

**FEDERAL OFFICE OF ROAD SAFETY
REPORT DOCUMENTATION PAGE**

Report No	Report Date	Pages	ISBN	ISBN (Series)	ISSN
CR131 (11)	1994	116	0 642 51364 3	0 642 51388 0	0810 770X

Title and sub-title

Young Driver Research Program - Mass Crash Data Analyses:
Overview of Results from Australian and USA Mass Crash Database Analyses

Author(s)

Macdonald WA, Bowland L, Hancock A

Performing Organization

Monash University Accident Research Centre
Wellington Road
Clayton, Victoria, 3168, Australia

Sponsoring Organization

Federal Office of Road Safety
PO Box 594
Canberra, ACT, 2601, Australia

Project Officer: K B Smith

Abstract

This report presents an overview of results tabled in other reports in this series which separately analysed Australian and USA mass crash databases. The focus was on identifying differences between the crash patterns of young and mature car drivers which occur consistently across databases, as well as consistent differences between daytime and night-time crash patterns. Results showed that day/night differences were often large, and usually of similar magnitude for both young and mature drivers. Higher young driver compared to mature driver involvement was shown for single vehicle crashes, crashes occurring on curves or slopes, travelling above the speed limit or at excessive speed, and crashes where 'loss of control' was identified as a causal factor.

Key Words

YOUNG DRIVER, CRASH ANALYSIS, DAY, NIGHT, CAR DRIVER

Notes

- (1) FORS reports are disseminated in the interest of information exchange.
- (2) The view expressed are those of the author(s) and do not necessarily represent those of the Commonwealth Government.
- (3) The Federal Office of Road Safety publishes four series of research reports:
 - (a) reports generated as a result of research done within FORS are published in the OR series
 - (b) reports of research conducted by other organizations on behalf of FORS are published in the CR series
 - (c) reports based on analyses of FORS' statistical databases are published in the SR series
 - (d) minor reports of research conducted by other organizations on behalf of FORS are published in the MR series.

ACKNOWLEDGEMENTS

The helpful comments of John Catchpole on an earlier draft of this report are gratefully acknowledged.

FEDERAL GOVERNMENT'S ROAD SAFETY INITIATIVE

**YOUNG DRIVER RESEARCH PROGRAM -
MASS CRASH DATA ANALYSIS**

**OVERVIEW OF RESULTS FROM AUSTRALIAN AND USA
MASS CRASH DATABASE ANALYSES**

Prepared by

**Wendy Macdonald
Lyn Bowland
Adrian Hancock**

**MONASH UNIVERSITY
ACCIDENT RESEARCH CENTRE**

**for
FEDERAL OFFICE OF ROAD SAFETY**

CR 131 (11)

1994

TABLE OF CONTENTS

	Page
EXECUTIVE SUMMARY	iv
1. INTRODUCTION	1
1.1 PREVIOUS REPORTS ON CRASH DATA ANALYSES	1
1.2 THE PRESENT REPORT	2
2. OVERVIEW ANALYSES OF AUSTRALIAN AND USA CRASH DATA	3
2.1 INTRODUCTION	3
2.2 NATURE OF DATA AND FORM OF PRESENTATION	3
2.3 YOUNG VERSUS OLDER DRIVER DIFFERENCES, FOR DAY AND NIGHT SEPARATELY	5
2.3.1 Description of crash	5
2.3.2 When did the crashes occur?	6
2.3.3 Where did the crashes occur?	7
2.3.4 What were the factors within the vehicle - driver	8
2.3.5 What were the vehicle factors?	9
2.3.6 What were the environmental conditions	10
2.3.7 What other factors surrounded the crash?	11
2.4 DAYTIME VERSUS NIGHT-TIME DIFFERENCES, FOR YOUNG AND OLDER DRIVERS SEPARATELY	14
2.4.1 Description of crash	14
2.4.2 When did the crashes occur?	17
2.4.3 Where did the crashes occur?	18
2.4.4 What were the factors within the vehicle - driver	21
2.4.5 What were the vehicle factors?	25
2.4.6 What were the environmental conditions	26
2.4.7 What other factors surrounded the crash?	27
3. SUMMARY AND DISCUSSION OF MAIN FINDINGS	32
3.1 SUMMARY OF RESULTS FROM THE OVERVIEW ANALYSES	32
3.1.1 Type and location of crash	32
3.1.2 Vehicle speed	34
3.1.3 Control of vehicle	34
3.1.4 Inattention, failure to observe	34
3.1.5 Responsibility for crash	35
3.1.6 Weather, dry/other road surfaces	35
3.1.7 Alcohol involvement	35
3.1.8 Legal aspects	36
3.1.9 Seatbelt wearing	36
3.1.10 Vehicle driven	36
3.1.11 Numbers of people/injuries/deaths in vehicle/crash	37
3.1.12 Times of crash	37

