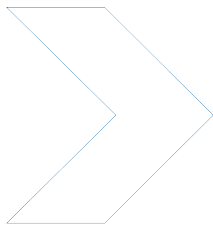


➤ Centre for Automotive Safety Research



Characteristics of alcohol impaired road users involved in casualty crashes

VL Lindsay

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Characteristics of alcohol impaired road users involved in casualty crashes

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ABSTRACT

This report links data from multiple sources to present a more comprehensive profile of the person, crash and licensing characteristics of a group of road users involved in a casualty crash as a result of alcohol impairment. Participants were drawn from data collected for those active road users who were admitted to the Royal Adelaide Hospital as a result of crash involvement over the three year period between 1 January 2008 and 31 December 2010. An objective alcohol reading was known for 1204 of the 1490 cases in the study. Acute alcohol intoxication was found to be a contributing factor to crash causation in 274 of these 1204 cases, constituting 22.76% of this group. Impairment as the result of alcohol was found across all road user types but was particularly noted amongst pedestrians (55.8% of pedestrians that were tested) and drivers (24.3% of drivers that were tested). An established diagnosis of alcohol dependence at the time of crash involvement was identified for 146 of the 1490 participants in this study, constituting 9.8% of all participants. Indigenous Australians were identified as a vulnerable group found to be at an increased risk of being involved in a crash as the result of alcohol impairment. More than 40 per cent of those participants identified as being alcohol impaired in this study were found to have incurred at least one previous infringement that involved driving with an alcohol level above 0.05gm/100ml and were twice as likely to have had at least one period of licence disqualification when compared with those road users who were not found to be impaired.

KEYWORDS

Drink driving, alcohol impairment, alcohol dependence, driver behaviour, pedestrian, driver, road user behaviour, recidivism, licence suspension

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Summary

Road users who are impaired as a result of acute alcohol intoxication are at an increased risk of being involved in a crash. In particular, they are at an increased risk of being involved in casualty and fatal crashes [1-9]. This problem is understood by the many stakeholders involved in road safety including health care professionals, police, licensing authorities and others. However, the knowledge gained from these discrete groups is in many cases held in isolation, without the opportunity to gain a more holistic understanding of the multiple variables that impact on crash risk.

The main purpose of this report is to link the data from these discrete sources and, in so doing, present a more comprehensive profile of the person, crash and licensing characteristics of a group of road users involved in a casualty crash as the result of alcohol impairment. Participants for this study were drawn from data collected for those active road users who were admitted to the Royal Adelaide Hospital as a result of crash involvement over the three year period between 1 January 2008 and 31 December 2010. Objective blood alcohol results related to road users was sourced from the Forensic Science Centre of South Australia. This was the primary source utilised to identify those participants who were acutely impaired as the result of alcohol at the time of crash involvement. For those cases where data was not found in the Forensic Science data, the breath alcohol results undertaken on presentation to hospital were utilised. For the purposes of this study an alcohol impaired participant was defined as any active participant with a blood alcohol concentration (BAC) of 0.05gm/100ml or a breath analysis result of 0.05 or more.

In the 1490 cases examined in the study, it was found that impairment as the result of alcohol was a major contributing factor to crash causation in 274 cases. These 274 cases represent 18.4 per cent of all cases in the study sample. Close to 20% of participants in the study did not have an alcohol reading available for scrutiny, and as a result this 18.4% figure is likely to be an underestimate. When only those cases where an alcohol reading was available were examined, it was found that close to 23% of participants were involved in their crash while alcohol impaired. This was particularly the case for pedestrians, where it was found that more than 55% of those tested for alcohol had a level that was 0.05 or more.

Data for each of the 274 crash involved participants identified as being impaired as the result of alcohol were linked with two other data sources: police crash data related to this crash and previous crashes, and registration and licencing data, including data related to infringement and disqualification history. This linkage provided a more comprehensive understanding of the multiple aspects that are important when trying to understand who is at risk of being involved in a crash as the result of alcohol impairment, the context in which the crash occurred and other common characteristics found amongst this group of road users.

Impairment as the result of alcohol was found across all road user types but was particularly noted amongst pedestrians (55.8% of those pedestrians who were tested) and drivers (24.3% of those drivers who were tested). Levels of alcohol impairment were found to be generally higher amongst pedestrians compared to other road user groups.

An established diagnosis of alcohol dependence at the time of crash involvement was identified for 146 of the 1490 participants in this study, constituting 9.8% of all participants. Although alcohol dependence was found across all road user types, 23 per cent of all pedestrians were found to have alcohol dependence compared to 8 per cent of drivers and 6.6 per cent of motorcycle riders. Half of all participants who had an established diagnosis of alcohol dependence were found to be acutely impaired as the result of alcohol at the time of the crash. Those who were identified as being alcohol dependent were more likely than other impaired road users to have an alcohol level within the higher

limits with more than 40% found to have an alcohol level that was 0.3 or above. Of the 93 licence holders identified in medical records as alcohol dependent only one had reported that status to the licensing authority.

Indigenous Australians were identified as a vulnerable group found to be at an increased risk of being involved in a crash as the result of alcohol impairment. While Indigenous Australians represented 3 per cent of the study group, they were identified as being involved in 9 per cent of the crashes involving a road user who was alcohol impaired. The involvement of alcohol in the crash for Indigenous road users was particularly noted amongst the pedestrian group where 15 of the 16 Indigenous pedestrians who were tested for alcohol found to have an alcohol reading above 0.05. More than 41 per cent of Indigenous Australians in the study had an established diagnosis of alcohol dependence.

More than 40 per cent of those participants identified as being alcohol impaired in this study were found to have incurred at least one previous infringement that involved driving with an alcohol level above 0.05gm/100ml and were twice as likely to have had at least one period of licence disqualification when compared with those road users who were not found to be impaired. This included eleven licence holders who were under a period of licence disqualification at the time of their involvement in the crash in this study. Evidence of driving during a period of disqualification was noted in 12 per cent of cases. There were 33 impaired road users who were identified as being involved in at least one previously reported crash where alcohol was identified as a contributing factor, constituting more than 12% of this group.

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1 Introduction and background

Road users who are impaired as the result of acute alcohol intoxication and the role that impairment takes in crash causation has been recognised as a road safety issue in Australia as well as other jurisdictions throughout the motorised world. This recognition has led to numerous studies that have attempted to identify the key issues [1-9]. The knowledge gained by these many studies has led to the development of countermeasures that have led to a reduction in alcohol related crashes as well as a demonstrable shift in public thinking and acceptability of alcohol impaired driving [10]. Yet the problem of alcohol impairment continues to be one area of concern in road safety that requires further countermeasure development.

Between 2008 and 2010 the Centre for Automotive Safety Research undertook a study investigating the prevalence of medical conditions and acute medical events as a contributing factor in casualty crash causation [11]. The study involved examination of the circumstances surrounding drivers, motorcycle riders, cyclists and pedestrians involved in casualty crashes on public roads in South Australia who were admitted to the Royal Adelaide Hospital over the three year period from January 2008 to December 2010. During the course of the study the records of 1490 individuals meeting the selection criteria were made available. Data for each of these 1490 crash involved participants was collected and matched from multiple sources to provide a more holistic understanding of the circumstances surrounding their crash involvement. Data collected and matched during the study included medical records data generated during hospitalisation, police data related to the current and previous crashes, licensing history data and forensic science data related to mandatory testing for alcohol and drugs.

During the course of this study it was found that alcohol intoxication was the leading contributing factor in the crashes investigated. More than 18 per cent of all active crash participants were identified as having a blood alcohol level or breath alcohol level above 0.05 at the time of their crash. Further, the study found that alcohol dependence was identified by medical personnel in close to 10 per cent of all participants.

This current report further explores the data collected in the above study for those active participants who were identified as being impaired as the result of alcohol at the time of their crash. The report attempts to identify common themes amongst this group by road user type and to determine key issues that may lead to a better understanding of those road users who may be at an increased risk of crash involvement as a result of alcohol impairment. This analysis has the potential to lead to a better understanding of those who are at risk of crash involvement as a result of alcohol impairment and lead to further countermeasure development related to alcohol affected road users.

2 Method

2.1 Overview

The main purpose of the study was to identify the person, licensing and crash characteristics for a group of drivers, motorcycle riders, pedestrians and cyclists who were identified as being involved in a casualty crash as the result of alcohol impairment. For the purposes of this study an alcohol impaired participant was defined as any active participant with a blood alcohol concentration (BAC) above 0.05gm/100ml or a breath analysis result of 0.05 or more. Of the 1490 participants in the study there were 274 drivers, motorcycle riders, pedestrians and cyclists who were known to have an alcohol level that met the inclusion criteria. Data for each of these 274 participants was collected and matched from four discrete data sources: hospital medical records, Police data related to this and previous crashes, licensing history data and Forensic Science data related to mandatory testing for alcohol and drugs.

2.1.1 Medical records

All persons who present to the Royal Adelaide Hospital for medical care that is of four hours duration or more are formally admitted to the hospital and are required to undergo International Classification of Disease coding utilising version ten, Australian Modification (ICD10-AM). Within the ICD10-AM are specific codes related to external sources of injury, some of which relate to road crashes. From these codes those individuals who were admitted to the hospital as a result of a motor vehicle accident were able to be identified. The original, primary source, medical records in these cases were examined in detail. The information available in the records included: South Australian Ambulance Service (SAAS) and/or Medical Retrieval reports, Emergency Department and hospital in-patient records.

2.1.2 Police generated records

Two discrete sources of information related to Police records were made available: Vehicle Collision Reports (VCR) and the Traffic Accident Reporting System (TARS). Information found in the Police crash records includes data related to both the current crash and any previous crashes that have been reported to Police. Police data related to previous crash history provides information related to licenced drivers and motorcycle riders only as this data can not be searched for pedestrians and cyclists.

2.1.3 Licensing records

The licensing records related to those drivers and riders involved in crashes during the data collection period were sourced at the Department of Planning, Transport, and Infrastructure (DPTI) - Lands, Vehicle Registration and Licensing Division. This licensing information is available for South Australian licenced drivers and motorcycle riders and is not available for pedestrians or cyclists who may or may not hold a current licence. Records were accessed by driver licence number identified in the South Australian Police (SAPOL) collision records, utilising the Transport Regulation User Management Processing System (TRUMPS) program. Information gathered from this source included: class and type of licence held, infringement history and history of previous periods of licence disqualification.

2.1.4 Forensic Science records

Since 1972 those crash involved drivers, motorcycle riders, vehicle occupants and pedestrians over the age of fourteen years, who present to hospital as a result of a crash, have been required to undergo mandatory testing for blood alcohol concentration in South Australia. In 2010 the legislation was altered to include all road users who were over the age of ten. This legislation requires a blood

sample to be taken by hospital medical personnel within eight hours of being involved in the collision, with most occurring within the first one to two hours following the crash. The samples are sent to, and tested by, the South Australian Forensic Science Centre. The results of these tests were made available for matching for those drivers, motorcycle riders, pedestrians and cyclists identified within the study following a confidentiality agreement. The records provided include the results following testing as well as the time that the sample was taken.

2.2 Results

The records for the 1490 participants in the study were examined for objective data that supported alcohol impairment as a contributing factor at the time of crash involvement. Participants were identified as being involved in a crash as the result of alcohol impairment primarily on the data sourced from the Forensic Science blood alcohol testing results.

Although testing for blood alcohol concentration (BAC) is mandatory for those who attend hospital as the result of crash involvement in South Australia, among the 1490 participants in the study there were 238 cases where a sample appears to have either not been taken or not tested within the eight hour time frame. This was particularly the case for pedestrians where it was found that a Forensic Science blood alcohol was identified in only 50 per cent of cases in the study; the remaining missing data related to drivers, motorcycle riders and cyclists, accounting for approximately 12 per cent of these cases. In addition there were 48 cases overall where a blood sample was taken but the sample was found to have denatured and was unable to be analysed. Of the cases where a BAC was known from this source, there were 232 cases where the blood alcohol concentration was found to be above 0.05gm/100ml.

A secondary source of objective information related to alcohol levels was the hospital Emergency Department records. These records frequently provided alcohol readings from breath testing undertaken on presentation to the department. In the 286 cases where no Forensic Science data was available these breath alcohol test results were sourced in an attempt to gain a more complete understanding of the involvement of alcohol in the crashes in the study. Among the 286 cases where no Forensic Science data was available there were 42 cases where a breath alcohol result above 0.05 was identified in the Emergency Department records. The results of these 42 cases were included with those from the Forensic Science data, bringing a total of known cases of alcohol levels above 0.05 to 274 cases. These 274 cases represent 18.4 per cent of the 1490 cases in the study.

Given the number of cases that were unable to be matched with a reliable source it is expected that the real impact of alcohol in crash causation is greater than that presented here. For example, there were at least 40 other cases where the medical documentation provided anecdotal evidence that a participant was intoxicated at the time of the crash. This evidence included statements such as 'been drinking all day, consumed three litres of wine', 'patient intoxicated on alcohol at time of MVA (motor vehicle accident)'. However, due to a lack of a supporting blood or breath alcohol result, these cases have not been included in any analysis of alcohol impairment in this report.

Data from the four sources were linked for the 274 cases where alcohol impairment in crash causation was established. This linkage of data provided a more complete understanding of the impact of alcohol impairment in both their crash involvement in this study and in their previous crash and infringement histories.

The results from this study are addressed in the following section and include an examination of the person, licensing and crash characteristics of those involved in a crash due to alcohol impairment. These characteristics were found to differ between the four different road user groups, in particular the characteristics of pedestrians differed from those of drivers and motorcycle riders. As a result of the

identified differences, the two groups are addressed separately in some sections of the report. Comparisons between those road users who were identified as impaired by alcohol and those participants who were not impaired are discussed. Further detail regarding the characteristics of the 1490 participants who made up the sample group are provided in Appendix 1.

3 Alcohol impairment participants

3.1 Person characteristics

3.1.1 Road user type

There were 274 cases where an active participant in the study was identified as being involved in their crash while impaired as the result of an alcohol level above 0.05. These 274 cases represent 18.4 per cent of the 1490 active participants in the study. Given that close to 20% of participants in the study did not have an alcohol reading available for scrutiny, this 18.4% figure is likely to be an underestimate of the impact of alcohol impairment. When only those cases where an alcohol reading was available were examined, it was found that close to 23% of participants were involved in their crash while alcohol impaired. This was particularly the case for pedestrians, where it was found that more than 55% of those tested for alcohol had a level that was 0.05 or more. Those involved in their crash as the result of alcohol impairment were found across all road user groups and involved 182 drivers, 36 motorcycle riders, 53 pedestrians and three cyclists. Table 3.1 provides a breakdown by number and percentage for each road user type, while Table 3.2 provides these breakdowns for the 1204 participants in the study where an alcohol reading was available.

Table 3.1
Number and percentage of cases involving a participant
with a known alcohol level above 0.05 by road user type

	Drivers	Riders	Pedestrians	Cyclists	Total
Total cases	845	377	207	61	1490
Alcohol cases	182	36	53	3	274
Percentage	21.54%	9.55%	25.60%	4.92%	18.39%

Table 3.2
Number and percentage of cases involving a participant with an alcohol level
above 0.05 for those with a known alcohol reading result by road user type

	Drivers	Riders	Pedestrians	Cyclists	Total
Total cases	748	326	95	38	1204
Alcohol cases	182	36	53	3	274
Percentage	24.33%	11.04%	55.79%	7.89%	22.76%

3.1.2 Age and sex distribution

Those with an alcohol level above 0.05 were found across all age groups with those between the ages of 20 and 49 years making up close to 80 per cent of the total. An alcohol level above 0.05 was noted most strongly amongst pedestrians and car drivers, with 25.6 per cent of all pedestrians and 21.5 per cent of all drivers, found to have an alcohol level of 0.05 or more at the time of their crash. Motorcyclists were found to have an alcohol level above 0.05 in 9.5 per cent of all motorcycle cases while 4.9 per cent of the cyclists had an alcohol level in this range. While males made up 70 per cent of all active participants in the study group, they made up more than 75 per cent of cases involving a participant with an alcohol level over 0.05.

Alcohol impaired drivers were more likely to be between the ages of 20 and 39 years with more than 62 per cent found to be within this age group range. Almost half of all motorcycle riders identified as being impaired were in the 40 to 49 year age grouping; this compares with only 17.6 per cent of

drivers in this age group. Approximately 9 per cent of crashes involving an alcohol impaired driver or rider were found to be between the ages of 16 and 19 years, most of whom were drivers.

