Motorcyclist fatality and motorcycle sales patterns in Australia

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Abstract
Research has shown the casualty crash risk of motorcycle riders in countries such as Australia, Canada, USA and the United Kingdom to be up to 17-20 times that of car occupants. Riders aged less than 25 years are over-represented in both fatal and injury crashes. It is of interest that, following a marked decline, the sale of new road motorcycles has increased steadily in Australia since about 1991 (eg sales of road registerable motor cycle in 2000 were more than 80% higher than in 1995). This apparent resurgence in on-road motorcycle numbers may have contributed to a corresponding increase in fatality for riders. This paper examines the relationship between Australian motorcycle rider fatality data and motorcycle sales patterns since 1990 and, where possible, looks for any changes in crash risk or involvement patterns. Results show reductions in exposure and fatality for riders aged less than 25 years over the last 10 years, but steady to rising patterns of exposure and fatality for older riders. Sales patterns also suggest that older riders are purchasing large, powerful motorcycles.

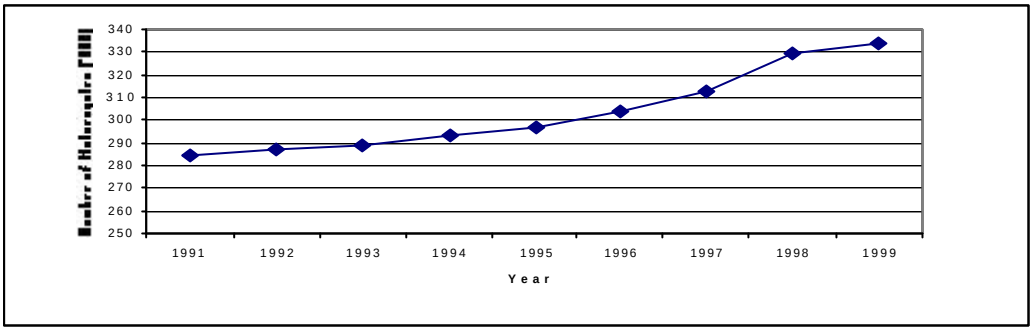
Keywords
Motorcycle, Rider, Driver, Crash, Fatality

Introduction
International studies have shown that the casualty crash risk of motorcycle riders in countries such as Australia, Canada, USA and the United Kingdom to be up to 17-20 times that of car occupants.[1, 2] For example, it is estimated that Victorian riders are about 18 times more likely to be involved in casualty crashes than car drivers with motorcyclists, 31 times more likely to suffer serious injury and 33 times more likely to die [3,4] While motorcyclist accounted for less than 1% of Victorian on-road travel in 1998, they represented about 7% of Victoria road-related casualties.[4]

Motorcyclist fatalities in Australia decreased markedly from 359 in 1987 to 177 in 1997 – a reduction of almost 50%. [5] This reduction was greater than the 29% decrease recorded for drivers over the same period. Fatalities for motorcyclists as a percentage of the overall road toll also dropped from 13% to 10%. However, recent ATSB comparisons of Australian motorcycle fatalities with those for OECD countries showed that Australia's rate of 5.7 fatalities per 10,000 registered motorcycles in 1997 was higher than the OECD median of 4 fatalities per 10,000 registered motorcycles – yet exposure to risk (ie average annual distance travelled) was similar to, or lower than, that for other OECD countries.[6] Overall, Australia ranked sixth worst amongst the 23 OECD nations rated in respect of motorcycle fatalities. This compares unfavourably with Australia's fatality rate for all road users per 10,000 registered motor vehicles of 1.5 – below the OECD median of 2 fatalities per 10,000 registered vehicles - which placed it equal sixth within the group of 23 OECD countries compared.[6]

