

A comparison of rider attitudes and behaviours between crash-involved and non crash-involved returned motorcyclists

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Abstract

Older motorcyclists (aged 25 and over) can be categorised into three groups: continuing riders, returned riders and new riders. While there is widespread concern about the safety of returned riders, little is known about the factors contributing to their crash involvement. Returned riders accounted for 24% of the 2,116 motorcyclists who responded to an on-line survey that asked about their riding patterns, attitudes and behaviours, and crash involvement. Attitudes and behaviours were compared between returned riders who had been involved in an on-road crash in the last five years (n=92) and returned riders who had never crashed (n=150). Crash-involved riders indicated a greater propensity towards risky riding behaviours than riders who had never crashed. Across the range of comparison variables, most of the behaviours for which statistically significant differences were evident related to speeding, both exceeding the speed limit and riding too fast for the prevailing conditions. The results support the use of insight training to help crash-involved returned riders better understand and manage their exposure to risk.

Keywords

Older motorcycle rider, Crash, Attitude, Behaviour, Returned

Introduction

Motorcycle rider fatalities and injuries are increasing in many developed countries as a result of an increase in crashes involving older riders (aged 25 and over) [1]. In 2008 the average age of motorcycle riders killed in crashes across Australia was 37, compared to 32 in 1999 and 25 in 1989 [1]. The percentage of riders killed on Australian roads who were aged 25 and over increased from 36% in 1989 to 74% in 2008 [1]. The increasing involvement of older riders in crashes probably reflects an increase in their exposure. The number of motorcycles registered in Australia increased by 53% from 1999 to 2009, showing the strongest growth of any vehicle type [2, 3]. There is relatively less information available regarding the age profile of riders. In New South Wales the number of motorcycles registered to people aged 40 and over increased by 57% between 1995 and 2000, compared with a decrease of 33% in the number of motorcycles registered to people aged under 25 years [4].

Older riders can be categorised into three groups:

- riders who have held a licence and ridden for many years (continuing riders);
- riders who have obtained a licence recently (new riders); and
- riders who have held a licence for many years but have recently returned to riding after a break (returned riders).

While there is recent concern about the safety of returned riders, little is known about factors that contribute to their crash involvement. A small number of studies on older riders have investigated their crash involvement relative to continuing and new riders [5, 6, 7]; and issues of training [8], age and experience [5], and riding patterns [5, 6, 7]. A number of factors that might place returned riders at a higher crash risk compared to new and continuing riders have been identified. These factors include that returned riders are less likely to undertake training, more likely to ride a motorcycle that is of a higher engine capacity than they did in the past, more likely to ride as part of a group at the time of a crash, more likely to ride in rural areas, and more likely to ride for recreation. However, the findings provide little useful information about which aspects of a rider's behaviour or attitudes might be usefully targeted for modification in the interests of safety. Two particular studies of note have identified a relationship between behaviours and attitudes and crash risk among motorcycle riders.

In a survey of 1,500 Australian motorcyclists aged over 25, Symmons *et al.* [9] found that crash-involved riders rated themselves as more careless, confident, irresponsible, risky, fast, and intolerant than riders

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who had not crashed in the previous five years. Crash involvement could be predicted by perceived above average motorcycle control skills, a perceived increased likelihood of being involved in a crash in the future, a more tolerant riding style, a greater perceived ability to avoid hazardous situations, and a self-assessed “safe” (rather than risky) riding style [9]. In a large sample of British motorcyclists [10], self-reported errors were the most important behavioural contributors to accident involvement (after controlling for mileage). Riding style and a liking for speed were identified as predictors of behavioural errors that were themselves predictors of crashes. Sexton *et al.* [10] argued that the link between errors and crashes may be as much to do with a careless, inattentive riding style and excessive speed as it is with lack of skill. Such relationships lend support to the view that an important element of the motorcycle safety problem stems directly from the motivations that lead individuals to ride motorcycles, which presents a challenging problem for road safety [10].

