence in Queensland.

In response to concerns about the safety of novice riders, Queensland Transport (later the Department of Transport and Main Roads or TMR) appointed the Centre for Accident Research and Road Safety-Queensland (CARRS-Q) to research the potential benefits of introducing a pre-learner motorcycle licensing and training scheme within Queensland (Haworth, Rowden, Wishart, Buckley, & Greig, 2012). This was part of a larger program of motorcycle safety research funded by the Motor Accident Insurance Commission. The detailed reports from the research program can be downloaded from the TMR website (http://www.tmr.qld.gov.au/Safety/Motorcycle-safety/Motorcycle-safety-initiatives.aspx#carrsq).

3.8 Changes in PTW usage

It is important to view trends in PTW crashes in the context of trends in PTW usage. PTW use, as indicated by the number of registered vehicles, has increased substantially over the last decade and at a far greater rate than that of other motorised vehicles (Figure 1). This helps to explain the increasing proportion of road user deaths involving PTWs. As can be seen in Figure 2, the largest overall increases in PTW registrations have occurred in Queensland, New South Wales and Victoria, as might be expected due to the larger populations in those states.

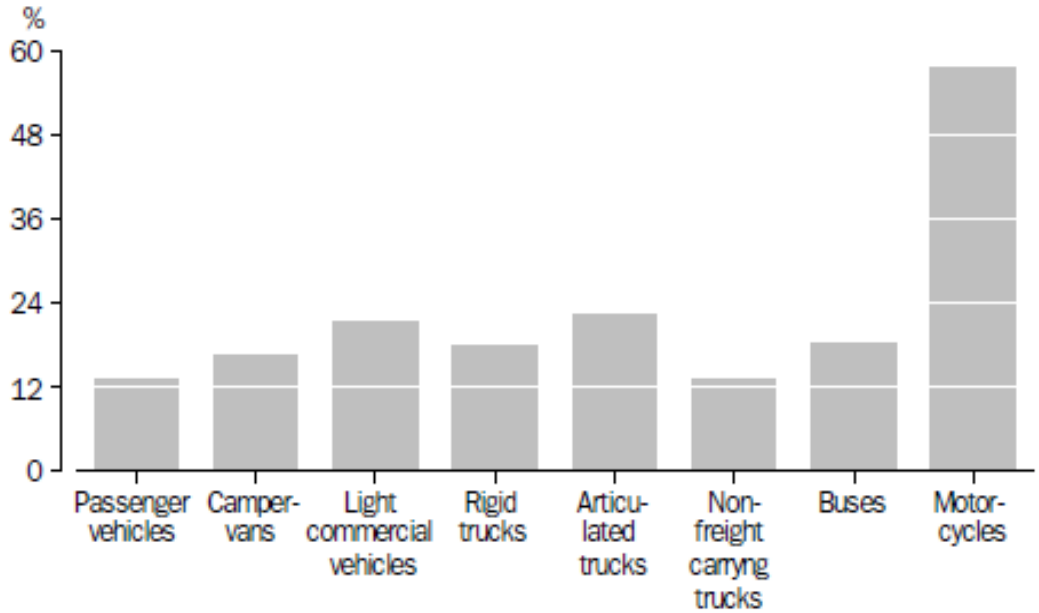

Figure 1: Australian registrations by vehicle type, % change 2004 – 2009 (ABS, 2009)