Pedestrians involved in crashes in the study as the result of alcohol impairment were found across all age groups, including one participant who was less than 16 years of age. As was the case with drivers and riders, more than 60 per cent of impaired pedestrians were aged between 20 and 39 years at the time of the crash. However, impaired pedestrians were more likely than drivers and riders to be between the ages of 16 and 19 years (15% of pedestrians, compared to 9% of alcohol impaired drivers and riders) and between 50 and 79 years (14% of pedestrians, compared to 9% of alcohol impaired drivers and riders). Figure 3.1 shows the age distributions by road user type, while Figure 3.2 shows these age distributions by gender. The three impaired cyclists were found to be between the ages of 20 and 49 years.

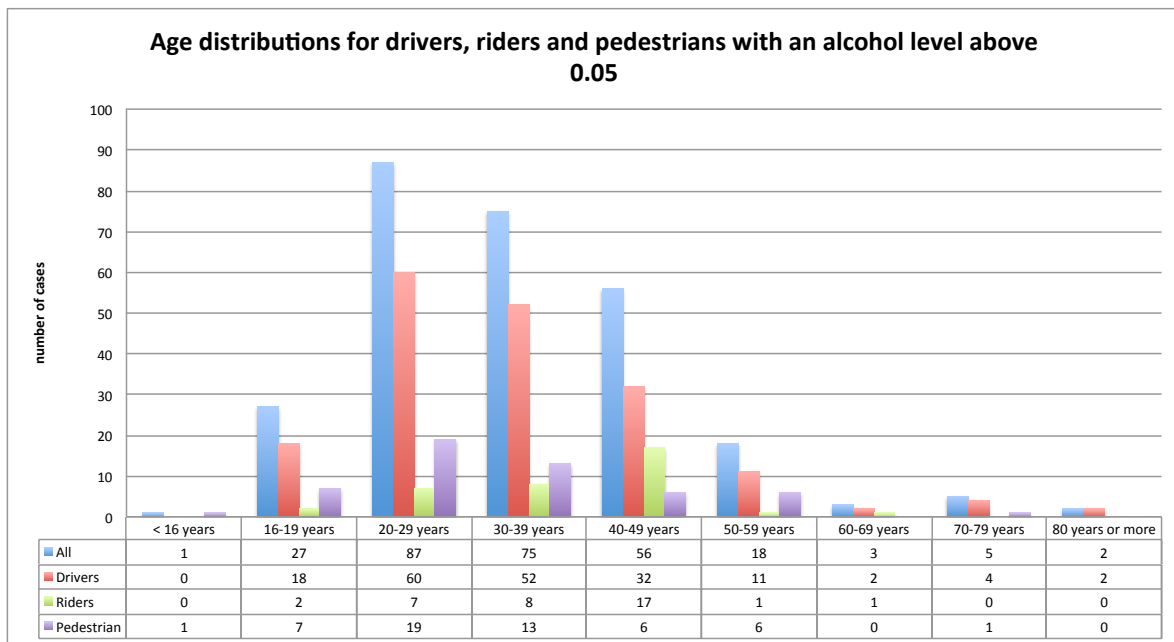


Figure 3.1
Age distributions among drivers, motorcycle riders and pedestrians with an alcohol level above 0.05

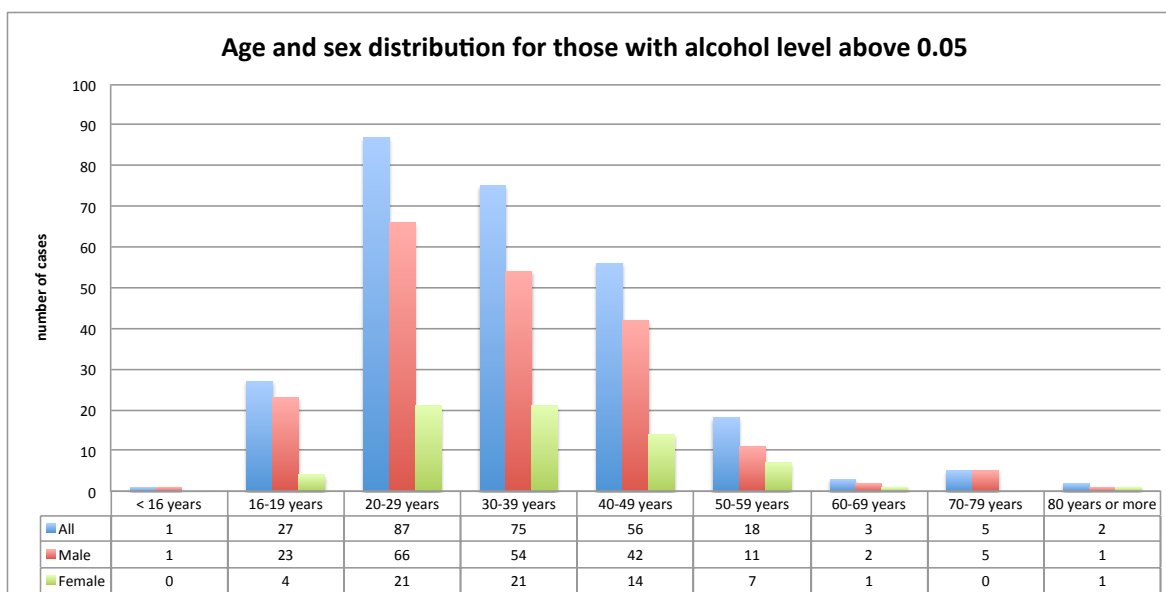


Figure 3.2
Age and sex distribution for participants with a known alcohol level above 0.05

3.1.3 Indigenous Australians

Acute alcohol intoxication that was substantiated by an objective alcohol reading was found in 25 of the 46 participants identified in medical records as being Indigenous Australians, constituting 54.4 per cent of all Indigenous road users in the study. Pedestrians were more likely than drivers and motorcycle riders in this group to have been acutely impaired, with 65.2 per cent of Indigenous pedestrians having an alcohol level above 0.05. This compares to 20.6 per cent of pedestrians who were not identified as Indigenous. In addition to the above figures there were a further seven cases involving an Indigenous pedestrian where there was medical documentation that stated that the participant was intoxicated on alcohol at the time of the crash, accounting for a further 30.4 per cent of the Indigenous pedestrians in this study. A recorded alcohol level above 0.5 was found amongst 47.4 per cent of drivers and 25 per cent of motorcycle riders who were identified as being Indigenous Australians. Acute alcohol intoxication was found across both genders with 60 per cent of this ethnic group being male and 40 per cent female.

3.1.4 Levels of alcohol

Close to 90 per cent of alcohol impaired participants were found to have an alcohol level of 0.1 or above, the majority of whom were found to have an alcohol level between 0.1 and 0.299. Fewer than 5.5 per cent of the alcohol impaired participants had an alcohol reading above 0.3.

More than half (55%) of all drivers and motorcycle riders impaired as the result of alcohol were found to have an alcohol level ranging between 0.1 and 0.199. Motorcycle riders were found to be more likely than drivers to have an alcohol level above 0.2, with a third of all riders having an alcohol level within this range compared to 27.5 per cent of drivers.

Alcohol levels among pedestrians were higher than those seen for all other road users, with more than half (54.6%) of all impaired pedestrians having an alcohol level that was greater than 0.2. Close to 17 per cent of all alcohol impaired pedestrians had an alcohol level above 0.3; compared to less than 3 per cent of drivers and motorcycle riders. Figure 3.3 shows the distribution of alcohol level found

amongst impaired road users by number of cases while Figures 3.4 to 3.6 show the distribution of alcohol level found amongst impaired drivers, motorcycle riders and pedestrians by percentage.

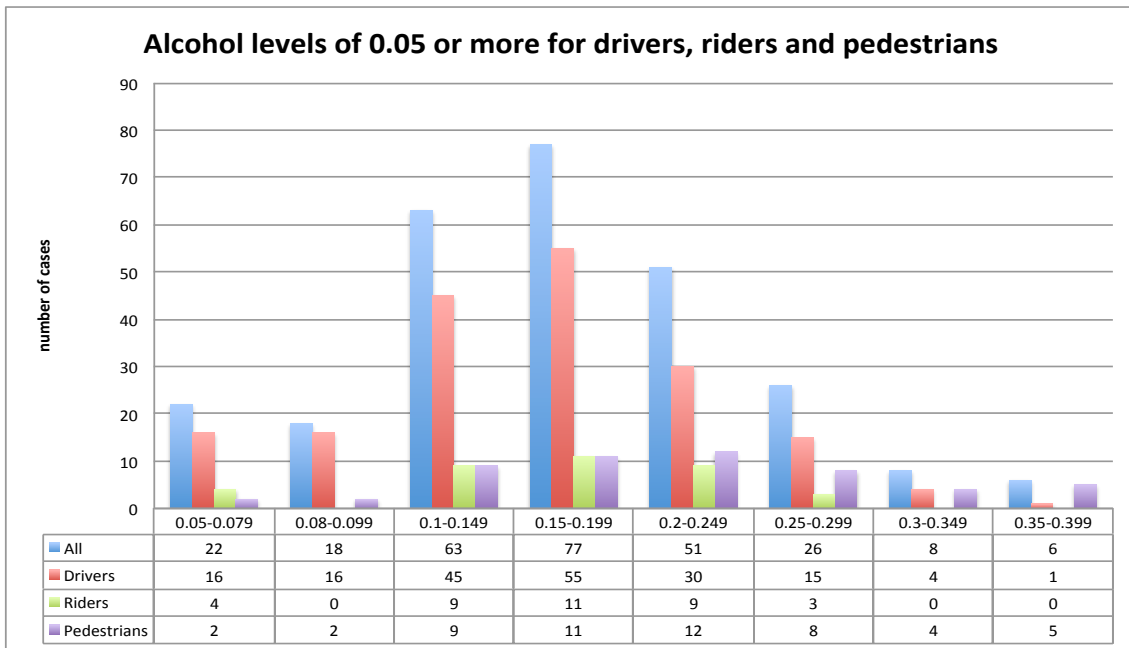


Figure 3.3

Distribution of alcohol level found amongst impaired drivers, motorcycle riders and pedestrians by number of cases

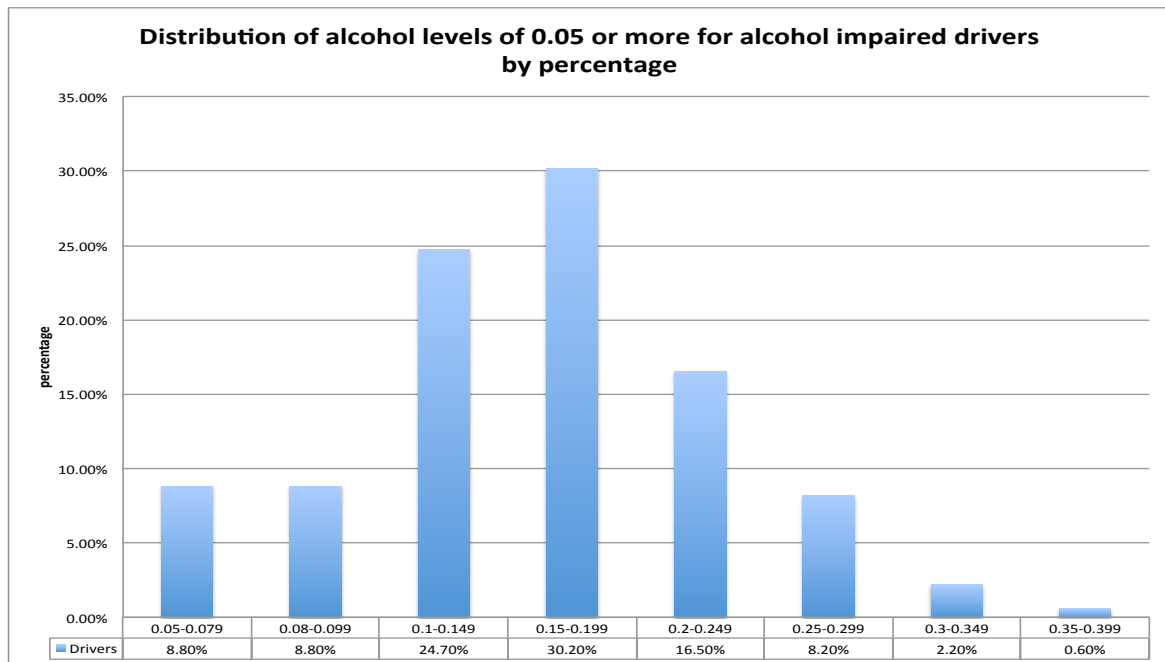


Figure 3.4

Distribution of alcohol level found amongst impaired drivers by percentage

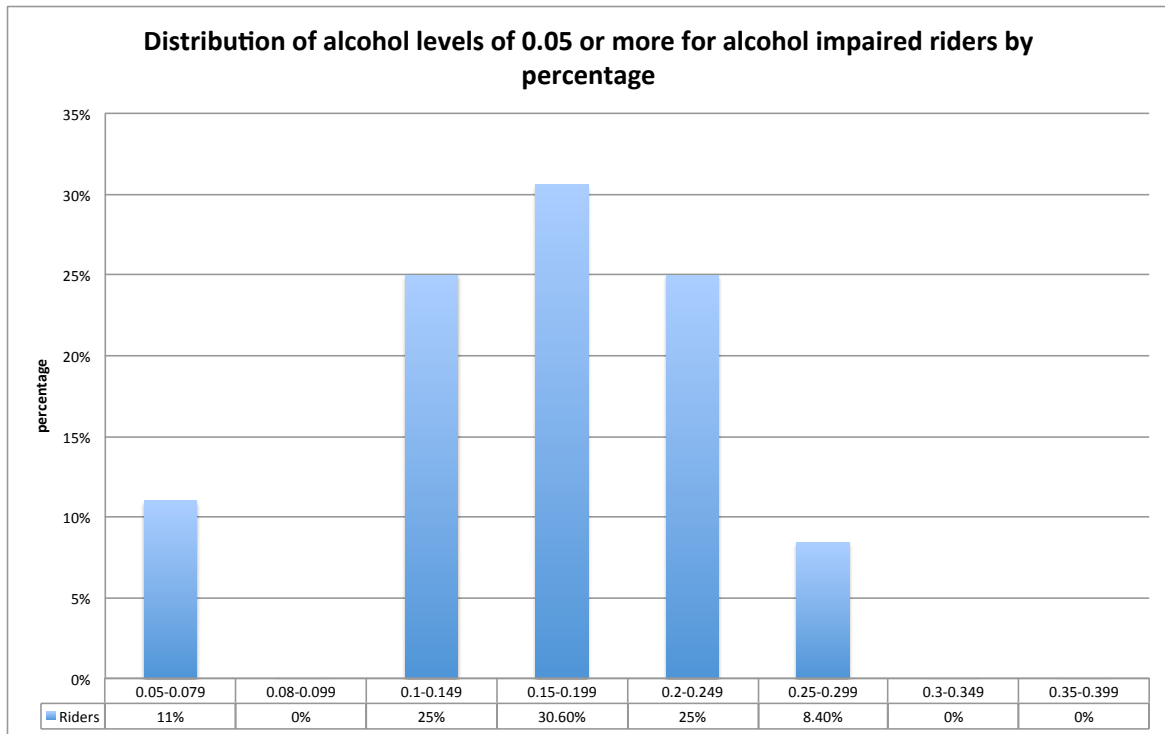


Figure 3.5
Distribution of alcohol level found amongst impaired motorcycle riders by percentage

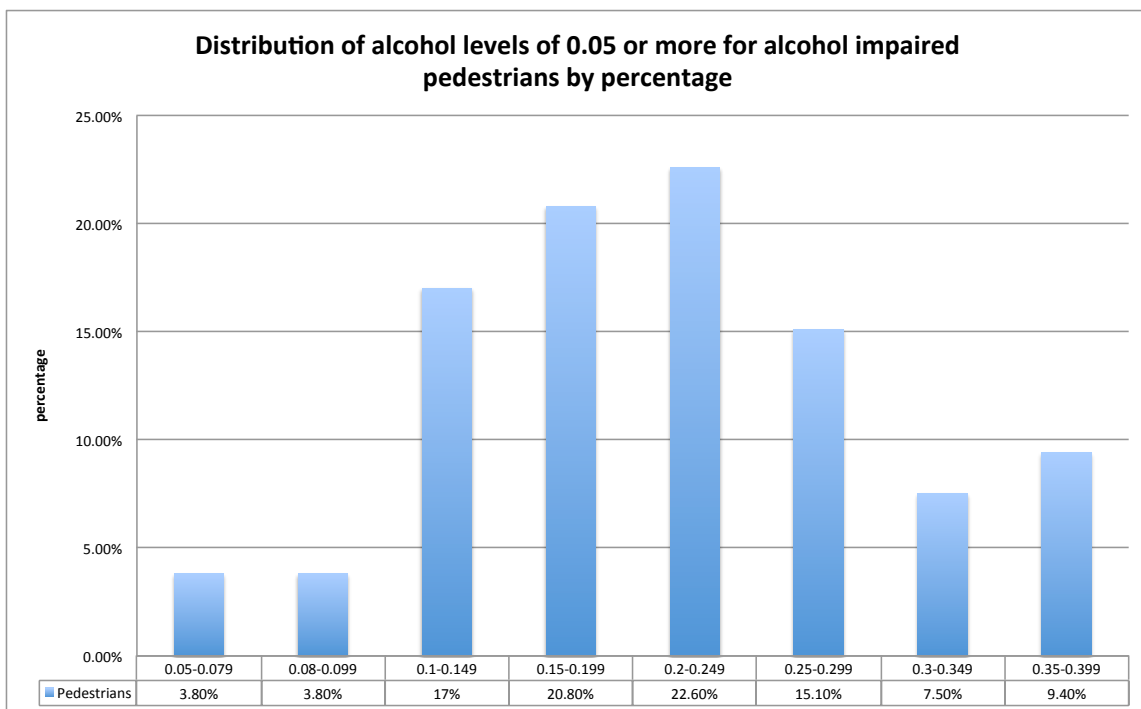


Figure 3.6
Distribution of alcohol level found amongst impaired pedestrians by percentage

3.1.5 Acute alcohol intoxication in a climate of known dependence

Of the 146 participants who were identified in medical records to be alcohol dependent, 73 (50%) were known to have an alcohol level above 0.05 at the time of the crash. Although this group were found across all road user types it was most noted amongst pedestrians. More than 45 per cent of pedestrians with an alcohol reading above 0.05 were known to be alcohol dependent; this compares to 25 per cent of the impaired motorcycle riders and 20.1 per cent of impaired drivers.