3.2	DISCUSSION AND OVERVIEW	38
3.2.1	Conceptual basis	38
3.2.2	Discussion of results	38
3.2.3	Overview	41
REFERENCES		66
APPENDICES:		
1	NSW CASUALTY FILE (1986-1989)	68
2	VICTORIAN CASUALTY FILE (1986-1989)	75
3	SA CASUALTY FILE (1986-1989)	81
4	FORS FATALITY FILE (1988) - NSW, VICTORIA AND SA	86
5	GES FILE (1989) - NORTH-WESTERN REGION	93
6	GES FILE (1989) - MID-WESTERN REGION	99
7	GES FILE (1989) - WESTERN REGION	105
8	GES FILE (1989) - SOUTHERN REGION	111

LIST OF TABLES

		Page
1	COMPARISON OF YOUNG AND MATURE DRIVER PROPORTIONS WITHIN EACH CRASH VARIABLE, FOR DAY AND NIGHT SEPARATELY	44
2	COMPARISON OF DAYTIME AND NIGHT-TIME PROPORTIONS OF DRIVERS WITHIN EACH CRASH VARIABLE, FOR YOUNG AND MATURE DRIVERS SEPARATELY	55

EXECUTIVE SUMMARY

INTRODUCTION

The Monash University Accident Research Centre was commissioned by the Federal Office of Road Safety to undertake a Young Driver Research Program as part of a Federal Government Road Safety Initiative. One of the research projects in this Young Driver Research Program focussed on Young Driver Crashes. As part of this project, the following Australian and USA databases were analysed:

- *New South Wales*: casualty data 1986 to 1990
- *Victoria*: casualty data 1984 to 1989
- *South Australia*: casualty data 1986 to 1990
- *Federal Office of Road Safety (FORS)*: 1988 Fatality File containing data for New South Wales, Victoria and South Australia
- *USA General Estimates System (GES)*: 1989 data files. These databases provide a probability sample of USA road crashes, compiled by the NHTSA from the original police accident reports.

PURPOSE AND NATURE OF OVERVIEW ANALYSIS

This report presents an overview analysis, incorporating results from all of the above databases. Results from each database are presented separately (in appendices) in the form of crash frequencies and group percentages for each crash descriptor variable, calculated within age groups (young/mature) and time of day (day/night) sub-categories. Cross-tabulations combining results from the appendices are presented in Tables 1 and 2. Table 1 shows differences between age groups, for day and night separately; Table 2 shows differences between day and night for each age group separately. Magnitudes of differences are shown in terms of absolute number of percentage points difference between the young/mature and day/night percentage figures presented in the appendices.

Focus is on identifying differences between the crash patterns of young and mature drivers which occur consistently across databases, and subsidiary to this, consistent differences between daytime and night-time crash patterns. The conceptual framework of the research identified day/night variation as a factor likely to interact with driver age and other factors in influencing crash risk (see Figure 1, Macdonald, 1993b). The overview analysis explores this issue within the bounds of information available from mass databases.

RESULTS

Major results are presented below, grouped within the main categories of crash variables.

Type and location of crash

Proportions of young drivers were higher than the corresponding proportions of mature drivers for the following types of crashes:

- *on curves and on slopes, as opposed to straight and level road sections, particularly at night*

Proportions of drivers involved in crashes on curves rather than on straight road sections were higher at night than during the day for both young and mature drivers; the difference was a little greater for young drivers.

For the Australian Fatals database, proportion of drivers in crashes on slopes was considerably higher at night than during the day for young drivers, but for mature drivers the proportion on slopes was considerably lower at night. The only other databases having this variable were the USA ones, where no trend in either direction was apparent.

- *off the road, or on the road shoulder*

Proportions of drivers in 'off road/shoulder' crashes were much higher at night, for young and mature drivers equally.

- *off path, on straight - particularly at night*
- *off path, on curve or turning - particularly at night*

Proportions of drivers in 'off path on straight' and 'off path, curve/turning' crashes were higher at night for both young and mature drivers; the relative increase was a little greater for young drivers.

- *crashes in which the impact was with an object other than another vehicle - particularly at night*

Proportions of drivers involved in these crashes were always considerably higher at night than during the day for both young and mature drivers; the night-time increase was considerably greater for young Australian drivers, but for USA drivers the night-time increase was a little greater for the mature drivers.

The broader category of 'single vehicle crashes' (not confined to collisions) also showed higher proportions of night-time relative to daytime drivers involved, in this case for young and mature drivers fairly equally.

- *in vehicle/vehicle crashes when the young driver was in the striking vehicle, rather than the struck - but only in daytime (USA data only)*

Proportions of drivers in vehicle/vehicle collisions (two or more vehicles) were lower at night than during the day for both young and mature drivers; the night-time decrease was greater for young drivers when they drove the striking vehicle, and greater for mature drivers when they drove the vehicle struck.

- *in urban rather than rural areas, and in 60 kph speed zones, for both day and night-time fatal crashes (Australian Fatals database only - not in other databases)*
- *where there were no controls, as opposed to where there were traffic lights, stop/give way signs or other forms of control*

Proportions of drivers who were crash-involved at stop or give ways signs tended to be lower at night than during the day, equally for young and mature drivers

- *when the vehicle was 'moving along roadway' as opposed to turning, reversing or stationary*
- *particularly at night the night-time increase was greater for mature than young drivers*

Proportions of drivers who were crash-involved while turning/reversing or stationary, were lower at night than during the day for both young and mature drivers.

