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BICYCLE CRASHES IN WESTERN AUSTRALIA, 1985-86

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Abstract
A survey of bicycle crashes in Western Australia was carried out in 1985/86. The survey gathered questionnaires from 781 crash participants (cyclists and motorists) contacted through the Police Department and hospitals in WA, representing about 40% of reported bicycle crashes or those resulting in hospital treatment. Analysis of the questionnaires reveals that crashes occur mainly at times of heavy traffic, and during daylight. Three quarters of cyclist crash victims are male, and high proportions are teenagers on school trips and young adults on work trips. Most bicycle/motor vehicle crashes occur at road intersections or where cyclists or drivers enter a road. Visibility obstructions are a significant factor in the latter. Injuries to limbs are the most common, followed by head injuries. Few respondents wore safety helmets, so their effectiveness in reducing head injury could not be assessed. Recommendations are made on initiatives to improve cycling safety (in conjunction with those in the Perth, Mandurah and Bunbury Bikeplans), and on improving the crash survey method and questionnaire for repeat studies in future years.

KEYWORDS: Bicycle, Crash, Safety, Bikeplan, Traffic, Safety Helmets, Injuries

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BICYCLE CRASHES IN WESTERN AUSTRALIA 1985-86

FORS ROAD SAFETY RESEARCH PROJECT

REPORT BY

TRAVERS MORGAN PTY LTD

FOR

STATE BICYCLE COMMITTEE
BICYCLE MANAGEMENT TEAM:
BIKEWEST

SEPTEMBER 1987

BICYCLE CRASHES IN WESTERN AUSTRALIA, 1985/86

REPORT ON DATA ANALYSIS

TABLE OF CONTENTS

Page

Page

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EXECUTIVE SUMMARY

This is the report of a survey of bicycle crashes in Western Australia over a twelve month period in 1985/86. The survey was designed and executed by the former Bikeplan Study Team, and funded jointly by the WA Department of Local Government (on behalf of the State Bicycle Policy Committee) and the Federal Office of Road Safety.

The survey was carried out with the help of the Police and Health Departments in WA, who distributed the Bikeplan Team's questionnaires to victims of bicycle crashes reported to the police, or whose injuries required hospital treatment. Motorists involved in reported bicycle/motor vehicle crashes were also sent questionnaires. Before being disbanded late in 1986, the Bikeplan Team received and processed the responses ready for analysis. Consultants Travers Morgan Pty Ltd were subsequently appointed to carry out the analysis and to write the report.

A total of 831 responses were received, giving data on 781 separate crashes. The overall response rates from the targetted crash types are assessed **at over 40% for cyclists**, and just under 40% for motorists. However the survey could not sample unreported incidents unless they resulted in hospital treatment, so a large number of bicycle crashes were not surveyed.

Principal findings from the analysis are:

- Crash occurrence is closely linked to the periods of heaviest traffic, and hence the degree of exposure to risk. 90% of crashes occur in daylight.

  Nearly three-quarters of cyclists in crashes are males.

  High proportions of crashes occur to teenagers on school trips and those in their twenties and thirties on work trips.

- Around two-thirds of cyclists were describing their first crash for three years. It appears that motorists have a worse crash record than cyclists in the survey.

  Only 10% of cyclists were using helmets or safety clothes; their effect on crash occurrence and injuries cannot be assessed with certainty.

- Only a small number of bicycles in the survey had defects at the time of their crashes, but the largest group of these had defective brakes.

- Bicycle/motor vehicle crashes occur most at road intersections or where cyclists or motorists are entering a road (such as from a driveway or path). Obstructions to visibility are a significant factor in the latter.

- Injuries to limbs are the most frequent, followed by head injuries. Injury severity may be slightly reduced by wearing trousers and shoes instead of shorts and thongs or bare feet. Injuries from collisions with moving vehicles are slightly more serious than those from collisions with stationary objects.

- Virtually all bicycle/motor vehicle crashes involve cars as opposed to other vehicle types (trucks, buses etc.).

The Bikeplan philosophy is to have a co-ordinated approach to measures that improve cycling conditions, through engineering, education, enforcement and encouragement means. All of the Perth Bikeplan recommendations (as well as those in the Mandurah and Bunbury Bikeplans) have a safety connotation. The following recommendations are made from the results of this Study:

- Points in the road network where cyclists and motorists conflict with one another should be critically appraised. The value of separate cycling facilities in safety terms should not be underestimated, but their success depends upon the degree of separation that can be acheived. A design manual for cycling facilities should be prepared and widely distributed.

- Bike-Ed course material in WA should contain some references to the findings of the Crash Study, and Bike-Ed should be supplemented by further cycling safety training in high schools to counteract the high crash rates amongst teenage cyclists.

- The Bikeplan recommendations under the heading of traffic laws, regulations and enforcement are endorsed. Particular efforts should be made to promote greater use of helmets and daytime visibility aids, and to press for more stringent standards for bicycle brakes.

- As the network of safer, off-road facilities for cyclists grows, it should be publicised as much as possible to maximise its use. The proposed Perth Bikemap should be published and regularly updated with this in mind.

Provided that certain essential improvements are made to the survey questionnaires to remove ambiguities and make the answers more compatible with Police and Health Department statistics, the Bicycle Crash Survey should be repeated in future years. A more satisfactory method of distributing questionnaires to hospital-treated crash victims should be found, and other means to cover a wider sample of bicycle crashes, perhaps through schools with the assistance of the Education Department.

The Study has proved valuable in providing greater insight into bicycle crashes, and with some improvement it can be even more useful in the study of crash causes and effects.

****

SECTION I

BACKGROUND

CHAPTER 1

INTRODUCTION

The bicycle has regained popularity as a mode of recreational and routine transport over recent years. This resurgence has prompted Australian authorities to undertake "Bikeplan" studies, in which the interaction of a wide range of issues affecting cyclists has been examined. The Geelong Bikeplan (1977) was the first of these, followed by Newcastle (1981), Melbourne (1979 - 84) and Adelaide (1983).

In Western Australia, an Advisory Committee on Bicycle Policy was established in 1978. The Government approved the establishment of a study team in 1983 to prepare a Bikeplan for Perth and other major centres in WA, as well as to undertake continued research of bicycle related matters. The Bikeplan Study Team produced Bikeplans for Perth (1985), Mandurah (1986) and Bunbury (1986) before being disbanded late in 1986. The study team is now being replaced by a State Bicycle Group in the Department of Local Government, to continue the work of bicycle planning in WA and to co-ordinate implementation of the Perth Bikeplan.

Increased bicycle usage has resulted in an increase of crashes involving cyclists. Because the bicycle is used as a form of transport by many of those not old enough to use motorised vehicles, many of the crashes occur to younger people. The study of bicycle crash causes and effects has always suffered from a lack of information about the circumstances.

In an effort to redress this situation, the Perth Bikeplan Study Team commenced a survey of bicycle crashes in Western Australia. The survey was jointly funded by the WA Bicycle Policy Committee and the Federal Office of Road Safety, and comprised questionnaires and interviews with bicycle crash victims (and motorists involved in crashes with bicycles) to gain information on crashes over a twelve month period (August 1985 to July 1986). Victims were contacted through the assistance of the police and hospitals throughout WA.

Due to time and workload constraints, however, the Study Team did not analyse the survey data. Travers Morgan Pty Ltd were subsequently appointed by the Department of Local Government (on behalf of the State Bicycle Policy Committee) to analyse and report findings on the data obtained, thus completing the study.

This report presents the analysis of the survey data. The survey is one of the largest of its kind; data on 781 separate crashes has been obtained. However, as will be shown there are a large number of bicycle crashes which, because they are neither reported to the police nor involve hospital treatment, were not sampled in the survey. These are likely to be the least serious crashes, mainly involving bicycles only, but their omission from this or indeed any survey of this type must be recognised.

Section I Background

The report is divided into five sections. Section I gives the background to the survey, and assesses the response rates achieved in relation to total bicycle crash occurrence in WA.

Sections II and III present the results from the cyclist and motorist questionnaires respectively. Section IV contains some conclusions and recommendations. Finally, Section V contains Appendices, including specimens of the questionnaires used in the survey.

CHAPTER 2

SURVEY METHOD AND RESPONSE RATES

2.1 Survey Method

The survey of bicycle crashes was undertaken by the Bikeplan Study Team, who employed a part time researcher for the purpose. The survey was conducted as follows:

i The Police Department assisted by sending questionnaires to all cyclists and motorists involved in bicycle/motor vehicle (B/MV) or bicycle/non-motor vehicle (B/NMV) crashes reported to the police.

ii Supplies of questionnaires were sent to WA hospitals, for them to hand to cyclists involved in crashes resulting in hospital medical treatment.

The questionnaires were voluntarily returned (reply paid) by parties involved, direct to the Bikeplan Team.

As a follow up to the questionnaires, it was intended to carry out in depth interviews with a sample of the respondents, initially concentrating on B/MV crashes resulting in hospitalisation, in the Perth Metropolitan area. However respondents outside Perth and those involved in B/NMV crashes expressed interest in participating in further interviews, so interview schedules were prepared and sent to them also.

It should be noted that the analysis herein is only of the initial questionnaires, which were reviewed by the Bikeplan Study Team and coded ready for computerisation.

A number of problems were experienced in conducting the survey, which are relevant to the results of the analysis. Firstly, the method of contacting crash parties through both the Police Department and hospitals resulted in some crash victims receiving two questionnaires. Most respondents simply returned their second forms blank, but some duplications were received by the Bikeplan Team. These were intercepted, but some victims may have been annoyed or upset by receiving two questionnaires, thus affecting the quality of their replies.

Secondly, difficulty was experienced in achieving full cooperation from the hospitals. One major teaching hospital in Perth did not participate in the study, and there is no means of determining how many questionnaires were distributed by the hospitals as some did not provide the Bikeplan Team with notification of documents sent out. An approximate response rate is however obtainable from Health Department statistics on the treatment of bicycle crash victims in hospital, as indicated later in this Chapter.

2.2 Questionnaires

The questionnaires are reproduced in Appendix B. They were designed by the Bikeplan Study Team. Questionnaires for cyclists involved in crashes sought information on demographic details, cycling habits and a wide range of circumstances associated with the crash itself. The motorists' questionnaire was shorter and included questions on motoring and cycling habits, and the driver's recollections of the circumstances of the crash in question.

2.3 Responses Received

In all, the Bikeplan Team received and processed 831 valid questionnaires, broken down as shown in Table 2.1. Of these, 50 motorist questionnaires were matched to those from cyclists as referring to the same crash, so data on 781 separate crashes was represented.

TABLE 2.1 WA Bicycle Crash Study
Responses Received (August 1985 to July 1986)

	Source of Questionnaires			
Crash Type	**Not Known**	**Police**	**Hospitals**	**TOTAL**
Cyclist Questionnaires				
Bicycle/Motor Vehicle	16	270	60	346
Bicycle/Bicycle	1	4	17	22
Bicycle Only	7	22	116	145
Rottnest	-	-	19	19
TOTAL	24	296	212	532
Motorist Questionnaires				
Bicycle/Motor Vehicle	33	266	-	299
All Questionnaires				
Bicycle/Motor Vehicle	49	486*	60	595*
TOTAL RESPONSES	**57**	**512***	**212**	**781***

* Excluding 50 motorist questionnaires duplicated by cyclists

2.4 Response Rate

To assess the response rate represented by the questionnaires, it is necessary to understand what types of crash the study was sampling. Because of the survey method, the following crash types were being covered ("reported" means reported to the police):

i Reported casualty crashes
ii Reported property damage only (PDO) crashes
iii Unreported casualty crashes involving hospital treatment

Excluded from the survey, therefore, are unreported PDO crashes and unreported casualty crashes not involving hospital treatment. Crashes resulting in fatalities are also excluded.

Table 2.2 summarises an assessment of the response rates achieved by the survey. According to Police Department advice, there were 821 reported crashes involving cyclists in Western Australia in 1985, of which 764 were B/MV crashes and 57 were B/NMV crashes. Four were fatal, and 474 resulted in casualties, of which 167 required hospital treatment. The remainder (343) were PDO crashes.

TABLE 2.2 WA Bicycle Crash Study
Approximate Response Rates

Total Crashes in WA (1985)**	**CRASH TYPE** Reported			Unreported				**TOTAL SURVEYED CRASHES**
	Casualty hosp.	Casualty non-hosp.	PDO	Casualty hosp.	Casualty non-hosp+	PDO	Fatal	
B/MV	132	299	329	-	nk*	nk*	4*	**760**
B/NMV	15	28	14	460	nk*	nk*	-*	**517**
Total	**146**	**260**	**343**	**460**	**nk***	**nk***	**4***	**1277**

nk = not known * = not surveyed PDO = property damage only

Survey Responses (1985/6)	**Cyclists**	**Motorists**	**TOTAL+**
B/MV	346	299	**595**
B/NMV	186	-	**186**
Total	**532**	**299**	**781**
Implied Response Rates			
B/MV	45%	39%	**78%**
B/NMV	36%	-	**36%**
Total	**42%**	**39%**	**61%**

Notes ** Source: ABS, WA Health Department and WA Police Department Records.

+ The Perth Bikeplan (1985) estimated that unreported, non-hospital casualty crashes could exceed 8,000 per annum.

++ Excluding 50 motorist responses duplicated by cyclists

In 1985 (the latest year for which figures are available), WA hospitals discharged 609 persons treated as a result of pedal cycle crashes, of which 134 were from B/MV crashes (including two fatalities) and 475 from B/NMV crashes. It is apparent that most of the casualties treated from the latter are not from crashes reported to the police. The hospital records indicate less B/MV crash hospital treatments than the police data (134 compared with 167); it is assumed that the additional victims in the police data were treated as outpatients, with injuries that required medical attention but not hospital admission. The police data has been adjusted accordingly.

Bearing in mind the foregoing assumptions a 61% sample of the targetted crash types has been achieved overall, but the cyclist and motorist questionnaires should be treated separately as they contain different information. The cyclist responses represent a 45% sample of B/MV crashes and a 36% sample of B/NMV crashes, making a 42% overall sample. Responses were received from a 39% sample of motorists involved in B/MV crashes.

These response rates are good, considering the fact that response was voluntary. However a greater coverage of B/NMV crashes may have been possible if a different method of contacting hospital patients had been devised.

When crash data for 1986 is obtainable from both the police and the Health Department (the latter was not available at the time of writing), a more accurate assessment of the response rates could be made.

2.5 Processing of Questionnaires

The questionnaires were examined by the Bikeplan Study Team, who entered the data onto computer coding forms ready for processing. A number of checks were made during this process, as follows:

- i All answers were checked for consistency and obvious contradictions were corrected where possible.
- ii Motorist questionnaires were matched to cyclist questionnaires where they were clearly referring to the same crash.
- iii The crash type (bicycle/motor vehicle, bicycle/bicycle, bicycle only, bicycle/pedestrian or bicycle/other) and the number of crash units (i.e. the total number of bicycles, motor vehicles, pedestrians, etc. involved in the crash) were identified from the answers and coded separately on the forms.
- iv Additional categories were created for some of the questions from a study of answers under the "other" category. For example, additional visibility obstructions (moving vehicle, sun and building) were identified and added to the coding forms.
- v The helmet brands given by respondents were checked against those approved by the Standards Association of Australia and coded accordingly.
- vi In question 34, which asked about the nature of the crash, answers not relating to bicycle/motor vehicle crashes were not coded because of the ambiguity apparent in the responses. The data for this question is consequently related to B/MV crashes only.

The completed coding forms were provided to Travers Morgan Pty Ltd. The consultant entered the data onto a personal computer, and subsequent analysis was carried out using statistical analysis software. A crosstabulation program was used to explore basic relationships between different variables. These initial results were enhanced by more detailed examination of certain aspects. Finally, spreadsheet and graphics software was used to generate the graphs and histograms presented throughout this report.

SECTION II

RESULTS - CYCLIST QUESTIONNAIRES

CHAPTER 3

OVERALL RESULTS

Of the 532 cyclist questionnaires, 19 were received from crashes on Rottnest. The remainder represent crashes in mainland Western Australia, but unfortunately the questionnaire did not ask for the address or location of the crash. It is not therefore possible to separate Perth Metropolitan Area crashes from those in the country, nor to establish the distribution within the Perth area or between country towns.

Appendix C summarises the overall responses to the questions on the cyclist questionnaires for the 513 mainland crashes. Principal indications from the overall responses are:

- Two-thirds (67%) of the sample are bicycle/motor vehicle crashes, and 71% involved two units (motor vehicles, cyclists, pedestrians etc).

- Over three quarters (77%) of cyclists in crashes are male (this agrees closely with the proportions in both Police and Health Department figures).

- Half (49%) of cyclists in crashes are 10 to 19 years old; 17% are 20 to 29, and 12% are 5 to 9.

- The majority (90%) of crashes occurred in daylight, 7% in twilight, and 3% at night.

- Over 90% of crashes occurred in dry weather.

- About 77% of crashes occurred on roadways or at junctions, 6% on footpaths and 3% on bikepaths.

- Obstructed visibility was a stated influence (i.e. stated by cyclists) in 24% of crashes.

- Most bikes (88% of the total) were under five years old, and only 5% of cyclists admitted to their bicycles being the wrong size for them (either too big or too small).

- Assuming that no answer means no defects were present, 15% of cyclists admitted that their bicycles had defect(s) immediately before the crash; 7% felt that defects were a contributory cause to the crash.

- Nearly two-thirds (65%) of cyclists were wearing light coloured clothes, but 90% were not wearing helmets or safety clothes.

- About 64% received injuries to their legs and/or feet, 58% to their arms and/or hands and 41% to their heads and/or faces. The nature of the questionnaire does not allow reliable analysis of the severity of injuries to different parts of the body, but 46% considered their overall injuries to be moderate, 39% slight and 10% severe.

- Falling from the bicycle without first hitting an object (implying loss of control or avoiding action) was a stated cause of 14% of crashes.

- Just over 70% of cyclists rode daily.

- The largest group (42%) of cyclists were on leisure or recreation trips (including visiting) when their crashes occurred, 20% were riding to or from work, 18% to or from school or college and 13% were on shopping trips.

- Most (93%) of the respondents were familiar with the route on which the crash happened; 74% had ridden through the crash site more than ten times, and 85% were riding the bike they normally use.

- Nearly two-thirds of cyclists said they had had no bike crashes requiring medical treatment over the three years prior to the crash.

- About 20% of cyclists said they were under some form of stress at the time of the crash; over half of these said they were excited about something (implying preoccupation).

From these overall results it is important to note the large proportion of male cyclists involved in crashes, and also the large number of teenagers. Both these groups are a larger proportion of the survey sample than they are of the total cycling population in WA, but they may also cycle more often and further than other people.

It is also noteworthy that the overwhelming majority of crashes occur in daylight and dry weather conditions; this is not typical of road crashes generally.

These and other aspects of the results are discussed further in the following Chapters.

CHAPTER 4

CHARACTERISTICS OF TIME AND PLACE

4.1 Relationship of Crashes with Time

The graphs in Figures 4.1 to 4.5 illustrate some of the characteristics of timing of the crashes. Figure 4.1 shows that crashes occur least frequently in the winter months, mainly due to a reduced number occurring on leisure trips and school trips at this time. Figure 4.2 illustrates the distribution of crashes through the week, showing in particular the increased incidence of crashes during leisure and shopping trips on Saturdays.

Figure 4.3 shows the occurrence of crashes through the day. 60% of crashes occur between the hours of 1400 and 1900, covering the period of trips to home from school and work. A further 16% occur between 0600 and 0900, when cyclists are travelling to school and work.

A considerable number of crashes occur on leisure trips between 1500 and 1900 hours, possibly coinciding with schoolchildren playing after school hours.

Figure 4.4 shows the distribution of crashes through the day on weekdays and weekend days. Although the number of crashes occurring at weekends is small, their timing shows a different pattern from weekdays. The weekday morning and evening peaks are replaced on Saturdays by a single, broad peak at around 1400 hours, whilst Sundays have no clearly discernible pattern when the small number of crashes is considered.

Figure 4.5 shows that the distribution of crashes through the day is similar in the winter, spring, summer and autumn quarters of the year, but there are less crashes in winter. In summer the morning peak is earlier and the evening peak is later, corresponding with the longer hours of daylight.

4.2 Weather and Lighting Conditions

Table 4.1 summarises the weather and lighting conditions at the time of the crashes. The majority (74%) of crashes occurred in dry, calm weather conditions. About 90% of crashes occurred in daylight, 7% in twilight and 3% in darkness. Of those not in daylight, 40% occurred where street lights were on. The questionnaire only asked whether it was "dry" or "raining" at the time of the crash, and not whether the ground or road surface was dry or wet. It is assumed that "dry" also means that the ground was dry.

ABS data for 1985 shows that 55% of all road crashes occur in daylight hours and dry conditions, and 60% occur in daylight regardless of the weather. Proportionately more bicycle crashes than other road traffic crashes are occurring in these circumstances.

These observations on time and weather conditions confirm that crash occurrence is strongly linked to the degree of exposure, as crashes are clearly happening at times when traffic is greatest. The seasonal variation further reinforces this view when one considers that cycling activity is probably greatest in daylight and fine weather conditions.

TABLE 4.1 Cyclist Questionnaires
Weather and Lighting Conditions at Time of Crash

Light and Wind Condition		Rain Condition			
		n/s	Dry	Raining	TOTAL
Daylight	n/s	1 (0%)	43 (8%)	6 (1%)	50 (10%)
	Windy	3 (1%)	43 (8%)	7 (1%)	53 (10%)
	Calm	3 (1%)	337 (66%)	17 (3%)	357 (70%)
	TOTAL	**7 (1%)**	**423 (82%)**	**30 (6%)**	**460 (90%)**
Twilight	n/s	-	1 (0%)	1 (0%)	2 (0%)
	Windy	-	1 (0%)	-	1 (0%)
	Calm	-	32 (6%)	1 (0%)	33 (6%)
	TOTAL	**-**	**34 (7%)**	**2 (0%)**	**36 (7%)**
Dark	n/s	-	2 (0%)	-	2 (0%)
	Windy	-	2 (0%)	-	2 (0%)
	Calm	-	10 (2%)	3 (1%)	13 (3%)
	TOTAL	**-**	**14 (3%)**	**3 (1%)**	**17 (3%)**
ALL LIGHT CONDS	n/s	1 (0%)	46 (9%)	7 (1%)	54 (10%)
	Windy	3 (1%)	46 (9%)	7 (1%)	56 (11%)
	Calm	3 (1%)	379 (74%)	21 (4%)	403 (79%)
	TOTAL	**7 (1%)**	**471 (92%)**	**35 (7%)**	**513(100%)**

4.3 Crash Locations

The questionnaires only identify the **type** of location at which crashes occur; specific locations are not given. Table 4.2 shows the distribution of crashes at the location types listed on the questionnaire.

Table 4.2 clearly indicates that most crashes (74%) occur on roads, including junctions of paths with roads. Most of these (76%) are B/MV crashes. Of the "off-road" locations, 62% of crashes occur on footpaths and driveways, 11% on bikepaths and the remaining 27% at a variety of other locations (car parks, private yards, etc). This serves to emphasise the predominance of B/MV crashes in the survey sample; one would expect that a large number of unreported crashes (which the survey did not sample) are B/NMV incidents in off-road locations.

TABLE 4.2 Cyclist Questionnaires
Crashes by Location Type

Location Type	No. of Crashes				% of
	B/MV	B/B	B Only	Total	Total
Not stated	4	2	-	**6**	1
Driveway	31	1	19	**51**	10
Footpath	12	1	18	**31**	6
Bikepath	3	5	7	**15**	3
Place used for BMX	-	-	3	**3**	1
Road intersection	97	1	6	**104**	20
Road t-junction	94	3	22	**119**	23
Roundabout	3	-	2	**5**	1
Road between two side roads	69	8	47	**124**	24
Private yard	1	-	8	**9**	2
Car park	5	-	5	**10**	2
Path at junction with road	25	1	3	**29**	6
Other	2	-	5	**7**	1
TOTAL	**346**	**22**	**145**	**513**	**100**

It is noteworthy in the above Table that crashes at t-junctions occur at a similar rate to those at intersections (four way junctions). This is contrary to what one might expect, as the potential number of conflicting manoeuvres is greater at the latter. However there are probably a greater number of t-junctions than four way junctions in WA, and more four way junctions are probably signal-controlled; this is almost certainly the case in the metropolitan area. If the survey enabled us to look at specific locations, and whether the intersection was signalised (and whether either of the parties to a crash were not obeying the signals), this aspect could be explored further.