During this same 10-year period, the number of registered motorcycles per 1,000 population fell from 21.6 to 16.9 in Australia – about a 22% reduction.[6] It is of note that the UK, USA and Canada also recorded marked declines in registered motorcycle numbers (ie 15, 29 and 39% reductions respectively) while the OECD as a whole experienced an increase of 21% in motorcycle registrations per head of population. [6]The number of road registered motorcycles in Australia, United Kingdom, USA and Canada reached a peak in the early 1980s.[1, 7] Motorcycles on the Australian register peaked at about 354,000 in about 1982, but this number had fallen by some 20% to about 284,000 by 1991.[8] However, since 1991, overall motorcycles on the national register have increased steadily by an average of about 2% per annum to reach about 324,000 by 1999.[9,10,11] This pattern of increase is evident in Figure 1,which shows the total number of motorcycles on register in Australia between 1991 and 1999. During this same period passenger vehicles on the national register increased by up to 3% per annum– passenger vehicle numbers have generally increased by about this annual amount across the last two decades.[8, 9,10,11] In 1997 and 1998, the annual increase for motorcycles was higher than that for passenger vehicles at about 3% and 5% respectively.[11]

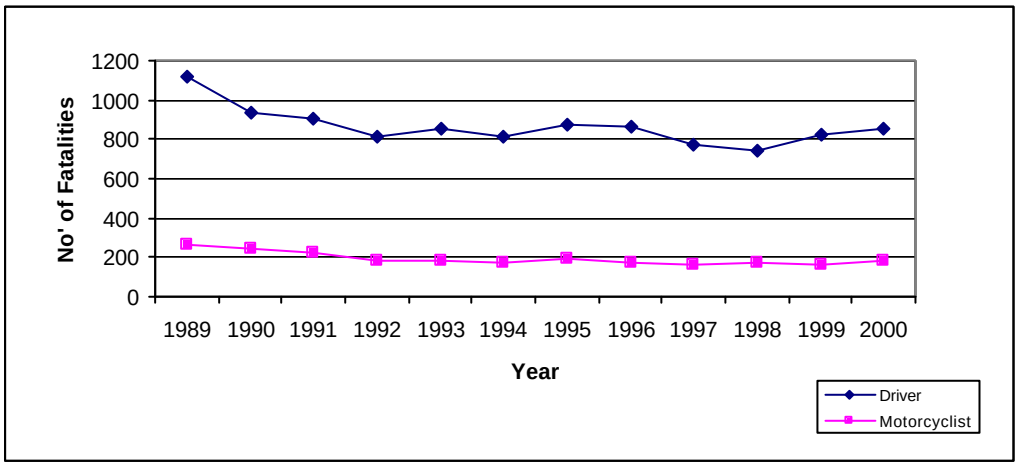
Figure 1. Motorcycles on Register, Australia 1991-1999 (source: ABS)



The reader should note that registration data is used in preference to driver (rider) licensing data for comparisons as many motorcycle licence holders are inactive or dormant. For example, it can be calculated from vehicle registration and driver licensing data that the ratio of licence holders to registered motorcycles in Victoria is greater than two to one and almost five to one in NSW. [12] While one could not assume that a person holding a motorcycle licence is an active rider, it is more probable that a currently registered motorcycle is being used on-road by its registered owner and at some risk of crash involvement.

The last three years have seen a reversal of the downward trend in fatalities for motorcyclist (and drivers) in Australia – see Figure 2 below. This situation caused the authors to consider why this situation may prevail in Australia. To this end, this paper attempts to examine the relationship between Australian motorcycle fatality and injury data, registration data and motorcycle sales patterns since 1990 with a view to identifying possible changes in crash risk or involvement patterns that may shed light on the situation noted above.

Figure 2: Driver & Motorcyclist Fatalities, Australia, 1989-2000 (source ATSB)



Method

The authors obtained data from several national sources for a period covering approximately the last decade. Sources were as follows:

- ?? Australian Transport Safety Bureau (ATSB) – motorcycle fatality and serious injury data;
- ?? Australian Bureau of Statistics (ABS) – registration and vehicle use data; and
- ?? Federal Chamber of Automotive Industries (FCAI) motorcycle sales information.

It should be noted that the data available were not all that the authors would have wished for. For example national serious injury (hospitalisation) data were not available for the period after 1996 and survey of motor vehicle use information was not available for every year of interest. Overall, fatality data were relied on more heavily as this information was available for the period 1990-2000 inclusive. Given the small number of annual motorcycle fatalities in some jurisdictions (eg Tasmania) it was decided to explore patterns at a national level only rather than attempt to look at individual states and/or territories. Similarly, pillion passengers were excluded given the relatively small number killed or injured each year. While the main focus was on motorcycle riders, comparisons are

sometimes made with passenger vehicle drivers to put fatality, injury and usage/exposure patterns for motorcyclists into a broader context.