In 42 cases the participant identified as alcohol dependent was found to have a blood alcohol reading of 0.00 at the time of the crash. There was also one participant with an alcohol reading that was positive but less than 0.05. An alcohol reading was not recorded for 30 (21%) of the participants known to be alcohol dependent, 17 of whom were pedestrians. Given that these 30 participants did not undergo testing for alcohol, it is proposed that the 50 per cent figure quoted above is conservative. Table 3.3 provides a summary of alcohol results for the 146 participants known to be alcohol dependent.

Table 3.3
Summary of alcohol level at time of crash for those with known alcohol dependence by road user type

Road user type	Alcohol level 0.00-0.049	Alcohol level unknown	Alcohol level 0.05 or more	Total
Driver	25	5	38	68
Rider	10	6	9	25
Pedestrian	7	17	24	48
Cyclist	1	2	2	5
All	43	30	73	146

More than 26 per cent of all participants involved in their crash as the result of alcohol impairment were found to have alcohol dependence identified as a pre-existing condition. Figure 3.7 shows the numbers of participants known to be impaired by alcohol at the time of crash involvement, identifying those who were known to have alcohol dependence and those who were not.

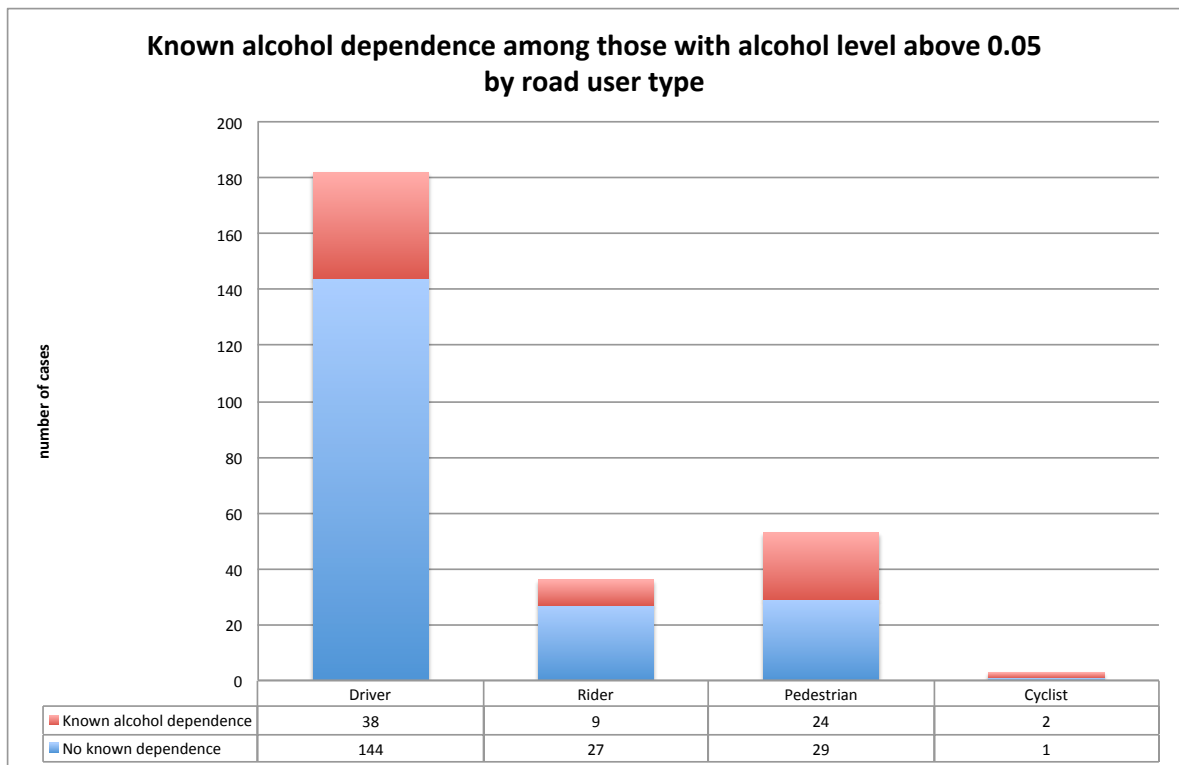


Figure 3.7
Number of cases where alcohol level was above 0.05 by road user type
identifying those who were known to have alcohol dependence with those who were not

The level of alcohol found between those alcohol impaired road users that were known to have alcohol dependence were compared with those where no alcohol dependence was identified. As might be expected, those with the highest alcohol levels were more likely to have alcohol dependence identified as a pre-existing condition. It was found that fewer than 20 per cent of participants with an alcohol level of less than 0.2 were found to have an established diagnosis of alcohol dependence compared with more than 42 per cent of those with an alcohol level greater than 0.2. Figure 3.8 shows the alcohol levels found across those participants who were impaired as the result of alcohol, and compares those with known alcohol dependence to those where no alcohol dependence was identified.

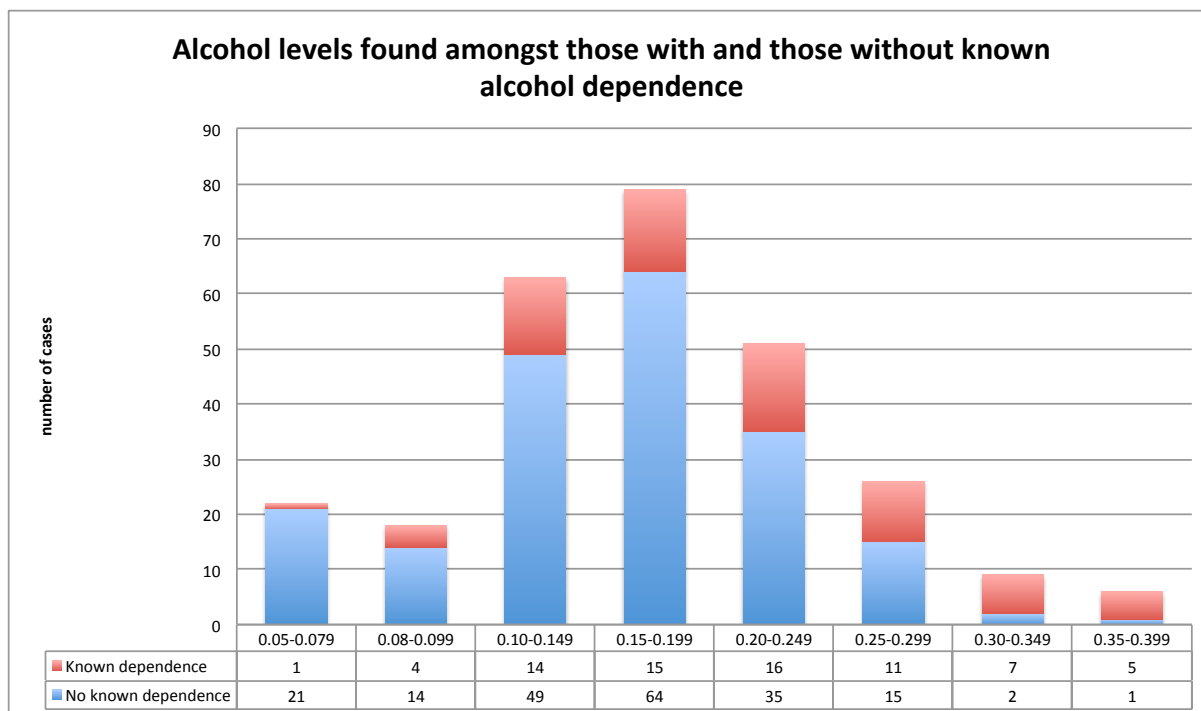


Figure 3.8
Alcohol levels found across all participants identified as being impaired by alcohol at the time of the crash, comparing those with and without known alcohol dependence

While the medical records identified 93 drivers and motorcyclists as being alcohol dependent, there is a likelihood that this figure does not reflect the true nature of the problem. For example, a review of the infringement records for the drivers and motorcycle riders who were known to have an alcohol reading above 0.2, but not known to be alcohol dependent, at the time of the crash was undertaken. It is not suggested that an alcohol reading of 0.2 is diagnostic of alcohol dependence, but rather that a participant with a reading of this level may more closely reflect those who at least have a problem with alcohol. The review found that 21 (34.4%) of the drivers and motorcycle riders who had an alcohol reading of 0.2 or above in their crash, had a history of at least one previous infringement related to driving whilst intoxicated. In five of these cases the driver or motorcycle rider had a history of between three to five previous alcohol related infringements.

3.1.6 Health outcomes as the result of crash involvement

There were 67 crashes in the study that resulted in a fatal outcome for at least one other person involved in the crash. In twelve of these crashes the active participant in the study was found to have an alcohol level greater than 0.05, constituting 18 per cent of all cases with a fatal outcome. There were eight alcohol impaired drivers who survived the crash but one or more passengers of their vehicle were fatally injured, resulting in 13 deaths. Of the 34 drivers and riders who had a fatal outcome following admission to hospital, two were known to be impaired by alcohol at the time of the crash: one motorcycle rider and one driver. Eleven pedestrians had a fatal outcome following admission to hospital; in two of these eleven cases the pedestrian was known to be impaired as the result of alcohol at the time of the crash.

3.2 Crash characteristics

3.2.1 Time of day of crash

Figure 3.9 shows the times of day where crashes involving an alcohol impaired participant occurred by road user type. Crashes involving alcohol impaired road users were found to have occurred over all time periods throughout the day, however, not unexpectedly, more than 57 per cent occurred between 2000 hours and 0400 hours. Close to 80 per cent of all crashes involving an alcohol impaired driver or motorcycle rider were found to have occurred between 1600 hours and 0400 hours. The times seen to be most prevalent, however, were found to differ between these groups. Almost half (47%) of the impaired motorcycle riders were involved in a crash between 1600 hours and 2000 hours; this compares with less than 20 per cent of crashes involving an alcohol impaired driver. Drivers were three times more likely to be involved in a crash due to alcohol impairment between 0000 hours and 0359 hours than motorcycle riders, with 35 per cent of crashes for alcohol impaired drivers occurring during this time period compared to 11 per cent of crashes involving an impaired rider. Crashes involving an impaired pedestrian were also more likely to have occurred between 1600 hours and 0400 hours, following a similar pattern to that seen for impaired drivers. Figure 3.10 shows the percentages of crashes occurring as the result of alcohol impairment over the time groupings for these three types of road user by percentage.

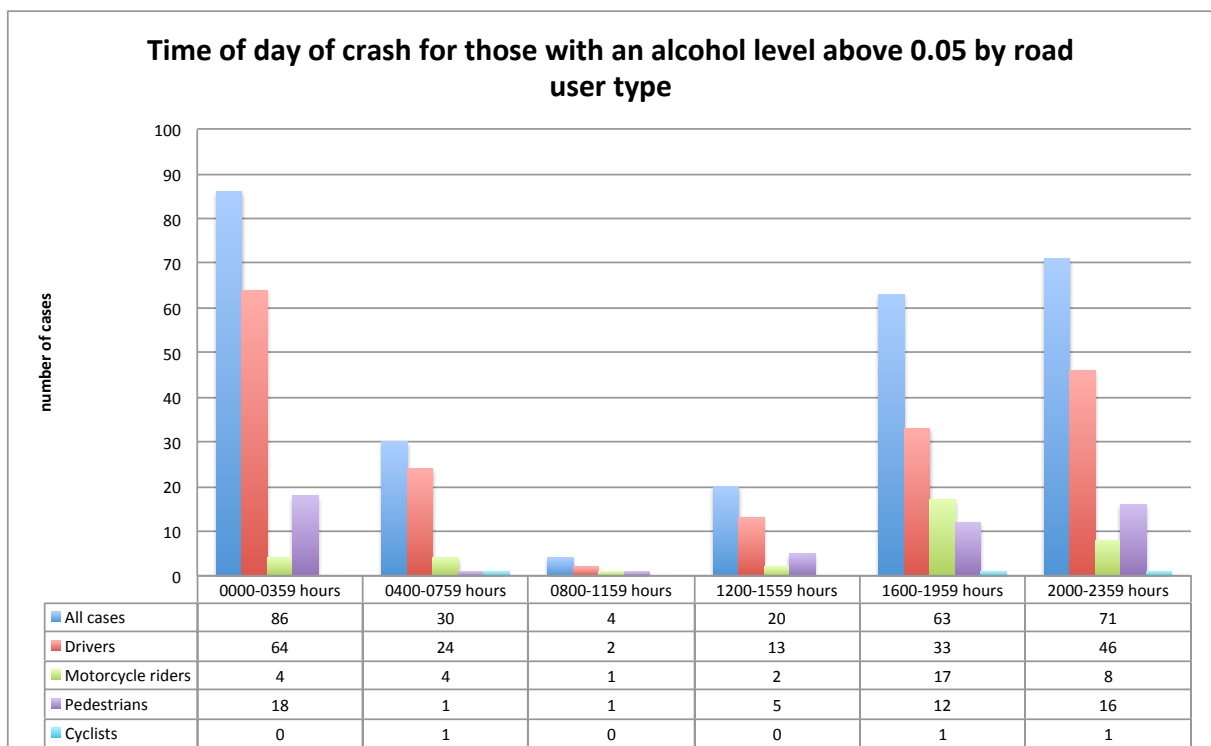


Figure 3.9
Time of day of crash involvement for those impaired by alcohol by road user type