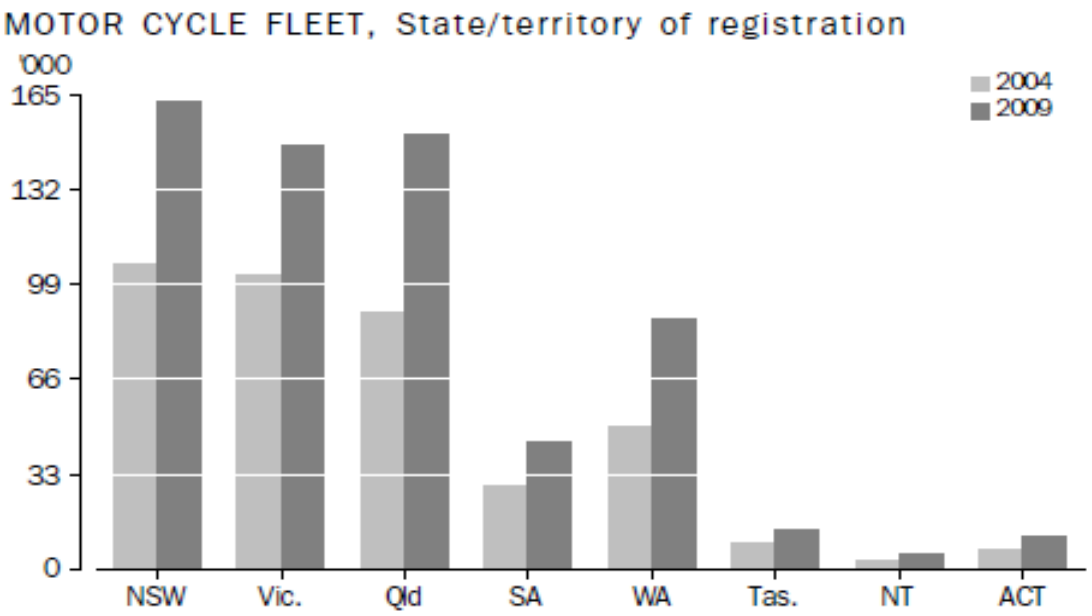

Figure 2: Motorcycle registrations by state 2004 – 2009 (ABS, 2009)

While the number of fatal crashes for most road user groups has declined in Australia over the last 5 years (2005-2010), there has been a slight increase (1.1%) in the number of PTW rider and pillion fatalities. Nationally, the number of older riders in crashes has increased, while young rider crash involvement has declined (BITRE, 2010). This has shifted the focus of research to some extent, with more recent attention given to the 'returning rider' phenomenon, in Australia and also internationally.

CARRS-Q research indicates that the increase in PTW use can be attributed to an increase in recreational riding as well as an increase in PTW use for commuting and general transport. Importantly, different riding purposes and motivations are associated with different PTW types. Relevant publications authored or co-authored by CARRS-Q researchers include:

Powered two-wheelers in a changing world: Challenges and opportunities (Haworth, 2010) http://eprints.qut.edu.au/39279/

Safety implications of increased moped and scooter use in an Australian city (Blackman & Haworth, 2010) http://eprints.qut.edu.au/33036/

Motor scooters and mopeds: Are increasing sales translating into increasing crashes? (Haworth & Nielson, 2008) http://eprints.qut.edu.au/14033/

Moped and motor scooter licensing and training: current approaches and future challenges (Haworth, Greig & Wishart, 2008). http://eprints.qut.edu.au/17775/

Crashes of older riders - Characteristics and implications for countermeasures (Mulvihill & Haworth, 2006) http://eprints.qut.edu.au/12939/

Crashes of older Australian riders (Haworth & Mulvihill, 2006b) http://eprints.qut.edu.au/6292/

3.9 The safety of off-road riders

While off-road motorcycle crashes are generally not reported in official transport data, current CARRS-Q research suggests an increase in both on-road and off road crashes has occurred in Queensland.

Responsibility for off-road rider safety has generally fallen upon riders (and organisers in the case of controlled events) rather than government agencies. Current CARRS-Q research suggests that a large proportion of recreational off-road riders are aware of inherently high risk in the activity, and also that their safety is their own responsibility. Of relevance here is previous research showing that motives associated with sensation seeking are an intrinsic part of motorcycling for some riders (Haworth & Mulvihill, 2005). Relevant publications authored or co-authored by CARRS-Q researchers include:

Profiling off-road motorcycle and all-terrain riders in Queensland, Australia (Steinhardt, et al., 2011). http://eprints.qut.edu.au/41915/

Rural and Remote Road Safety Study: Final report (Sheehan, et al., 2008) http://eprints.qut.edu.au/26539/

Integrating policy approaches for vulnerable road users (Haworth, 2006) http://eprints.qut.edu.au/13024/

4. RECOMMENDING CHANGES TO BE MADE IN THE ACT TO BETTER PROTECT AND ENCOURAGE VULNERABLE ROAD USERS

A wide range of countermeasures addressing PTW rider safety in the ACT are proposed in the following report by CARRS-Q researchers:

Identifying programs to reduce road trauma to ACT motorcyclists (Greig, Haworth, & Wishart, 2007) http://eprints.qut.edu.au/27211/

Based on earlier research (see below), it is recommended that the ACT Road Rules be examined to identify whether there are any potential changes to road rules that could benefit VRUs.