The relationship between crash involvement and psychological factors has not been explored in returned motorcyclists. In order to identify psychological attributes of this group that might be amenable to intervention, this paper compares the attitudes and behaviours of returned riders who have been involved in an on-road crash with those who have not.

Method

An on-line survey of Australian motorcycle riders was undertaken in late 2009 to explore potential contributors to crash risk, such as attitudes, personal characteristics, self-reported riding behaviours and level of experience and training. To be eligible to participate, respondents must have ridden a motorcycle on a public road and held at least a learner permit at the time of completing the survey. Riders were asked a sub-set of questions from a modified version of the Motorcycle Rider Behaviour Questionnaire (MRBQ) and the Motorcycle Rider Motivations Questionnaire (MRBQ) [10], and completed a modified version of the Riding Style Scale [11]. The questions were designed to quantify the riders’ behaviours and attitudes and provide some understanding of the psychological antecedents of motorcycle crashes.

Riders were informed about the survey through four main avenues:

- advertisements in two popular Australian motorcycling magazines;
- an advertisement in the Royal Automobile Club of Victoria (RACV) magazine;
- links or other information about the survey on websites likely to be visited by riders; and
- emails sent to members of motorcycling clubs or organisations.

Results

Sample description

There were a total of 2,116 valid questionnaire responses. Respondents were classified as returned riders if they obtained their permit or licence ‘more than five years ago, rode for a while, then stopped riding for at least a year, then took it up again within the last three years’. New riders were defined in the survey as those who got their learner permit or licence only in the last five years; and continuing riders were those who got their licence more than five years ago and have ridden regularly since then. Of the 2,058 respondents who answered the question about rider type, 24% were returned riders, 27% were new riders and 49% were continuing riders.

Riders were asked whether they had ever been involved in a crash while riding on a public road. Overall, 58% of respondents (1,226 riders) had crashed. In order to determine the type of rider at the time of the crash (rather than at the time of survey completion), only “most recent” crashes in the five year period 2005-2009 were included in the analyses. Ninety-one percent of new rider crashes, 31% of continuing rider crashes and 32% of returned rider crashes occurred within this five year period. Continuing riders were relatively more likely to have crashed (43%), compared to 19% of the returned riders and 38% of the new rider group. These differences were statistically significant ($\chi^2(8)=77$; $p<0.001$). The focus for the remaining paper is on returned riders; a comparison between returned riders who had crashed within the period 2005-2009 and returned riders who had *never* crashed (rather than those who had only not crashed within the five-year period of interest). A total of 244 returned riders were available for analysis, 38% of whom had crashed within the last five years and 62% of whom had never crashed.

Riders who had crashed were asked how severely they were injured. The injury categories were collapsed into two composites – no injury or being treated at the scene (minor) and being taken to hospital (major). Two-thirds (66%) of the returned riders who had crashed suffered minor injuries and one third (34%) suffered major injuries.

Demographics and motorcycle use

As shown in Table 1, there were no statistically significant differences between crash-involved and never-crashed riders in terms of age, gender, licence status, completion of training, and purpose of trip in the last month. Crash-involved riders rode further per month and more frequently but the differences were not statistically significant.

Table 1: Demographics and riding patterns of returned riders

Characteristic	Crash-involved	Never crashed	Statistic
Mean age	51 (SD=10)	48 (SD=11)	t(240)=1.6, p>.05
Male	91%	91%	$\chi^2(1)=0.03$; p>0.05
Full licence	97%	94%	$\chi^2(1)=1.7$; p>0.05
Training course last 5 years	61%	60%	$\chi^2(1)=0.005$; p>0.05
<i>Distance ridden in last month (km)</i>			
<50	2%	4%	$\chi^2(4)=8$; p>0.05
50-100	6%	10%	
101-200	5%	15%	
201-500	27%	24%	
>500	60%	47%	
<i>Number of trips taken in last month</i>			
1-10	52%	64%	$\chi^2(5)=7$; p>0.05
11-20	21%	16%	
21-30	7%	4%	
31-40	4%	7%	
41-50	7%	4%	
51+	9%	4%	
<i>Main purpose of trips in last month</i>			
Recreation	54%	55%	$\chi^2(5)=7$; p>0.05
Commute	34%	30%	
Other	12%	15%	

Table 2 shows that crashed riders reported more near misses while riding over the last month than never-crashed riders and were more likely to incur a traffic infringement over the last three years – both differences were statistically significant. The two rider groups did not differ statistically in the number of speeding infringements they had amassed within the last three years.