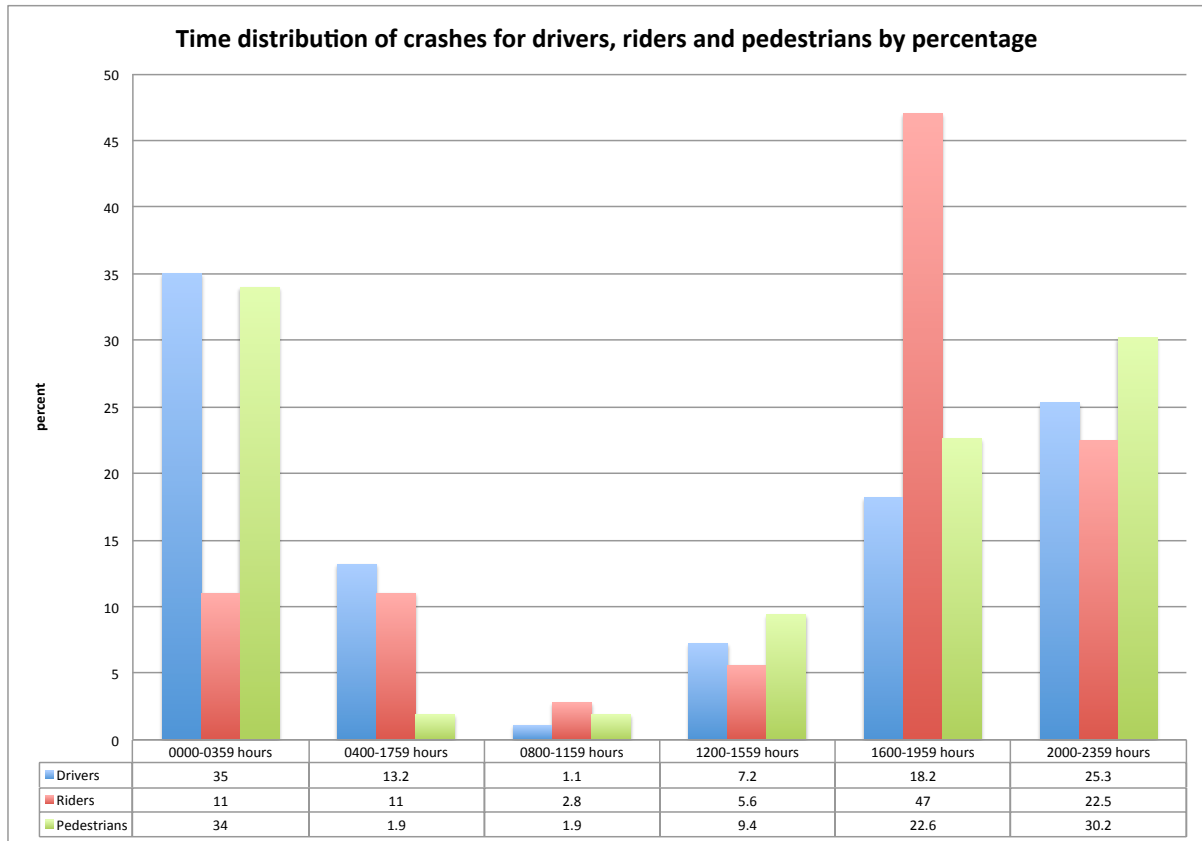


Figure 3.10
Time distributions for crashes involving impaired drivers, motorcycle riders and pedestrians

The levels of alcohol intoxication were found to differ over the times of day of the crash. Those with an alcohol level above 0.3 were more likely than other groups to be involved in crashes at earlier times of day, with 53 per cent of their crashes occurring between 1200 hours and 1959 hours; this compared to 29 per cent of those with an alcohol level between 0.1 and 0.25 for the same time period. Approximately one third of all crashes involving a road user with an alcohol level between 0.1 and 0.25 occurred between the 0000 hours and 0400 hours. Figure 3.11 shows the alcohol levels found across the various time spans.

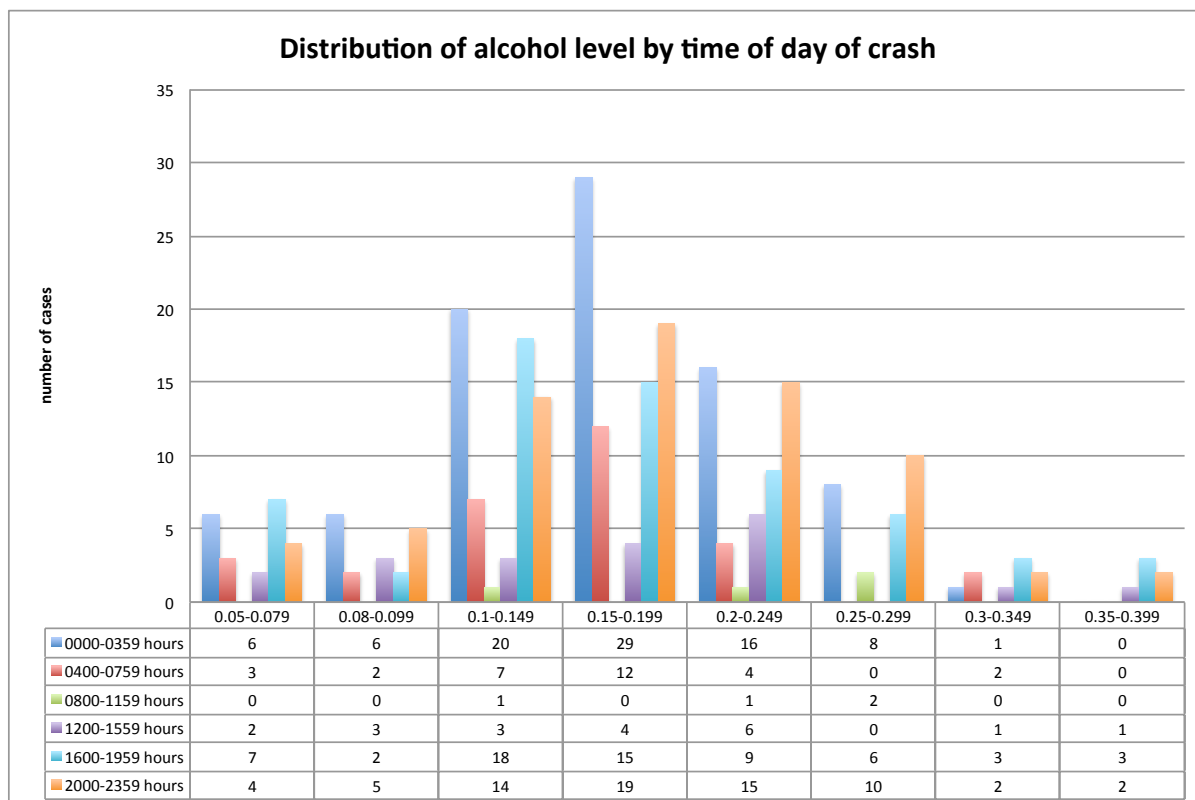


Figure 3.11
Distribution of alcohol levels found across the various time spans

3.2.2 Day of week of crash

Impaired drivers, motorcycle riders and pedestrians were found to be involved in crashes over all days of the week, generally increasing as the week progressed. Close to half (47%) of all those involved in a crash as the result of alcohol impairment were involved in that crash on the weekend. Figure 3.12 shows the day of week distribution for crashes involving impaired drivers, motorcycle riders and pedestrians by road user type.

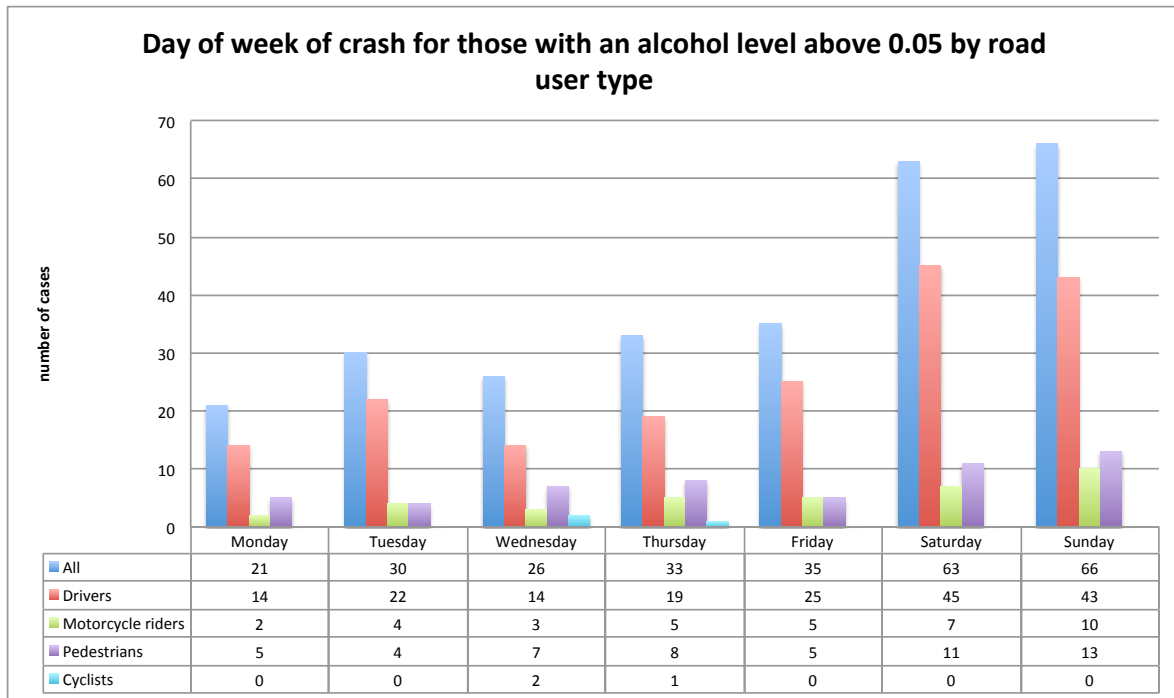


Figure 3.12
Day of week distribution for crashes involving impaired drivers, motorcycle riders and pedestrians

3.2.3 Location of crash

The locations where crashes occurred in the study were categorised into three groups: those occurring in the metropolitan area, those occurring in rural areas within a 100 kilometre radius of Adelaide and those occurring in rural areas greater than 100 kilometres of Adelaide. More than 56 per cent of the crashes in the study that involved a participant with an alcohol level above 0.05 occurred in the metropolitan area. This was particularly the case for pedestrians where it was found that more than 90 per cent of pedestrians who were impaired by alcohol were involved in a crash within the metropolitan area. A third of all impaired drivers and motorcycle riders had their crash in a rural area less than 100 kilometres from the metropolitan area. All alcohol impaired cyclists were involved in crashes within the metropolitan area. Figure 3.13 shows the distribution of crashes across the three identified locations by road user type.

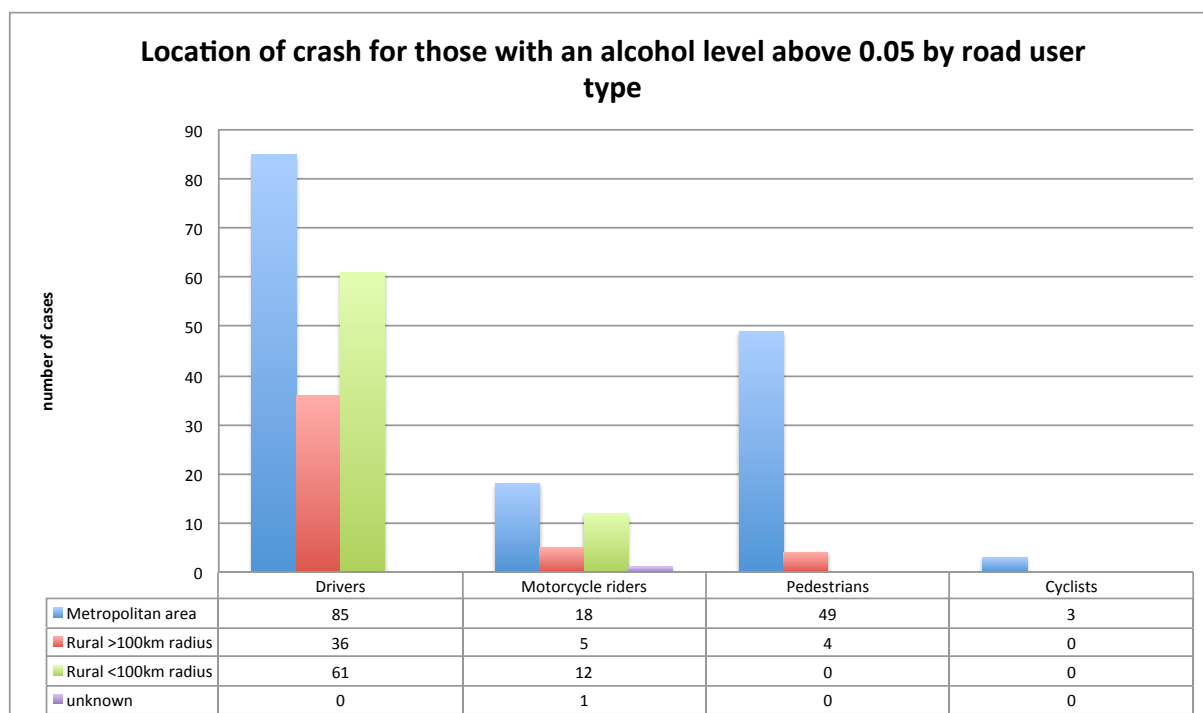


Figure 3.13
Distribution of crashes across the three locations by road user type

The proximity of the crash location to the drivers' and motorcycle riders' home residence was reviewed for those crashes occurring in rural areas. More than 85 per cent of the drivers and motorcycle riders involved in crashes in both rural environments were found to reside within easy travelling distance from the location of their crash. The remaining 15 per cent of cases generally involved a driver or motorcycle rider who was known to reside in the Adelaide metropolitan area.

The locations of crashes for pedestrians involved in metropolitan crashes were categorised into three distinct areas: those occurring either in or in close proximity to the Central Business District (CBD), those occurring on arterial roads and those occurring on minor local government roads. In more than 38 per cent of cases the pedestrian crash occurred in the CBD region. In two cases (4%) the pedestrian was involved in a crash on a local road, while all other metropolitan crashes involving a pedestrian occurred on major arterial roads (58%). Crashes involving alcohol impaired pedestrians were more likely to have occurred in a midblock section of a roadway (64%) compared to intersection sites (36%).

Pedestrian crashes occurring outside the CBD were reviewed for proximity of the crash to the pedestrians home residence. In all but five cases the pedestrian was found to reside within reasonable walking distance of the crash site. The pedestrian resided within ten kilometres of the crash site in four cases and there was one pedestrian who was identified as having no fixed address.

There were four crashes involving impaired pedestrians that occurred in rural areas; each of these occurred more than 100 kilometres from Adelaide. Three of these crashes occurred in major regional towns while the fourth crash occurred on a section of highway that was a considerable distance from a major town centre. In each of these four crashes the pedestrian was known to live locally.

3.2.4 Types of crashes involving an impaired driver or motorcycle rider

Single vehicle crashes were the most common crash type seen among drivers and motorcycle riders impaired by alcohol, with more than 88 per cent of drivers and 55 per cent of motorcycle riders involved in single vehicle crashes. A collision between the vehicle and a fixed object was the most common crash type found for drivers, with more than two thirds being involved in this type of crash. The second most common crash type for drivers was a single vehicle rollover, accounting for 25 per cent of crashes involving impaired drivers. Impaired motorcycle riders were close to four times more likely to be involved in a multiple vehicle collision compared to impaired drivers. Single vehicle crashes among impaired motorcycle riders were equally distributed between striking a fixed object or losing control of the motorcycle and impacting with the road surface. The types of crashes seen amongst impaired drivers and motorcycle riders by number of cases can be seen in Figure 3.14, while Figure 3.15 shows these by percentage.