Figure 4.1

Crash Occurrence Through the Year

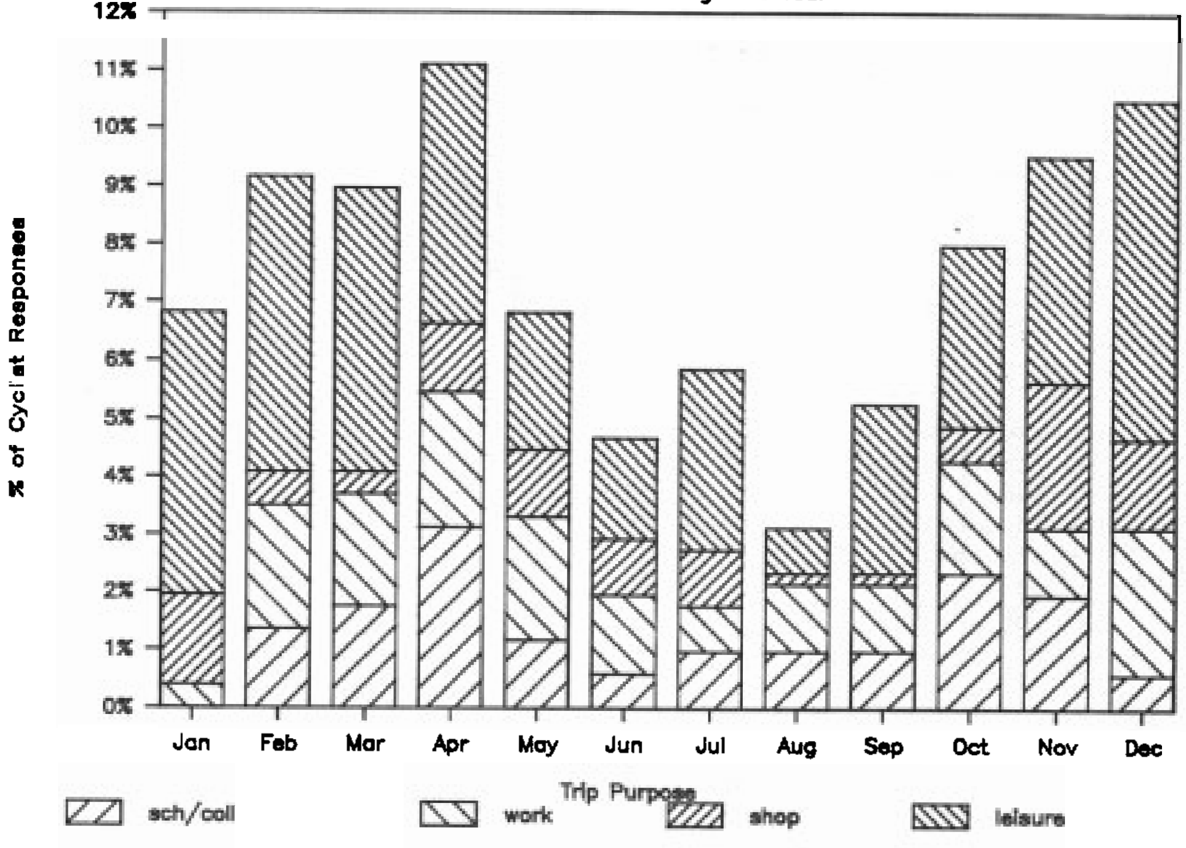


Figure 4.2

Crash Occurrence Through the Week

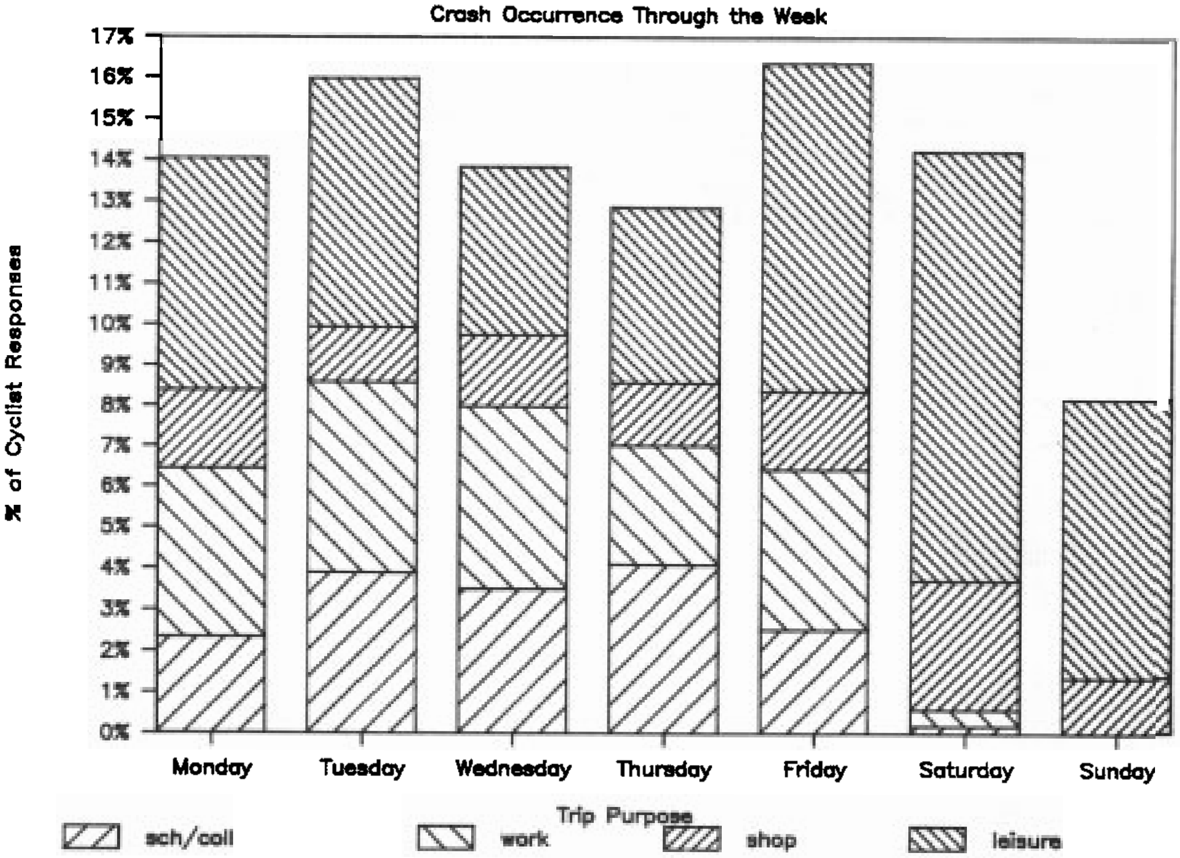


Figure 4.3

Crash Occurrence Through the Day

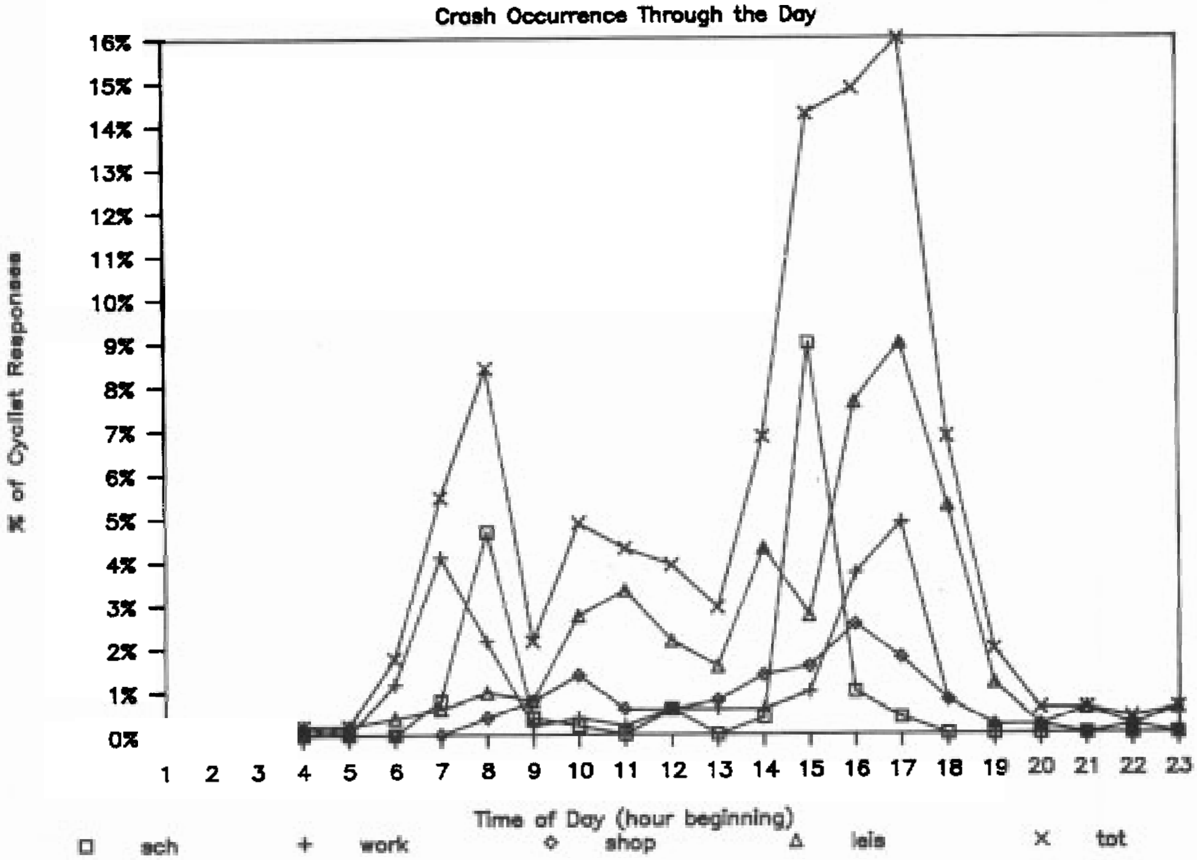


Figure 4.4

Crash Occurrence — Time and Day

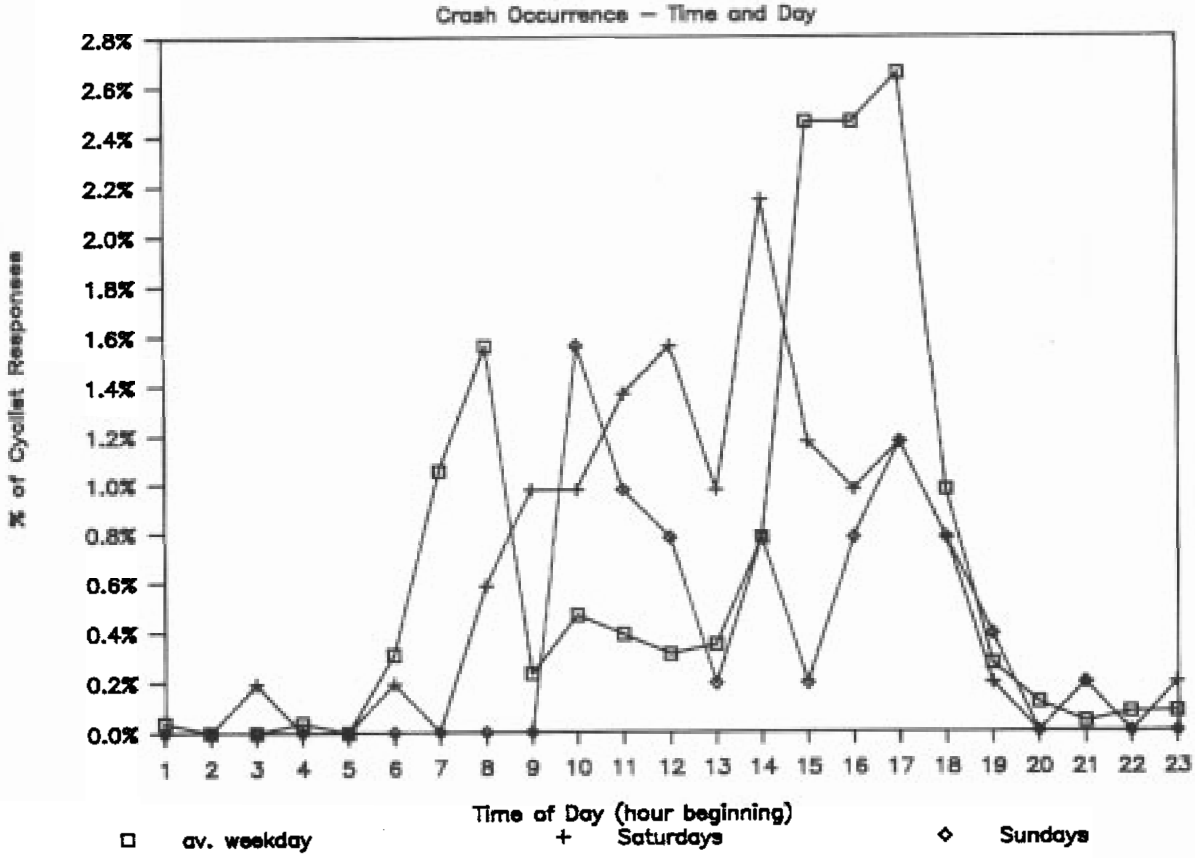
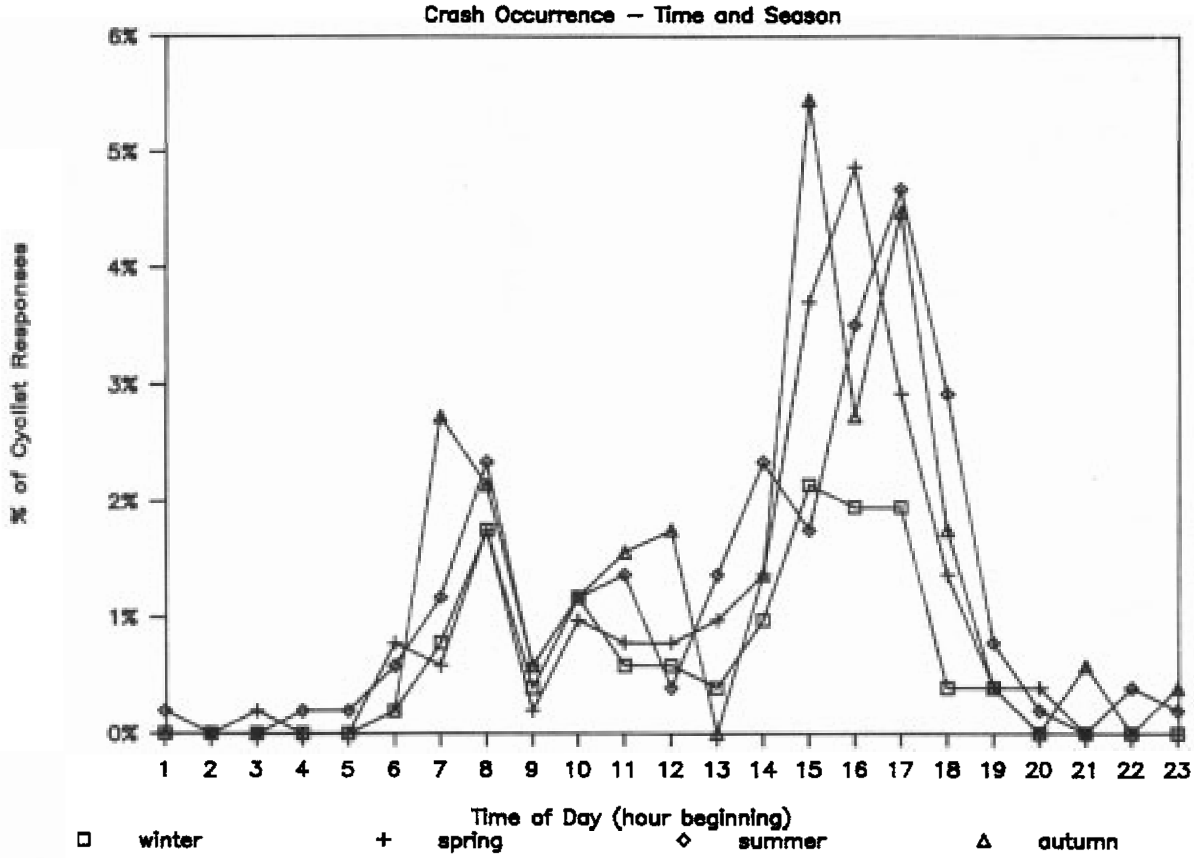


Figure 4.5


Crash Occurrence — Time and Season
6%
5%
4%
3%
2%
1%
0%
% of Cyclist Responses
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Time of Day (hour beginning)
winter
spring
summer
autumn

CHAPTER 5

CYCLIST CHARACTERISTICS

5.1 Sex and Age of Cyclists

The majority (77%) of cyclist crash victims in the survey are male. Figure 5.1 illustrates the age and sex of cyclists in the survey data and compares this with the age structure of the cycling population indicated in the Perth Bikeplan (Perth Bikeplan, 1985, Figure 7). The comparison is approximate because the Perth Bikeplan data is for the Perth Metropolitan Area in 1982, but it suggests that male cyclists are substantially more prone to crashes than females, particularly in the younger (10-14, 15-19 and 20-29) age groups. Nearly one third of bicycle crash victims are aged between 10 and 14 years.

5.2 Trip Purposes

Figure 5.2 shows the stated purposes of cyclists' journeys at the time of their crashes, compared with the proportions of overall cycling activity for each trip purpose as indicated in the Perth Bikeplan (Figure 9). Whilst the comparison is approximate (due to the data from the Perth Bikeplan being for 1982) it indicates that work trips give rise to substantially greater numbers of crashes than their proportion of total cycling trips. When trip purposes are plotted against the ages of cyclists (Figure 5.3), it is clear that this is because of the high incidence of crashes amongst 20-39 year olds on work trips. All other trip purposes give rise to proportionately fewer crashes than their proportions of total cycling activity.

The reason for this may lie partly in the survey method. As most of the crashes sampled are reported B/MV crashes, work trips (which generally involve longer distances and greater exposure to vehicular traffic) could be over-represented in the sample. However the amount of difference shown in Figure 5.3 is surprising, so the greater risk of such journey types is probably a partial reason. Figure 5.3 also emphasises the high proportion of crashes occurring to 10-15 year olds, particularly on school trips, visiting and leisure/recreation.

5.3 Cycling Experience and Route Familiarity

Over two thirds of cyclist crash victims stated that they had more than five years' cycling experience. When the amount of experience is compared with the age of cyclists (Figure 5.4), it is clear that the majority of cyclists over the age of 15 years are claiming more than five years' experience, so it is not surprising that so many apparently experienced cyclists are crash victims. About 70% of the sample said they rode their bicycles daily, and another 15% said 3-4 times per week. This suggests that neither longer experience of cycling nor regular, frequent use will significantly reduce the risk of crashes. The quality of experience and amount of cyclist education received may be more important, but the questionnaire did not enquire on these aspects.

Most respondents (93%) said they were familiar with the route on which the crash happened, and 74% said they had ridden through the crash site more than ten times. Again, this indicates that experience of the route is not likely to reduce the risk of an crash.

5.4 Cyclists' Crash History

At least 65% of the crash victims were describing their first injury crash for three years; 75% had not had a "bicycle damage only" crash over the three years preceding the crash in question. When past crashes are compared with cyclists' ages (Figure 5.5), it is clear that older cyclists (i.e. those over 40) have more crashes requiring medical treatment than younger riders, although those between 15 and 29 years old have a relatively high number. The proportion of such crashes that involved motor vehicles is highest amongst 20 to 40 year old cyclists, and although the average number of crashes amongst those under four is low it is of concern that they all appear to involve motor vehicles. The number of past damage only crashes is highest amongst late teenagers, but is also relatively high amongst riders in their fifties.

It should be remembered that these indications are from a sample of crash victims and not cyclists in general.

5.5 Use of Helmets and Safety Clothes

The vast majority of respondents (90%) were not wearing safety clothes. However, 65% were wearing light coloured clothes.

A similar majority (90%) were not wearing safety helmets. Of the 46 respondents that were, only four said their helmets were dislodged at the time of the crash.

The Bikeplan Team identified a list of helmet types, and noted those approved by the Standards Association of Australia (SAA). Table 5.1 shows a breakdown of this information for the cyclist questionnaires.

The table shows that over half (26 out of 46) of the helmet wearers were using non-SAA approved helmets. This does not necessarily mean that the helmets were unsafe or not up to standard, since they may not have been put up for approval at the time. It is noteworthy that sixteen respondents were wearing helmets not listed by the Bikeplan Study Team (under the "other" category).

The small number of crashes involving helmet use is insufficient to draw any conclusions about the merits or otherwise of any particular helmet type. Detailed circumstances of the crashes in question would need to be explored to gain a better appreciation of the actual performance of different helmet types; such a study is beyond the scope of this report.

As will be shown in Chapter 8, the questions on injury location and severity were not detailed enough to assess reliably whether helmet use results in less serious head injury.

TABLE 5.1 Cyclist Questionnaires
Helmet Use and Retention

Type of Helmet	Retained in Crash		Dislodged in Crash		TOTAL
	B/MV	B/NMV	B/MV	B/NMV	
SAA Approved					
Stackhat	5	1	1	-	7 (1%)
Guardian	2	-	-	-	2 (0%)
Non-SAA Approved					
Bell	6	-	-	-	6 (1%)
Brancale	3	1	-	-	4 (1%)
Other	9	5	2	-	16 (3%)
Type not stated	6	4	1	-	11 (2%)
TOTAL WEARING HELMETS	**31**	**11**	**4**	**-**	**46 (9%)**
Helmet not worn					**467 (91%)**

Note: SAA Approval rating as given in SAA listings April 1986.

5.6 Other Clothing

Table 5.2 summarises the clothing worn at the time of the crashes. Just over half the respondents were wearing shorts, and 60% were wearing shirts only. Most (77%) were wearing shoes as opposed to thongs or bare feet. The clothing combinations probably reflect the largely fair-weather conditions prevailing at the time of crashes; as we have established, most crashes occur in daylight, in dry conditions. Furthermore, cycling is an energetic activity and is not conducive to wearing heavy clothing.

As with helmet use, the questions on injury locations and severity were not sufficiently detailed to allow us to assess whether clothing worn has an influence on injury severity. This is discussed further in Chapter 8.