Riders were asked what was the maximum speed they had ridden in the previous year and the maximum speed they had ridden ever. Crashed riders claimed a higher maximum riding speed than those who had never crashed for both their fastest speed in the last year and their fastest speed ever (See Table 3). The differences between the groups for both of these comparisons were statistically significant.

Table 2: Near-misses and traffic infringements for returned riders

Characteristic	Crash-involved	Non-crash involved	Statistic
No. near misses last month	1.9 (SD=2.6)	1.1 (SD=2.3)	t(219)=2.4, p<.05
≥1 infringement last 3 years	32%	15%	$\chi^2(1)=9$, p<0.005
<i>Speeding infringements last 3 years</i>			
1	25%	32%	$\chi^2(5)=3$, p>0.05

2	36%	37%
3	21%	16%
4	14%	5%
5	4%	5%
6		5%

Table 3: Highest self-reported speed in last 12 months and ever by returned riders

Characteristic	Crash-involved	Non-crash involved	Statistic
<i>Highest speed last 12 months</i>			
Mean	155 km/h	144 km/h	t(222)=2;p<0.05
Min	70 km/h	80 km/h	
Max	298 km/h	298 km/h	
<i>Highest speed ever</i>			
Mean	193km/h	171km/h	t(214)=3.3;p<0.005
Min	105 km/h	95 km/h	
Max	300 km/h	298 km/h	

Riding style

Respondents were asked to consider the 12 statements listed below about their own riding style and decide how strongly they agreed or disagreed with each one. Respondents indicated their level of agreement on 7-point Likert scales ranging from 'strongly agree' through 'neither agree nor disagree' to 'strongly disagree'. The items were randomly re-ordered for each respondent.

- Inattentive rather than attentive
- Safe rather than risky
- Indecisive rather than decisive
- Experienced rather than inexperienced
- Nervous rather than confident
- Patient rather than impatient
- Responsible rather than irresponsible
- Careful rather than careless
- Slow rather than fast
- Intolerant rather than tolerant
- Irritable rather than placid
- Selfish rather than considerate

Table 4 details the only two items that produced statistically significant differences between the crashed and never-crashed returned rider groups. Crashed riders were more likely to strongly agree than never-crashed riders that their riding was 'experienced' rather than 'inexperienced' ($\chi^2(6)=17$; $p<0.01$) and to somewhat disagree that their riding was 'slow' rather than 'fast' ($\chi^2(6)=17$; $p<0.05$). Crashed riders in general seemed to rate themselves as faster, with consistently lower percentages for 'slow' and higher percentages for 'fast'.

Table 4: Relative level of agreement with riding styles for comparisons reaching statistical significance for returned riders

a. Experienced rather than inexperienced

b. Slow rather than fast

Experienced	Crashed	Never crashed	Overall	Slow	Crashed	Never crashed	Overall
Strongly agree	33%	14%	21%	Strongly agree	4%	8%	7%
Agree	34%	33%	33%	Agree	17%	23%	20%
Somewhat agree	17%	24%	21%	Somewhat agree	21%	18%	19%
Neither	9%	16%	13%	Neither	17%	29%	24%
Somewhat disagree	3%	8%	6%	Somewhat disagree	27%	10%	16%

Disagree	3%	5%	4%	Disagree	11%	11%	11%
Strongly disagree	0%	1%	1%	Strongly disagree	3%	1%	2%
Total	100%	100%	100%	Total	100%	100%	100%