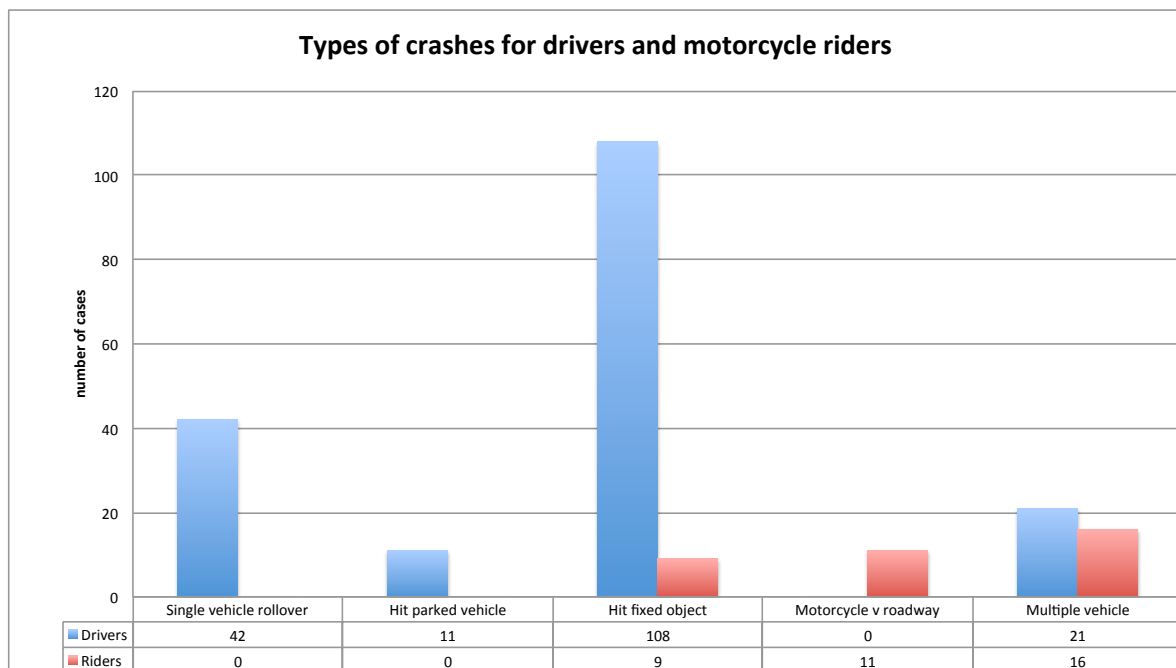


Figure 3.14
Types of crashes involving drivers and riders impaired by alcohol by number of cases

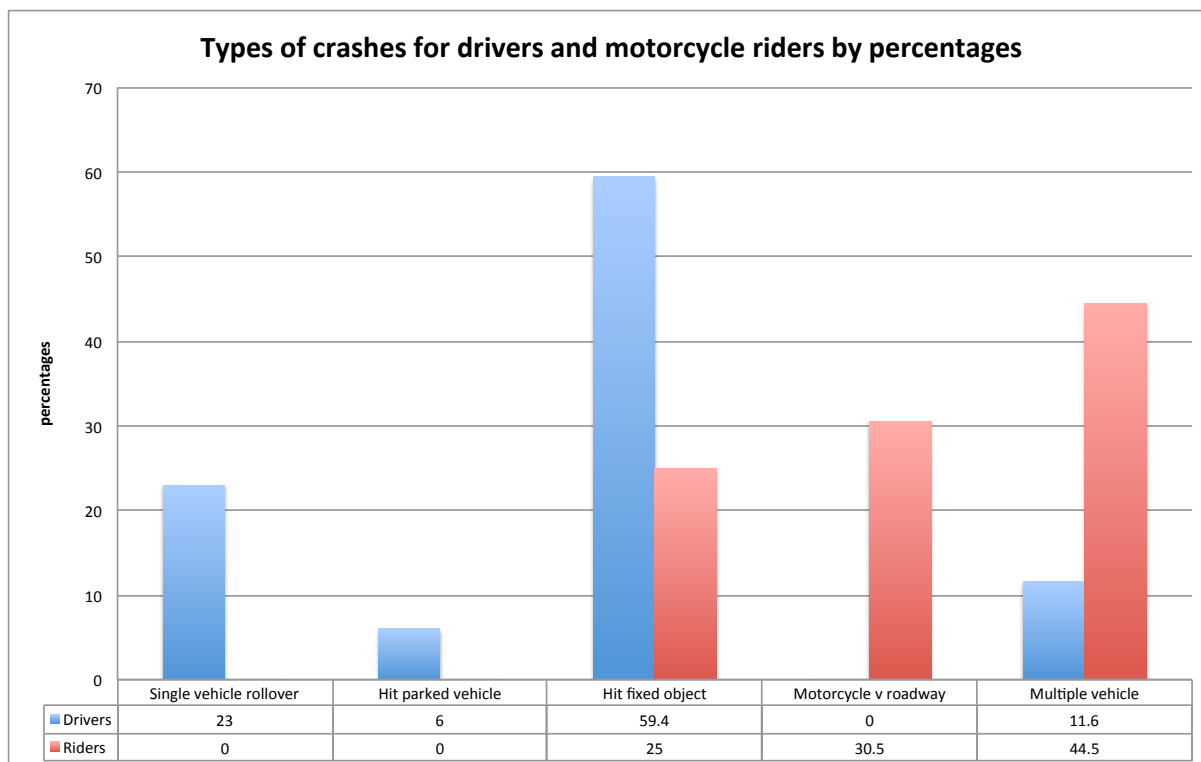


Figure 3.15
Types of crashes involving drivers and riders impaired by alcohol by percentage

3.2.5 Circumstances surrounding crash involvement

The cases in this study were reviewed for documented evidence that may shed light on the circumstances surrounding the drivers' or motorcycle riders' involvement in the crashes. This review included gathering information related to where the drinking took place and other information that might prove useful in understanding why the participant may have undertaken the driving task while impaired. In the large majority of cases there was limited information in the available data to draw any conclusions. The venue where the participant had been drinking prior to the crash was identified in only 16 cases; among these there were ten cases where the driver or motorcycle rider was known to be returning home after drinking in a pub or club. There were four cases where the participant was returning home from a party and one participant was known to have been returning home after drinking during the course of a dinner engagement. In four cases involving drivers, it was found that the driver had undertaken the driving task following an altercation with others. There were four other cases where the impaired driver or rider was known to be evading Police at the time of their crash. In one of these cases the participant was known to be being pursued as the result of stealing a vehicle, but the reasons why Police were involved for the remaining three cases were unknown. One important aspect was the high incidence of non-restraint and helmet use among those drivers and riders whom were impaired by alcohol.

3.2.6 Restraint and helmet use

Restraint and helmet use at the time of crash involvement was identified in medical records documentation; in particular this information was commonly included in the documentation recorded at the crash scene by the South Australian Ambulance Service (SAAS) and the MedStar medical retrieval personnel. Non-restraint or helmet use featured strongly amongst those drivers and motorcycle riders impaired by alcohol. There were 36 drivers who were confirmed as being

unrestrained at the time of their crash, accounting for close to 20 per cent of all impaired drivers. In a further 16 cases, or 9 per cent, it was thought that a restraint was not used. In 58 cases (32%) the restraint use was unknown. As a comparison, the incidence of non-restraint use found amongst those drivers who were not impaired by alcohol was 3 per cent, thus alcohol impaired drivers were at least six times more likely to be unrestrained than other drivers.

Seven motorcycle riders, or nearly 20 per cent of cases involving an alcohol impaired rider, were found to not be wearing a helmet at the time of the crash. Of those that were known to be wearing a helmet there was one case where the chin strap was found to have not been secured. There was one other case where the helmet was found to have been thrown from the rider at the time of the crash, however, there was no further information in this case to determine whether the helmet had been appropriately secured. Among the 36 motorcycle riders there were eight cases where the use or non-use of a helmet was not known. Non-use of a helmet for those riders in the study not impaired by alcohol was considerably lower (less than 1%) than the incidence found in impaired riders. Table 3.4 provides a breakdown of restraint and helmet use found amongst the alcohol impaired drivers and motorcycle riders. All three of the alcohol impaired cyclists in the study were found to be wearing a bicycle helmet at the time of crash involvement.

Table 3.4
Breakdown of restraint and helmet use among impaired drivers and motorcycle riders

Restraint/helmet	Driver	Rider	Total
Worn	72	21	93
Not worn	36	7	43
Thought not worn	16	0	16
Unknown	58	8	66
Total	182	36	218

3.2.7 Previous involvement in crashes as the result of alcohol

The records related to the 274 alcohol impaired road users identified in the study were reviewed for evidence of other alcohol related crash involvement. This review involved examination and linkage of the data found from three sources: the police records related to previous crashes, the DPTI licensing and infringement records and the Forensic Science records. The available data from the Forensic Science Centre was limited to the ten year period between 2000 and 2010. This review found 33 participants had been involved in at least one previous alcohol related crash, constituting more than 12 per cent of this group.

There were 26 impaired drivers and riders who were found to have been involved in at least one other crash as a result of alcohol intoxication, with four of these participants having a history of two other alcohol related crashes. In 24 of these cases the driver or rider was found to be involved in a previous crash as a driver, while in the remaining two cases the driver in the current study was found to have been involved in a previous crash as a pedestrian. The specific levels of alcohol at the time of these previous crashes were noted in 17 cases while the remaining were identified as DUI (driving under the influence) only. In those where a specific alcohol concentration was known the concentrations ranged between 0.05 - 0.4gm/100ml, the majority being between 0.1 and 0.2gm/100ml.

Five pedestrians were found to have been involved in a previous crash as a pedestrian with one of these having been involved in three separate pedestrian crashes prior to the crash in this study. There was one pedestrian who had been involved in a previous alcohol related crash as a driver. One cyclist had also been involved in a crash as a driver in the months leading to the crash within the study. In all but one of the previous alcohol related crashes for this group the participants blood alcohol

concentrations (BAC) at the time of the crash were noted to be above 0.1gm/100ml, with most being within the range of 0.2 to 0.35gm/100ml.

3.3 Licensing characteristics

3.3.1 Licence type at time of crash

Of the 218 drivers and motorcycle riders found to be impaired as the result of alcohol there were 203 known to hold a South Australian drivers licence at the time of the crash. Two drivers were known to hold an interstate licence. In thirteen cases the driver or motorcycle rider was found to be either unlicensed or the licence status was unable to be determined. Licensing information for the 203 drivers and motorcycle riders that were available were accessed utilising the TRUMPS database at the Department of Planning, Transport and Infrastructure.

Close to 71 per cent of the drivers and 73 per cent of the motorcycle riders held a full licence at the time of the crash or immediately prior to their licence disqualification. Drivers were found to hold a provisional or probationary licence in 24 per cent of the cases and riders 18 per cent. Just under 5 per cent of drivers and 6 per cent of motorcycle riders were known to hold a learners permit at the time of the crash. There were ten drivers and one motorcycle rider found to be disqualified from driving at the time of the crash in this study; these eleven cases are discussed in more detail in section (3.3.4). Table 3.5 provides details of licence status for the 203 drivers and riders where licensing information was available, this information includes the licence status at the time of disqualification for the ten drivers and one motorcyclist identified above.

Table 3.5
Licence status for impaired drivers and motorcycle riders holding a South Australian drivers licence

Licence status	Driver	Rider	Total
Full licence	121	24	145
Provision/Probation	41	6	47
Learner	8	2	10
Expired	-	1	1
Total	170	33	203

Those licence holders with a medical condition that has the potential to impact on driving performance are required to report that condition to the registration and licensing authority. Included among these conditions is alcohol dependence. There were 93 drivers and motorcycle riders in the study who were identified in the medical records as being alcohol dependent, however, this alcohol dependence status had been reported to the licensing authority in only one of these 93 cases.

3.3.2 Infringement history as the result of alcohol

Infringement histories for the 203 alcohol impaired drivers and motorcycle riders who held a South Australian licence were examined to determine the incidents of prior alcohol related offences among this group. A previous alcohol related offence was noted in 82 of these 203 licence holders, accruing 146 offences between them. Drivers were more likely than motorcycle riders to have had at least one alcohol infringement (39% of impaired drivers compared to 30.5% of impaired motorcycle riders). In 60 per cent of these cases the driver or rider had a history of one infringement each, however, there was one driver who was noted to have had nine previous alcohol infringements. Figure 3.16 shows the number of alcohol infringements found among this group by road user type.

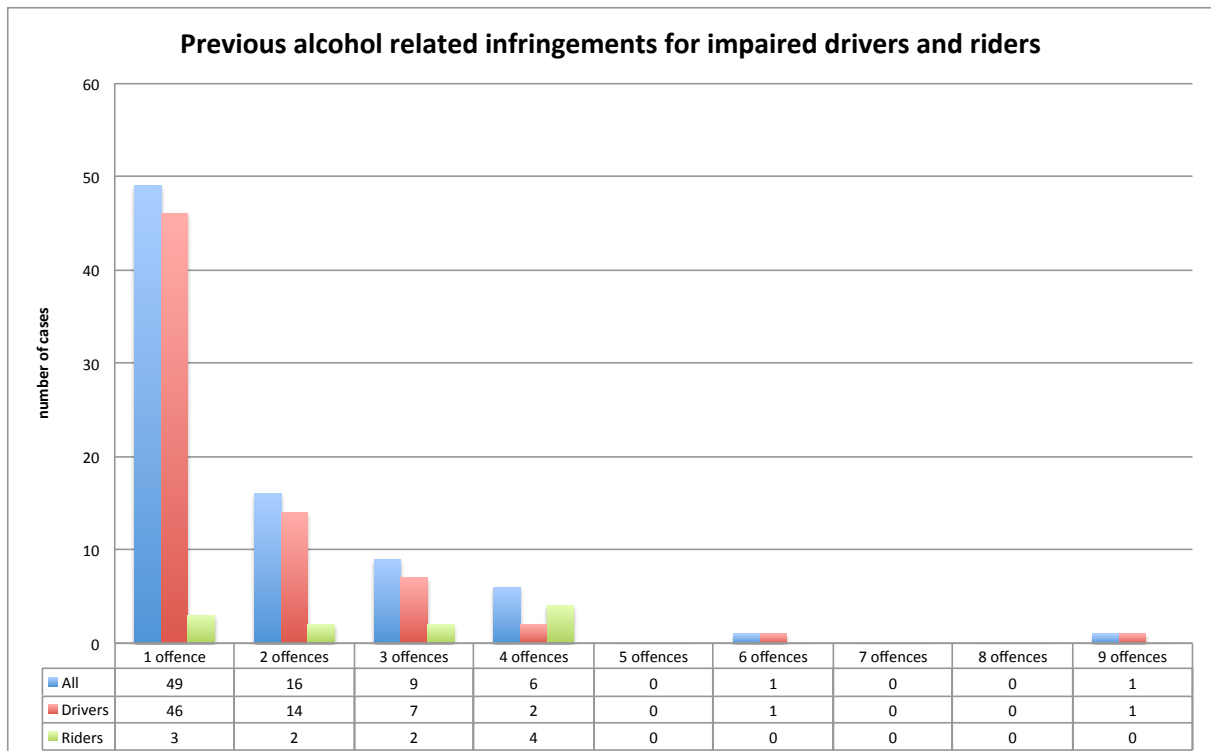


Figure 3.16
Previous alcohol related infringement histories for impaired drivers and motorcycle riders

The levels of alcohol or the description of the alcohol offence were noted for those with a previous history of an infringement related to an alcohol offence. As a general rule those who had more than one infringement tended to demonstrate a higher level of alcohol in their subsequent infringements, however, this was not always the case. Figure 3.17 shows the number of cases for each of the seven different alcohol related infringement types that were identified in the licence infringement records.

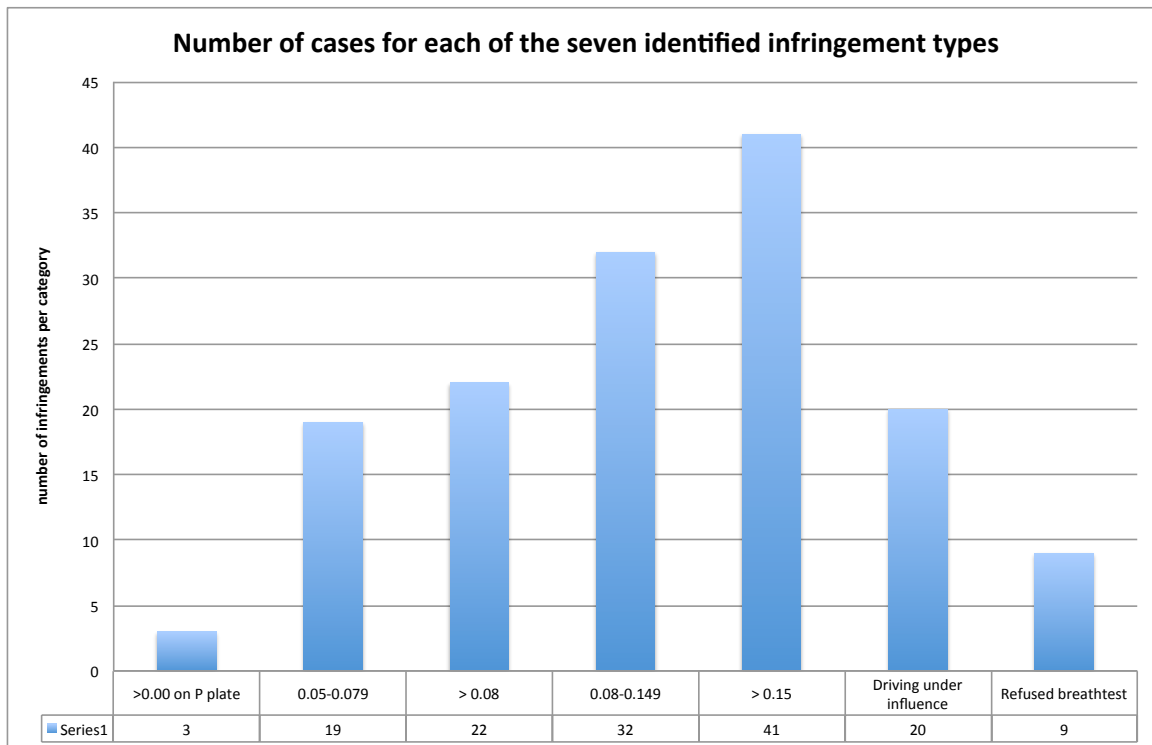


Figure 3.17
Distribution of alcohol infringements found in the 146 alcohol related offences accrued by the 82 drivers and riders with a prior alcohol related offence

3.3.3 Previous disqualification periods among impaired drivers and motorcycle riders

The incidence of previous licence disqualification, for any reason, amongst impaired drivers and motorcycle riders was found to be more than twice that of drivers and riders not impaired; with more than 45 per cent found to have had at least one disqualification prior to their involvement in this crash; this compares to 22 per cent for other licence holders in the study. A previous disqualification related to an alcohol offence was seen for 79 of the impaired drivers and riders, constituting 39 per cent of this group. In 90 cases the driver or rider had a period of disqualification as the result of demerit point loss for other offences; the most common being related to speeding. A history that included both an alcohol related disqualification(s) and disqualifications for other reasons was commonly observed amongst impaired drivers and riders. In close to 65 per cent of cases this previous history of disqualification, for what ever reason, was limited to one occurrence. However, more than 10 per cent of the drivers and riders had a history of eight or more periods of disqualification, two of whom had been disqualified on 17 separate occasions. Figure 3.18 shows the number of previous disqualifications amongst the impaired drivers and riders that occurred as a result of all types of offences, while Figure 3.19 shows the number of previous disqualifications as the result of alcohol offences only.