Using this data, occasionally supplemented by information from RTA (NSW), the authors examined the following:

?? General fatality patterns for motorcyclists;
?? The relationship between rider age and fatality/serious injury;
?? Exposure- to-risk by age over the last decade for motorcycle riders; and
?? Sales patterns for motorcycles (ie what type of motorcycles were being purchased and who was buying them).

Results

Exposure to risk: Annual Distance travelled by motorcyclists

ABS vehicle use data shows that the total annual distance travelled by Australian motorcycles decreased markedly between 1985 (the peak year for motorcycle numbers) and 1999. [8,9,10,11] At first glance, this makes sense as the number of motorcycles also decreased. However, closer inspection reveals that the average annual distance travelled per motorcycle also decreased – dropping from about 6,500 kilometres per annum to about 3,100 kilometres, a reduction of more than 50%. This pattern is shown in Figure 3 below. The figure also shows that the average annual distance travelled for passenger vehicles reduced slightly over the same period (ie from about 15,300 kilometres to 14,400 kilometres per vehicle – about 6%). Thus there were fewer motorcycles, travelling fewer kilometres each year. This implies that exposure-to-risk per distance travelled for fatalities for motorcyclists was also reducing over this 15-year period. Figure 4 shows this reduction in fatalities per distance travelled, but also a sharp increase in 1999 – the decreasing pattern for passenger vehicle driver fatalities is also shown for comparison purposes. While the fatality risk for passenger vehicle drivers fell by almost 50% between 1985 and 1999 (from 1.1 fatalities per 100 million kilometres in 1985, to 0.6 in 1997), motorcycle fatality risk fell by only about 7% (from 17.4 fatalities per 100 million kilometres in 1985 to 16.4 in 1999). The methodology applied by ABS in the conduct of the seven motor vehicle use surveys of the 1982-1999 period appears to have been largely consistent.

Figure 3: Average Kilometres Travelled by Motorcycle & Passenger Vehicles, Australia, 1982-1999 (incomplete series) (source ABS)

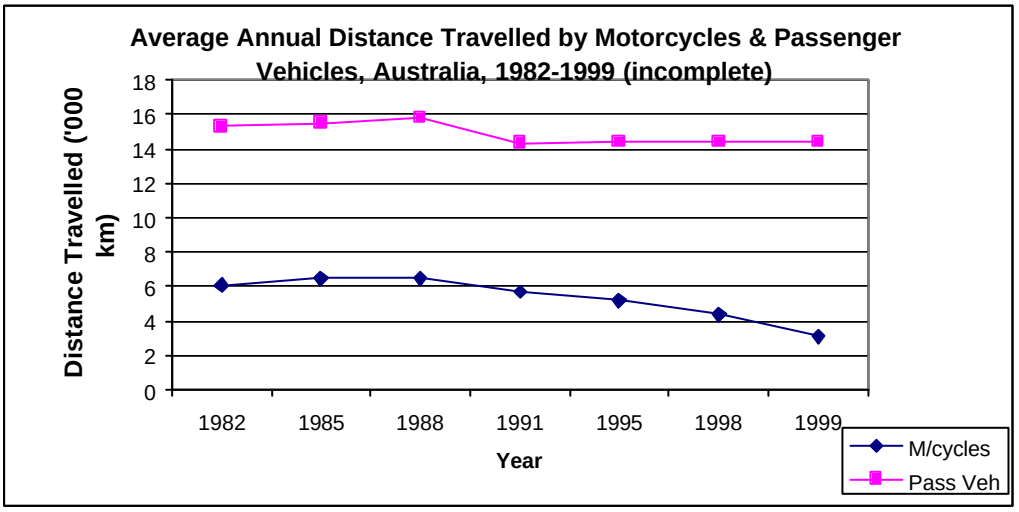


Figure 4: Fatalities per 100 million Kilometres Travelled, Motorcycles & Passenger Vehicles, Australia, 1982-1999 (incomplete series) (source ABS)