Riding behaviours

Respondents were also asked to indicate on a 7-point Likert scale ranging from ‘never’ through to ‘always’ how often they had engaged in 35 behaviours while riding their motorcycle on the road in the past 12 months. Each behaviour related to either a hazardous or risky event or the absence of a safe or protective action. The propensity for respondents to choose extreme scores meant that in all but one of the 35 comparisons one of the requirements for using a chi-square test was violated – that cells do not contain an expected count of less than five. All items in this block were therefore recoded to a three point scale: 1- never, 2-occasionally (representing 2 and 3 on the original 7-point scale), and 3-regularly (accounting for 4-7 on the original scale). Recoding the scales in this way resulted in eight items for which there were statistically significant differences between the groups, as shown in Table 5a-5h below.

Table 5: Occurrence of behaviours over previous year that resulted in statistically significant comparisons for returned riders

a. Exceeded speed limit on residential streets

How often	Crashed	Never crashed	Overall
Never	20%	24%	23%
Occasionally	48%	59%	55%
Regularly	32%	17%	22%
Total	100%	100%	100%

b. Exceeded speed limit on rural roads

How often	Crashed	Never crashed	Overall
Never	10%	14%	12%
Occasionally	47%	60%	55%
Regularly	43%	26%	32%
Total	100%	100%	100%

c. Disregarded speed limit at night or early morning

How often	Crashed	Never crashed	Overall
Never	42%	61%	54%
Occasionally	42%	31%	35%
Regularly	16%	8%	11%
Total	100%	100%	100%

d. Raced away from traffic lights to be ahead of traffic

How often	Crashed	Never crashed	Overall
Never	11%	24%	20%
Occasionally	40%	41%	41%
Regularly	48%	34%	39%
Total	100%	100%	100%

e. Skidded on wet road, manhole cover, etc

How often	Crashed	Never crashed	Overall
Never	32%	49%	43%
Occasionally	64%	42%	50%
Regularly	5%	9%	7%
Total	100%	100%	100%

f. Intentionally caught up to or kept up with another rider not met before

How often	Crashed	Never crashed	Overall
Never	47%	63%	57%
Occasionally	44%	32%	36%
Regularly	9%	5%	6%
Total	100%	100%	100%

g. Ridden too fast for the conditions

How often	Crashed	Never crashed	Overall
Never	32%	54%	46%
Occasionally	60%	43%	50%
Regularly	8%	3%	5%
Total	100%	100%	100%

h. Raced another rider or driver

How often	Crashed	Never crashed	Overall
Never	54%	65%	61%
Occasionally	36%	33%	34%
Regularly	10%	2%	5%
Total	100%	100%	100%

As shown in Table 5, just over half of all returned riders admitted to exceeding the speed limit on residential roads occasionally, and 22% did so on a regular basis. Returned riders who had crashed were more likely to regularly exceed the speed limit, while returned riders who had never crashed were more likely to do so only occasionally ($\chi^2(2)=7$; $p<0.05$). A similar pattern was evident for exceeding the speed limit on country/rural roads (including rural freeways). However, the overall percentage of riders speeding in such locations was higher, with only 12% claiming to never do it, compared with 23% of riders who said they never exceeded the speed limit on residential roads ($\chi^2(2)=7$; $p<0.05$).

Just over half of all returned riders said they never disregarded the speed limit at night. Crashed riders were more likely than never-crashed riders to disregard the speed limit at night – both occasionally and regularly ($\chi^2(2)=8$; $p<0.05$). An equivalent proportion of the two rider groups occasionally raced away from traffic lights to be ahead of traffic, but crashed riders were more likely to do it regularly – 48% versus 34% ($\chi^2(2)=8$; $p<0.05$).

Riders were asked how often they had “Skidded on a wet road, manhole cover, road markings etc”. Just under half of the never-crashed group said such a thing never happened to them compared to a third of the crashed group. Almost two-thirds of crashed riders had skidded occasionally versus 42% of never-crashed riders ($\chi^2(2)=11$; $p<0.01$).