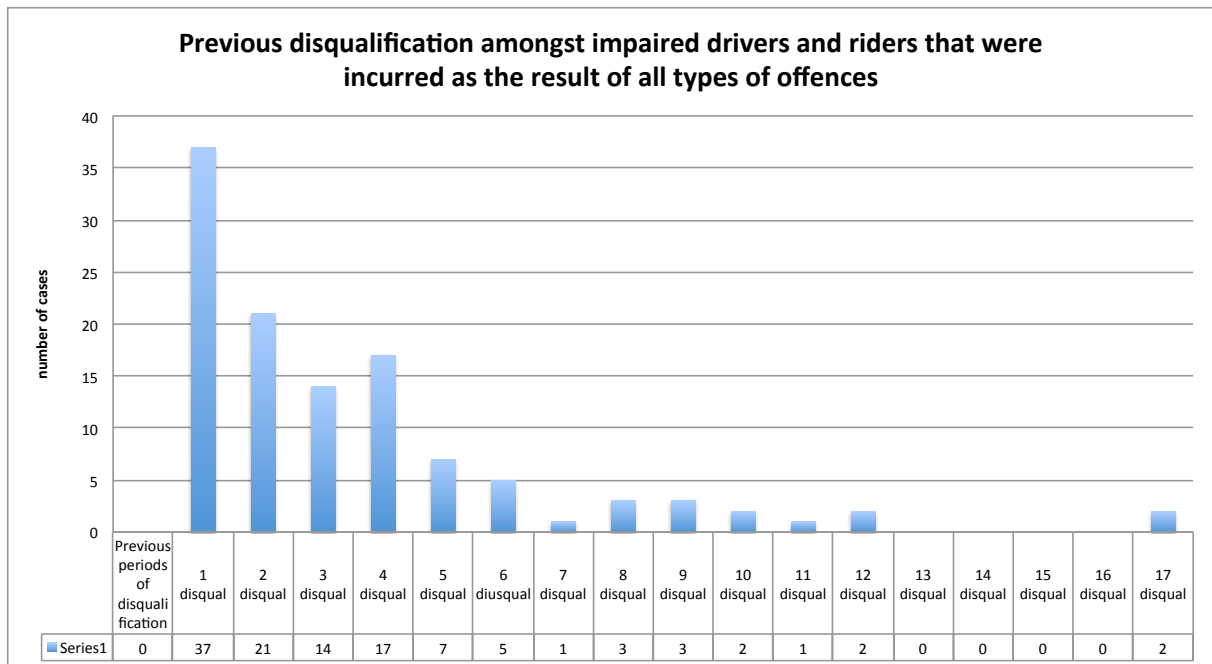


Figure 3.18
Number of previous periods of licence disqualification for all reasons found amongst impaired drivers and riders

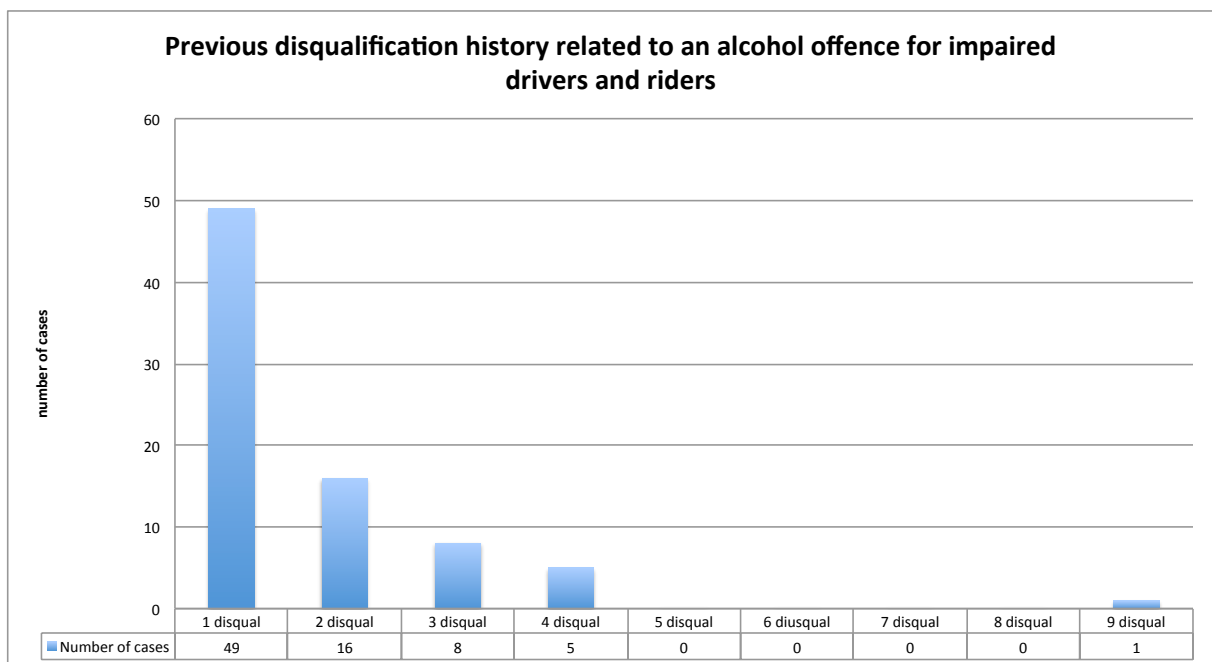


Figure 3.19
Number of previous periods of licence disqualification related to an alcohol offence amongst impaired drivers and riders

3.3.4 Evidence of driving during periods of disqualification

The licensing records held by DPTI for the impaired drivers and motorcycle riders in the study were reviewed for evidence of driving during periods of disqualification. This review is limited and does not necessarily reflect the true number of those who choose to drive whilst disqualified, but rather provides information for those who have been detected. There were eleven cases where a participant was found to be on a current licence disqualification at the time of being involved in the crash in this study, this group consisted of ten drivers and one motorcycle rider. In eight of these eleven cases the disqualification was in place as the result of a previous alcohol related offence while the remaining three had been disqualified for demerit point loss for other reasons.

In total there were 25 licence holders among the alcohol impaired group who had been detected driving during a period of disqualification on at least one occasion during their licensing history, constituting more than 12 per cent of this group of licence holders. In ten of these cases the licence holder had been detected driving during a period of disqualification on two or more occasions, one of whom had been detected driving on 17 separate occasions during one 12 month period of disqualification. In 40 per cent of cases the person detected as driving whilst disqualified was noted to be driving with an alcohol level of 0.05mg/100ml or above at the time of the detection, while the remaining 60 per cent of detections were not related to an alcohol offence.

The periods of disqualification varied among this group of 25 licence holders between six months and three years, with more than 60 per cent being disqualified for a six month period. The records related to these 25 licence holders were examined to determine whether there were any patterns related to when a driving whilst disqualified offence occurred; in particular: 1. were the licence holders more likely to drive during a more extensive period of disqualification? and 2. were they more likely to be driving toward the end of a disqualification period?. However, detections were found to have occurred across a broad time range and across all lengths of disqualification with no patterns observed. As an example, of the 15 licence holders who were undergoing a six month disqualification period there were three detected driving in each of the first three months of that disqualification. One participant was detected driving in the fourth month and there were five participants detected driving in the fifth month of the disqualification period.

4 Discussion and summary

This report has drawn together information from four discrete data sources related to road users involved in casualty crashes as a result of alcohol impairment. This linkage approach has provided a more holistic understanding of the multiple aspects surrounding the road users involvement in both the crash within the study and other alcohol impaired events; including an understanding of their previous infringement, disqualification and crash histories. This multi-faceted approach has provided some insights into the characteristics found amongst alcohol impaired road users. In many instances the characteristics were found to differ between the different road user types, in particular the characteristics of pedestrians were often different than those seen for drivers and motorcycle riders. Some of the more important findings in this analysis will be discussed.

Age of impaired road users

Close to 80 per cent of all impaired road users involved in the crashes in the study were found to be between 20 and 49 years of age, however, the age distributions were found to vary between the different road user types. In particular, drivers were more likely to be between the ages of 20 and 39 years while more than half of all motorcyclists were between the ages of 40 and 49 years. Pedestrians were more broadly distributed across all age groups with the youngest pedestrian being 15 years of age and the oldest being 79 years.

Time of day and alcohol level

The majority (57%) of crashes involving an impaired road user occurred between 2000 hours and 0400 hours. The prevalence of crash involvement over the times of day were found to differ when the type of road user and levels of alcohol were isolated. Close to half of all impaired motorcycle riders were involved in a crash between 1600 hours and 2000 hours, more than twice as prevalent at this time of day when compared to impaired drivers. Crashes involving a road user with higher levels of alcohol were also found to be more prevalent at earlier times of the day with more than 50 per cent of the road users with an alcohol level above 0.3 found to have been involved in a crash between 1200 hours and 1945 hours, compared to less than 30 per cent of road users who had an alcohol level of less than 0.25.

Pedestrians

More than 90 per cent of all impaired pedestrians in the study were involved in a crash within the metropolitan area, with most occurring on major arterial roads and at midblock locations. More than 43 per cent of all impaired pedestrians were found to be Indigenous Australians. Pedestrians were found to be the road user type most likely to be impaired as the result of alcohol at the time of their crash; with more than 25 per cent of pedestrians in the study found to be impaired as the result of alcohol compared to 21.5 per cent of drivers and less than 10 per cent of motorcycle riders. Given that only 50 per cent of pedestrians underwent mandatory testing for alcohol, this figure is expected to be conservative. Of the pedestrians that were tested for alcohol it was found that more than 55% had an alcohol reading that was 0.05 or more. Pedestrians were also more likely than other road user types to have higher alcohol levels; for example more than 54 per cent of the impaired pedestrian group had an alcohol level that was greater than 0.2, 17 per cent of whom had an alcohol level greater than 0.3. This compares with drivers where 27 per cent were found to have an alcohol level greater than 0.2, only 3 per cent of whom had a level above 0.3.

Drivers and motorcycle riders

Close to 90 per cent of all impaired drivers and motorcycle riders were found to have an alcohol level that was above 0.1, with the majority (55%) found to have an alcohol level between 0.1 and 0.199. Crashes involving impaired drivers and motorcycle riders occurred in all three location categories. Drivers and riders were generally found to live within a reasonable travelling distance from where their crashes occurred. Single vehicle crashes were the most common crash type seen for both road user types but this was particularly the case for drivers, where 88 per cent of their crashes were single vehicle crashes that involved striking a fixed object or a single vehicle rollover. Non-restraint or non-helmet use was a common feature of crashes involving impaired drivers and motorcycle riders with close to 20 per cent found to not be wearing a restraint or helmet at the time of the crash; this compares with 3 per cent of drivers and less than 1 per cent of motorcycle riders who were not impaired by alcohol.

Indigenous Australians

Indigenous Australians were over-represented among alcohol impaired road users, with more than 54 per cent of all participants identified as Indigenous Australians found to be impaired at the time of the crash. While Indigenous Australians made up 3 per cent of those crash involved participants in the study overall, they were found to be involved in more than 9 per cent of all crashes involving an impaired road user. The involvement of alcohol in the crash for Indigenous road users was particularly noted amongst the pedestrian group where 15 of the 23 pedestrians who were identified as being Indigenous found to have an objective alcohol reading above 0.05. In addition to this, the medical record documentation provided support for the notion that all but one of the remaining eight Indigenous pedestrians was intoxicated at the time of the crash. Due to the lack of an objective alcohol reading, these seven pedestrians were not included in any of the analyses of impaired participants.

Alcohol dependence

Alcohol dependence was identified as a pre-existing condition for 146 of the road users, representing close to 10 per cent of all participants in the study; this compares with the national average of 3.5 per cent [12]. Half of the participants identified as being alcohol dependent were found to be impaired as the result of alcohol at the time of the crash. Those impaired road users who were identified as being alcohol dependent were more likely than other impaired road users to have a alcohol level within the higher limits, with more than 40 per cent of the group identified as alcohol dependent found to have an alcohol level that was 0.3 or above. There were 93 drivers and motorcycle riders in the study who were identified in the medical records as being alcohol dependent, however, this alcohol dependence status had been reported to the licensing authority in only one of these 93 cases.

Previous evidence of impairment in crashes and infringements

Close to 40 per cent of the impaired drivers and motorcycle riders were found to have had at least one previous infringement related to a drink driving offence. In the majority of these cases (60%), the participants previous drink driving offence history was limited to one offence, however, 20 per cent had an alcohol offence rate that included three or more previous alcohol related infringements, one of whom had nine. There were 33 impaired road users who were identified as being involved in at least one previously reported crash where alcohol was identified as a contributing factor, constituting more than 12 per cent of this group. Among them were four drivers and riders who had been involved in two previous alcohol related crashes and one pedestrian who was known to have been involved in an alcohol related crash as a pedestrian on three separate occasions.

Previous licence disqualifications and compliance

Licensed drivers and riders who were found to be impaired in this study were found to be twice as likely to have had a previous period of licence disqualification than those licence holders that were not impaired. These disqualification periods were noted to be as a result of an alcohol offence or as the result of demerit point loss. Multiple disqualifications that occurred as the result of both an alcohol offence and as the result of demerit point loss unrelated to alcohol were frequently observed in this group. Determining compliance to an imposed disqualification period is difficult to determine. However, it was noted that 12 per cent of those impaired participants in this study were found to have been detected driving whilst undergoing a licence disqualification period on at least one occasion, including eleven drivers and riders who were identified as being disqualified from driving at the time of involvement in the crash in this study. Detections for driving whilst disqualified were noted across all lengths of disqualification periods with no pattern detected.

5 Study limitations

The identification of those involved in a crash as the result of alcohol impairment relied heavily on the objective blood alcohol concentration data that was sourced from the South Australian Forensic Science Centre. During the data collection process from this source it was found that 50 per cent of the pedestrian group had not undergone testing. This was particularly noted for those pedestrians involved in crashes from mid 2009 onward. As pedestrians were more likely than other road users to be both alcohol dependent and impaired as a result of alcohol at the time of crash involvement, this missing data is likely to have resulted in an under-representation of the prevalence of alcohol impairment for participants in this study, particularly amongst pedestrians.

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Appendix A – Characteristics of the sample group

Data sources

Summary of successful matching of the multidisciplinary data sources

Data matching for the 1490 medical records that were available and meeting the selection criteria of the study was undertaken. Of the 1490 cases that met the inclusion criteria, 1406 were able to be matched with SAPOL crash records, thus just under 95 per cent matching of cases was achieved. The study involved 1222 drivers and motorcycle riders. The records for 1159 of these drivers and riders were able to be matched with licensing records within the TRUMPS database, therefore 95 per cent matching was achieved. As noted earlier, there were 286 cases where a forensic blood result could not be found, thus 81 per cent matching was achieved from this source. Table A.1 provides a summary of the successful linkage of data from the three other sources.