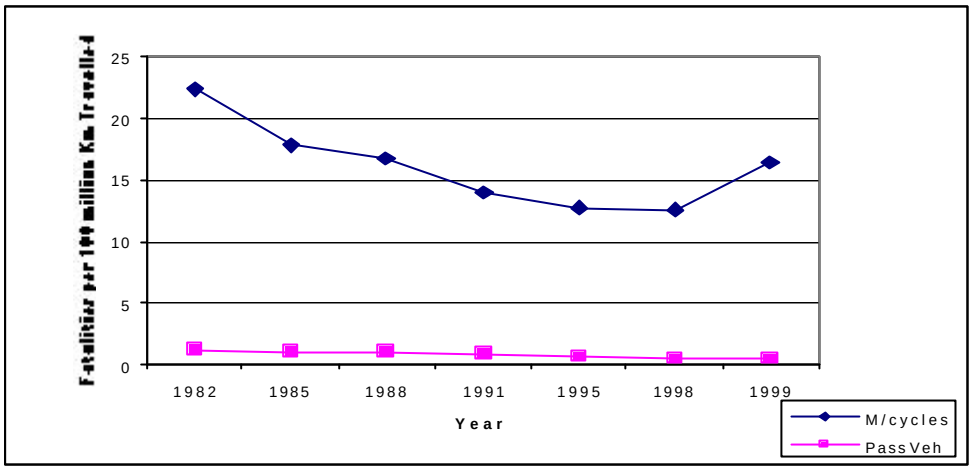
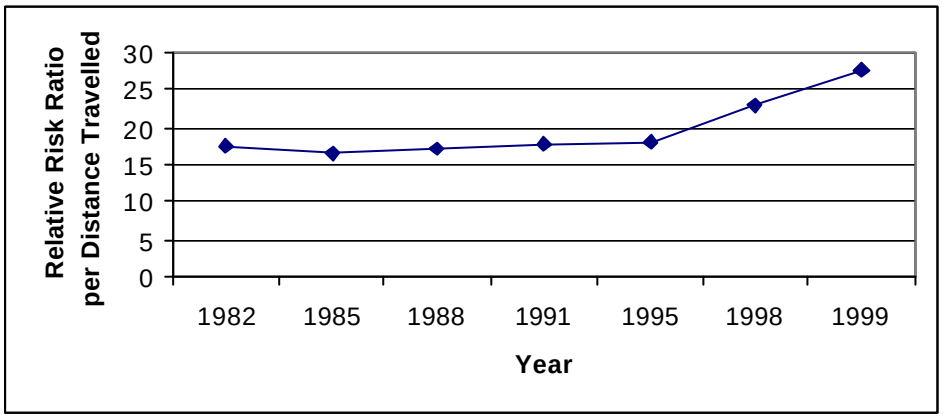


Figure 5 shows that the risk of motorcyclist fatality relative to passenger vehicle driver fatality per distance travelled has increased by about 66% over the same period (from 16.5:1 in 1985 to 27.5:1 in 1999). By contrast, a decrease in relative fatality risk is found for the same period if the comparison is based on fatalities per 10,000 registered vehicles (ie the ratio in 1985 was 6.9:1 and 5.9 in 1999).

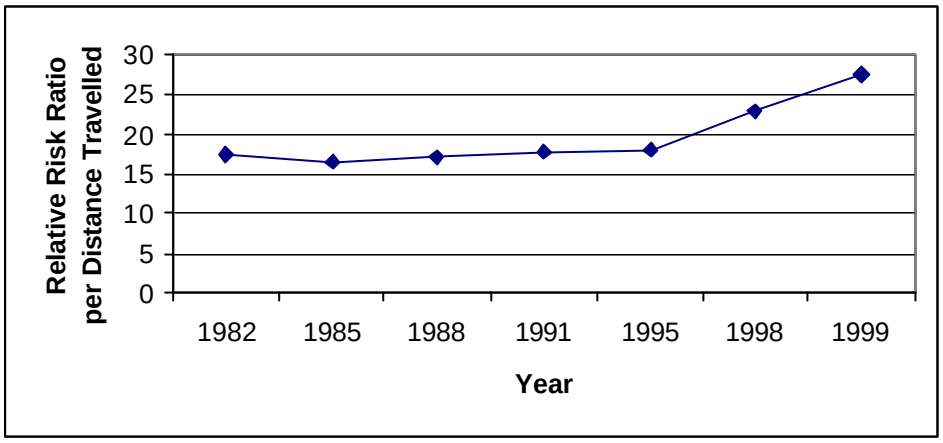
Figure 5: Relative Fatality Risk, Motorcycle: Passenger Vehicle (per 100 million kilometres travelled), Australia, 1982-199 (incomplete series) (derived from ABS data)