TABLE 5.2 Cyclist Questionnaires
Clothing Worn at Time of Crash

		Above Waist			
	n/s	**Skirt**	**Trousers**	**Shorts**	**TOTAL**
Below Waist					
n/s	6	8	5	9	28 (5%)
Shirt	3	26	80	201	310 (60%)
Jumper, coat or jacket	2	4	47	18	71 (14%)
Both	-	12	57	35	104 (20%)
TOTAL	**11**	**50**	**189**	**263**	**513**
Footwear					
n/s	5	-	4	7	16 (3%)
Shoes	4	39	165	187	395 (77%)
Thongs	-	5	14	50	69 (13%)
Bare feet	2	6	6	19	33 (6%)
TOTAL	11(2%)	**50**(10%)	**189**(37%)	**263**(51%)	**513**

Figure 5.1

Age and Sex of Cyclist Crash Victims

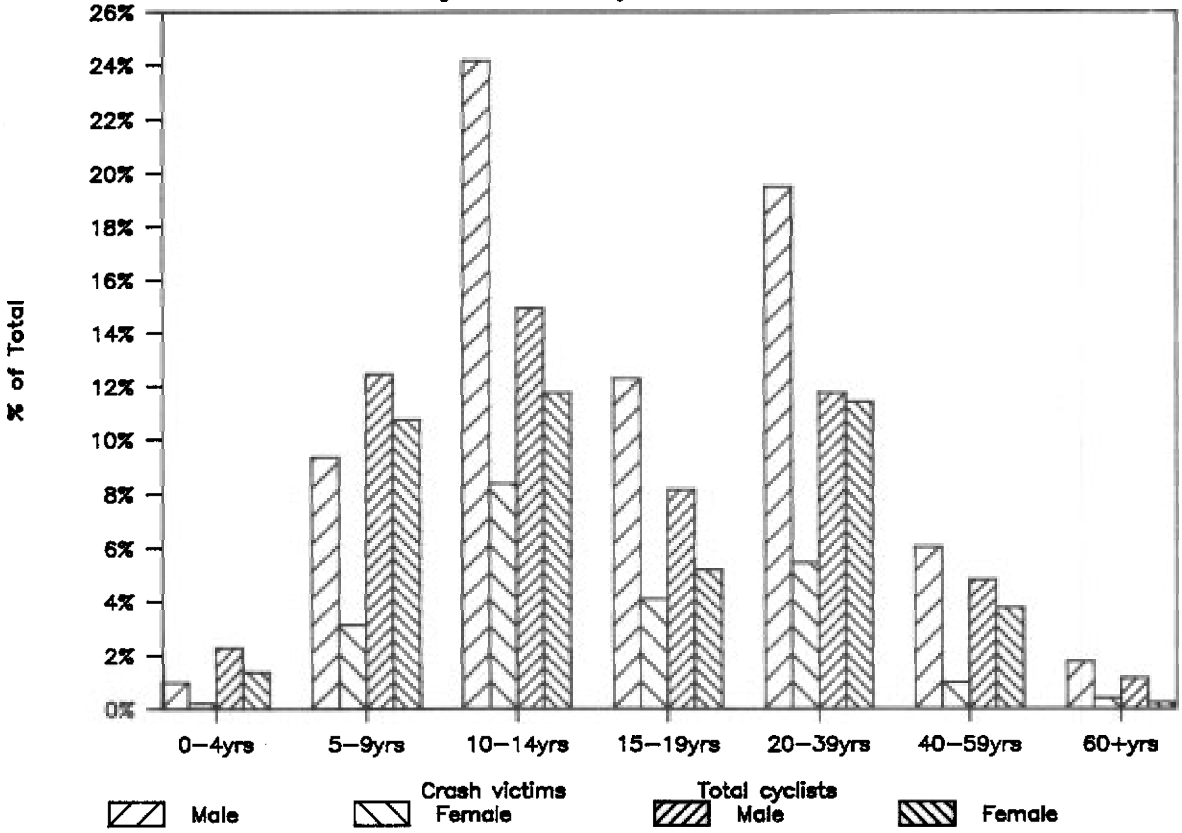


Figure 5.2

Trip Purposes when Crashes Occurred

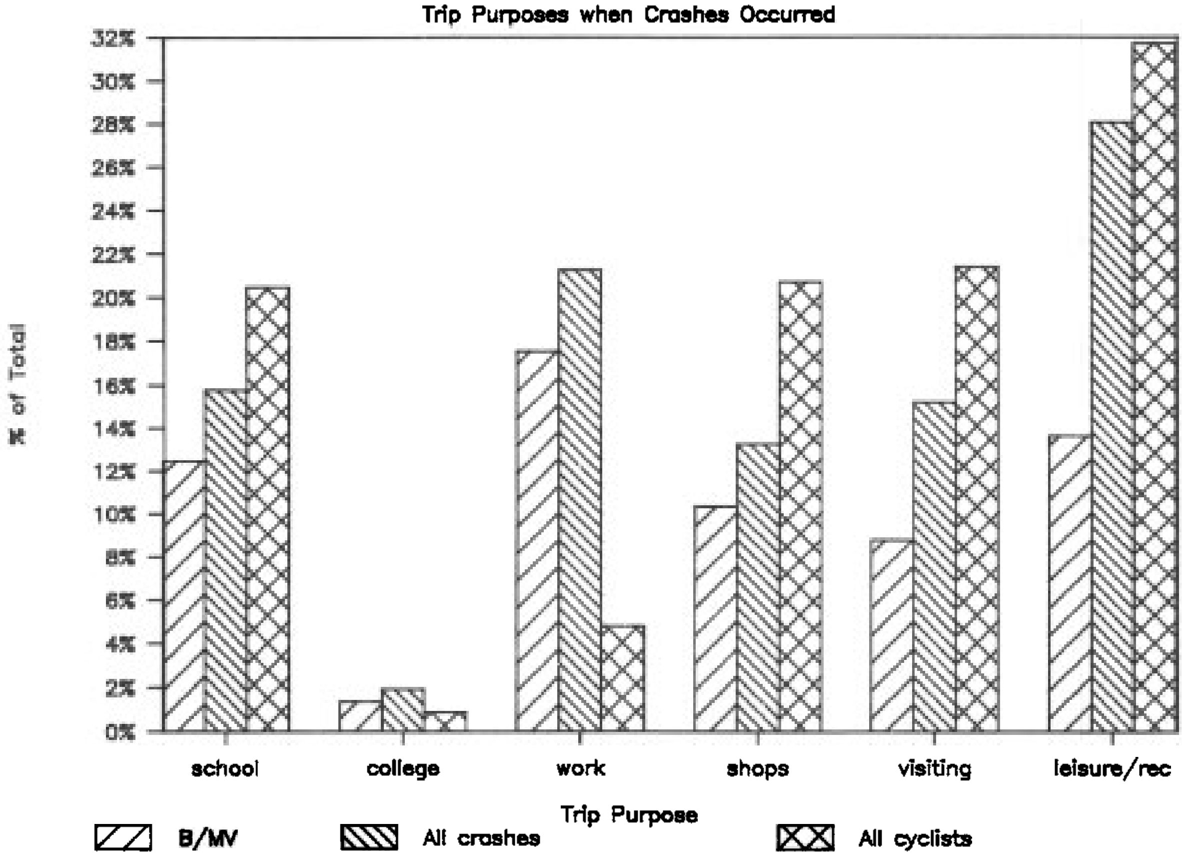


Figure 5.3

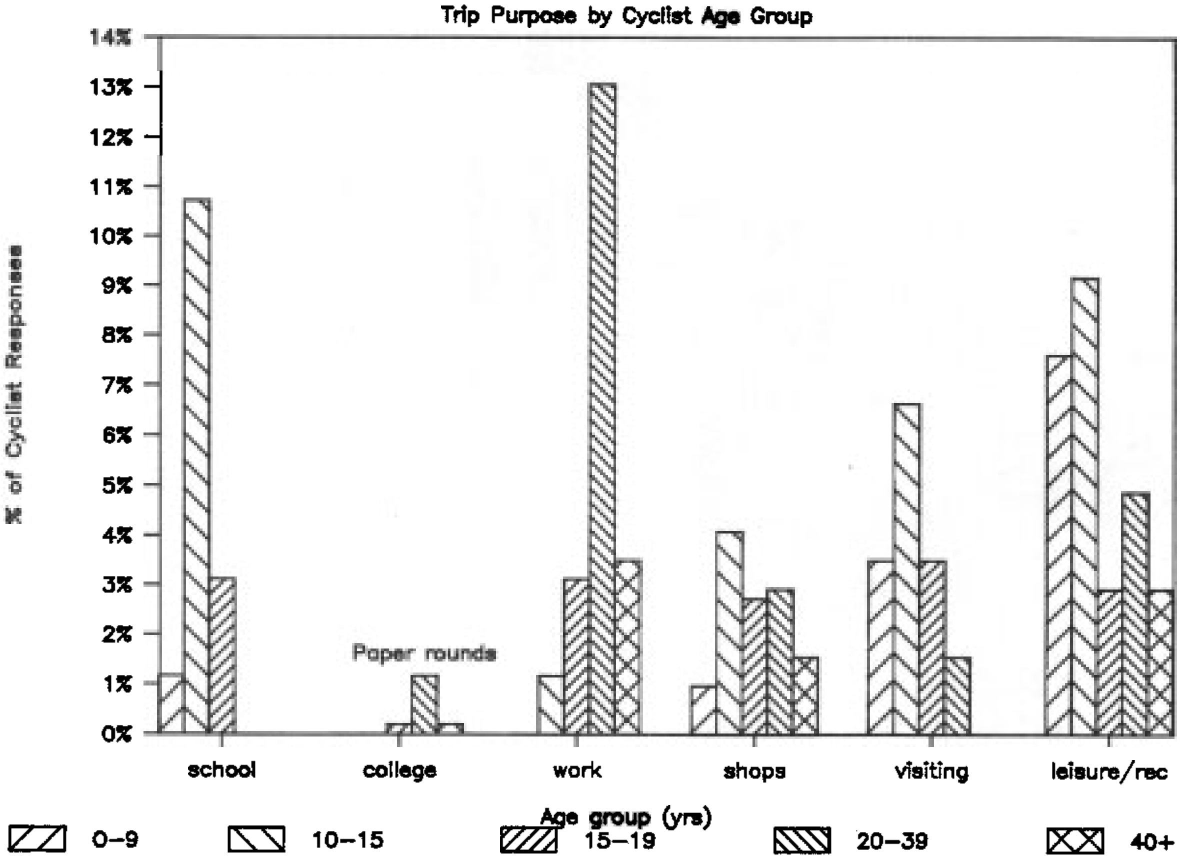


Figure 5.4

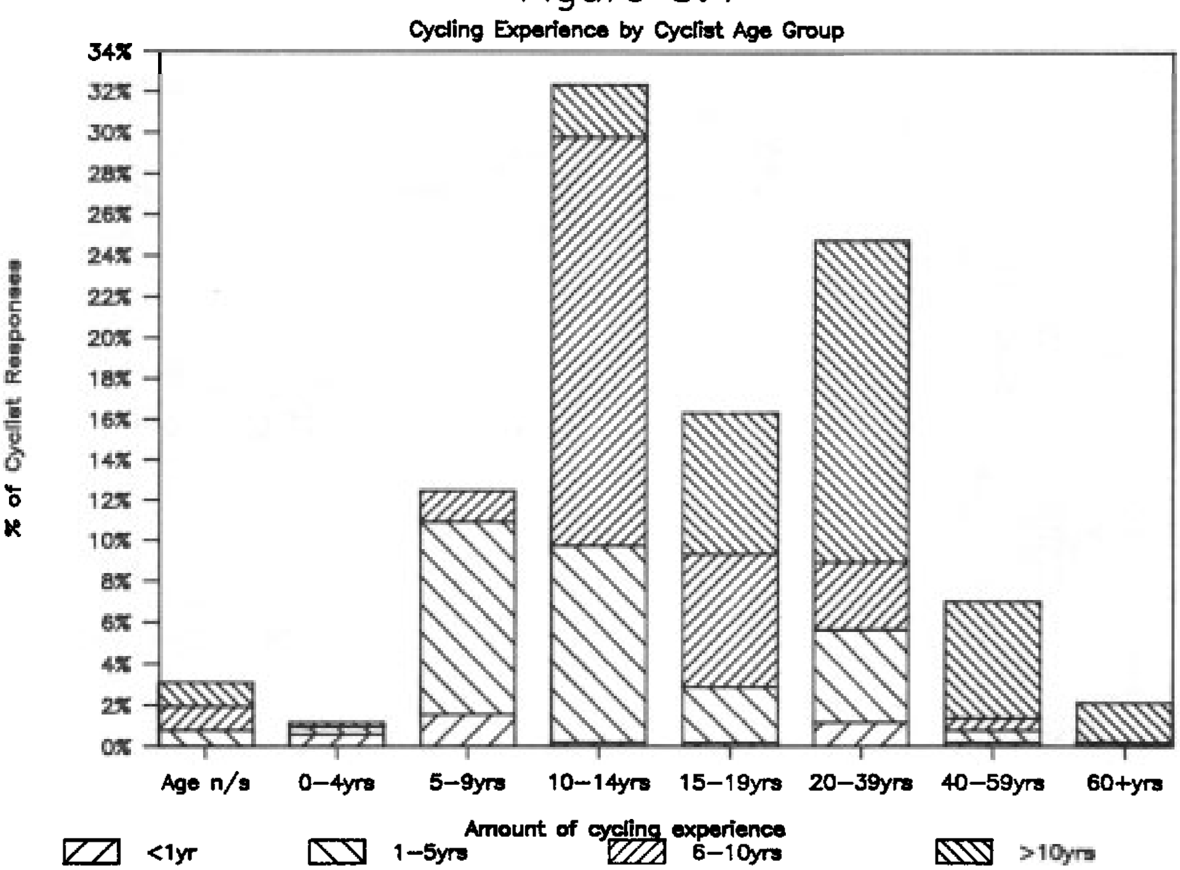
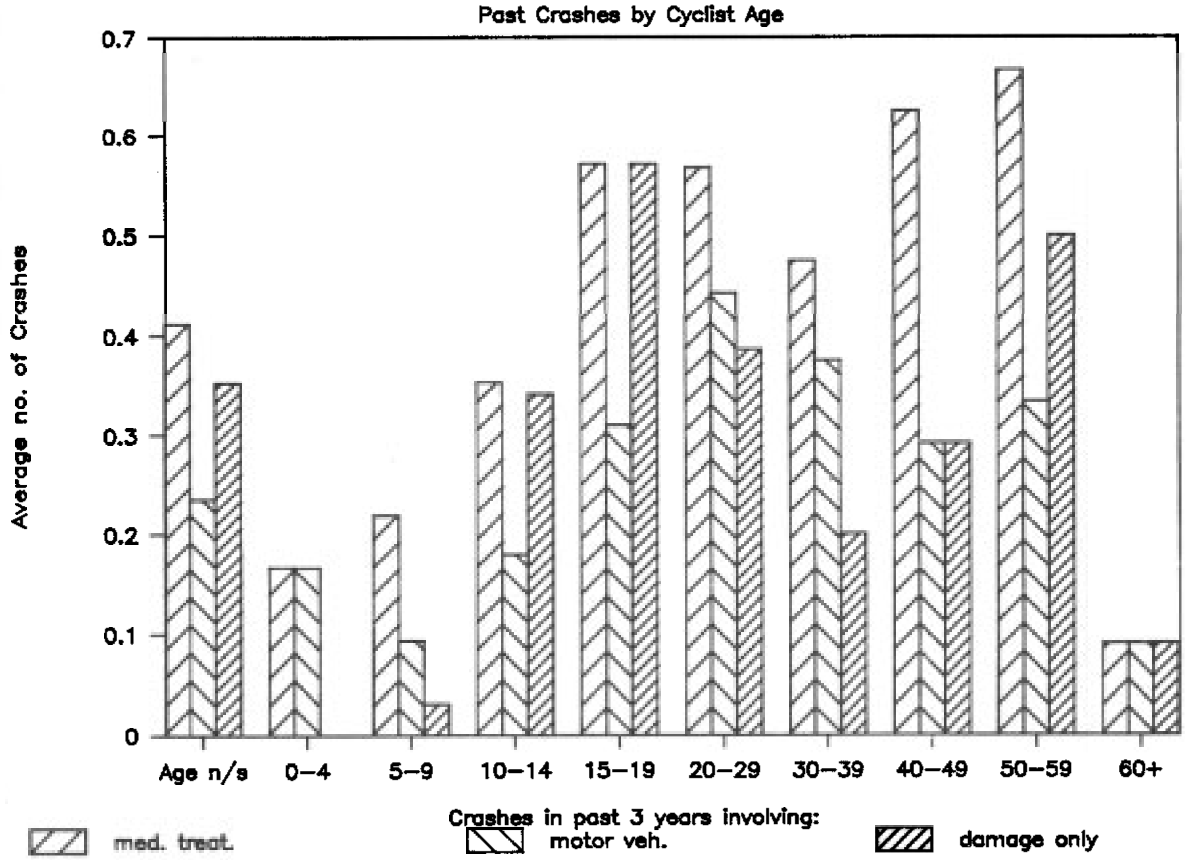


Figure 5.5


Past Crashes by Cyclist Age
Average no. of Crashes
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Age n/s
0–4
5–9
10–14
15–19
20–29
30–39
40–49
50–59
60+
Crashes in past 3 years involving:
med. treat.
motor veh.
damage only

CHAPTER 6

BICYCLE CHARACTERISTICS

The cyclist questionnaires asked a number of questions about the bicycles involved in crashes, as follows:

- Type of bicycle
- Age and size
- Defects
- Bicycle equipment
- Wheel material

6.1 Bicycle Types, Age and Size

Table 6.1 summarises the bicycle types and their ages. The high incidence of drop handlebar bicycles is clearly illustrated. Most machines are five years old or less. When bicycle types are compared with cyclists' ages (Figure 6.1) drop handlebar machines are most prevalent from the 10-14 year age group onwards. BMX bikes are frequent amongst children under 15. It should be remembered that this data is from crash victims only; similar information on overall cycle usage is not available for comparison. Some bicycle types may be under- or over-represented in the sample; this is probably true of BMX bikes, whose use by children is widespread. A large number of crashes involving this group will probably not have been sampled by the survey.

TABLE 6.1 Cyclist Questionnaires
Bicycle Types and Ages

	Bicycle Age				
Bicycle Type	**new**	**1-5yrs**	**6-10yrs**	**10yrs+**	**TOTAL**
Upright handlebars	37	76	20	7	141 (27%)
Drop handlebars	93	165	20	8	286 (56%)
BMX	15	63	2	-	81 (16%)
Other	-	2	1	-	3 (1%)
TOTAL	**145** (28%)	**306** (60%)	**43** (8%)	**15** (3%)	**509***

* Excluding 4 not stated

The questionnaire asked cyclists whether their bikes were the right size for them; 94% said they were, whilst 2% said they were too small and 3%, too big. This is not an accurate assessment of whether bikes are correctly adjusted for their riders, however.

6.2 Bicycle Defects

About 15% of respondents said that their bikes had defects at the time of the crash. Of these, nearly 40% had defective brakes. Other most frequent defects were gears (15%), chains (11%) and wheels (10%). A small number mentioned two or more defects. The extent to which defects were seen as contributing to crashes is discussed in the next Chapter.

6.3 Bicycle Equipment

Figure 6.2 shows the percentages of bikes fitted with various items of equipment at the time of the crashes. The diagram indicates that over 90% of drop handlebar bikes had front and rear brakes, but smaller percentages of other bike types (particularly BMX) had them. 40% of BMX bikes had backpedal brakes. Under half of all bikes had bells fitted; again less BMX bikes were thus equipped than the other types. Around 40% of all bikes had front or rear lights, but virtually no BMX bikes had them. All bicycle types were similarly equipped with rear, wheel and pedal reflectors (around 60-70%).

The questionnaires also asked whether safety flags, child seats or panniers were fitted. Only 1% (six bicycles) had safety flags. Nine bicycles had child seats and fifteen had panniers.

Of the 133 bicycles fitted with headlights, 64% had dynamos and 28% had batteries. Fewer bicycles (125) had rear lights; 62% of these were dynamo powered and 28% had batteries. Most of these bikes were of the drop handlebar type.

About 62% of all bikes had steel wheels, and most of the remainder had alloy wheels. A small number of BMX bikes had plastic wheels.

6.4 Use of Bicycle Lights

Table 6.2 summarises cyclists' stated use of lights at the time of their crashes. Of the 17 crashes in darkness only 9 said their lights were on (the other 8 did not answer the question). Of those occurring in twilight (36), six respondents said both lights were on, and another two said their rear light was on.

It is interesting to note that of the 460 crashes in daylight, thirty cyclists said their rear lights were on.

Although the number of crashes occuring at night or twilight is small, it is of concern that only one third of cyclists in crashes at these times were apparently using lights.

TABLE 6.2 Cyclist Questionnaires
Use of Bicycle Lights at Time of Crash

		Light conditions			
		Daylight	**Twilight**	**Dark**	**TOTAL**
Headlight:	On	2	6	9	17
	Off	108	6	-	114
	Not known/stated	350	24	8	382
	TOTAL	**460**	**36**	**17**	**513**
Rear light:	On	30	8	9	47
	Off	98	4	-	102
	Not known/stated	332	24	8	364
	TOTAL	**460**	**36**	**17**	**513**
Both lights:	On	1	6	9	16
	Off	96	4	-	100
	Not known	2	-	-	2
	Not known/stated	327	22	8	357
	TOTAL	**424**	**32**	**17**	**473**

Figure 6.1

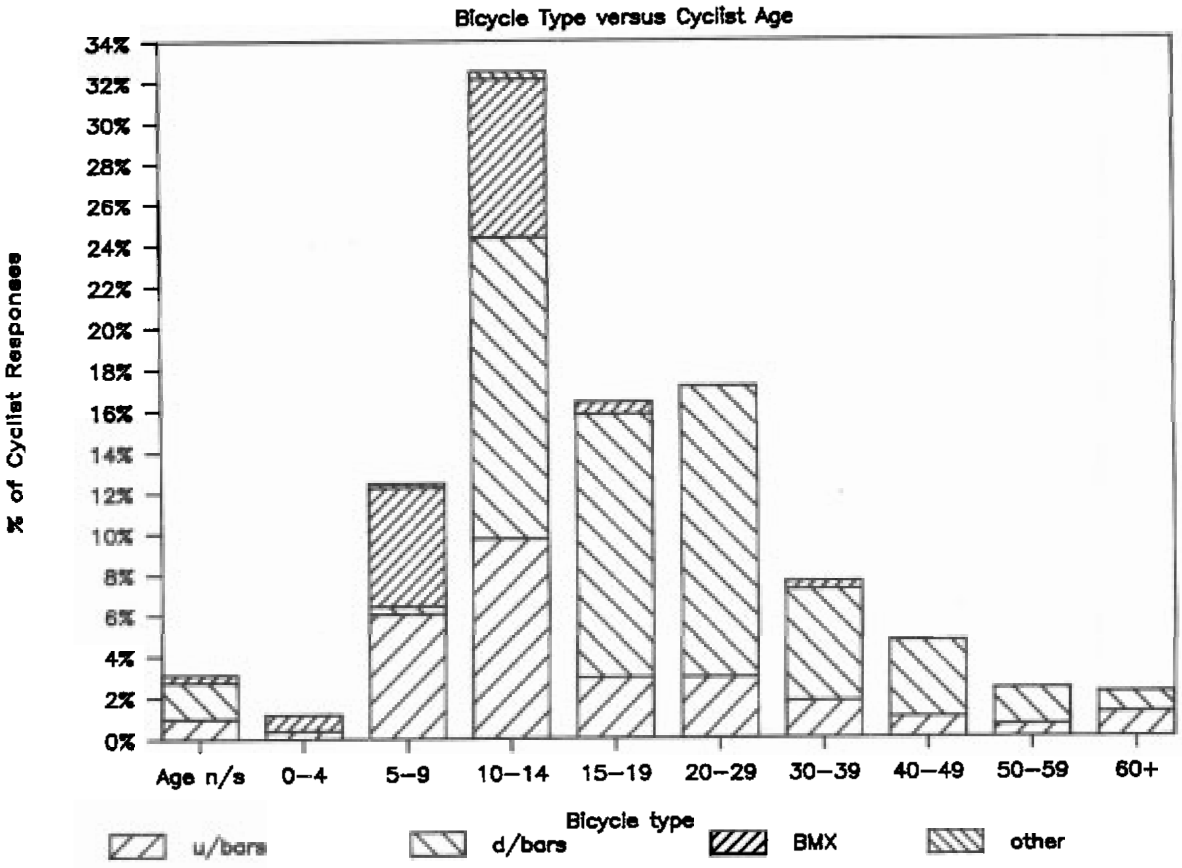
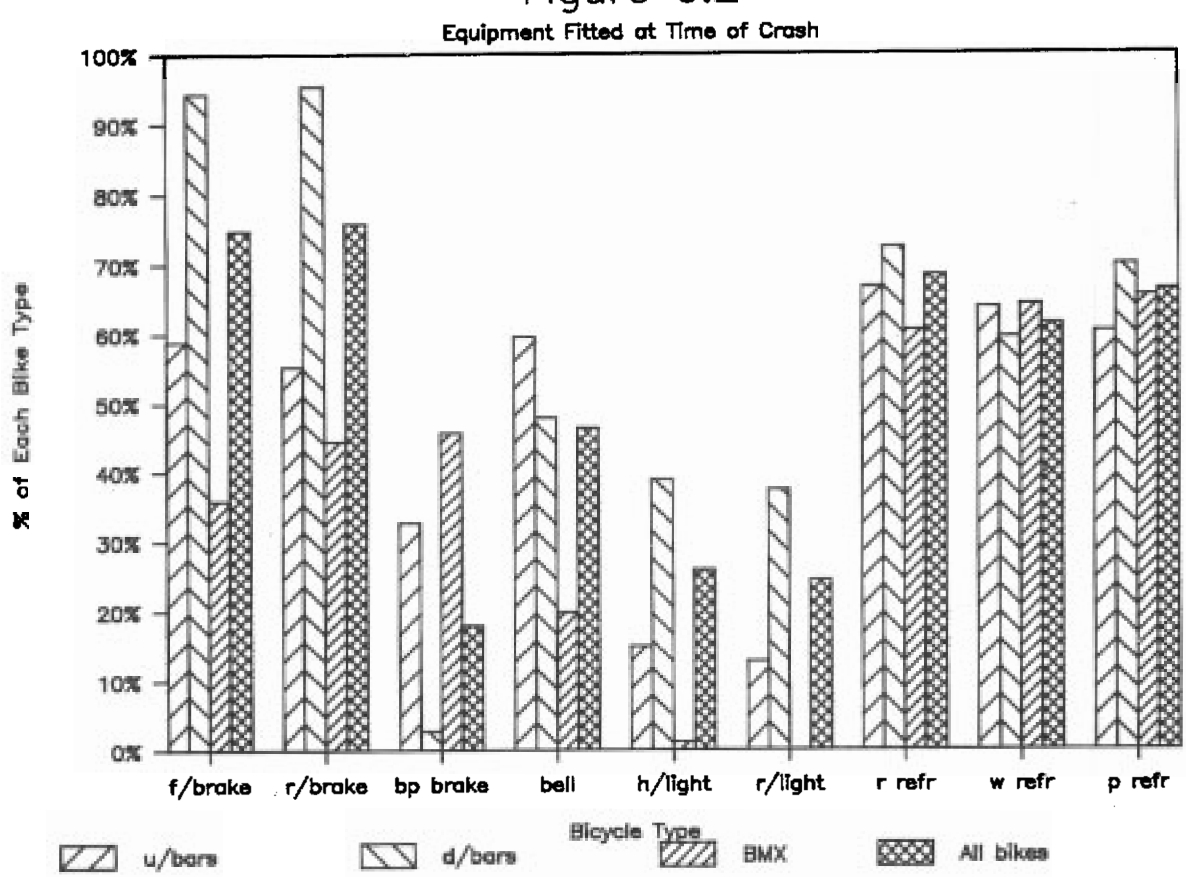


Figure 6.2



CHAPTER 7

CRASH CIRCUMSTANCES AND CAUSES

The question of what causes a crash is often very complex. Apart from the more general questions on timing, weather and lighting conditions, crash locations, cyclist details and bicycle information, the survey asked some specific questions on the circumstances of the crash, including the following:

- description of crash circumstances (bicycle/motor vehicle crashes only)
- object collided with (if a collision occurred)
- visibility obstructions
- bicycle defects contributing to crash
- cyclists' riding habits
- psychological factors

7.1 Crash Circumstances

Question 34 on the questionnaire asked how the crash happened, giving a choice of several different circumstances. However, due to ambiguity in the structure of the question, the Bikeplan Team did not code the following:

i bicycle cornering or out of control
ii impact with another bicycle
iii impact with a pedestrian

This information was available elsewhere on the survey forms for B/NMV crashes. The responses to this question, as coded, therefore relate only to B/MV accidents, of which there are 346 in the survey sample.