Table A.1
Summary of matching from the multidisciplinary sources

	SAPOL crash data	DPTI licensing data	FSC alcohol/drug data
number of cases	1490	1222 drivers/riders only	1490
unable to be matched	84	63	286
number available	1406	1159	1204
percentage matched	95%	95%	81%

Person characteristics

Road user type

Participants in the study were identified by road user type. There were 845 drivers of cars or trucks, accounting for 56.7 per cent of the study group. There were 377 motorcycle riders who accounted for 25.3 per cent, 207 pedestrians, 13.9 per cent and 61 cyclists, 4.1 per cent. There was one motorised mobility scooter rider involved in the study.

Age and sex distribution

The age and sex distribution for the study sample can be seen in Figure A.1. In 59.4 per cent of the crashes in the study the active participant was aged between 20 and 50 years. Overall males were found to be involved as active participants in 70 per cent of the crashes while women made up around 30 per cent. These percentages were consistent for those participants under the age of 80 years, although women were involved in less than 25 per cent of the crashes in the 30-50 year age groupings. The sex distributions for those over 80 years of age were found to be more evenly distributed, with female participants involved in more than 43 per cent of the crashes for this age group.

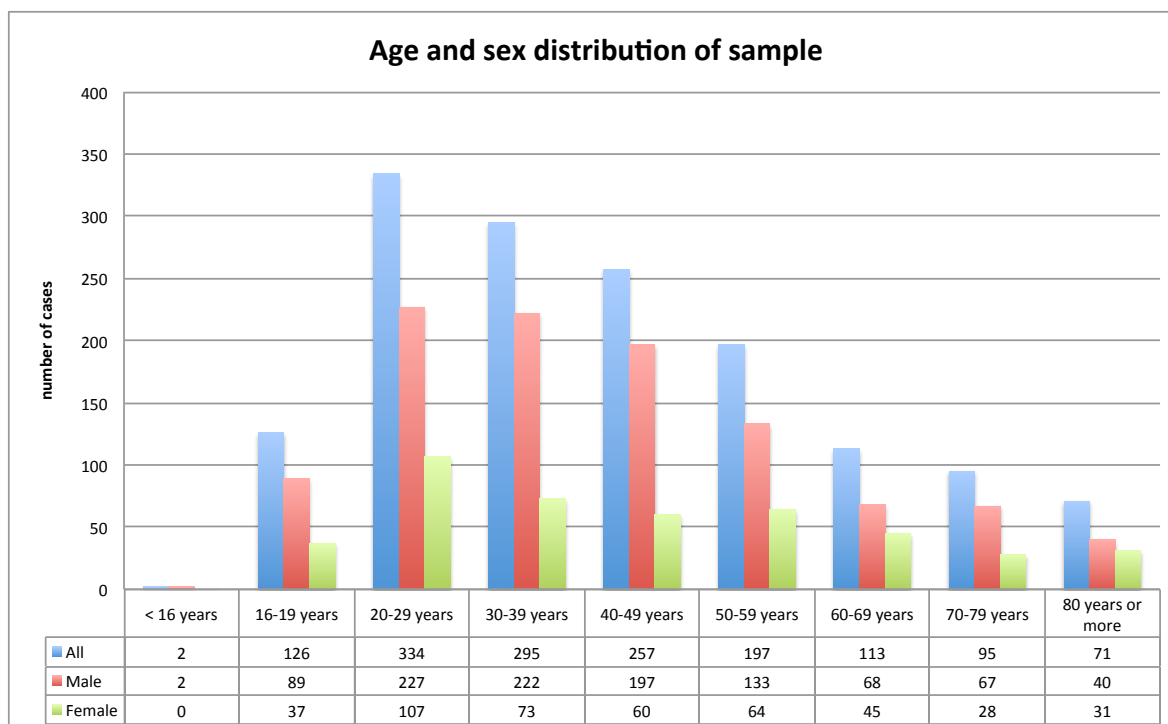


Figure A.1
Age and sex distribution for sample

Indigenous Australians

The medical records documentation provided information regarding country of birth and ethnicity. Included in this information was identification of those participants who were Indigenous Australians. There were 46 participants in the study who were identified as Indigenous Australians, constituting just over 3 per cent of the active participants in the study. This group consisted of 23 pedestrians, 19 drivers and four motorcycle riders.

Alcohol dependence

Information related to alcohol dependence as a pre-existing medical condition was sourced from the hospital medical records. Alcohol dependence was identified as a pre-existing medical condition for 146 of the 1490 participants in the study or 9.8 per cent of all participants. This compares with 3.5 per cent for the general population [12].

The incidence of alcohol dependence was found to be highest amongst the pedestrians in this group, with 48 cases or 23.2 per cent of all pedestrians in the study identified in the medical record documentation to be alcohol dependent. The incidence of alcohol dependence was found to be much lower in drivers (68 cases or 8% of all drivers), motorcyclists (25 cases or 6.6% of all riders) and cyclists (5 cases or 8.2%). Males were more likely than females to be identified as alcohol dependent, with males constituting more than 75 per cent of this group.

The incidence of alcohol dependence was found to be higher among those participants who were identified as being Indigenous Australians when compared with those participants who were not Indigenous. Of the 46 Indigenous participants 19, or 41.3 per cent, were identified as alcohol dependence at the time of crash involvement. This compares with less than 8.8 per cent of those participants who were not identified as Indigenous.

More than 73 per cent of participants identified as alcohol dependent were between the ages of 20 and 49 years. Pedestrians with alcohol dependence were seen across all age groups but were more likely than other road user groups to be 50 years of age or more (27.8%), compared with drivers (23.5%) and motorcycle riders (12%). Figure A.2 shows the age and sex distribution of those with an established diagnosis of alcohol dependence at the time of their crash involvement, while Figure A.3 shows the age distribution of those with alcohol dependence by road user type.

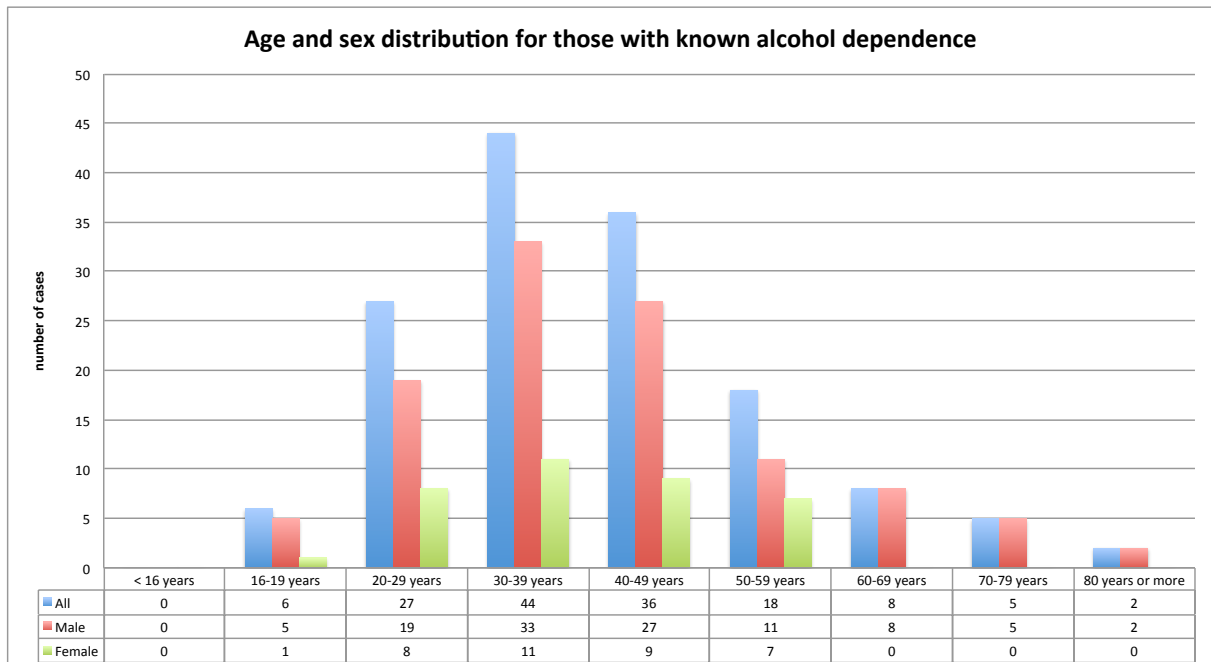


Figure A.2
Age and sex distribution for those with known alcohol dependence

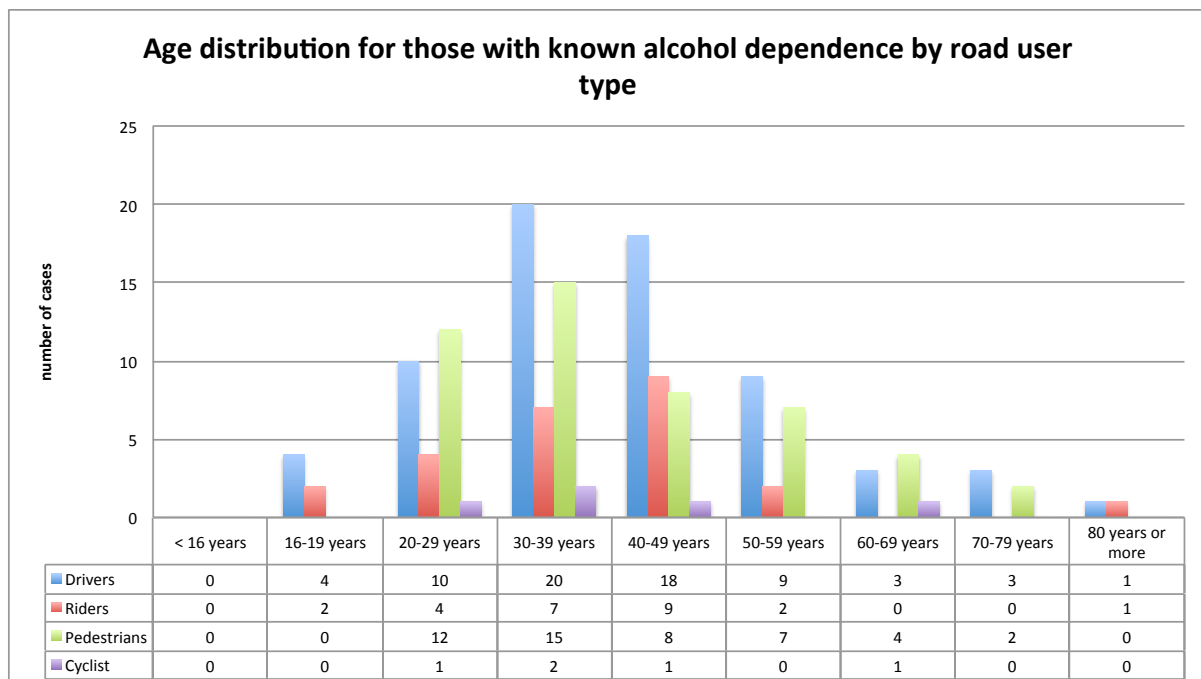


Figure A.3
Age distribution of those with alcohol dependence by road user type

Health outcomes as the result of crash involvement

In 21 per cent of cases the participant was hospitalised at the Royal Adelaide Hospital for less than 24 hours, with more than 60 per cent of all those involved in the study being hospitalised for five days or less. Close to 6 per cent of cases resulted in the active participant being hospitalised for 35 days or more. In 45 cases (3%), the active participant who presented to hospital as a result of injuries incurred in the crash, died as a result of those injuries. More than 37 per cent of these participants survived for less than 24 hours following their crash involvement, with more than 22 per cent occurring within the first twelve hours. Fatal outcomes were seen among drivers (53.5% of all fatalities), motorcycle riders (22%) and pedestrians (24.5%). There were no cyclists involved in the study who were fatally injured.

In a further 22 cases, all involving drivers, the driver was found to have survived the crash but others were fatally injured. These 22 cases consist of 17 cases where at least one passenger within the vehicle had a fatal outcome, resulting in 27 passenger deaths; and five cases where the driver in the study survived but a pedestrian or an occupant of another vehicle was fatally injured.

Crash Characteristics

Time of day and day of week of crash

The time of day and day of week of crashes in the study sample can be seen in Figure A.4 and Figure A.5. Crashes in the study occurred across all hours of the day and days of week. Crashes tended to increase as the day progressed and generally increased toward the end of the week, including week-ends.

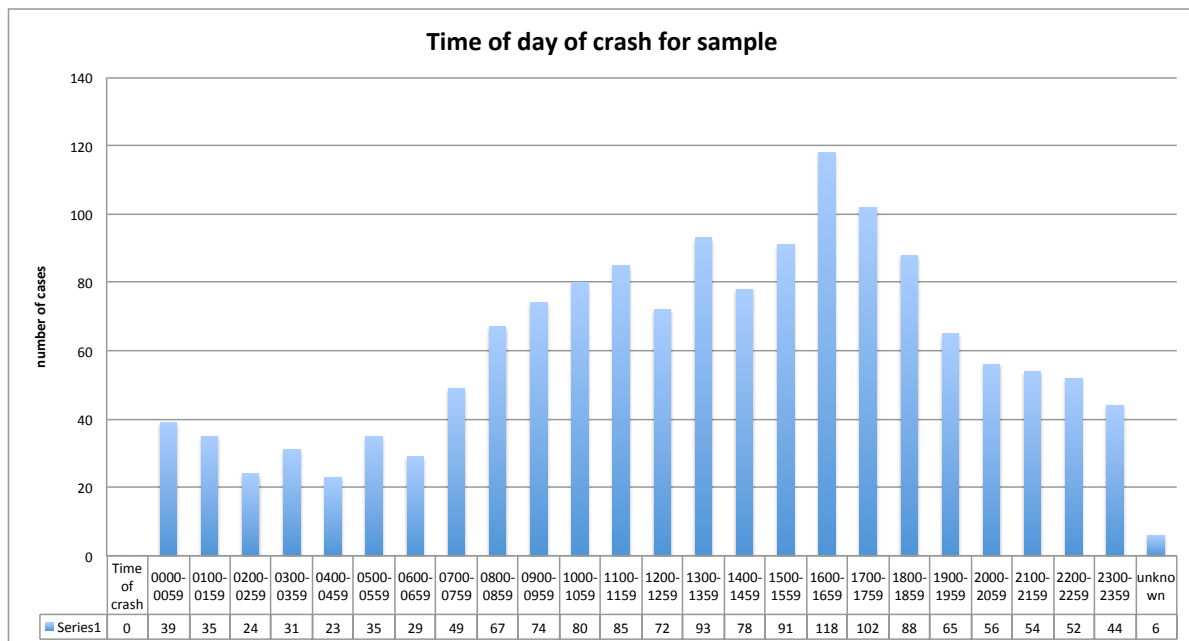


Figure A.4
Time of day of crash for sample

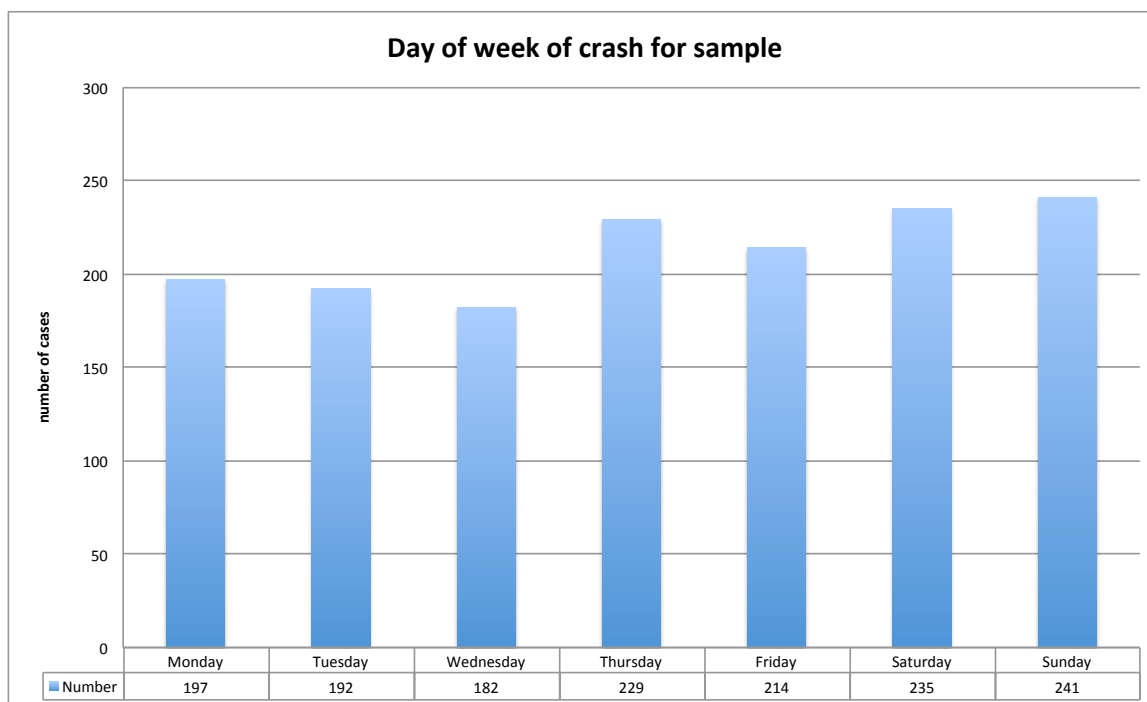


Figure A.5
Day of week of crash for sample

Location of crash

Crashes in the study were categorised by three distinct locations: metropolitan area, rural areas within a 100 kilometre radius of Adelaide and those occurring in areas greater than 100 kilometres from Adelaide. Crashes in both rural environments included regional towns as well as high speed rural roads. Those occurring in the metropolitan area accounted for approximately 57 per cent of all crashes with 27 per cent occurring within 100 kilometres of Adelaide and the remaining 16 per cent occurring in areas beyond the 100 kilometre radius. Pedestrian and cyclist crashes featured strongly in the metropolitan area and less so in rural areas beyond 100 kilometres of Adelaide. Figure A.6 shows the location distribution by road user type.