Rider Age, Annual Distance Travelled and Fatally Injured/Hospitalised Motorcyclist s

Comparison of ABS vehicle use survey data for 1991, 1995, 1998 and 1999, shows a downward trend over the eight year period in average annual kilometres travelled for passenger vehicle drivers and motorcycle riders aged under 25 years, but an upward trend for drivers and riders aged 25 years or more. [8,9,10,11] Figure 6 shows the pattern for motorcycles by age group of rider. This suggests that the fatality risk per distance travelled for younger drivers and riders was decreasing while the risk for older riders and drivers was increasing.

Figure 6: Average Annual Distance Travelled by Age Group of Motorcyclist, 1991-99 (incomplete series) (source ABS)



This pattern is reflected in the decreasing number of motorcycle fatalities and serious injuries involving riders aged less than 25 years and the slightly upward trend for riders aged 25 years and above. These patterns are clearly evident in Figure 7, in respect of motorcyclist fatalities 1989-2000, and Figure 8 in respect of hospitalisations (serious injuries) 1990-1996.

Figure 7: Motorcyclist Fatalities, Australia, 1989-2000 – Riders aged <25 years Vs Riders aged 25 years or more (source: ABS)

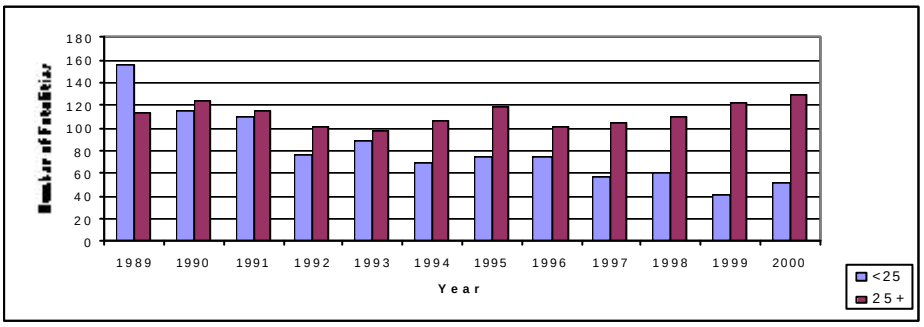
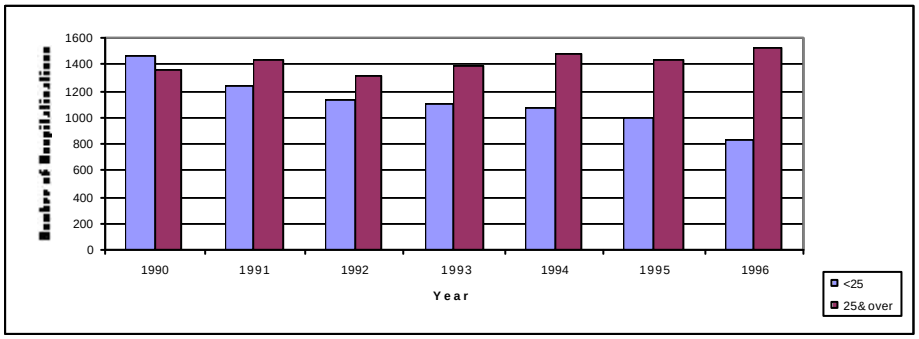


Figure 8: Hospitalisations for motorcyclists, Australia, 1990-1996 - Riders aged <25 years Vs Riders aged 25 years or more



Proportion of Business, Commuting and Private use of Motorcycles

Comparison of ABS vehicle use survey data for 1991, 1995 and 1999 shows an increase in the percentage of motorcycle kilometres expended on business and private use and a reduction in commuting use (to/from work) between 1991 and 1999 – ie from 10% to 20% for business use, 40% to 25% for commuting and 50 to 55% for private use [8,9,10,11] A similar, though less pronounced pattern was found in respect of passenger vehicle use.