Two categories ("car turning left" and "right angled collision at a road intersection") were added from the comments given under "other".

Figure 7.1 shows the number of responses for each crash circumstance, expanded by groups of crash location types as given in question 12 of the questionnaire.

Well over half of the B/MV crashes occur at road junctions. Whilst the descriptions in the questionnaire give rise to some ambiguities (for instance, "cyclist entering a roadway" at a junction location could mean entering from a side road or from off the road), most of these crashes involved turning vehicles. About 40% were right-angled collisions, in which one of the vehicles presumably crossed the path of the other, but was not necessarily making a turning manoeuvre (such as a vehicle crossing a main road to continue on a side road). Just under a quarter of crashes at road junctions involved a car turning right colliding with a bicycle proceeding straight ahead, and a further 9% involved a car turning left. Only 8% were crashes in which a bicycle was struck from behind, although the questionnaire does not distinguish whether the bicycle was stationary or moving at the time (a stationary bicycle could have been waiting to make a turn). Just over 10% involved a collision between a cyclist entering a roadway and a vehicle proceeding along it.

About 20% of B/MV crashes occurred on roads between junctions. The largest group of these crashes were cyclists being struck from behind. Crashes involving car doors were also significant, as were crashes where cyclists entered the roadway.

Crashes in "near-road" locations (driveways, paths etc) mainly involved cyclists or motorists entering the road. These crashes amount to 21% of B/MV crashes.

A relatively small number of B/MV crashes occurred in "off-road" locations.

Questions 30 and 31 on the questionnaire give further insight into the circumstances of the crash, by asking what object the bicycle was in collision with or whether the crash was caused by loss of control without hitting an object. Table 7.1 shows this information compared with the crash types.

TABLE 7.1 Cyclist Questionnaires
Collision Details

Object collided with	**Crash type**			**TOTAL**
	B/MV	**B/NMV**		
		Loss of control	**Collision**	
None/not stated	3	66	4	73 (14%)
Moving vehicle	319	-	-	319 (62%)
Bicycle	-	-	22	22 (4%)
Stationary vehicle	21	-	-	21 (4%)
Rock	-	-	4	4 (1%)
Pedestrian	-	-	2	2 (0%)
Animal	-	-	4	4 (1%)
Tree/pole	-	-	3	3 (1%)
Loose surface	1	3	25	29 (6%)
Pothole/grille	-	-	8	8 (2%)
Other	2	2	24	28 (5%)
TOTAL	**346**	**71**	**96**	**513(100%)**

The table emphasises the prominence of moving vehicle collisions in the data. The proportion of B/NMV crashes (33%) is probably an underestimate for all bicycle collisions because of the sampling methods used in the survey (see Chapter 2).

The majority (92%) of B/MV crashes were collisions between bicycles and moving vehicles. Most of the remaining B/MV crashes (21) were collisions with stationary vehicles, of which 14 were with car doors.

Over 40% of B/NMV crashes resulted from loss of control. Of those that involved collisions, just over a quarter were caused by loose surfaces, and just under a quarter were collisions with other bicycles.

7.2 Visibility Obstructions

Nearly a quarter of all the cyclist responses, including 29% of those referring to B/MV crashes, indicated that visibility was obstructed in some way. The obstructions described were varied; around 20% were in the "other" category. Of the responses mentioning obstructions, 38% were fixed obstructions (trees, hedges, fences or buildings) and 20% were moveable, stationary obstructions (parked cars). Moving vehicles obscured visibility in 18% of the responses. Few mentioned the sun as an obstruction to visibility.

When visibility obstructions are compared with crash circumstances (Figure 7.2) it is apparent that fixed obstructions are prevalent in crashes involving cyclists or motorists entering a road. About 60% of B/MV crashes occurring when cyclists enter roads involved a visibility obstruction of some sort.

7.3 Bicycle Defects Contributing to Crashes

As indicated in Chapter 6, 15% of respondents said that their bikes had defects at the time of the crash; 40% of these had defective brakes. About 10% of all respondents considered that bicycle defects contributed to the crash. This is too small a number for the significance of any particular defects to be assessed with statistical reliability, but by far the greatest number (twenty) identified brakes. Twelve instances cited the chain or gears.

7.4 Cyclists' Riding Habits

Question 33 of the questionnaire asked whether the cyclist was doing a range of things at the time of the crash, to try and establish possible rider influences on the crash cause. The activities listed were varied, ranging from "riding on loose gravel" to "double dinking" (carrying a passenger on a bicycle built for one person), and a number of respondents ticked more than one box. Table 7.2 summarises the results of this question.

Half the respondents gave an answer to the question. Of these, 62% ticked one activity only, 25% ticked two and 10% ticked three. The remaining 4% ticked four activities.

The results from this question suggest that rider error is a greater influencing factor in bicycle only crashes than in other crash types, because the number of such crashes with more than one of the activities ticked is greater. However the question is not worded clearly enough to ensure that respondents are attributing the activities to the cause of the crash, and the activities themselves are of a mixed nature. For instance, any number of cyclists could have been braking at the time of their crashes, but braking may not have caused loss of control; it may even have made the crash less serious.

TABLE 7.2 Cyclist Questionnaires
Riding Habit at Time of Crash

At the Time of the Crash were you:	**Crash Type** B/MV	B/B	B Only	**TOTAL**
Riding too fast	32	3	46	81 (31%)
Racing	7	5	6	18 (7%)
Double dinking	7	-	5	12 (5%)
Doing tricks	-	-	13	13 (5%)
Braking	40	4	15	59 (23%)
Making a sharp turn	17	1	30	48 (19%)
Riding on RHS of road	3	-	1	4 (2%)
Talking to a companion	10	5	8	23 (9%)
Not looking ahead	21	1	10	32 (12%)
Riding on loose gravel	1	1	20	22 (8%)
Carrying an object	22	1	7	30 (12%)
Passing too close to MV	12	-	1	13 (5%)
Other	5	-	37	42 (16%)
Total of above	**177**	**21**	**199**	**397(153%)**
No. of Crashes concerned	135	15	109	259(100%)
% with more than one of above	31%	40%	83%	53%
No. not stated	211	7	36	254
Total No. of Crashes	**346**	**22**	**145**	**513**

Notwithstanding the ambiguities of the question, there are a number of points to note:

- Nearly one third of the respondents who answered the question said they were riding too fast at the time of the crash. The majority of these (46 out of 81) were bicycle-only crashes.

- Relatively few respondents (10% of those answering the question) said they were double dinking or doing tricks - regarded as irresponsible cycling - and a further 7% were racing, which may or may not be an irresponsible activity.

- One fifth (21%) of those answering were talking to a companion or not looking ahead (i.e. probably not paying full attention to their riding) at the time of their crashes.

7.5 Psychological Factors

The questionnaire asked respondents whether they were in a state of mind preoccupied by a number of external influences at the time of the crash. Most (79%) did not answer the question. Of those that did, the results were as follows (some respondents gave more than one answer):

- Over half (53%) said they were excited about something
- A third (33%) said they were running late
- Under a quarter (21%) were under some degree of stress from worry about work or exams, arguments with family or friends and other causes.

These overall proportions were similarly reflected in the different types of crash (B/MV, B/NMV).

7.6 Relationship with Time and Place

Crash circumstances do not vary significantly with time in the survey data. A larger sample of incidents may provide greater insight into this.

Most crashes occurred in dry, calm weather and in daylight, as shown in Chapter 4. There is no evidence that particular crash circumstances are more likely to occur in any given weather conditions.

The distribution of various crash circumstances with location type is shown in Figure 7.1.

7.7 Relationship with Cyclist Characteristics

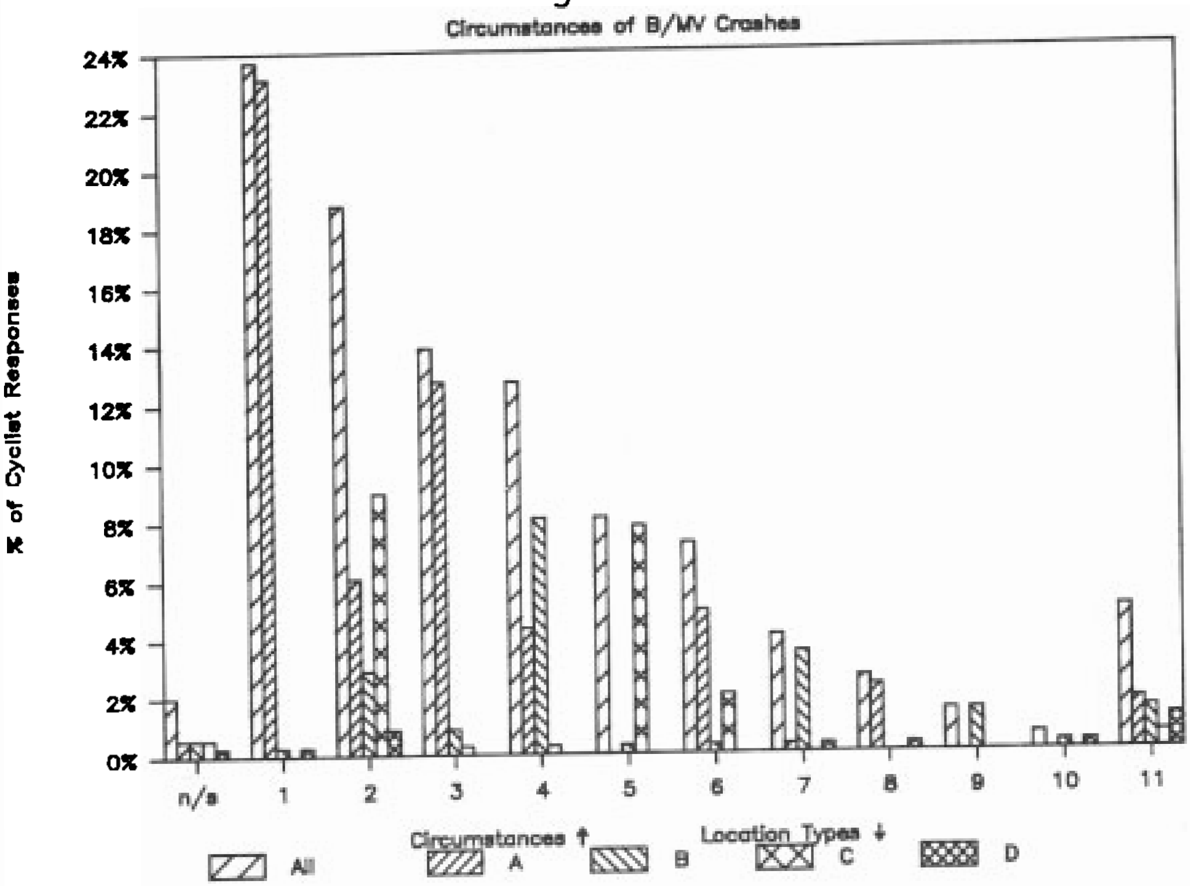
Different crash circumstances and collision types occur amongst the age groups of cyclists in similar proportions to the overall survey population. There is therefore no evidence of particular age groups being more or less prone to any given crash circumstances. As stated in Chapter 5, nearly one third of all crashes occur to cyclists aged from 10 to 14 years old.

There are no special relationships (beyond those already identified) between crash circumstances and other cyclist characteristics (trip purposes, cycling and route experience, crash history, clothing or helmet use).

7.8 Relationship with Bicycle Characteristics

Different bicycle types are spread across the crash circumstances and collision causes in proportion with their numbers in the overall survey data, and there is no obvious significance in whether a bicycle had certain equipment fitted.

Figure 7.1



KEY

Crash Circumstances

1. Right angled collision at road intersection
2. Cyclist entering a roadway
3. Car turning right
4. Cyclist struck from behind
5. Car entering a roadway
6. Car turning left
7. Car door
8. Cyclist turning right
9. Parked car or obstacle
10. Overtaking, hit rear of moving car
11. Other

Location Types

A. Road junctions (intersections, t-junctions, roundabouts)

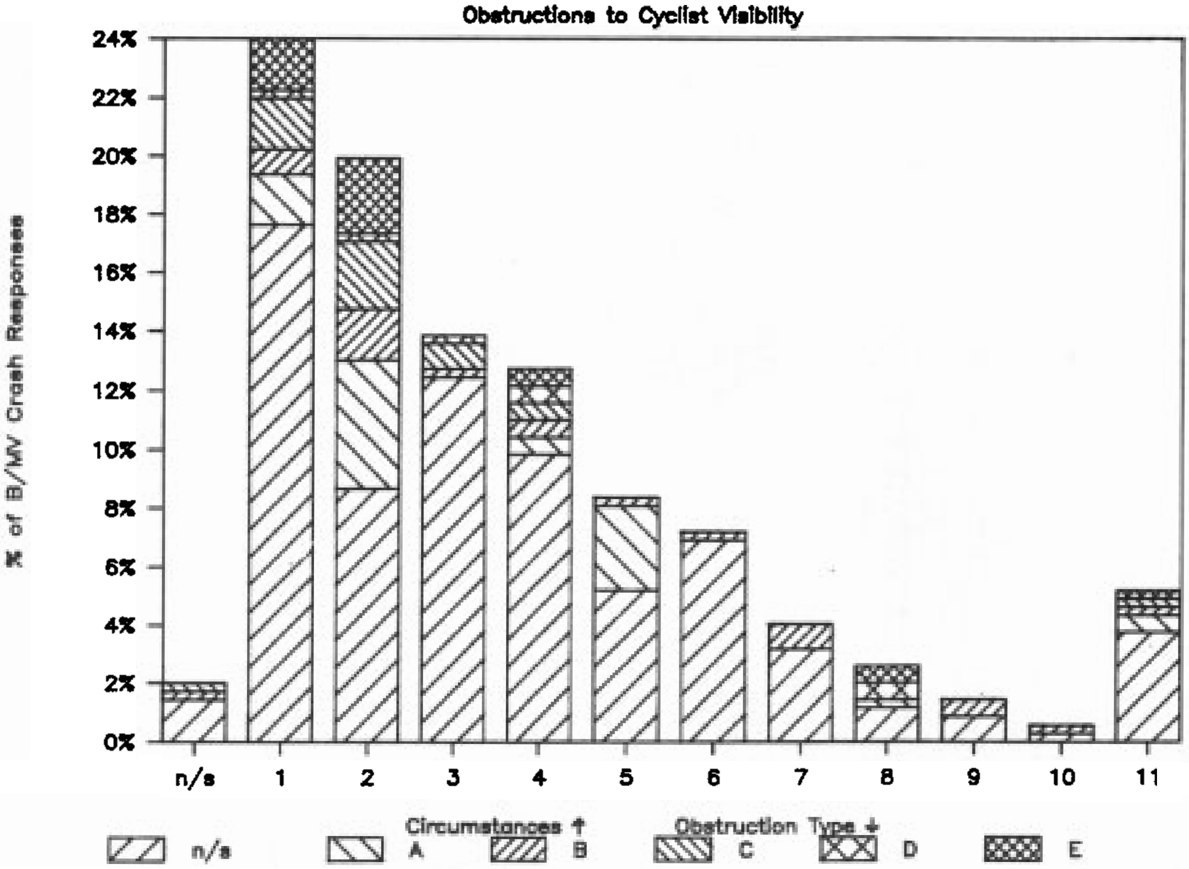
B. Road between junctions

C. Near-road locations (driveways, footpaths, bikepaths and junctions of paths with roads)

D. Off-road locations (car parks, private yards, "other")

n/s = not stated

Figure 7.2



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5. Car entering a roadway
6. Car turning left
7. Car door
8. Cyclist turning right
9. Parked car or obstacle
10. Overtaking, hit rear of moving car
11. Other

Visibility Obstructions

A. Fixed (fences, trees, hedges and buildings)

B. Moveable (parked cars on road or verge)

C. Moving vehicles

D. Sun

E. Other

n/s = not stated

CHAPTER 8

INJURY CHARACTERISTICS

The questionnaire asked cyclists to describe both the location(s) and severity of injuries they received from their crashes. Figure 8.1 summarises this information. It should be noted that many respondents had multiple injuries, and their assessment of the severity of their injuries was on an overall basis rather than for each type of injury.

8.1 Injury Locations

Nearly two-thirds (64%) of crashes in the survey resulted in injuries to legs and/or feet, and 58% resulted in injuries to arms and/or hands. Head and/or face injuries occurred in 41% of crashes.

Injuries to the torso occurred in 34% of crashes. Most of these (60%) were injuries to the neck or back.

It is clear that injuries to the extremities of the body (arms, legs and head) are most frequent, probably because they are the most vulnerable in a crash situation.

8.2 Injury Severity

Figure 8.1 shows that the severity of injuries was broadly similar regardless of the location on the body. This is not as one might expect, and is because the questionnaire asked respondents to state the severity of their total injuries rather than the individual ones; many respondents had injuries to more than one part of their bodies.

In overall terms, 10% of respondents had severe, 46% had moderate and 39% had minor injuries. The remaining 5% did not answer the question.

Figure 8.2 shows injury locations against the number of locations stated. Single, double and three or more injuries each account for around 30% of crashes. 40% of single injuries occur to the legs, 30% to the arms and 20% to the head. When two injury locations were stated, 72% were legs and 67% were arms. Head injuries become more frequent when three or more injury locations are stated (70% of these victims had head or face injuries). This suggests that head injuries occur in the more serious crashes (i.e. those resulting in multiple injuries).

8.3 Relationship with Time and Place

The data shows no significant variations of injury characteristics with time, weather conditions, crash type (i.e. B/MV, B/NMV) or crash location. The risk of injury in a bicycle crash can therefore be said to be similar at all times and places. In particular there is no evidence that crashes in darkness or twilight are any more serious (in terms of resulting injuries) than crashes in daylight; the same is true of crashes in rainy conditions. The fact that there are relatively few such crashes in the survey data means that the statistical significance of any variations is limited.

8.4 Relationship with Cyclist Characteristics

There is little variation of injury characteristics with the age or sex of cyclists, nor with trip purposes, cycling experience, route familiarity or crash site familiarity. Past crash history has little influence either.

The data does not include enough helmet wearers to assess with certainty whether head injuries are less common or less serious when a helmet is worn. With this in mind, there is an indication that severe overall injuries are actually slightly more common among helmet wearers, as shown in Figure 8.3. Whilst this may not be significant, it does suggest that further research could be worthwhile.

About 13% of cyclists wearing shirts received severe injuries above the waist, compared with only 8% of those wearing jumpers, coats or jackets. Similarly, 13% of cyclists wearing thongs or with bare feet received severe injuries to their legs or feet, compared with 10% of those wearing shoes. These are the most significant variations we have established between injuries and clothing types. More detailed assessment may have been possible if the question on injury location was more detailed (for instance, "legs and/or feet" was given as a single category).

8.5 Relationship with Bicycle Characteristics

There is no evidence in the data that injuries are more or less serious with different types of bicycle, nor between bicycles with various defects at the time of the crashes (regardless of whether any defects helped cause the crash or not). As with helmet use, comparatively few respondents said their bikes had defects; this reduces the significance of any variation in crash or injury characteristics.

8.6 Relationship with Crash Circumstances and Causes

As with the other factors mentioned above, there is no indication in the data that injuries vary with the crash circumstances. Injuries resulting from collisions with stationary objects (including parked cars) appear to be slightly less serious than those from crashes with moving vehicles, insofar as they result in proportionately more minor injuries (44% compared with 39%) and fewer moderate or severe injuries. Again, more detailed questions on the location and severity of injuries would probably allow better analysis.