About a third of riders admitted to racing another driver or rider occasionally, with only minor differences between the two groups. Crashed riders, however, were much more likely to have done this on a regular basis ($\chi^2(2)=9$; $p<0.05$). A higher percentage of crashed riders “intentionally caught up to or kept up with another rider they had not met before”, both occasionally and regularly – 63% of never-crashed riders never intentionally caught up to or kept up with another rider versus 47% of crashed riders ($\chi^2(2)=6$; $p<0.05$).

Just over half of all returned riders admitted that they had occasionally ridden too fast for the conditions in the last year, while 46% said they had not done so at all. Those who had never crashed were much more likely to say they had not ridden too fast, while the crashed group were more likely to report occasionally or regularly finding themselves in this situation ($\chi^2(2)=12$; $p<0.005$). Finally, crashed riders were more likely to admit that they occasionally or regularly raced other riders or drivers, and at least a third of both groups had raced ($\chi^2(2)=9$; $p<0.05$).

While not all of the 35 items posed to riders were related to speed, each of the items that demonstrated a statistically significant difference between the never-crashed and crashed groups were speed related (See

Table 5). An additional four items from the original 35 that were also speed related did not result in statistically significant differences between the two rider groups. Those items were:

- Tried to break your own record for speed or time
- Open up the throttle to 'go for it' on a quiet road
- Ridden so fast into a corner that you scared yourself
- Attempted to keep up with other riders or drivers going faster than you.

Riding motivation

Respondents were asked to consider the 13 items below in terms of their own motivations for riding. Respondents indicated their level of agreement with each item along 7-point Likert scales ranging from 'strongly agree' through 'neither agree nor disagree' to 'strongly disagree'.

- I like the manoeuvrability of a motorcycle
- I get a sense of freedom when riding
- Riding is a good social activity
- When riding I feel I am one with my machine
- When riding I can feel the road
- When it is safe and I am not likely to be caught I like to open it up a bit
- Riding is risky
- I like accelerating rapidly
- I ride more cautiously than the average rider
- I would like to be a professional racer
- I take calculated risks when riding
- I like to ride hard
- I would like to ride on a road with no speed limits

The propensity for respondents to choose extreme scores, coupled with the relatively low sample size, meant that in most comparisons of rider motivation one of the requirements for using a chi-square test was violated – that cells do not contain an expected count of less than five. As for the earlier behavioural items, all items in this block were recoded using a three point scale, with one level each for disagreement, neutral and agreement. The strongly agree and strongly disagree options (and their disagree counterparts) were combined and the two somewhat levels and neutral were combined.

As shown in Table 6, collapsing to a 3-point Likert scale resulted in three statistically significant differences. Compared to never-crashed returned riders, crashed returned riders were more likely to agree than disagree that "I get a sense of freedom when riding" ($\chi^2(2)=9$; $p<0.05$), "I like to ride hard" ($\chi^2(2)=8$; $p<0.05$), and "I like accelerating rapidly" ($\chi^2(2)=8$; $p<0.05$).

Table 6: Motivations for riding for comparisons reaching statistical significance

a. Sense of freedom when riding

	Crashed	Never crashed	Overall
Agree	98%	86%	91%
Neutral	2%	13%	9%
Disagree	0%	1%	0%
Total	100%	100%	100%

b. I like to ride hard

	Crashed	Never crashed	Overall
Agree	18%	8%	54%
Neutral	56%	55%	55%
Disagree	25%	37%	32%
Total	100%	100%	100%

c. I like accelerating rapidly

	Crashed	Never crashed	Overall
Never	56%	39%	46%
Occasionally	41%	49%	46%
Regularly	3%	12%	8%
Total	100%	100%	100%

Discussion

Overall, the results of this study show that crash-involved returned riders have a greater propensity towards risky riding behaviours than returned riders who have never crashed. In addition, most of the behaviours for which statistically significant differences between the groups were found related to speeding, both exceeding the speed limit and riding too fast for the prevailing conditions. Crashed riders were more likely to report that they had exceeded the speed limit on residential and rural roads or freeways, disregarded the speed limit late at night or in the early hours of the morning, raced away from traffic lights to be ahead of traffic, intentionally caught up to or kept up with another rider they have never met before, raced another driver or rider, ridden too fast for the conditions, and skidded on a wet manhole cover or road markings (with the assumption the rider had not slowed to take account of the environment and/or conditions). Crashed riders were also more likely to strongly agree than never-crashed riders that their riding style was fast rather than slow. Consistent with these findings, crashed riders claimed a higher speed than those who had never crashed for both the fastest speed they had ridden in the last year and the fastest speed they had ever ridden.