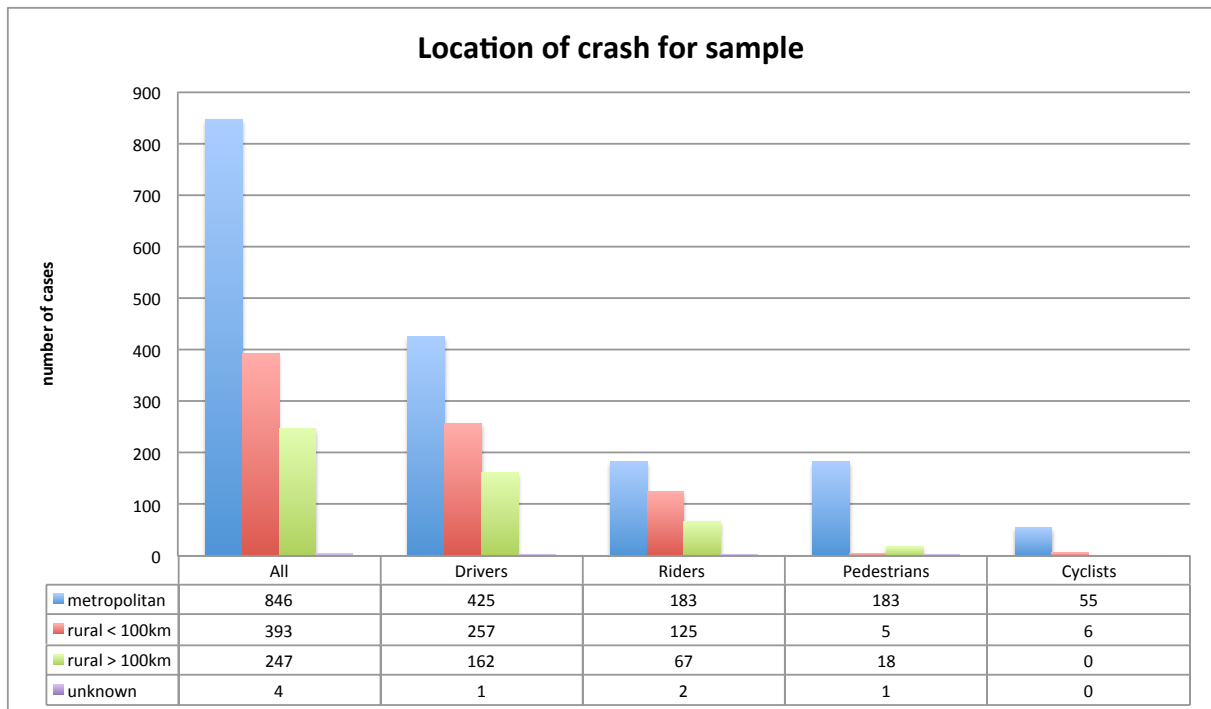


Figure A.6
Location of crash for sample

Type of crash

The types of crashes were categorised under ten broad headings. The distribution of crashes by crash type can be seen in Figure A.7. The most common crash types for drivers and motorcycle riders related to hitting a fixed object or collisions between two or more motorised vehicles, accounting for more than 60 per cent of all crashes in the study. Note that there were a total of 208 pedestrian crashes in the study. This includes all pedestrian cases where the pedestrian presented to the Royal Adelaide Hospital (207 cases) plus one pedestrian crash where the pedestrian died at scene and the driver presented to the Royal Adelaide Hospital as a result of injuries incurred in the crash.

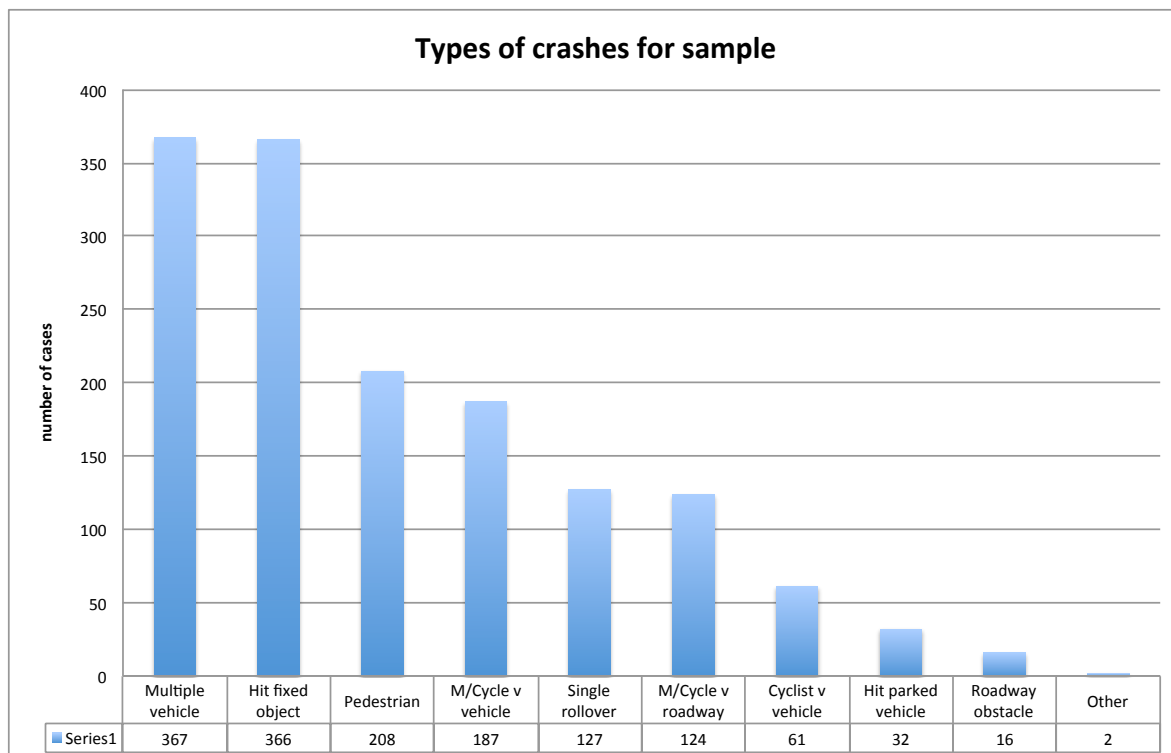


Figure A.7
Crash types seen across sample

Crash history

The TARS database contains information related to the previous crash histories of drivers and motorcycle riders. The data provides details of the date, time and location of the previous crashes as well as a brief account of the crash events. The use of this data for any analysis has inherent limitations. Firstly, the data source is based on driver licence numbers and is, therefore, a source of information for drivers and motorcycle riders only as it is unable to identify the previous crash involvement for pedestrians, cyclists or the mobility scooter rider. Secondly, the data is limited to crashes occurring in South Australia and so information related to those drivers and riders with interstate or international licences or those who have been involved in crashes outside South Australia are not included in the available data. Thirdly, and importantly, the data is confounded by a lack of corresponding information related to length of driving experience and exposure detail. These limitations need to be considered when interpreting the presented data. Given these limitations, close to 50 per cent of the drivers and motorcycle riders in the study had no previous crash history. Fewer than 6 per cent of drivers and motorcycle riders were involved in six or more crashes, with three participants having a recorded crash history of ten or more crashes. Figure A.8 provides a breakdown of reported crashes, including the crash in this study, for drivers and motorcycle riders.

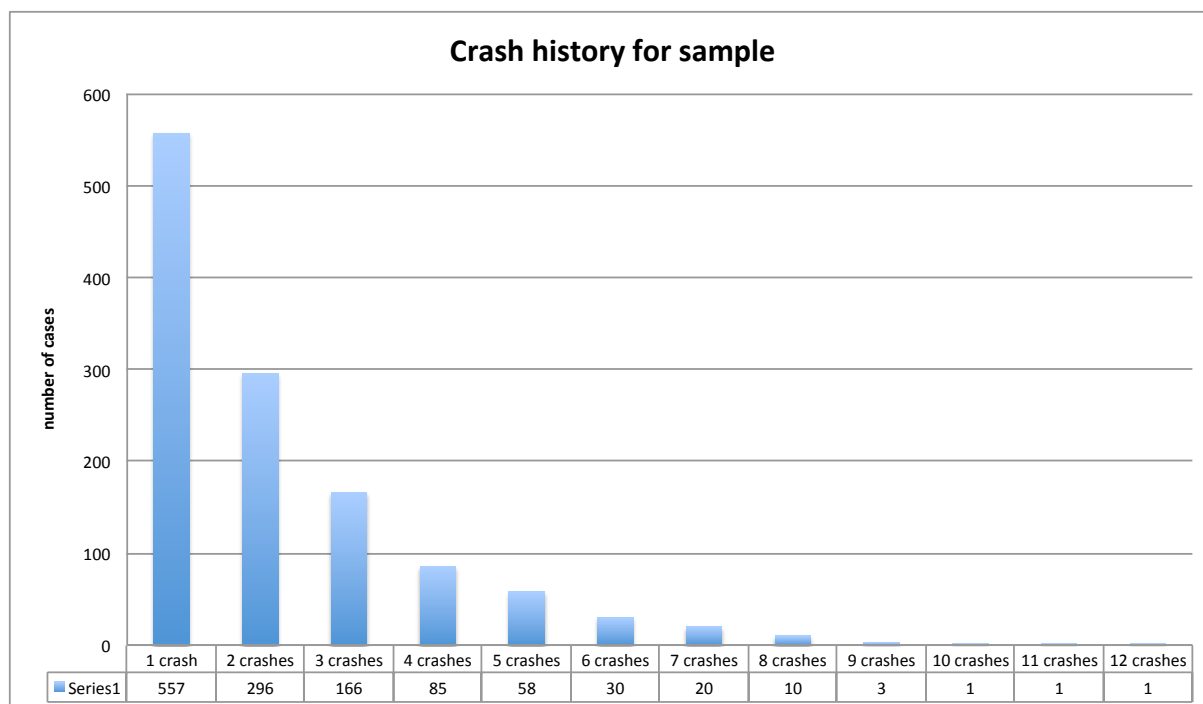


Figure A.8
Crash history for drivers and motorcycle riders

Licence characteristics

Licence type at time of crash

Licence type held at the time of crash involvement was unknown for those drivers and motorcycle riders travelling on interstate or international licences. From the cases where licensing details were able to be matched, 79 per cent of the drivers and motorcycle riders were travelling on a full licence at the time of the crash, with 15 per cent holding a provisional or probationary licence. There were fewer than 2.5 per cent of drivers and motorcycle riders who were unlicensed or disqualified from driving at the time of the crash. Table A.2 shows the breakdowns of licence type found among drivers and motorcycle riders by road user type.

Table A.2
Licence status for drivers and riders at time of crash

Type of licence	Drivers	Motorcycle riders	Total
Full licence	630	289	919
Provisional	138	46	184
Learner	17	11	28
Disqualified	5	1	6
Unlicensed	15	7	22
Unknown	40	23	63

Infringement history

The infringement histories for the 1159 matched cases were examined by type and number. As was the case with crash experience, this information is confounded by a lack of data related to exposure detail and therefore should be viewed with caution. The most common infringement incurred by drivers and motorcycle riders related to speeding offences, with more than 69 per cent of all drivers and riders found to have had at least one previous speeding infringement. The number of infringements related to speeding per person was also much higher than for other infringement types with 18.5 per cent of the drivers and riders having a history of six or more speeding infringements; the worst 1 per cent having a history of more than 25 infringements each.

A previous history of drink driving offences was found for 22.5 per cent of the drivers and motorcycle riders in the study. In more than 62 per cent of this group their drink driving infringement history was limited to one offence; however, there were eight participants who had a history of five or more infringements related to drink driving. Similarly, 25 per cent of participants had one or more infringements related to disobeying a sign or traffic signal. In more than 70 per cent of these cases the participant's infringement history related to this was limited to one infringement.

Infringements for non-usage of a seatbelt were lower than other infringement types, with fewer than 15 per cent of drivers and motorcycle riders having an infringement related to this. More than 33 per cent of all drivers and 46 per cent of all motorcycle riders had had their licence suspended or cancelled due to driving offences at some time during their licensing history. Figure A.9 shows the number of infringements for the 1159 drivers and motorcycle riders in the study that were able to be matched with licensing data.

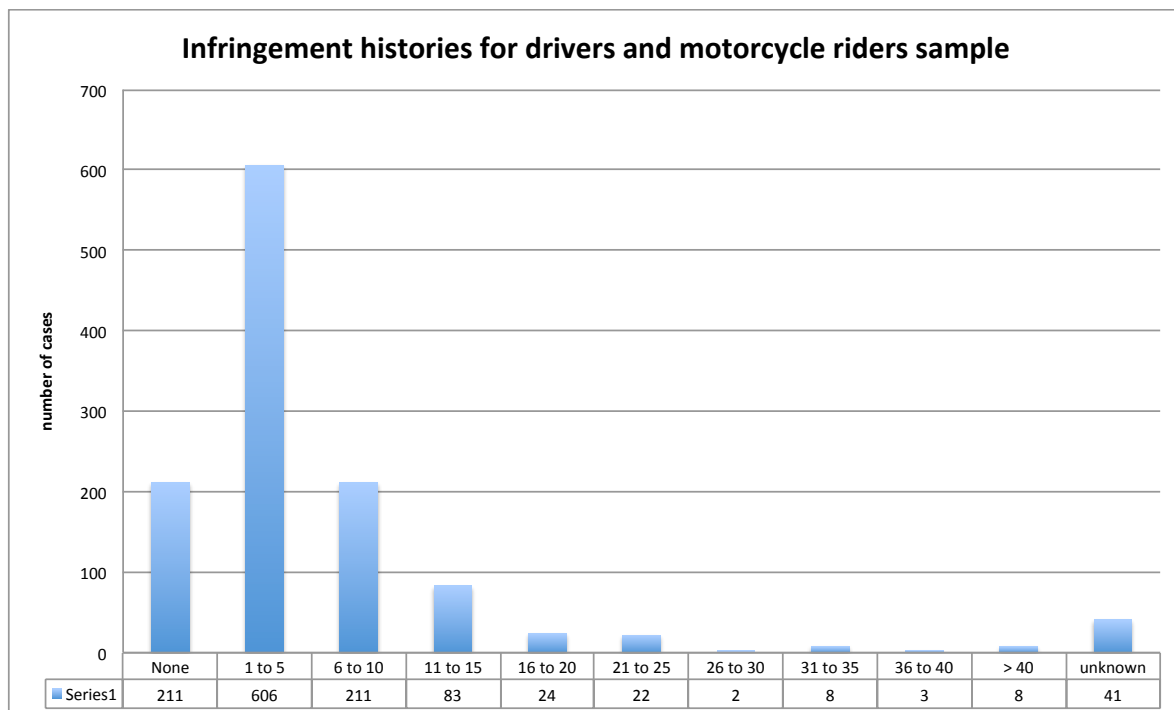


Figure A.9
Infringement history for drivers and motorcycle riders in sample