Figure 8.1

Severity and Location of Injuries

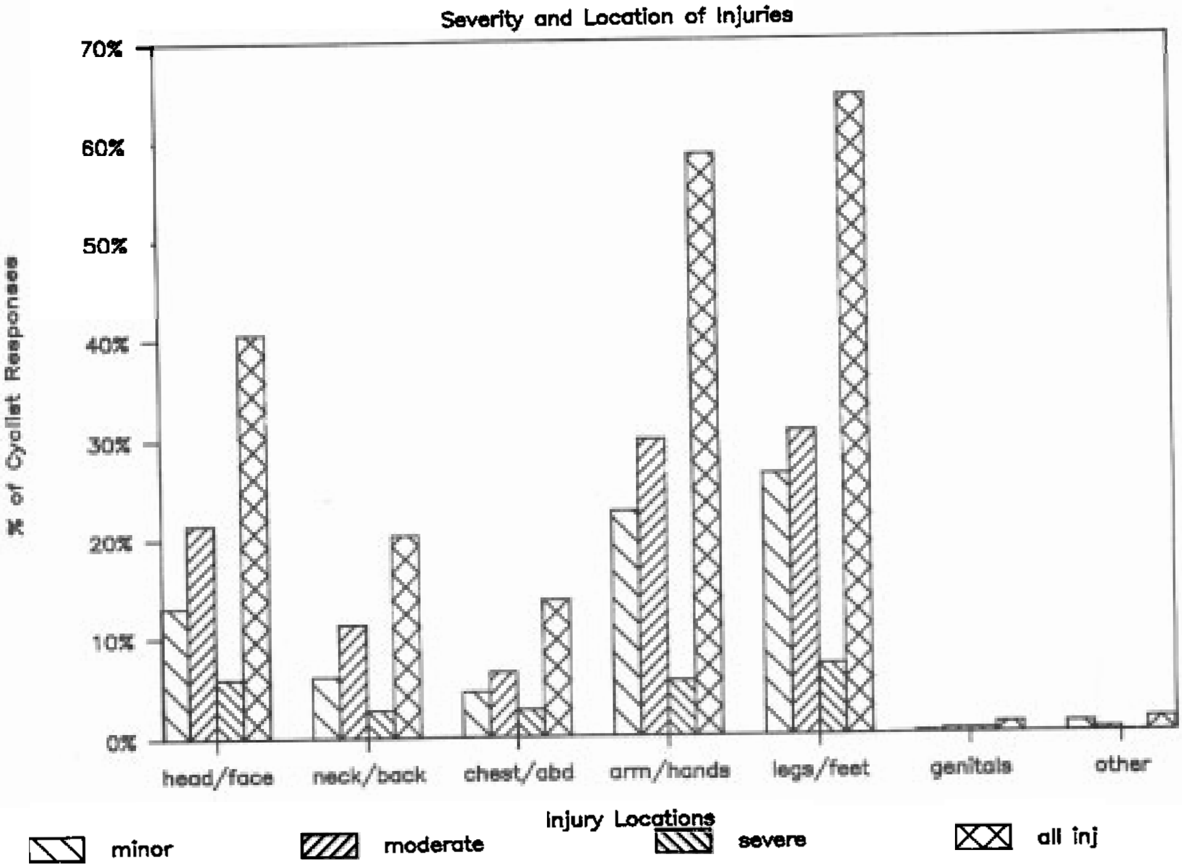


Figure 8.2

Number of Injuries by Location

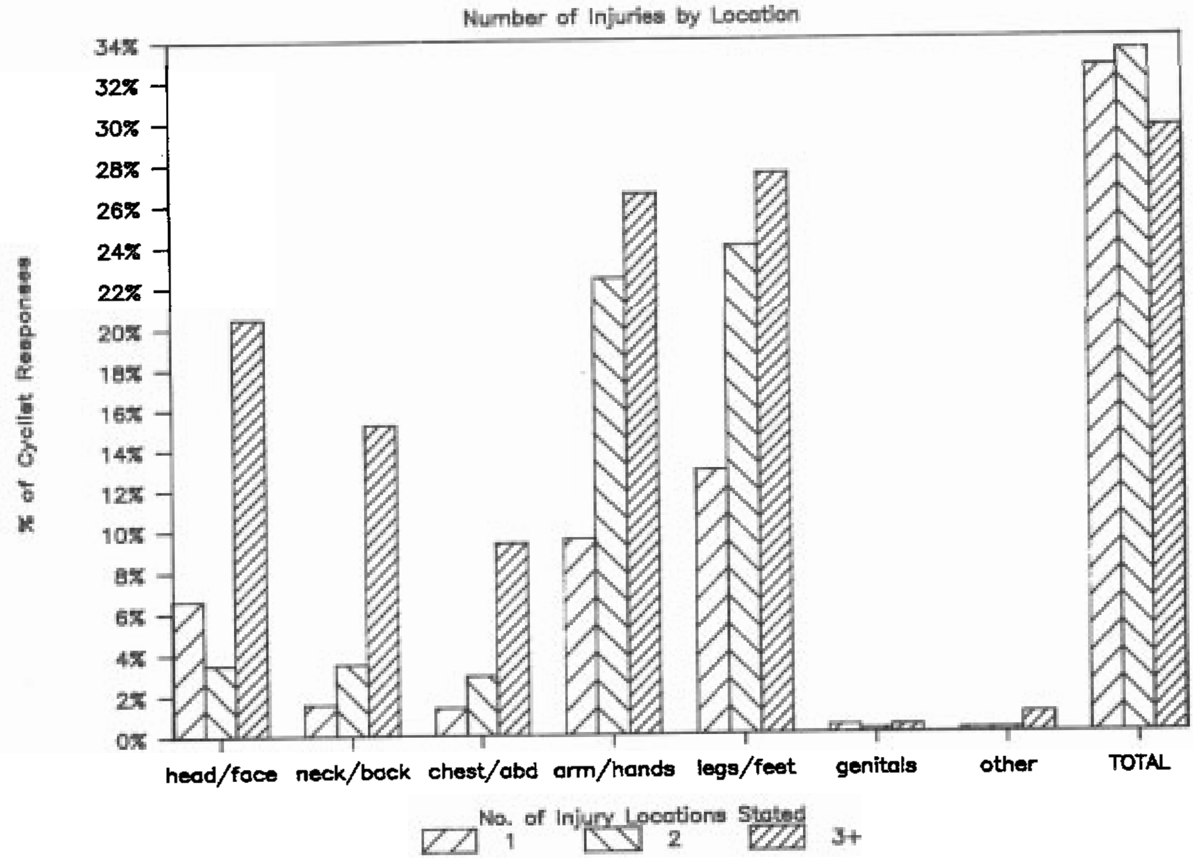
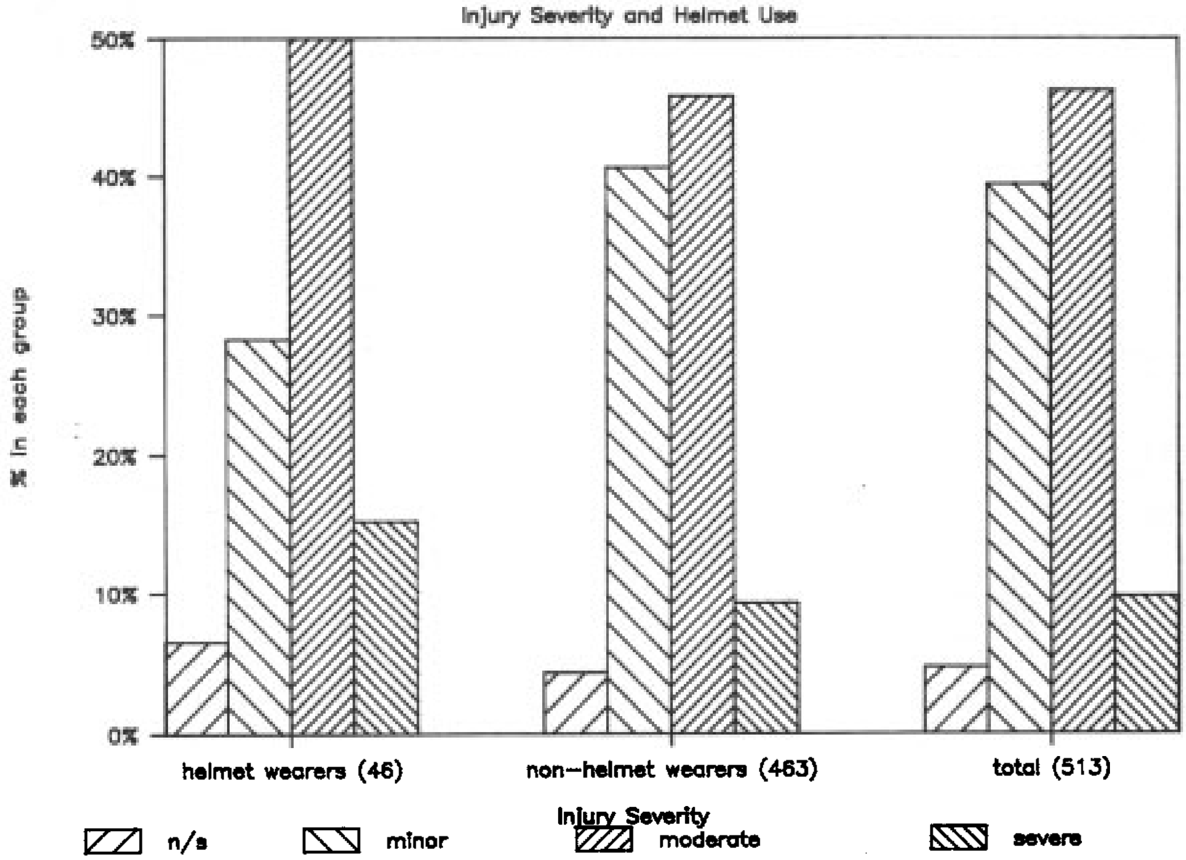


Figure 8.3

Injury Severity and Helmet Use



CHAPTER 9

CRASHES ON ROTTNEST

As stated earlier, 19 of the cyclist questionnaires were returned from cyclists in crashes on Rottnest Island. All were distributed through the island's Nursing Post. The circumstances of the island are very different from the rest of WA; there are a few residents but most of the island's population at any given time are holidaymakers or day trippers from the mainland. **Bikes are available for hire**, or one can ship one's own bicycle on the ferries to and from Rottnest. Motor vehicle traffic is limited to official vehicles and a few residents' cars.

9.1 Time and Place

Seventeen of the crashes were bicycle only and two were bicycle/bicycle. There were no B/MV crashes in the data.

None of the crashes occurred in June, July, August or September (i.e. the winter months, when tourists on the island are few). Crashes were spread through the week; few occurred at weekends but the small number of respondents involved does not make this significant.

All but one of the crashes were in dry weather conditions, and none were at night (although one was in twilight).

9.2 Cyclist Characteristics

Nine of the cyclists were male, and ten female. Eleven were in the 10-14 year age group; the remainder were of varying ages.

All but one of the cyclists gave "other" as their trip purpose; the questionnaires show that they were all on holiday or leisure trips. Most had more than one year's cycling experience and half were familiar with the route they were taking at the time of their crash.

Nearly all the cyclists were wearing shirts and shorts or skirts, whilst nine wore shoes, eight wore thongs and two had bare feet. None were wearing helmets and only one was wearing safety clothes.

9.3 Bicycle Characteristics

Twelve of the bicycles had upright handlebars and fourteen were not the cyclist's usual bike (suggesting they were hired bikes). Ten of the bikes had defects of various types at the time of the crashes.

9.4 Crash Circumstances and Causes

Six respondents fell from their bikes without first hitting an object. Seven fell on loose sand or gravel and two in potholes or grilles. This reflects the effect of the generally poor surfaces on the island both on and off the roads, and the greater proportion of off-road cycling that occurs, compared with the mainland. It may also reflect the lack of familiarity cyclists had with their bicycles.

9.5 Injuries

Ten cyclists had minor injuries, six moderate and two severe. Injuries to limbs were most common (eleven injured their legs or feet, and ten their arms or hands). Six cyclists injured their head or face.

9.6 Summary

In summary, it is not possible to draw firm conclusions with such a small number of crashes, but crashes on Rottnest show clear differences to those in the rest of WA. These differences are in accordance with the cycling conditions prevalent on the island. The apparently greater incidence of minor injuries is perhaps explained by island visitors not having ready access to first aid equipment, save through the Nursing Post.

Considering the extent to which cyclists and pedestrians mix and conflict with each other on the island, it is perhaps surprising that none of the crashes involved collision with a pedestrian.

SECTION III

RESULTS - MOTORIST QUESTIONNAIRES

CHAPTER 10

OVERALL RESULTS

There were 299 questionnaires from motorists involved in bicycle/motor vehicle crashes. Appendix D summarises the overall responses to the questions asked; principal indications are:

- The overwhelming majority (97%) of vehicles involved in B/MV crashes are cars.

- Just over half (54%) the motorists involved in B/MV crashes are male.

- Forty percent of motorists are under 30 years of age and 63% are under 40.

- Most crashes (84%) occurred in daylight, 10% in twilight and 5% at night.

- Obstructed visibility was a stated influence (i.e. stated by motorists) in 41% of crashes.

- Over half (54%) of the crashes were right angle collisions at intersections, or with cyclists entering a roadway.

- Nearly 60% of motorists stated they had over 10 years' driving experience.

- Most motorists (83%) had driven through the crash site more than ten times previously, and 92% were driving the car they normally use.

- A reasonable proportion (44%) of motorists said they were bicycle users, but 70% of these cycled less than once per week.

- Just over 40% of drivers had had no previous motor vehicle crashes, and 52% had had no crashes with bicycles.

Some of the questions were identical to those asked of cyclists. When the results are compared for these questions, there is strong correlation between the two sets of data, with the notable exception of the colour of the cyclist's clothing. Nearly two-thirds of cyclists in B/MV crashes said they were wearing light coloured clothes, but only just under half the motorists saw light coloured clothes.

The comparatively large proportion of motorists who said their visibility was obscured in some way is worthy of note.

CHAPTER 11

CHARACTERISTICS OF TIME AND PLACE

11.1 Relationship of Crashes with Time

Figures 11.1 to 11.3 show the characteristics of timing of crashes from the motorist responses. The distribution of crashes with time is almost identical to that obtained from the cyclist responses, which are plotted for comparison (bicycle/motor vehicle crashes only). There is no more than about 2% difference between the two at any point on the graphs.

11.2 Weather and Lighting Conditions

Table 11.1 summarises the weather and lighting conditions recorded from the motorist questionnaires. The results are very similar to those from the cyclist questionnaires (see Table 4.1).

TABLE 11.1 Motorist Questionnaires
Weather and Lighting Conditions

Light and Wind Condition		Rain Condition n/s	Dry	Raining	TOTAL
Daylight	n/s	-	19 (6%)	2 (1%)	21 (7%)
	Windy	-	9 (3%)	3 (1%)	12 (4%)
	Calm	1 (0%)	211 (71%)	7 (2%)	219 (73%)
	TOTAL	**1 (0%)**	**239 (80%)**	**12 (4%)**	**252 (84%)**
Twilight	n/s	-	5 (2%)	1 (0%)	6 (2%)
	Windy	-	-	3 (1%)	3 (1%)
	Calm	1 (0%)	20 (7%)	1 (0%)	22 (7%)
	TOTAL	**1 (0%)**	**25 (8%)**	**5 (2%)**	**31 (10%)**
Dark	n/s	-	-	1 (0%)	1 (0%)
	Windy	-	-	3 (1%)	3 (1%)
	Calm	-	10 (3%)	2 (1%)	12 (4%)
	TOTAL	**-**	**10 (3%)**	**6 (2%)**	**16 (5%)**
ALL LIGHT CONDS	n/s	-	24 (8%)	4 (1%)	28 (9%)
	Windy	-	9 (3%)	9 (3%)	18 (6%)
	Calm	2 (1%)	241 (81%)	10 (3%)	253 (85%)
	TOTAL	**2 (1%)**	**274 (92%)**	**23 (8%)**	**299(100%)**

11.3 Crash Locations

Table 11.2 compares the location types from the motorist responses to those from the cyclist questionnaires, for bicycle/motor vehicle crashes only. Again, the proportions of different crash locations are very similar between the two sets of data.

TABLE 11.2 Motorist Questionnaires
Crashes by Location Type

Location Type	No. of Crashes	
	Motorist Responses	Cyclist Responses
Not stated	-	4 (1%)
Driveway	28 (9%)	31 (9%)
Footpath/Bikepath	16 (5%)	15 (4%)
Road intersection	82 (27%)	97 (28%)
Road t-junction	76 (25%)	94 (27%)
Roundabout	5 (2%)	3 (1%)
Road between two side roads	51 (17%)	69 (20%)
Private yard	-	1 (0%)
Car park	4 (1%)	5 (1%)
Path at junction with road	37 (12%)	25 (7%)
Other	-	2 (1%)
TOTAL	**299 (100%)**	**346 (100%)**

The similarities between cyclist and motorist responses with respect to time and place serve to reinforce the conclusions in Chapter 4, namely that crashes occur at times when traffic (and hence exposure to risk) is greatest.

Figure 11.1

Crash Occurrence Through the Year

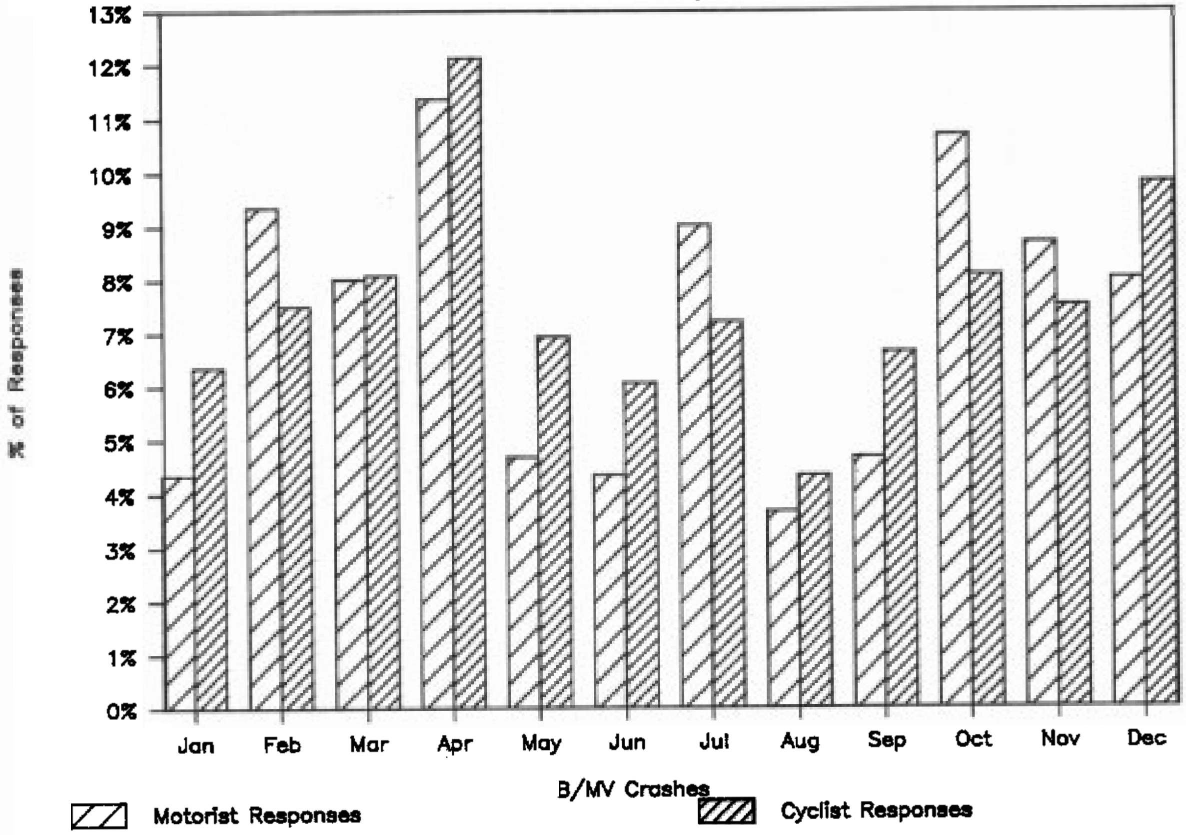


Figure 11.2

Crash Occurrence Through the Week

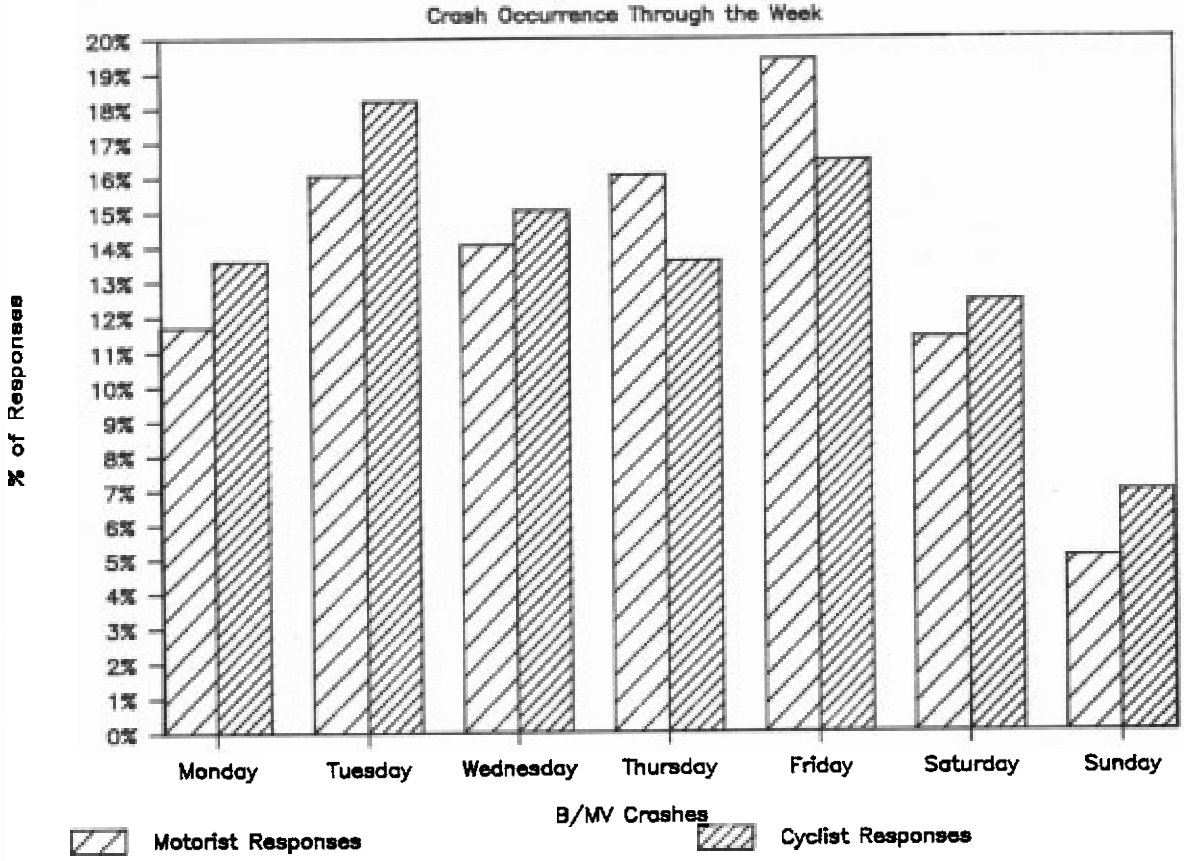
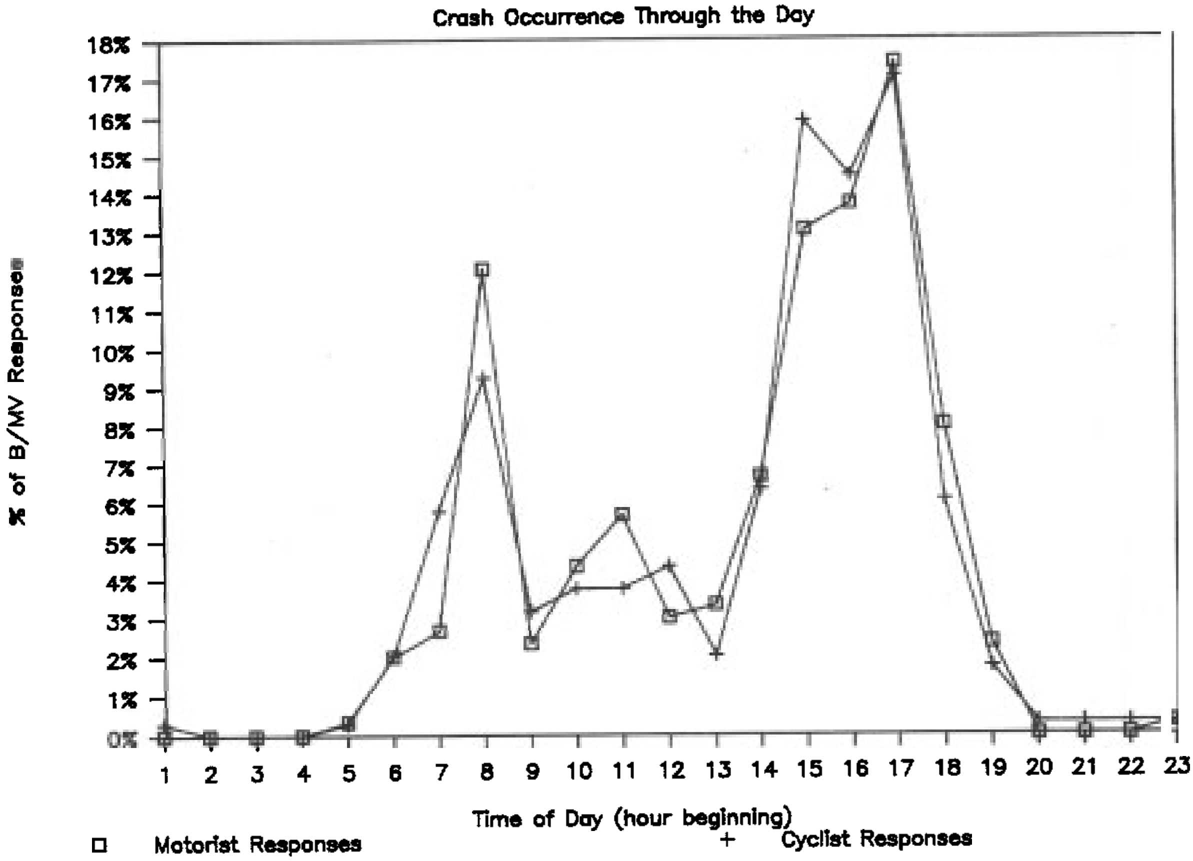


Figure 11.3


Crash Occurrence Through the Day
18%
17%
16%
15%
14%
13%
12%
11%
10%
9%
8%
7%
6%
5%
4%
3%
2%
1%
0%
% of B/MV Responses
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Time of Day (hour beginning)
Motorist Responses
Cyclist Responses

CHAPTER 12

MOTORIST CHARACTERISTICS

12.1 Age and Sex of Motorists

Figure 12.1 shows the age and sex of motorists in the survey data. 54% of motorists involved in B/MV crashes are male. There is a significant proportion of younger drivers (those under 30 and especially those in the 20 to 29 year age group) in the survey data; 29% of motorists are in their twenties.