In 2011, CARRS-Q conducted a review of legislation relating to walking and cycling for Transport and Main Roads (Haworth, Schramm, Palk & King, 2011). TMR commissioned CARRS-Q to:

- Identify legislative impediments to walking and cycling that have the scope to be changed without compromising the original safety intent of the legislation;
- Identify the impact of the likely changes of these legislative impediments and prioritise these based on the likely increase to walking/cycling; and
- Develop options and recommendations for legislative amendments or changes.

Legislation can impede increased walking and cycling by making these modes less safe (objectively or in user perceptions), by making them slower or less convenient, or by preventing or increasing the cost of changes to infrastructure designed to promote walking or cycling. Given the focus of the project on impediments to increasing current levels of walking and cycling, attractiveness and perceived safety were assessed in relation to new or less confident users, rather than experienced and highly competent users. The extent to which legislation functions as an impediment is limited by the extent to which it is complied with, which in turn relates to the level of knowledge of the legislation and the degree of enforcement.

The review concluded that some rules related to bicycle lanes (Rules 132 and 153) can prevent or inflate the cost of installing specific bicycle infrastructure to allow better separation of bicycles and motor vehicles. Other rules related to priority at intersections (Rules 62, 67-69, 72-73) and riding across pedestrian crossings (Rule 248) discourage and fail to protect those new or risk-averse cyclists who are riding on the footpath. The rules related to where bicycles should travel, and their priority, where there is no bicycle-specific infrastructure (Rules 119 and 150) were also identified as potentially impacting rider safety and participation.

The following items were deemed by TMR to be out of scope but may be of interest to explore in the ACT:

- Passing distance requirements for vehicles overtaking cyclists;
- Potential change of liability in crashes involving motor vehicles and vulnerable road users; and
- The current level of penalties imposed for violations.
- Compulsory helmet legislation;
- Taxation and other related issues considered by the Australian Bicycle Council review;
- Planning legislation;
- Road design/engineering; and
- Complete analysis of large-scale recent crash dataset.

5. ANY OTHER RELEVANT MATTER

Recent years have seen the development and increased popularity of a wide range of human-powered and motorised two- and three-wheeled vehicles. Many of these new vehicles do not easily fit into current vehicle classifications and legislative requirements. For example, there are relatively few external or performance differences between some electric (or petrol) bicycles and mopeds, which creates difficulties for regulation and enforcement. Many of these new vehicles raise questions about who should be allowed to use them, and where, and under what rules.

Previously, the Australian Design Rules defined a bicycle as a vehicle which is designed to be propelled by human power using pedals, which may have an electric or petrol powered motor attached provided the motor's maximum power output does not exceed 200 watts. Recent changes to the Australian Design Rules have incorporated Pedelecs (Bourke, 2013). A Pedelec is defined as meeting EU standard EN15194, has a motor of no more than 250w of continuous rated power and which is only to be activated by pedalling, when travelling at speeds of between 6 km/h and 25 km/h.

This change to the ADRs is likely to result in a large increase in sales and use of electric bicycles. Power Assisted Bicycle sales in Europe more than tripled from 2007 to 2010 and now 1 in 5 bicycles sold in Europe are electric (Bourke, 2013). Bourke (2013) reports that the international experience is that the riders of electric bicycles are older, less fit, more likely to have been injured, and more likely to be commuters than the riders of standard bicycles. The safety and health consequences of such a future increase in usage and change in demographics need to be carefully examined.

Recently, several governments have announced that they will allow the use of Segways (referred to generically as two-wheeled self-balancing personal transporters) on footpaths and bikeways. The popularity of these devices is yet to be determined, but they are wide and heavy and their compatibility with bicycles and pedestrians on footpaths and in relation to motor vehicles when used on roads requires further research.

This “morphing” of vehicle categories is likely to continue into the future and may lead us to abandon our current prescriptive vehicle classifications in favour of a performance-based system with consequences for operator licensing and training, and vehicle registration.

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