Motorcycle Sales Patterns

FCAI motorcycle sales data were not as full and as organised as the authors would have hoped. However, national sales information showed a marked increase in new road motorcycle sales from the mid 1990's. Most sales (about 40%) of road motorcycle sales have been of large capacity supersports machines (race replica style, usually of 600cc engine capacity or above) with the age range of purchasers falling within the 25-35 year old age band. The next largest sales group (about 25%) was of large capacity machines (usually 750cc or above) of a touring, sports/touring (powerful motorcycles designed for comfortable long-distance travel which have an upright seating position and often come with extensive fairings and built-in panniers/luggage carriers) or cruiser (retro-design motorcycles similar in style to the classic Harley-Davidsons) configuration – sold mainly to purchasers in the 38-45 year old age band. Under 250cc motorcycles accounted for about 19% of sales -sold mainly to learner and probationary/provisionally licensed riders who may not exceed a 250/260cc limit. Thus, the majority of road motorcycle sales have been of larger capacity machines, predominantly those with engine capacities of 600ccc or more. These have been in most cases sold to existing full-licence holders aged 25 years or above. However, it was not possible to determine what proportion of these were previously inactive/dormant licence holders returning to riding after an absence of months, years or even decades.

Discussion

The information presented above suggests that patterns of motorcycle use, fatality and injury have changed over the last 10-15 years with exposure-to-risk (ie distance travelled per annum) for motorcycles dropping by about 50% between 1985 and 1997.[8,9,10,11] One could speculate that this marked reduction in exposure may have been the major contributor to the approximately 44% reduction in motorcycle fatalities per registered motorcycle reported by ATSB for the period 1987-1997. [6] It is of concern, however, that total motorcycle fatalities per distance travelled increased in 1998 and 1999 and the number of fatalities in 2000 exceeded those for 1997 to 1999 inclusive.

Riders aged less than 25 years appear to have markedly reduced their involvement in fatalities and hospitalisations over the last 10 years. As shown above in Table 7, the number of fatalities involving riders aged under 25 years in 2000 was less than half of that for 1990. This reduction could be due to the direct effects of more stringent rider training and licensing programs introduced around Australia from the mid 1980's. However, it could also be the product of reduced exposure to risk as riders aged under 25 years reduced the average annual distance they travelled by about 45% between 1991 and 1999. Furthermore, driver licensing data from NSW, the largest Australian jurisdiction, also shows that the number of motorcycle licence holders aged under 30 years fell by about 42% between 1990 and 2000, suggesting that there may have been fewer younger riders riding fewer annual kilometres over the last decade.[13] It is possible that the indirect effect of more stringent rider training and licensing programs introduced from the mid 1980's has been to discourage motorcycle licensing among younger people leading to a consequential reduction in exposure and a reduction in fatality/injury involvement for younger motorcyclists.

As shown in Figures 7 and 8 above, motorcyclists aged over 25 years have not experienced a reduction in fatality or injury numbers in the last decade. indeed their fatality and injury numbers have been steady to rising. This may be a consequence of their becoming a larger proportion of all motorcycle licence holders, due partially to a diminishing of the under 25 year old rider group and the "greying" of the licensed driver population. Allied to this, as shown in Figure 6, the average annual distance travelled by riders aged 25- 54 years has decreased little between 1991 and 1999, while the distance travelled for older motorcyclist aged 55 years and above has actually increased.