12.2 Trip Purposes

About 40% of drivers in B/MV crashes were on trips to and from work. Figure 12.2 shows the stated trip purposes of drivers in B/MV crashes, compared with their ages.

12.3 Driving Experience and Route Familiarity

Well over half the motorists in the survey (60%) said they had more than ten years' driving experience, and another 16% said they had five to ten years' experience. When this is compared with motorists' ages, the lesser experience of drivers under 30 is apparent (see Figure 12.3)

The majority (92%) of motorists were driving the car they normally use at the time of their crashes, and 83% said they had driven through the crash site more than ten times.

12.4 Motorists' Crash History

Figure 12.4 shows the past crashes stated by motorists on the questionnaires. One third of respondents had no previous crashes, compared with two thirds of cyclists (although the latter only stated crashes in the past three years). Of those with a crash record, 30% had had one previous crash (of which nearly one third were with bicycles), and 68% had more than one, of which 40% were with bicycles.

Figures are not available to compare these results with those for motorists generally, but comparison with the results from the cyclist questionnaires suggests that motorists in B/MV crashes seem to have a worse crash record than cyclists.

12.5 Motorists' Cycling Experience

Under half the motorists (44%) said they rode a bicycle. Table 12.1 shows the frequency and amount of cycling experience given by respondents.

TABLE 12.1 Motorist Questionnaires
Motorists' Cycling Frequency and Experience

	Years of cycling experience					
Riding frequency	**1 or less**	**2-5**	**6-10**	**11-20**	**20+**	**TOTAL**
Not stated	-	-	-	-	1	1 (1%)
Daily	-	1	2	6	2	11 (8%)
3-4 times/week	1	2	-	3	3	9 (7%)
1-2 times/week	-	2	2	9	7	20 (15%)
less than once/week	3	4	9	37	38	91 (69%)
TOTAL	**4**	**9**	**13**	**55**	**51**	**132(100%)**
	(3%)	**(7%)**	**(10%)**	**(42%)**	**(39%)**	
Number not cyclists						167
TOTAL RESPONSES						**399**

The table shows that most (69%) drivers in the survey who cycle, ride less than once a week, although 81% have over ten years' cycling experience. However, as with cyclists, the questionnaire did not explore the quality of cycling experience (i.e. whether respondents had cycling training or education). Few motorists are regular cyclists.

12.6 Motorists' View of Cyclists

The motorist questionnaire asked a number of questions about the cyclist, as follows:

- cyclists' use of front and rear lights
- cyclists' clothing colour
- cyclists' use of safety clothes

Sixteen of the motorist responses were from crashes in darkness, but only one of these said that both bicycle lights were on and another two said only the headlight was on. Eight said the bicycle headlight was off; the remaining five did not know or did not answer the question. Although the numbers are small they correspond with the answers from cyclists in crashes after dark; half said their lights were on.

Nearly half (47%) of motorists said the cyclists were wearing light coloured clothing. This is less than the proportion of cyclists who said they were (65%). Only 14 motorists (5% of the total) said the cyclists were wearing safety clothes, but 10% of cyclists said they were. In both questions a larger proportion of motorists (than cyclists) did not answer the question, suggesting they did not know or remember what the cyclist was wearing.

Figure 12.1

Motorists in B/MV Crashes: Age and Sex

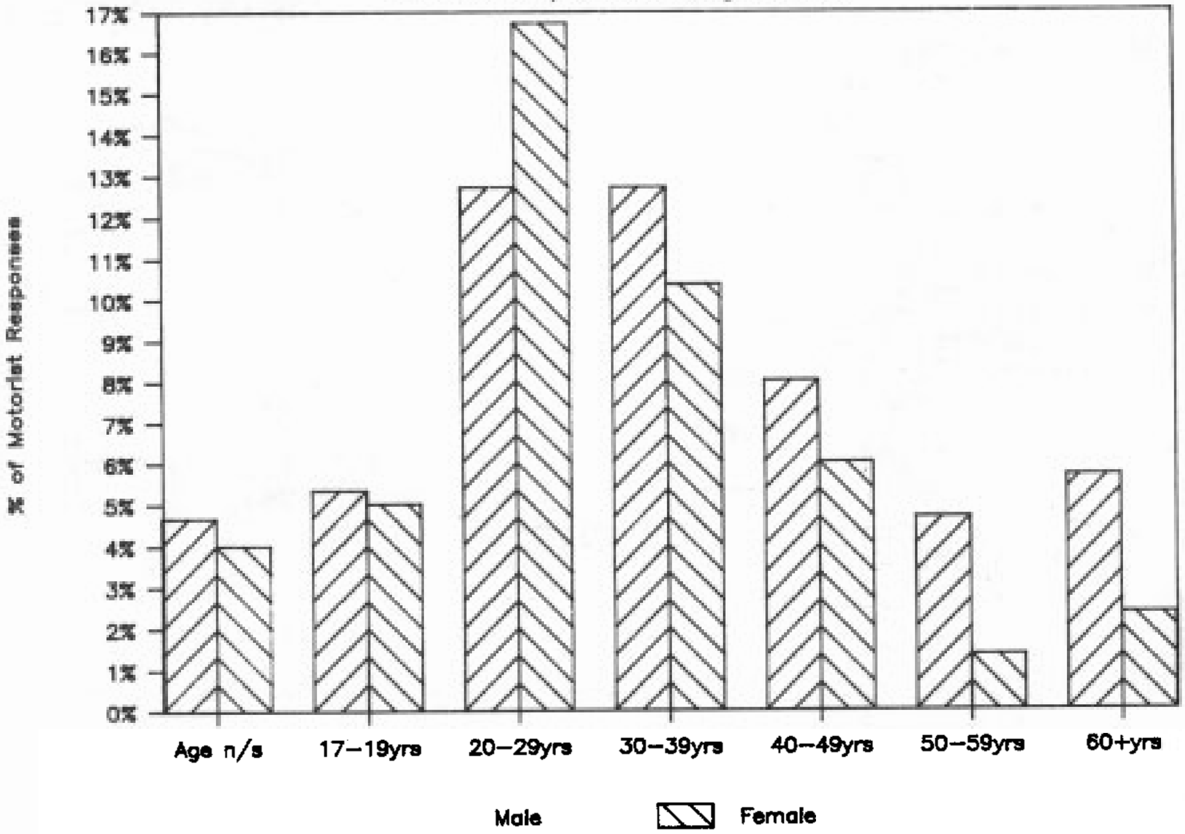
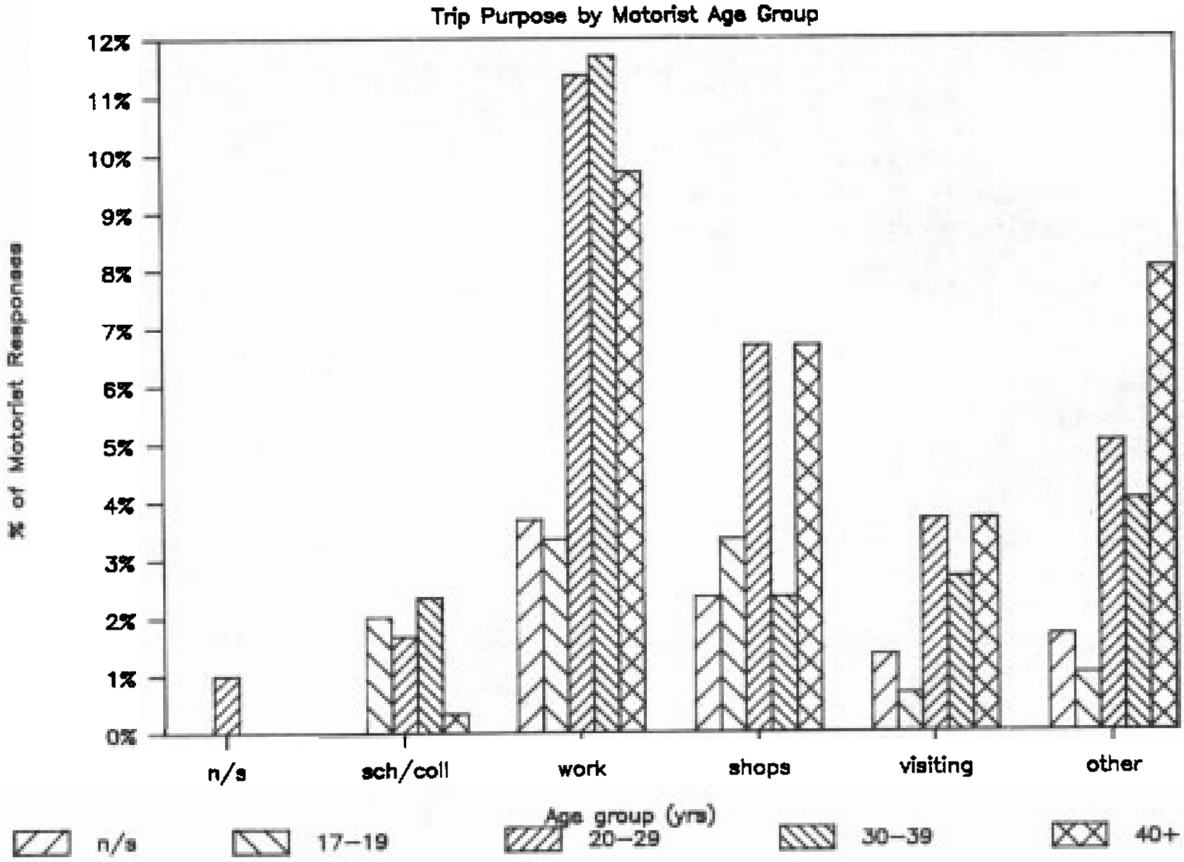


Figure 12.2

Trip Purpose by Motorist Age Group



DEPT. OF TRANSPORT
BOX 538 GPO
ADELAIDE 5001

Figure 12.3

Motorists' Driving Experience

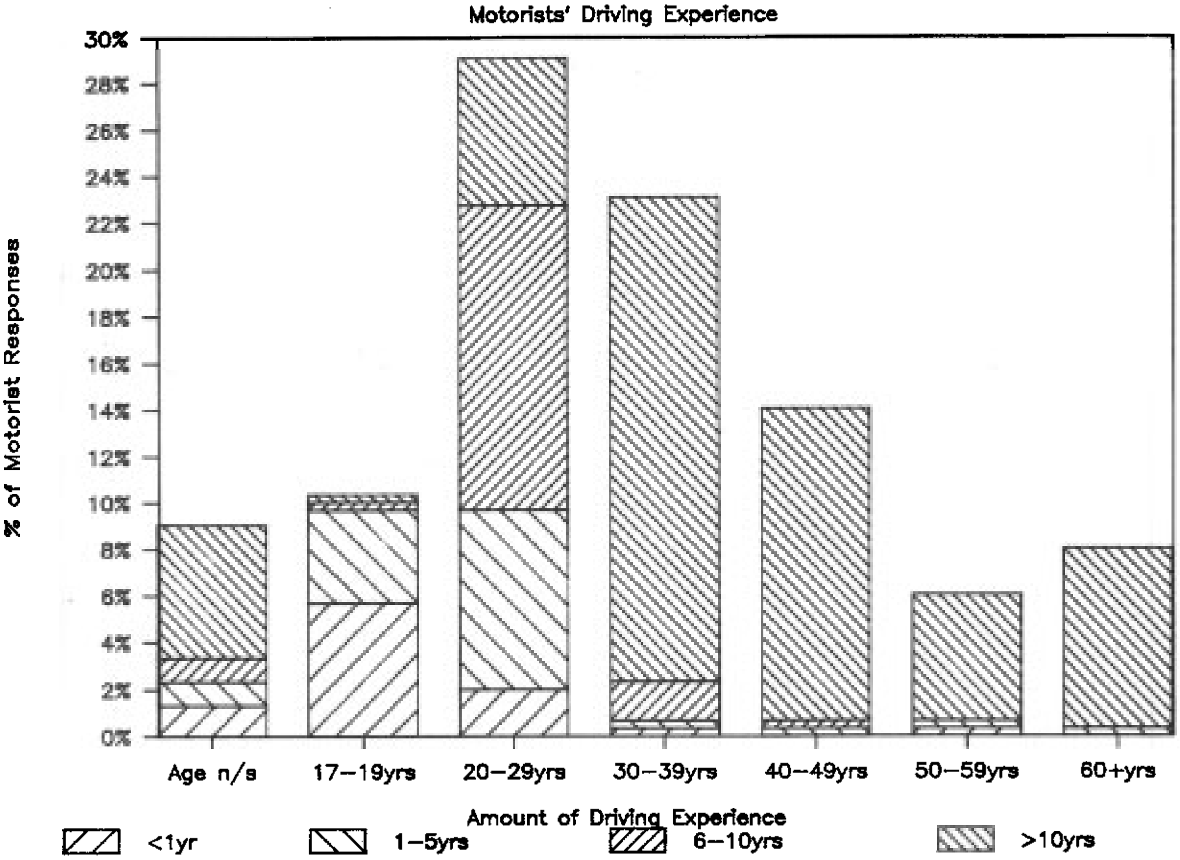
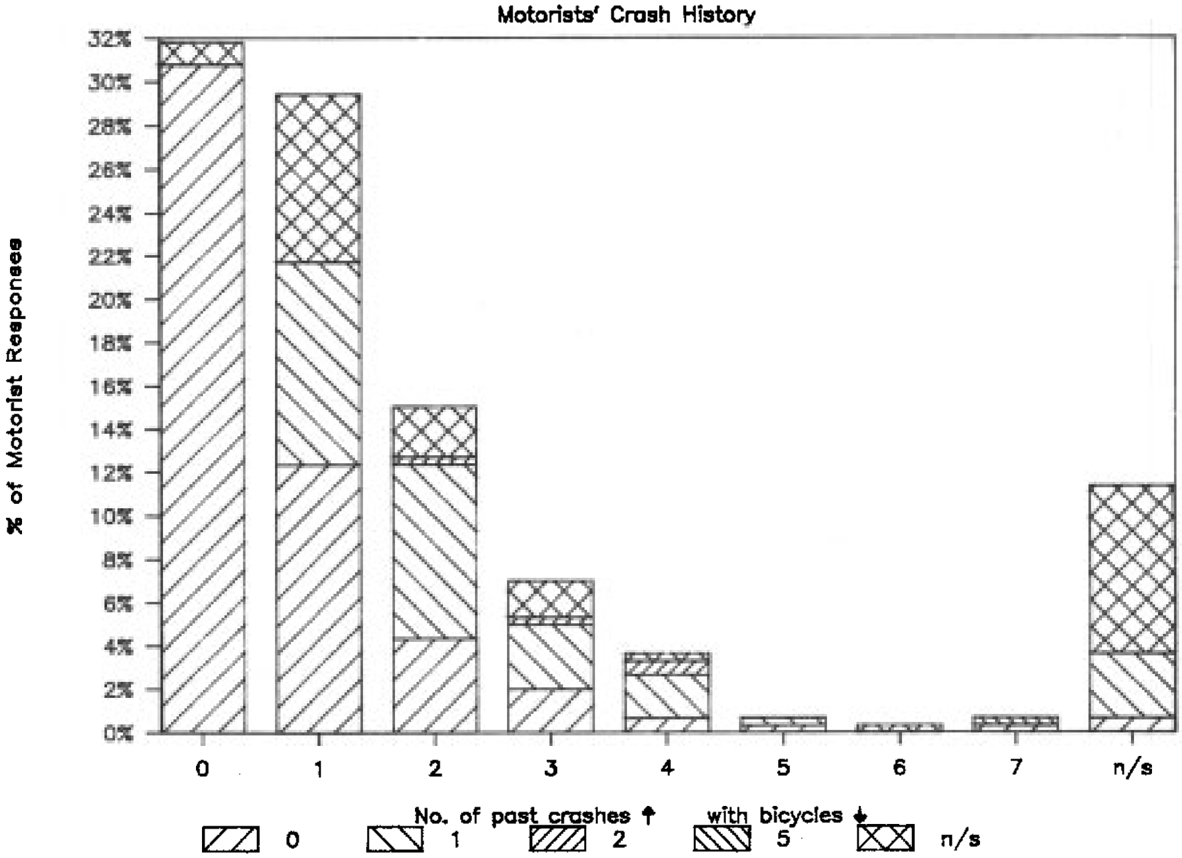


Figure 12.4

Motorists' Crash History



CHAPTER 13

CRASH CIRCUMSTANCES AND CAUSES

13.1 Crash Circumstances

Table 13.1 shows the crash circumstances described by motorists, compared with those by cyclists in B/MV crashes. The proportions are broadly similar, with two exceptions. Firstly, more motorists than cyclists (28% compared with 19%) described the crash circumstances as "cyclist entering a roadway", and secondly , less (7% compared with 14%) described "car turning right". We do not regard this difference as significant but it may suggest that crashes which were the fault of the respondent are under-represented; the fact that response was voluntary may have encouraged more people to reply whose crashes were not their own fault.

TABLE 13.1 Motorist Questionnaires
Crash Circumstances compared with Cyclist Responses

Circumstance	Motorists		Cyclists	
Not stated	3	(1%)	7	(2%)
L collision at road i/section	78	(26%)	82	(24%)
Cyclist entering a roadway	85	(28%)	65	(19%)
Car turning right	21	(7%)	48	(14%)
Car turning left	14	(5%)	25	(7%)
Struck from behind	43	(14%)	44	(13%)
Car entering a roadway	28	(9%)	28	(8%)
Car door	8	(3%)	14	(4%)
Cyclist turning right	7	(2%)	9	(3%)
Parked car or obstacle	-		5	(1%)
Overtaking, hit rear of mvng veh	5	(2%)	2	(0%)
Other	7	(2%)	17	(5%)
TOTAL	**299**		**346**	

13.2 Visibility Obstructions

Forty percent of motorists said their visibility was obscured at the time of their crashes. Of these, 36% quoted fixed obstructions (trees, hedges, fences or buildings) and 23% quoted stationary, moveable objects (parked cars); 22% said their visibility was obscured by moving vehicles, and 11% quoted the sun. Around 15% cited objects in the "other" category. When visibility obstructions are compared with crash circumstances (Table 13.2), fixed obstructions were an influence in crashes when cyclists or motorists entered a road. Half the right-angled collisions at intersections were influenced by obstructions to motorists' vision.

TABLE 13.2 Motorist Questionnaires
Visibility Obstructions in B/MV Crashes

Circumstance	**Visibility obstruction (see below)**						
	n/s	**A**	**B**	**C**	**D**	**E**	**TOTAL***
Not stated	2	1	-	-	-	-	3 (1%)
L collision at rd i/section	41	10	9	10	5	6	78 (26%)
Cyclist entering a roadway	57	12	4	8	1	5	85 (28%)
Car turning right	7	1	3	4	6	1	21 (7%)
Car turning left	12	1	1	-	-	-	14 (5%)
Struck from behind	33	1	1	4	-	4	43 (14%)
Car entering a roadway	8	18	4	-	-	1	28 (9%)
Car door	6	-	2	-	-	-	8 (3%)
Cyclist turning right	5	-	1	1	-	-	7 (2%)
Parked car or obstacle	-	-	-	-	-	-	-
Overtaking, hit rr of mvng car	3	-	2	-	-	-	5 (2%)
Other	4	-	1	-	1	1	7 (2%)
TOTAL	178 (59%)	44 (15%)	28 (9%)	27 (9%)	13 (4%)	18 (6%)	299

OBSTRUCTION TYPES:
- A Fixed (fences, trees, hedges and buildings)
- B Moveable (parked cars on road or verge)
- C Moving vehicles
- D Sun
- E Other

* Total does not necessarily agree with each row because some respondents quoted more than one obstruction.

13.3 Psychological Factors

The questionnaire asked motorists whether they were in a state of mind preoccupied by a number of external influences at the time of the crash. The vast majority (90%) did not answer the question. Of the 29 that did:

- eight were running late
- three were excited about something
- five were under some degree of stress from worry about work, exams or arguments with family or friends.
- eleven described other stressful circumstances.

SECTION IV

CONCLUSIONS AND RECOMMENDATIONS

CHAPTER 14

DISCUSSION

4.1 Cyclists in Crashes

As shown in Section II it is important to note that crash occurrence is closely linked to the degree of exposure to risk. However, it is also notable that over three quarters of bicycle crash victims are male, and that they are more prone to crashes than female cyclists when compared with their proportion of the cycling population. Furthermore the high incidence of younger cyclists, particularly 10-15 year olds on school trips and those in their twenties and thirties on work trips is of concern.

Cycling experience and route familiarity do not appear to have an influence; crashes are occurring in similar proportions to inexperienced and experienced cyclists alike, on routes they use regularly. The quality of experience may be more important, but the survey did not explore this.

Around two-thirds of cyclists in the survey experienced their first crash for at least 3 years, but the remainder had varied crash histories; cyclists in their late teens and twenties record a comparatively high average number of past injury crashes.

Helmets and safety clothes are used by few cyclists in the survey and their effect on crash occurrence and injuries cannot be assessed with certainty.

14.2 Bicycles in Crashes

Crashes occur in similar proportions to different types of bicycles; there is no strong evidence that, for instance, BMX bikes encourage more risk taking and hence more crashes. However, such bikes used by younger riders could be under represented in the survey.

A fairly small proportion of bicycles in crashes have defects (assuming that respondents who did not answer the question considered their bicycles were in good repair). However a large number of these have defective brakes.

Less than half of bicycles have lights fitted (cycling is largely a daylight activity), and although the number of crashes in darkness or twilight is small, only one third of them were apparently using their lights at the time.

14.3 Crash Circumstances

As with other types of road crash, bicycle/motor vehicle collisions occur most frequently at road intersections, or when cyclists or motorists are entering a road (from a driveway or path). Obstructions to visibility are a significant factor in the latter. Few crashes occur off roads, although these are probably under represented in the survey.

These observations again demonstrate that crashes are closely related to exposure to risk; vehicles at intersections are making conflicting manoeuvres and the risk of collision is much greater than in mid-block or off road locations.

14.4 Injuries

Injuries to limbs are the most common, followed by head and face injuries. Use of helmets is too infrequent for their effect on head injuries to be assessed. There is some evidence that injury severity is slightly reduced in victims who wore shoes and/or long trousers. Similarly it is apparent that collisions with moving vehicles result in slightly more serious injuries than those with stationary objects.

14.5 Motorists in Crashes

Virtually all bicycle/motor vehicle crashes involve cars as opposed to other types of vehicle (trucks, buses etc.). There does not seem to be any special significance in the age of motorists involved in bike/motor vehicle crashes, or in any other of the personal details surveyed.

As with cyclists, driving experience and familiarity with the crash site are not major influences on crash occurrence. It is possible that the motorists have worse crash records than the cyclists in the survey.

The influence of visibility obstructions to motorists is strongest in crashes where bicycles or cars enter a road (from a driveway or path).