The results of this study do not indicate a causal link between crash involvement and speeding-related behaviour, but they do warrant attention. Previous motorcycle safety research has established a link between crash involvement and speeding and stunt-type intentional risk-taking behaviours, with motivations for riding related to pleasure and excitement indicating increased crash risk [10]. In the current study both crashed and never-crashed returned riders cited recreation as the main purpose of riding (a finding consistent with previous studies). Crashed riders demonstrated a greater propensity towards motivations arguably associated with speeding related pleasure and excitement: 'sense of freedom; 'like to ride hard' and 'like accelerating rapidly'.

Riders who had crashed reported more near misses over the last month than those who had not crashed and were more likely to have incurred a traffic infringement over the previous three years. The contributory factors surrounding the near misses and traffic infringements are not known in the current study. Previous research has found that unintentional errors are the biggest predictor of motorcyclist crash involvement and often occur in a violational context, with those displaying a liking for speed and/or a fast and risky riding style being more likely to commit such errors [10]. For the purposes of developing rider countermeasures, it would be important to determine whether rider error played a contributory role in the near misses reported here. Despite the increased propensity for crashed riders to engage in risky speed related behaviours, no differences were found between the groups on speeding infringements in the last three years. However, a lack of detection does not necessarily indicate a lack of participation in speeding related behaviours.

It should be noted that these findings are based on self-report data, as is much of the research assessing the relationship between crash involvement and riding behaviours and attitudes. A simulator study could be used to determine whether crashed riders display a greater propensity for actual risky riding behaviours than never crashed riders, though of course the realism of such risk is arguable in the controlled and safe environment of a simulator. However, neither a survey nor simulator study allows one to know whether the differences in rider behaviour and attitudes preceded or followed a crash.

Another shortcoming of the current study is the relatively small sample size. Consistent with previous surveys of older riders, returned riders comprised a smaller proportion of the sample than the novice or experienced rider groups [5, 6, 13], and their involvement in crashes was also lower [5, 6, 10]. Other unpublished research has also found that returned riders are much harder to recruit than other types of riders. This may suggest that returned riders comprise a smaller proportion of the population of motorcyclists than other types of rider. It may also suggest that returned riders are less likely to come into contact with publicity materials posted on the internet and in motorcycling magazines, or that they are simply less likely to be interested in participating. This explanation would seem to fit with the profile of returned riders as more commonly weekend, fair-weather, recreational riders for whom motorcycling is more of a discretionary activity than for other riders (i.e., they ride less often and fewer kilometres [5, 6]). Despite the relatively small sample size, the characteristics of the returned riders in this study were not dissimilar to those found in previous surveys of returned riders in Australia [5, 6] and in the UK [10, 13]. This provides some confidence that the sample in the current study was representative.

In the absence of more objective data, the current findings support the introduction of insight training as a method for encouraging crash-involved returned riders to understand and manage their risk exposure. The differences between crashed and never-crashed riders reported here may exist in other rider types and age groups. However, they would seem to warrant greater attention in the returned rider group given their increased presence on the road. Additionally, previous survey research has found that returned riders are less likely than new and continuing riders to undertake training [5,6,7] and anecdotal reports suggest they are less likely than other riders to believe that training is necessary or relevant to them [12].

As a first step towards countermeasure development, there needs to be a greater emphasis on encouraging the uptake of training by those returning to riding. As a second step, any training program must be able to reduce the propensity for risky riding behaviours and attitudes without removing the primary goal of enjoyment from riding.

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