Given the reduction in the number of younger motorcycle holders, due mainly to decreasing numbers seeking new motorcycle licences , the largest pool of riders is those who already hold a licence – particularly those aged 26-49 years.[13] It could be speculated that as many of these licence holders may not ride frequently, or have not ridden on-road for some time, their skill/competence levels may be degraded. New motorcycle sales patterns suggest that it is older licence holders who are purchasing large, powerful motorcycles. One could speculate that a substantial proportion of these may be dormant/inactive licence holders returning to motorcycling following, months, years or even decades away from on-road riding. These riders may lack currency and competence in important riding skills such as obstacle avoidance, curve riding and braking which have long been identified as key safety skills for on-road riders. [14] Changes in motorcycle use away from commuting (ie regular daily riding in traffic) towards private/recreational use on weekends may also contribute to a decrease in rider skill levels. This may also be contributing to increased crash risk for older riders. For example, RTA(NSW) crash data shows that in 2000, relative

to younger riders, motorcyclists aged 40 years and above, were involved in crashes further from home, usually on main roads and highways with presumably higher travel speeds and the potential for greater crash /injury severity.[13]

Conclusions

Patterns of motorcycle use, rider fatality and injury have changed over the last 10-15 years in Australia. Exposure to risk in terms of annual distance travelled fell by some 50% for all riders between 1987 and 1997, but mostly for those aged under 25 years, with fatality numbers dropping by about the same proportion for riders overall. This resulted in a marked reduction in fatalities during this period for riders aged under 25 years, but also to steady to increasing fatality numbers for older riders. Indeed, older riders are becoming more active, in terms of kilometres travelled, and numerous users of motorcycles on Australian roads. This suggests that jurisdictions around Australia may need to consider the development of countermeasures which address the risks faced by older rather than just novice motorcyclists, particularly those dormant/inactive licence holders who may be returning to on-road riding on large, powerful motorcycles after a long period of absence. There may also be a place for the motorcycle community, including rider groups, industry and manufacturers/importers, in developing, promoting and/or applying measures designed to reduce the crash and injury risk of older motorcyclists.

Given the limitations of the data used in this paper, it is also recommended that more research be conducted into crash, fatality and injury patterns for motorcyclists, together with more extensive surveys of motorcycle use to better determine where and when these vehicles are being used on Australian roads and by whom. In particular, it would be useful to establish the proportions of older riders who are new riders, riders returned from dormancy and those who have being riding continuously on-road since their youth. Improved motorcycle sales data may also assist in gaining greater insight into the type and size of motorcycles purchased and operated by older and younger riders in Australia.

References

1. Nairn, R.J. (1993). *Motorcycle safety research literature review: 1987 to 1991*. Report CR 117, Canberra: Federal Office of Road Safety.
2. Presseur, D., Williams, A., & Ulmer. (1995). Analysis of fatal motorcycle crashes: crash typing. *Accident Analysis & Prevention, 27(6),* 845-851.
3. Road Safety Committee (RSC). (1998). *Inquiry into the Review of Motorcycle Safety in Victoria*. Melbourne: Road Safety Committee, Parliament of Victoria.
4. VicRoads (2000). *Road safety strategy for Victoria 2000-2005: Discussion paper*. Melbourne: Author.
5. Australian Transport Safety Bureau (ATSB) web site: www.atsb.gov.au
6. Australian Transport Safety Bureau (ATSB) (2000). Motorcycle Safety: Australia's international motorcycle safety performance 1987 to 1997. Monograph 4, Canberra: Author.
7. Transport Canada. (1999). *1998 Canadian motor vehicle traffic collision statistics*. Report TP3322. Ottawa: Author.
8. Australian Bureau of Statistics (ABS) (1993). 1991 Survey of motor vehicle use Australia. Report 9202.0. Canberra: Author.
9. Australian Bureau of Statistics (ABS) (1996). Survey of motor vehicle use Australia (Preliminary 30 September 1995). Report 9202.0. Canberra: Author.
10. Australian Bureau of Statistics (ABS) (1999). Survey of motor vehicle use Australia (12 months ended 31 July 1998). Report 9208.0. Canberra: Author.
11. Australian Bureau of Statistics (ABS) (2000). Survey of motor vehicle use Australia (12 months ended 31 July 1999). Report 9208.0. Canberra: Author.
12. Personal communication, VicRoads & RTA (NSW), October 2000.
13. Roads & Traffic Authority (RTA) (2000). Trends in motorcycle crash statistics. Presentation to Motorcycle Safety Consultative Committee, July, Sydney: Author.
14. Prem, H. & Good, M.C. (1984). *Motorcycle rider skills assessment*. Canberra: Federal Office of Road Safety.