CHAPTER 15

RECOMMENDATIONS

15.1 The Bikeplan Philosophy

The philosophy of the Bikeplan approach is that cycling conditions are enhanced by co-ordinated efforts in the fields of the four-Es:

- Engineering
- Education
- Enforcement
- Encouragement

The basic premise is that cycling is a healthy, energy-saving form of transport that should be encouraged. One factor which deters many people from cycling is that they perceive it to be unsafe, although the Perth Bikeplan argued that as relatively few cyclist injury crashes involve motor vehicles (when a wider range of crashes than those covered by this Study are considered) this fear is largely unfounded.

The Perth, Mandurah and Bunbury Bikeplan recommendations all have a safety connotation. The results of this Study serve to reinforce the co-ordinated approach proposed by the Bikeplans, because we have seen that crashes are influenced to varying degrees by environmental, mechanical and human factors (although the first group is more important). Engineering measures can improve the cycling environment, whilst education, enforcement and encouragement can serve to make cyclists more aware of the potential risks, making them better equipped to avoid them.

If risks are to be reduced, the single most important consideration is to minimise the conflict that arises between cyclists and other road users. Whilst the crashes analysed in this Study are a small proportion of the total that occur each year (many of which go unreported and do not involve hospital treatment, and thus were not surveyed), they are certainly the most serious in terms of both personal trauma and their cost to the community.

15.2 Engineering Measures

Construction of bikepaths or dual-use paths reduces the conflict between motor vehicles and bicycles, although careful design is necessary to avoid unnecessary new risks being introduced. A particular problem exists with dual use paths in that conflict between cyclists and pedestrians is increased, as is that between cyclists and vehicles crossing the path (on driveways, for instance). The success of purpose-built cycling facilities depends on the degree of segregation that can be achieved in a given situation; a path with frequent driveway and side road crossings or heavy pedestrian use can be hazardous for cyclists, and they may be discouraged from using it.

The cost of fully separate cycle facilities that offer comparable routes and improved safety to existing roads, is often prohibitive. However their safety value should not be underestimated.

Considering the influence of visibility obstructions in the crashes surveyed, points where cyclists and drivers enter roads, (both from driveways, off-road locations and side roads at intersections) should be critically appraised to assess their visibility. In designing crossings between cycle or dual-use paths and roads care should be taken to ensure that no fixed obstructions to visibility exist, and parking restrictions should be enforced for a suitable distance either side of a crossing.

The survey did not allow crashes in WA to be located, so the existence of any cycling "black spots" is not known. The high incidence of crashes at road intersections emphasises the care that is also needed to design these points in the road system. Guidelines for intersection designs that cater for cyclists should be formalised and promoted; before being disbanded the Bikeplan Team was working on engineering initiatives and planned to prepare a Bicycle Facilities Design Manual for wide distribution that would offer guidelines for bikepaths, dual use paths, general road design considerations and signing. Preparation of this Manual is to be continued by the new State Bicycle Group, Bikewest.

15.3 Educational Initiatives

The 'Bike Ed' course promoted by the National Safety Council of WA with assistance from the Bicycle Policy Committee has shown some success but its implementation has been hampered by a lack of support from teachers and administrators in incorporating it into school programmes. Updating of the course material was recommended in the Perth Bikeplan, and its introduction into schools was urged in the Perth, Mandurah and Bunbury Bikeplans.

Amongst other things, the course material should include some reference to the findings of this Study, to emphasise where and to whom bicycle crashes in WA are occurring.

The high incidence of crashes amongst teenagers and young adults suggests that Bike-Ed type initiatives, which are aimed entirely towards primary school children, should be supplemented by courses and promotional material on bicycle safety for high schools and beyond. There are many ways in which those could be implemented. The Perth Bikeplan recommended a cycling course for high school students, and several other promotional initiatives aimed at cyclists and the public in general. An example is the promotion of responsible cycling through instruction, advice or information provided by dealers to bicycle purchasers. It is considered that the findings of this Study reinforce the need for such measures.

15.4 Traffic Laws, Regulations and Enforcement

There is little in the survey to suggest that enforcement initiatives could have a major influence on crash occurrence, but this is probably due to the survey techniques and the resulting comparatively small sample of crashes surveyed. Several of the recommendations under the heading of enforcement in the three WA Bikeplans (Perth, Mandurah and Bunbury) relate to cycling safety and should be encouraged. In particular greater initiatives should be taken to promote use of safety helmets and daytime visibility aids, and more stringent standards for bicycle brakes.

Despite the small number of crashes in darkness the survey shows that a majority of cyclists do not use lights. This and other infringements of existing road traffic laws should be more effectively enforced, and the laws themselves publicised and promoted through educational initiatives.

The survey was restricted to reported crashes and those involving hospital treatment. There was a very small number of "damage only" crashes amongst the former; only 4% did not say they had any injuries. Only crashes which involve injury, or property damage worth more than $300 (soon to be increased to $500), are required to be reported to the police. Many bicycle crashes involve damage below this value and so never get reported. The Bikeplan recommended that the reporting requirements should be changed so that all bicycle "damage only" crashes are reported. On the grounds of better safety research this move is desirable, but the crashes of greatest concern are those involving injury, and it should be recognised that wider reporting requirements would increase the administration involved in processing the large number of less important crashes, to the possible detriment of overall reporting quality.

15.5 Encouragement

As the network of safer, off-road facilities for cyclists grows, it should be publicised as much as possible to maximise its use. The Perth Bikeplan recommendations on encouragement initiatives should be pursued to this end amongst others.

The Perth, Mandurah and Bunbury Bikeplans all recommended that Bikemaps of the areas should be published showing both the location of off-road cycling facilities and an assessment of the standard of roads from a cycling viewpoint. The Perth Bikemap is about to be released; it and the others should be publicised widely and regularly updated.

15.6 Further Surveys

The Survey of Bicycle Crashes in WA has suffered from some inadequacies in its design and implementation which should be rectified as far as possible if further surveys of its type are to be undertaken. The following paragraphs list the main points which should be addressed.

- A means of improving contact with victims should be found. Whilst the Police have been able to contact virtually all victims of reported crashes, the coverage of unreported casualty crashes was not very effective, partly because of difficulties in achieving co-operation from hospitals. However by their very nature such crashes are extremely difficult to survey.

- The location of crashes should be coded on the questionnaire so that distribution around Perth and the rest of WA can be determined and "black spots" identified. Questions on junction types should include whether the intersection was signalised, and whether signals were obeyed.

- Questions on weather conditions should include whether the road was dry or wet. Categories of weather and lighting conditions should be standardised with those used by the Police in crash reporting.

- Cyclists' and motorists' crash histories should be requested on the same basis (the cyclist questionnaire asked for crashes over the last 3 years, whilst the motorist questionnaire asked for all previous crashes) for comparison purposes.

- Unless a question can be devised which allows a more objective assessment of whether the bicycle is the right size and properly adjusted for its rider, the question on bike size should be dropped.

- Questions exploring crash circumstances and causes should be revised. The ambiguities between different circumstances, particularly at road intersections, should be removed. The question on cyclists' riding habits should be improved to reduce the variation of activities, possibly concentrating on irresponsible or dangerous riding habits. Respondents should be encouraged to answer the questions candidly; some may be reluctant to answer a question that infers guilt. The covering letter attached to the questionnaire should emphasise that the information will not be used for any purpose other than the survey, and that full confidentiality is guaranteed.

- The questions about injuries should be improved. The Health Department classification of injury types (ICD) could be used as a basis, as it allows both injury location and severity to be assessed. Another widely-used method is the Abbreviated Injury Scale (AIS). Questions should be introduced to explore the source and type of treatment received for injuries, ranging from first aid at home to hospital admission.

- In the same way that motorists were asked about their cycling experience, cyclists should be asked about their driving history. The survey response can then be compared with general statistics on driving and cycling frequency in WA. Both groups should also be asked about any cycling training and education they have received, to explore the quality of experience as well as the quantity.

- In general and to aid subsequent analysis all questions should be phrased to permit one answer only. Multiple answers can be best analysed if the list offered is exhaustive and as unambiguous as possible.

- Sufficient time and resources should be allocated to designing the questionnaire layout so that questions are grouped in a logical sequence, and clear instructions should be given on how to complete the form. Good graphic design can improve the quality of responses considerably; the aim should be to make the task of completing the questionnaire as easy as possible.

15.7 Conclusion

Despite a number of drawbacks the Study has been effective in providing data on bicycle crashes in greater detail than has been available hitherto. The survey should be repeated in an improved form as outlined above, in future years.

****

SECTION V

APPENDICES

APPENDIX A

REFERENCES

The following references have been used in the course of preparing this report:

1. **Perth Metropolitan Region Bikeplan - Main Report**, Perth Bikeplan Study Team, July 1985.

2. **Mandurah Region Bikeplan**, Bikeplan Study Team, January 1986

3. **Greater Bunbury Bikeplan**, Bikeplan Study Team, September 1986

4. **Road Traffic Accidents Involving Casualties Reported to the Police Department, WA, 1985**, Australian Bureau of Statistics, July 1986

5. **Road Traffic Accidents Involving Casualties Reported to the Police Department, WA, September Quarter 1986**, Australian Bureau of Statistics, January 1987

6. **Pedal Cycle Accidents - Hospital Discharges, WA 1985**, WA Health Department (unpublished statistics)

APPENDIX B

CYCLIST AND MOTORIST QUESTIONNAIRES

DEPARTMENT OF LOCAL GOVERNMENT

32 ST. GEORGE'S TERRACE, PERTH 6000.

TELEPHONE 325 7088
TELEX 94684
FAX 325 1618

OUR REF:

YOUR REF:

ENQUIRIES:

Dear Cyclist/Parent,

The W.A. Bicycle Policy Committee and the Federal Office of Road Safety are jointly funding a study of accidents involving cyclists. The W.A. Health Department and the Road Traffic Branch of the W.A. Police Department have agreed to co-operate by contacting people involved in such accidents.

In W.A., as elsewhere in Australia, the number of accidents involving injury to cyclists increases each year. Cyclists now account for more than 1 in 10 vehicle accident victims. Whilst this reflects an increase in the popularity of cycling, the fact that over 600 cyclists are admitted to hospital each year in W.A. is a cause for real concern.

We are concerned that you/your child have sustained injuries, possibly serious, in an accident and that completing this questionnaire may be very disturbing for you and/or your child.

Only with your assistance, however, can we develop positive measures to reduce the likelihood of such accidents occurring and to reduce the pain and anguish associated with them. Information gained will greatly enhance our knowledge of accident causation and assist the development of effective safety measures.

We trust you will complete the enclosed questionnaire, which should only take about 30 minutes. An addressed envelope is enclosed for you to return the completed questionnaire. No postage stamp is necessary. All answers will be treated as private and confidential.

Should you wish to provide further information or take part in a brief interview at a later date, please indicate your name and address in the space provided at the end of the questionnaire.

If you DO NOT wish your child/yourself to participate in this survey, simply return the incompleted questionnaire in the envelope provided.

Yours sincerely,

Michael J. Harding

M.J. HARDING
Chairman, Bicycle Policy Committee.

INSTRUCTIONS TO CYCLISTS/ PARENTS OF YOUNG CYCLISTS.

YOU ARE ASKED TO INDICATE YOUR ANSWER BY TICKING THE APPROPRIATE BOX.

SOME QUESTIONS MAY ASK YOU TO WRITE INFORMATION IN THE BOXES PROVIDED. IF IT IS A SINGLE NUMBER, PUT A ZERO IN FRONT LIKE THIS.

0	3

OTHER QUESTIONS MAY ASK YOU TO PRINT YOUR ANSWER IN THE SPACE PROVIDED.

THANK YOU VERY MUCH FOR COMPLETING THIS QUESTIONNAIRE.

1	2	3	4	5	6

BICYCLE ACCIDENT STUDY

CYCLISTS/PARENTS OF YOUNG CYCLISTS SURVEY

THIS QUESTIONNAIRE CONCERNS A SURVEY OF BICYCLE / MOTOR VEHICLE ACCIDENTS.

THERE IS NO NEED FOR YOU TO WRITE YOUR NAME ON THIS QUESTIONNAIRE, JUST ANSWER EACH QUESTION HONESTLY AND TRUTHFULLY, TO THE BEST OF YOUR KNOWLEDGE. THE ANSWERS YOU GIVE ARE STRICTLY CONFIDENTIAL.

OUR AIM IS NOT TO PLACE THE BLAME ON ANYONE, BUT SIMPLY TO IDENTIFY SOME OF THE CAUSES OF BICYCLE AND MOTOR VEHICLE ACCIDENTS.

CONFIDENTIAL

FUNDED BY THE W.A. BICYCLE POLICY COMMITTEE AND THE FEDERAL OFFICE OF ROAD SAFETY

CARD 1 COL 6

1 SEX

MALE ☐ 1 7

FEMALE ☐ 2

2 AGE AT TIME OF ACCIDENT.

YEARS ☐☐ 8,9

3 DATE OF THE ACCIDENT.

DAY ☐☐ MONTH ☐☐ YEAR ☐☐ 10-15

WHAT DAY OF THE WEEK WAS THE ACCIDENT?

MONDAY ☐ 1

TUESDAY ☐ 2

WEDNESDAY ☐ 3

THURSDAY ☐ 4 16

FRIDAY ☐ 5

SATURDAY ☐ 6

SUNDAY ☐ 7

5 WHAT TIME WAS IT?

WRITE TIME AM ☐☐☐☐ 1 17-24

WRITE TIME PM ☐☐☐☐ 2

6 LIGHTING CONDITIONS.

DAYLIGHT ☐ 1

TWILIGHT ☐ 2 25

DARK ☐ 3

7 WERE THE STREET LIGHTS:

ON ☐ 1

OFF ☐ 2 26

DON'T KNOW ☐ 3

8 WAS THE BICYCLE HEADLIGHT SWITCHED:

ON ☐ 1

OFF ☐ 2 27

DON'T KNOW ☐ 3

9 WAS THE BICYCLE REAR LIGHT SWITCHED:

ON ☐ 1

OFF ☐ 2 28

DON'T KNOW ☐ 3

10 WAS THE WEATHER:

DRY ☐ 1 29

RAINING ☐ 2

11. WAS IT:

WINDY ☐ 1 30

CALM ☐ 2

12 WHERE DID THE ACCIDENT HAPPEN? (CHOOSE ONE)

DRIVEWAY ☐ 1

FOOTPATH ☐ 2

BIKEPATH ☐ 3

PLACE KIDS USE FOR BMX ☐ 4

ORGANIZED BMX ☐ 5

INTERSECTION  ☐ 6 31-2

T JUNCTION  ☐ 7

ROUNDABOUT  ☐ 8

ROAD BETWEEN TWO SIDE ROADS ☐ 9

PRIVATE YARD ☐ 10

CARPARK ☐ 11

PATH JUNCTION WITH ROAD ☐ 12

OTHER (PLS SPECIFY) ☐ 13

----

3 WAS THE VISIBILITY OBSCURED BY

FENCE	☐	1
PARKED CAR	☐	2
HEDGE	☐	3
TREE	☐	4
CAR PARKED ON A VERGE	☐	5
OTHER (PLS SPECIFY)	☐	6

33-34

14 WHAT TYPE OF BIKE?

UPRIGHT HANDLEBARS	☐	1
DROP HANDLEBARS	☐	2
BMX	☐	3
OTHER (PLS SPECIFY)	☐	4

35

15 HOW OLD WAS THE BIKE?

NEW	☐	1
1-5 YEARS	☐	2
6-10 YEARS	☐	3
OVER 10 YEARS	☐	4

36

16 WAS IT THE RIGHT SIZE FOR YOU?

TOO BIG	☐	1
RIGHT SIZE	☐	2
TOO SMALL	☐	3

37

7 DID THE BIKE HAVE ANY DEFECTS BEFORE THE ACCIDENT (CHOOSE ONE OF MORE)?

BRAKES	☐	1
HANDLES	☐	2
SEAT	☐	3
FRAME	☐	4
GEARS	☐	5
CHAIN	☐	6
SPOKES	☐	7
WHEELS	☐	8
TYRES	☐	9
OTHER (PLS SPECIFY)	☐	10

----

8 DID ANY BIKE DEFECT HELP CAUSE THE ACCIDENT?

YES	☐	1
NO	☐	2

(IF YES, PLEASE SPECIFY WHICH ONE).

----

19 WHICH OF THE FOLLOWING WERE ON THE BIKE AT THE TIME OF THE ACCIDENT?

FRONT HANDBRAKE	☐	1
REAR HANDBRAKE	☐	2
BACK PEDAL BRAKE	☐	3
BELL	☐	4
FRONT HEADLIGHT	☐	5
REAR LIGHT	☐	6
REAR REFLECTOR	☐	7
WHEEL REFLECTORS	☐	8
PEDAL REFLECTORS	☐	9
SAFETY FLAG	☐	10
A CHILD CARRIER SEAT	☐	11
PANNIERS	☐	12

59-60

20 ARE THE LIGHTS POWERED BY:

	FRONT		REAR	
A BATTERY	☐	1	☐	1
A DYNAMO	☐	2	☐	2
BOTH	☐	3	☐	3

61

21 WHAT ARE THE BICYCLE WHEELS MADE OF?

STEEL	☐	1
ALLOY	☐	2
PLASTIC	☐	3

62

22 WHAT CLOTHING WAS WORN AT THE TIME OF THE ACCIDENT?

SHIRT	☐	1
JUMPER, COAT OR JACKET	☐	2
SKIRT	☐	3
LONG PANTS	☐	4
SHORT PANTS	☐	5
SHOES	☐	6
THONGS	☐	7
BARE FEET	☐	8
OTHER CLOTHES (PLS SPECIFY)	☐	9

63-71

----

23 WERE THEY:

LIGHT	☐	1
DARK	☐	2

72

24 WERE YOU WEARING SAFETY CLOTHES?

YES	☐	1
NO	☐	2

73

25 WERE YOU WEARING A HELMET?

YES	☐	1
NO	☐	2

74

(IF NO, GO TO QUESTION 28).

26 IF YES, WHAT SORT?

HARD SHELL WITH POLYSTYRENE LINER 1

HARD SHELL WITH LIGHT FOAM OR NO LINER 2

SOFT HELMET RACING STYLE 3

WHAT BRAND OF HELMET 4

75

27 WAS THE HELMET DISLODGED DURING THE ACCIDENT?

YES 1

NO 2

76-77

END CARD

NEW RECORD 80

CARD 2 COL 6

28 INJURY LOCATION (TICK MORE THAN ONE BOX IF NECESSARY).

HEAD AND/OR FACE 1

NECK AND/OR BACK 2

CHEST AND/OR ABDOMEN 3

ARMS AND/OR HANDS 4

LEGS AND/OR FEET 5

GENITALS 6

OTHER (PLS SPECIFY) 7

7-13

29 DO YOU CONSIDER THE INJURY FROM THIS ACCIDENT TO BE:

MINOR 1

MODERATE 2

SEVERE 3

14

0 DID THE BIKE HIT OR WAS IT HIT BY A (CHOOSE ONE):

MOVING MOTOR VEHICLE 1

ANOTHER BICYCLE 2

STATIONARY MOTOR VEHICLE 3

ROCK 4

PEDESTRIAN 5

ANIMAL 6

TREE/POLE 7

LOOSE GRAVEL/SAND ON ROAD 8

POTHOLE/GRILL 9

OTHER OBJECT (PLS SPECIFY) 1

15-

31 IF NOT, WAS THE ACCIDENT CAUSED BY FALLING FROM THE BICYCLE WITHOUT FIRST HITTING AN OBJECT?

YES 1

NO 2

17

32 HOW OFTEN DO YOU RIDE YOUR BICYCLE?

DAILY 1

3-4 TIMES A WEEK 2

1-2 TIMES A WEEK 3

LESS THAN ONCE A WEEK 4

18

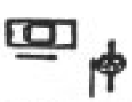
33. AT THE TIME OF THE ACCIDENT WERE YOU (YOU MAY TICK MORE THAN ONE):

- RIDING TOO FAST ☐ 1 19
- RACING ☐ 2 20
- DOUBLE DINKING ☐ 3 21
- DOING TRICKS ☐ 4 22
- BRAKING ☐ 5 23
- SHARP TURN ☐ 6 24
- RIDING ON THE RIGHT HAND SIDE OF THE ROAD ☐ 7 25
- TALKING TO COMPANION ☐ 8 26
- NOT LOOKING AHEAD ☐ 9 27
- RIDING ON LOOSE GRAVEL ☐ 10 28
- CARRYING OBJECT ☐ 11 29
- PASSED TOO CLOSE TO MOTOR VEHICLE ☐ 12 30
- OTHER (PLS SPECIFY) ☐ 13 31

----

34 WHAT WAS HAPPENING AT THE TIME OF THE ACCIDENT?

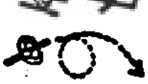

STRUCK FROM BEHIND ☐ 1

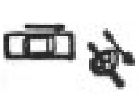

CYCLIST ENTERING A ROADWAY ☐ 2

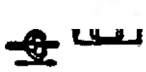

CAR ENTERING A ROADWAY ☐ 3


CAR TURNING RIGHT ☐ 4 32-33


CAR DOOR ☐ 5


CORNERING OR OUT OF CONTROL ☐ 6


CYCLIST TURNING RIGHT ☐ 7


PARKED CAR OR OBSTACLE ☐ 8


OVERTAKING, HIT REAR OF MOVING CAR ☐ 9


IMPACT WITH BICYCLE (PLS SPECIFY) ☐ 10


IMPACT WITH PEDESTRIAN ☐ 11

OTHER (PLS SPECIFY) ☐ 12

----

35 WHAT WAS THE PURPOSE OF THE TRIP DURING WHICH THE ACCIDENT HAPPENED?

- TO/FROM SCHOOL ☐ 1
- TO/FROM TERTIARY INSTITUTION ☐ 2
- TO/FROM WORK ☐ 3
- SHOP ☐ 4
- PAPER ROUND ☐ 5
- COMPETITION RACING ☐ 6
- FRIEND'S PLACE ☐ 7
- BMX MEETING ☐ 8
- LEISURE/RECREATION ☐ 9
- OTHER (PLS SPECIFY) ☐ 10

----

36 WHAT WERE YOU DOING BEFORE COMMENCING THE TRIP?

---------------------- ☐

----

7 WERE YOU FAMILIAR WITH THE ROUTE?

YES	☐	1
NO	☐	2

38

8 HOW MANY TIMES HAD YOU RIDDEN THROUGH THIS ACCIDENT SITE?

NEVER	☐	1
1-10 TIMES	☐	2
MORE THAN 10 TIMES	☐	3

39

19 AT THE TIME OF THE ACCIDENT HOW MANY YEARS HAD YOU BEEN RIDING A BICYCLE?

LESS THAN 1 YEAR	☐	1
1-5 YEARS	☐	2
6-10 YEARS	☐	3
LONGER THAN 10 YEARS	☐	4

40

10 DO YOU USUALLY RIDE:

ON FOOTPATHS/CYCLEPATHS	☐	1
ON ROADS	☐	2
ABOUT HALF ROAD/PATHS	☐	3

41

41 WERE YOU RIDING THE BIKE YOU NORMALLY USE WHEN THE ACCIDENT HAPPENED?

YES	☐	1
NO	☐	2

42

2 HOW MANY BICYCLE ACCIDENTS REQUIRING MEDICAL TREATMENT (FROM G.P., HOSPITAL) HAVE YOU HAD IN THE PAST THREE YEARS?

PLEASE SPECIFY, ☐☐ 43-44

HOW MANY OF THESE INVOLVED A MOTOR VEHICLE?

PLEASE SPECIFY ☐☐ 45

3 HOW MANY OTHER ACCIDENTS HAVE YOU HAD IN THE LAST THREE YEARS WHERE YOUR BICYCLE WAS DAMAGED?

PLEASE SPECIFY ☐☐ 46-4

4 AT THE TIME OF THE ACCIDENT WERE YOU:

RUNNING LATE	☐	1
WORRYING ABOUT EXAMS/ WORK STRESS	☐	2
EXCITED ABOUT SOMETHING	☐	3
ARGUMENT WITH FRIENDS/ FAMILY	☐	4
OTHER (PLS SPECIFY)	☐	5

48-

----

45 PLEASE GIVE A DESCRIPTION OF HOW THE ACCIDENT HAPPENED. (DRAW A DIAGRAM TO HELP EXPLAIN - IF YOU CAN RECALL STREET NAMES, WRITE THEM IN).

____

____

____

____

____

6 HAVE YOU ANY OTHER THINGS YOU WOULD LIKE TO SAY?

____

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____

____

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____

____

47 IF YOU WOULD BE WILLING TO PROVIDE FURTHER INFORMATION, OR TAKE PART IN AN INTERVIEW, PLEASE PROVIDE THE FOLLOWING INFORMATION.

NAME : ____________________________________

ADDRESS : ____________________________________

____

TELEPHONE NUMBER :

DEPARTMENT OF LOCAL GOVERNMENT

32 ST. GEORGE'S TERRACE, PERTH 6000.

TELEPHONE 325 7088
TELEX 94604
FAX 325 1618

OUR REF:

YOUR REF:

ENQUIRIES:

Dear Motorist,

The W.A. Bicycle Policy Committee and the Federal Office of Road Safety are jointly funding a study of accidents involving cyclists. The W.A. Health Department and the Road Traffic Branch of the W.A. Police Department have agreed to co-operate by contacting people involved in such accidents.

In W.A., as elsewhere in Australia, the number of accidents involving injury to cyclists increases each year. Cyclists now account for more than 1 in 10 vehicle accident victims. Whilst this reflects an increase in the popularity of cycling, the fact that over 600 cyclists are admitted to hospital each year in W.A. is a cause for real concern.

We are concerned that you were involved in an accident with a cyclist and realize how disturbing this must be for you.

It is the intention of this study to identify some of the factors which may have contributed to the accident. It is strictly not the aim of the study to identify or project the blame on any party. Information gained will greatly enhance our knowledge of accident causation and assist the development of effective safety measures.

Your assistance, by completing this questionnaire, is greatly appreciated. The questionnaire should only take approximately 20 minutes. An addressed envelope is enclosed for you to return the completed questionnaire. No postage stamp is necessary.

All answers will be treated as private and confidential.

Should you be willing to provide further information or to take part in a brief interview concerning the accident at a later stage, please write your name and address in the space provided at the end of the questionnaire.

Yours faithfully,

Richard J. Harding

M.J. HARDING
Chairman, Bicycle Policy Committee.

BICYCLE ACCIDENT STUDY

MOTORIST SURVEY

THIS QUESTIONNAIRE CONCERNS A SURVEY OF BICYCLE ACCIDENTS.

THERE IS NO NEED FOR YOU TO WRITE YOUR NAME ON THIS QUESTIONNAIRE, JUST ANSWER EACH QUESTION HONESTLY AND TRUTHFULLY, TO THE BEST OF YOUR KNOWLEDGE. THE ANSWERS YOU GIVE ARE STRICTLY CONFIDENTIAL.

OUR AIM IS NOT TO PLACE THE BLAME ON ANYONE, BUT SIMPLY TO IDENTIFY SOME OF THE CAUSES OF BICYCLE / MOTOR VEHICLE AND BICYCLE ONLY ACCIDENTS.

CONFIDENTIAL

FUNDED BY THE W.A. BICYCLE POLICY COMMITTEE AND THE FEDERAL OFFICE OF ROAD SAFETY

<u>INSTRUCTIONS TO MOTORISTS</u>

YOU ARE ASKED TO INDICATE YOUR ANSWER BY TICKING THE APPROPRIATE BOX.

[✓]

SOME QUESTIONS MAY ASK YOU TO WRITE INFORMATION IN THE BOXES PROVIDED. IF IT IS A SINGLE NUMBER, PUT A ZERO IN FRONT LIKE THIS.

0	3

OTHER QUESTIONS MAY ASK YOU TO PRINT YOUR ANSWER IN THE SPACE PROVIDED.

THANK YOU VERY MUCH FOR COMPLETING THIS QUESTIONNAIRE.

1	2	3	4	5	6

1 SEX

MALE	☐	1	7
FEMALE	☐	2	

2 AGE

YEARS ☐☐ 8,9

3 DATE OF THE ACCIDENT.

DAY ☐☐ MONTH ☐☐ YEAR ☐☐ 10–15

WHAT DAY OF THE WEEK WAS THE ACCIDENT?

MONDAY	☐	1	
TUESDAY	☐	2	
WEDNESDAY	☐	3	
THURSDAY	☐	4	16
FRIDAY	☐	5	
SATURDAY	☐	6	
SUNDAY	☐	7	

WHAT TIME WAS IT?

WRITE TIME AM	☐☐☐☐	1	17–24
WRITE TIME PM	☐☐☐☐	2	

6 LIGHTING CONDITIONS.

DAYLIGHT	☐	1	
TWILIGHT	☐	2	25
DARK	☐	3	

WERE THE STREET LIGHTS:

ON	☐	1	
OFF	☐	2	26
DON'T KNOW	☐	3	

8 WAS THE CYCLIST'S HEADLIGHT SWITCHED:

ON	☐	1	
OFF	☐	2	27
DON'T KNOW	☐	3	

9 WAS THE CYCLIST'S REAR LIGHT SWITCHED:

ON	☐	1	
OFF	☐	2	28
DON'T KNOW	☐	3	

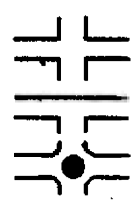
10 WAS THE WEATHER:

DRY	☐	1	29
RAINING	☐	2	

11 WAS IT:

WINDY	☐	1	30
CALM	☐	2	

2 WHERE DID THE ACCIDENT HAPPEN?



DRIVEWAY	☐	1	
INTERSECTION	☐	2	
T JUNCTION	☐	3	
ROUNDABOUT	☐	4	3
ROAD BETWEEN TWO SIDE ROADS	☐	5	
PATH ENTERING ROAD	☐	6	
CARPARK	☐	7	
OTHER (PLS SPECIFY)	☐	8	

----

3 WAS THE VISIBILITY OBSCURED BY:

FENCE	☐	1
PARKED CAR	☐	2
HEDGE	☐	3
TREE	☐	4
CAR PARKED ON A VERGE	☐	5
OTHER (PLS SPECIFY)	☐	6

33-34

----

14 WERE THE CYCLIST'S CLOTHES:

LIGHT	☐	1
DARK	☐	2

35

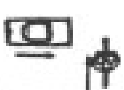
15 WAS THE CYCLIST WEARING SAFETY CLOTHES?

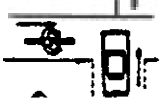
YES	☐	1
NO	☐	2

36

16 WHAT WAS HAPPENING AT THE TIME OF THE ACCIDENT?


STRUCK FROM BEHIND ☐ 1

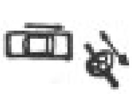

CYCLIST ENTERING A ROADWAY ☐ 2


CAR ENTERING A ROADWAY ☐ 3

CAR TURNING RIGHT ☐ 4


CAR DOOR ☐ 5


CORNERING OR OUT OF ☐ 6


CYCLIST TURNING RIGHT ☐ 7

37-38

PARKED CAR OR OBSTACLE ☐ 8


OVERTAKING, HIT REAR OF MOVING CAR ☐ 9

OTHER (PLS SPECIFY) ☐ 10

----

7 AT THE TIME OF THE ACCIDENT, HOW MANY YEARS HAD YOU BEEN DRIVING A CAR?

LESS THAN 1 YEAR	☐	1
2-5 YEARS	☐	2
6-10 YEARS	☐	3
LONGER THAN 10 YEARS	☐	4

39

8 WERE YOU DRIVING THE CAR YOU NORMALLY USE WHEN THE ACCIDENT HAPPENED?

YES	☐	1
NO	☐	2

40

9 WHERE WERE YOU GOING WHEN THE ACCIDENT HAPPENED?

TO/FROM SCHOOL OR TERTIARY INSTITUTION	☐	1
TO/FROM WORK	☐	2
SHOPS	☐	3
VISITING FRIENDS	☐	4
OTHER (PLS SPECIFY)	☐	5

41-

----

0 WHAT WERE YOU DOING BEFORE COMMENCING THE TRIP?

-44

1 HOW MANY TIMES HAD YOU DRIVEN THROUGH THIS ACCIDENT SITE BEFORE THE ACCIDENT?

NEVER ☐ 1 45

1-10 TIMES ☐ 2

MORE THAN 10 TIMES ☐ 3

2 DO YOU RIDE A BICYCLE?

YES ☐ 1

NO ☐ 2

3 IF YES, HOW OFTEN?

DAILY ☐ 1

3-4 TIMES A WEEK ☐ 2

1-2 TIMES A WEEK ☐ 3

LESS THAN ONCE A WEEK ☐ 4

4 HOW MANY YEARS HAVE YOU RIDDEN A BICYCLE?

YEARS ☐☐ -49

5 HOW MANY ACCIDENTS HAVE YOU BEEN INVOLVED IN WHILST DRIVING A CAR?

WITH ANOTHER MOTOR VEHICLE ☐ 1 50

WITH A BICYCLE ☐ 2 51

6 AT THE TIME OF THE ACCIDENT WERE YOU:

RUNNING LATE ☐ 1

WORRYING ABOUT EXAMS/ WORK STRESS ☐ 2

EXCITED ABOUT SOMETHING ☐ 3

ARGUMENT WITH FRIENDS/ FAMILY ☐ 4 52-

OTHER (PLS SPECIFY) ☐ 5

----

7 PLEASE GIVE A DESCRIPTION OF HOW THE ACCIDENT HAPPENED. (DRAW A DIAGRAM TO HELP EXPLAIN - IF YOU CAN RECALL STREET NAMES, WRITE THEM IN).

----

8 HAVE YOU ANY OTHER THINGS YOU WOULD LIKE TO SAY?

----

9 IF YOU WOULD BE WILLING TO PROVIDE FURTHER INFORMATION, OR TAKE PART IN AN INTERVIEW, PLEASE PROVIDE THE FOLLOWING INFORMATION.

NAME : ----------------------------------

ADDRESS : ----------------------------------

TELEPHONE NUMBER : ----------------------------------

APPENDIX C

STUDY OF BICYCLE CRASHES IN WA

CYCLIST QUESTIONNAIRES

Summary of Responses - 513 Mainland Questionnaires

Question			No.	%
-	Accident Type:	Bicycle/Motor Vehicle	346	67
		Bicycle/Bicycle	22	4
		Bicycle Alone	145	28
		Bicycle/Pedestrian	0	0
		Bicycle/Other	0	0
		TOTAL	513	100
-	Number of Units(bicycles, motor vehicles, etc) involved in accident:	One	144	28
		Two	365	71
		Three	1	0
		Four	3	1
1	Sex of Cyclist:	Male	395	77
		Female	118	23
2	Age at time of accident (years):	n/s	17	3
		0-4	6	1
		5-9	64	12
		10-14	167	33
		15-19	84	16
		20-29	88	17
		30-39	40	8
		40-49	24	5
		50-59	12	2
		60+	11	2
3	Month in which accident occured:	n/s	45	9
		Aug 85	17	3
		Sep 85	27	5
		Oct 85	42	8
		Nov 85	49	10
		Dec 85	55	11
		Jan 86	35	7
		Feb 86	47	9
		Mar 86	47	9
		Apr 86	59	12
		May 86	36	7
		Jun 86	24	5
		Jul 86	30	6

Question			No.	%
4	Day of week of accident:	n/s	16	3
		Monday	73	14
		Tuesday	82	16
		Wednesday	72	14
		Thursday	67	13
		Friday	86	17
		Saturday	73	14
		Sunday	44	9
5	Time of day of accident:	n/s	14	3
		0000-0600	4	1
		0600-0800	37	7
		0800-1000	36	7
		1000-1200	47	9
		1200-1400	35	7
		1400-1600	108	21
		1600-1800	158	31
		1800-2000	45	9
		2000-0000	11	2
6	Lighting conditions:	Daylight	460	90
		Twilight	36	7
		Dark	17	3
7	Were the street lights:	On	28	5
		Off	442	86
		Don't know	19	4
		n/s	24	5
8	Was the bicycle headlight switched:	On	17	3
		Off	114	22
		Don't know	2	0
		n/s	380	74
9	Was the bicycle rearlight switched:	On	47	9
		Off	102	20
		Don't know	2	0
		n/s	362	71
10	Weather conditions:	n/s	1	0
11		Windy	3	1
		Calm	3	1
		Dry	46	9
		Raining	7	1
		Dry and Windy	46	9
		Dry and Calm	379	74
		Raining and Calm	7	1
		Raining and Windy	21	4

Question			No.	%
12	Where did the accident happen?	n/s	6	1
		Driveway	51	10
		Footpath	31	6
		Bikepath	15	3
		Place kids use for BMX	3	1
		Organised BMX	0	0
		Road intersection	104	20
		Road t-junction	119	23
		Roundabout	5	1
		Rd between 2 side roads	124	24
		Private yard	9	2
		Car park	10	2
		Path junction with road	29	6
		Other	7	1
13	Was the visibility obscured by:	n/s	390	76
		Fence	7	1
		Parked car	19	4
		Hedge	10	2
		Tree	28	5
		Car parked on a verge	6	1
		Moving vehicle	22	4
		Sun	8	2
		Building	2	0
		Other	28	5
14	What type of bike?	n/s	2	0
		Upright handlebars	141	27
		Drop handlebars	286	56
		BMX	81	16
		Other	3	1
15	How old was the bike?	n/s	4	1
		New	145	28
		1-5 years old	306	60
		6-10 years old	43	8
		Over 10 years old	15	3
16	Was it the right size for you?	n/s	6	1
		Too big	16	3
		Right size	483	94
		Too small	8	2

Question			No.	%
17	Did the bike have any defects before the accident?	n/s	434	85
		Brakes	37	7
		Handles	2	0
		Seat	5	1
		Frame	2	0
		Gears	14	3
		Chain	10	2
		Spokes	6	1
		Wheels	9	2
		Tyres	7	1
		Pedals	1	0
		Other	2	0
18	Did any bike defect help cause the accident?:	n/s	16	3
		No	461	90
		Yes	36	7
19	Which of the foll-owing were on the bike at the time of the accident?	Front handbrake	384	75
		Rear handbrake	389	76
		Backpedal brake	92	18
		Bell	238	46
		Front headlight	133	26
		Rear reflector	351	68
		Wheel reflector	315	61
		Pedal reflector	340	66
		Safety flag	6	1
		Child carrier seat	9	2
		Panniers	15	3
20	Are the front lights powered by:	n/s	383	75
		Battery	43	8
		Dynamo	86	17
		Both	1	0
	Are the rear lights powered by:	n/s	396	77
		Battery	37	7
		Dynamo	79	15
		Both	1	0
21	What are the bicycle wheels made of?:	n/s	14	3
		Steel	319	62
		Alloy	175	34
		Plastic	5	1

Question			No.	%
22	What clothing was worn at the time of the accident?	Shirt	414	81
		Jumper, coat or jacket	175	34
		Skirt	56	11
		Long pants	190	37
		Short pants	263	51
		Shoes	395	77
		Thongs	69	13
		Bare feet	33	6
		Gloves	10	2
		Other clothes	19	4
23	Were the clothes:	n/s	4	1
		Light	334	65
		Dark	129	25
		Both	46	9
24	Were you wearing safety clothes?:	n/s	12	2
		Yes	39	8
		No	462	9
25	Were you wearing a helmet?:	n/s	4	1
		Yes	46	9
		No	463	90
26	If yes, what sort?:	n/s	11	2
		Stackhat	7	1
		Guardian	2	0
		Gemray	0	0
		Star/Rampar	0	0
		Bell	6	1
		Brancale	4	1
		Skidlid	0	0
		Leather hairnet	0	0
		Other	16	3
27	Was the helmet dislodged during the accident?	Yes	4	1
		No	42	8
28	Injury location	Head and/or Face	208	41
		Neck and/or back	104	20
		Chest and/or abdomen	70	14
		Arms and/or hands	300	58
		Legs and/or feet	330	64
		Genitals	5	1
		Other locations	7	1

Question			No.	%
29	Do you consider the injury from this accident to be:	n/s	24	5
		Minor	202	39
		Moderate	237	46
		Severe	50	10
30	Did the bike hit or was it hit by a:	n/s	73	14
		Moving motor vehicle	319	62
		Another bicycle	22	4
		Stationary m/vehicle	21	4
		Rock	4	1
		Pedestrian	2	0
		Animal	4	1
		Tree or pole	3	1
		Loose gravel/sand on rd	29	6
		Pothole or grille	8	2
		Other object	28	5
31	If not, was the accident caused by falling from the bicycle without first hitting an object?:	n/s	2	0
		Yes	72	14
		No	439	86
32	How often do you ride your bicycle?:	n/s	12	2
		Daily	366	71
		3-4 times/week	77	15
		1-2 times/week	31	6
		less than once/week	27	5
33	At the time of the accident were you:	n/s	353	69
		Riding too fast	28	5
		Racing	15	3
		Double dinking	6	1
		Doing tricks	7	1
		Braking	40	8
		Sharp turn	27	5
		Riding on RHS of road	4	1
		Talking to a companion	15	3
		Not looking ahead	27	5
		Riding on loose gravel	11	2
		Carrying an object	24	5
		Passing too close to m/veh	13	3
		Loss of control	42	8

Question			No.	%
34	What was happening at the time of the accident?	n/s	173	34
		Struck from behind	44	9
		Cyclist entering rdwy	65	13
		Car entering roadway	28	5
		Car turning right	48	9
		Car door	14	3
		Cornering or lost ctl	0	0
		Cyclist turning right	9	2
		Parked car or obstacle	5	1
		Overtaking, hit rear of moving car	2	0
		Impact with bicycle	0	0
		Impact with pedestrian	1	0
		Car turning left	25	5
		Rt angle collision at rd i/section	82	16
		Other	17	3
35	What was the purpose of the trip during which the accident happened?	n/s	7	1
		To/from school	81	16
		To/from tert. instn.	10	2
		To/from work	102	20
		Shop	68	13
		Paper round	7	1
		Competition racing	7	1
		Friend's place	78	15
		BMX meeting	0	0
		Leisure/recreation	137	27
		Other	16	3
37	Were you familiar with the route?:	n/s	7	1
		Yes	477	93
		No	29	6
38	How many times had you ridden through the accident site?	n/s	10	2
		Never	35	7
		1-10 times	86	17
		Over 10 times	382	74
39	At the time of the accident how many years had you been riding a bicycle?	n/s	3	1
		Less than 1yr	21	4
		1-5 years	143	28
		6-10 years	170	33
		Over 10 years	176	34
40	Do you usually ride:	n/s	8	2
		On foot/cycle paths	65	13
		On roads	216	42
		About half rds/paths	224	44

Question			No.	%
41	Were you riding the bike you normally use when the accident happened?	n/s	7	1
		Yes	437	85
		No	69	13
42	How many bicycle accidents requiring medical treatment have you had in the past three years?	n/s	25	5
		None	331	65
		One	114	22
		Two	33	6
		Three	7	14
		Four	2	0
		Ten	1	0
	How many of these involved a motor vehicle?	n/s	78	15
		None	326	64
		One	89	17
		Two	16	3
		Three	4	1
43	How many other accidents have you had in the last three years in which your bicycle was damaged?	n/s	43	8
		None	385	75
		One	49	10
		Two	21	4
		Three	5	1
		Four	2	0
		Five	7	1
		Twenty	1	0
44	At the time of the accident were you:	n/s	407	79
		Running late	35	7
		Worrying about exams/work stress	7	1
		Excited about something	56	11
		Argument with somebody	4	1
		Other	11	2

STUDY OF BICYCLE CRASHES IN WA

MOTORIST QUESTIONNAIRES

Summary of Responses - 299 Questionnaires

NOTE: Some questions allowed multiple answers, so the total number of responses to each question will often exceed 299.

Question			No.	%
-	Number of Units(bicycles, motor vehicles, etc) involved in accident:	One	0	0
		Two	299	100
1	Sex of Driver:	Male	161	54
		Female	137	46
2	Age at time of accident (years):	n/s	27	9
		0-4	0	0
		5-9	0	0
		10-14	0	0
		15-19	31	10
		20-29	88	29
		30-39	69	23
		40-49	42	14
		50-59	18	6
		60+	24	8
3	Month in which accident occured:	n/s	39	13
		Aug 85	11	4
		Sep 85	14	5
		Oct 85	32	11
		Nov 85	26	9
		Dec 85	24	8
		Jan 86	13	4
		Feb 86	28	9
		Mar 86	24	8
		Apr 86	34	11
		May 86	14	5
		Jun 86	13	4
		Jul 86	27	9
4	Day of week of accident:	n/s	19	6
		Monday	35	12
		Tuesday	48	16
		Wednesday	42	14
		Thursday	48	16
		Friday	58	19
		Saturday	34	11
		Sunday	15	5

Question			No.	%
5	Time of day of accident:	n/s	8	3
		0000-0600	1	0
		0600-0800	14	5
		0800-1000	43	14
		1000-1200	30	10
		1200-1400	19	6
		1400-1600	59	20
		1600-1800	93	31
		1800-2000	31	10
		2000-0000	1	0
6	Lighting conditions:	Daylight	252	84
		Twilight	31	10
		Dark	16	5
7	Were the street lights:	On	15	5
		Off	262	87
		Don't know	11	4
		n/s	11	4
8	Was the bicycle headlight switched:	On	5	2
		Off	220	74
		Don't know	33	11
		n/s	41	14
9	Was the bicycle rearlight switched:	On	4	1
		Off	199	67
		Don't know	55	18
		n/s	41	14
10	Weather conditions:	n/s	0	0
11		Windy	0	0
		Calm	2	1
		Dry	24	8
		Raining	4	1
		Dry and Windy	9	3
		Dry and Calm	241	81
		Raining and Calm	9	3
		Raining and Windy	10	3
12	Where did the accident happen?	n/s	0	0
		Driveway	28	9
		Road intersection	82	27
		Road t-junction	76	25
		Roundabout	5	2
		Rd between 2 side roads	51	17
		Path entering road	37	12
		Car park	4	1
		Footway/cycleway	16	5
		Other	0	0

Question			No.	%
13	Was the visibility obscured by:	n/s	178	59
		Fence	19	6
		Parked car	18	6
		Hedge	5	2
		Tree	17	6
		Car parked on a verge	10	3
		Moving vehicle	27	9
		Sun	13	4
		Building	3	1
		Other	18	6
14	Were the cyclist's clothes:	n/s	24	8
		Light	142	47
		Dark	125	42
		Both	8	3
15	Was the cyclist wearing safety clothes?	n/s	4	1
		Yes	14	5
		No	281	94
16	What was happening at the time of the accident?	n/s	3	1
		Struck from behind	43	14
		Cyclist entering rdwy	85	28
		Car entering roadway	28	9
		Car turning right	21	7
		Car door	8	3
		Cornering or lost ctl	0	0
		Cyclist turning right	7	2
		Parked car or obstacle	0	0
		Overtaking, hit rear of moving car	5	2
		Car turning left	14	5
		Rt angle collision at rd i/section	78	26
		Other	7	2
17	At the time of the accident, how many years had you been driving a car?	n/s	1	0
		Less than 1yr	29	10
		2-5 years	42	14
		6-10 years	49	16
		Over 10 years	178	59
18	Were you driving the car you normally use when the accident happened?	n/s	2	1
		Yes	274	91
		No	23	8

Question			No.	%
19	Where were you going when the accident happened?	n/s	3	1
		To/from school or tertiary institution	19	6
		To/from work	119	40
		Shop	64	21
		Visiting friends	35	12
		Other	59	20
21	How many times had you driven through the accident site?	n/s	2	1
		Never	12	4
		1-10 times	36	12
		Over 10 times	249	83
22	Do you ride a bicycle?	n/s	5	2
		Yes	132	44
		No	162	54
23	If yes, how often?	n/s	167	56
		Daily	11	4
		3-4 times/wk	9	3
		1-2 times/wk	20	7
		Less than once/wk	92	31
24	How many years have you ridden a bicycle?	n/s	159	53
		1 year	3	1
		2-5 years	14	5
		6-10 years	15	5
		Over 10 years	108	36
25	How many accidents have you been involved in whilst driving a car?	Motor vehicle accidents		
		n/s	34	11
		None	124	41
		One	85	28
		Two	32	11
		Three	17	6
		Four	4	1
		Five and over	3	1
		Accidents with bicycles		
		n/s	63	21
		None	154	52
		One	77	26
		Two	4	1
		Five	1	0

Question			No.	%
26	At the time of the accident were you:	n/s	270	90
		Running late	8	3
		Worrying about exams/work stress	2	1
		Excited about something	5	2
		Argument with somebody	3	1
		Other	11	4