- *left turns, USA - daytime only*
- *pedestrian - daytime Australian fatals only*

The converse of young drivers' relatively higher proportions of the 'single vehicle' types of crash were their relatively lower proportions of vehicle/vehicle collisions, including right-angle, adjacent directions, rear-end, and head-on.

Proportions of drivers in vehicle/vehicle crashes were generally lower at night than during the day - again, the converse of the pattern for single vehicle crashes.

As would be expected in view of this pattern of day/night variation in vehicle/vehicle crashes, proportions of drivers at most types of intersection crashes were lower at night than during the day for both young and mature drivers, and proportions of non-intersection crashes were higher at night.

Vehicle speed (data only from NSW and Australian Fatals databases)

Proportions of young drivers were higher than the corresponding proportions of mature drivers for the following types of crash:

- *speeds greater than 60 kph, particularly at night*
- *for both young and mature drivers, proportions were higher at night than during the day*
- *'definitely over the speed limit', particularly at night; the increase in night-time proportions was greater for young than for mature drivers*
- *combination of all 'speeding' categories: 'possibly over limit', 'definitely over limit' and 'within limit but excessive for conditions'*

Proportions were much higher at night than during the day, equally for young and mature drivers

- *'excessive speed' identified as a causal factor, mainly day (Australian Fataals)*

Control of vehicle

Proportions of young drivers were higher than the corresponding proportions of mature drivers for:

- *'loss of control' identified as a causal factor, particularly at night*
- *the night-time increase was greater for young drivers (data only for NSW)*

Inattention, failure to observe

Proportions of young drivers were higher than the corresponding proportions of mature drivers for:

- *crashes when driver 'inattention' was judged to be a factor, both day and night (SA database only)*

Proportions of 'inattentive' drivers were higher at night than during the day, for young and mature drivers equally.

Proportions of drivers coded with 'failure to observe person/vehicle' recorded as a causal factor were lower at night than during the day for both young and mature drivers (Australian Fataals database only).

Responsibility for crash

Proportions of young drivers were higher than the corresponding proportions of mature drivers for crashes where:

- *driver designated as responsible for the crash (Australian Fataals database only), both day and night*

Proportions of 'responsible' drivers were higher at night than during the day for both young and mature drivers, but more so for young drivers.

Weather, dry/other road surface

Proportions of young drivers were *lower* than the corresponding proportions of mature drivers:

- *when weather conditions were wet or non-clear - daytime only*
- *for young drivers only, proportions were higher at night than during the day*

Proportions of both young and mature Australian drivers were higher at night than during the day when the road surface was wet; this pattern did not occur in the USA databases

Alcohol involvement

Proportions of young drivers were *lower* than the corresponding proportions of mature drivers for:

- *drivers in 'alcohol-involved' crashes at night - USA data only; proportions of drivers in alcohol-involved crashes were higher at night than during the day, equally for both young and mature drivers*
- *driving under the influence at night (Australian Fatalis only)*

Drivers apportioned to crashes where 'driving under the influence' was a factor were much higher at night than during the day: a little more so for mature than young drivers

Proportions of drivers with a BAC above 0.05 were much higher at night, particularly in fatal crashes: a little more so for mature than young drivers

Proportions of drivers with zero BAC were much lower at night, equally for young and mature drivers (NSW data only)

Proportions of drivers involved in crashes where the highest BAC was above 0.05 were much higher at night, equally for young and mature drivers (NSW data only)

Legal aspects

Proportions of young drivers were *higher* than the corresponding proportions of mature drivers for crashes where:

- *legal action taken against driver, or driver charged with violation, particularly during the day (NSW, USA data only).*

Proportions of drivers involved in crashes where legal action taken against a driver were higher at night than during the day, particularly for mature drivers.

- *driver charged with 'negligent driving' (NSW data only)*

Proportions of non-licensed drivers (no USA data) were slightly but consistently higher at night, equally for young and mature drivers.

Proportions of provisional/probationary licensed drivers (no USA data - young drivers only) were a little higher at night.

Proportions of drivers charged with 'proscribed alcohol content' were higher at night, equally for young and mature drivers (NSW data only).

Seatbelt wearing

Proportions of young drivers were higher than the corresponding proportions of mature drivers for:

- *driver not wearing a seatbelt - night-time (found only in Australian Fatals data (no USA data; trend not present in other two databases)*

Proportions of drivers not wearing seatbelts were higher at night than during the day, particularly for young drivers and particularly in fatal crashes.

Vehicle driven

Proportions of young drivers were higher than the corresponding proportions of mature drivers for:

- *cars aged 9 to 13 years (8 to 12 years for Fatals and the USA databases)*
- *cars aged 14+ years (13+ years for Fatals and USA databases) - trend much stronger in the Australian data*

Proportions of drivers with cars in the oldest category (14+ or 13+ years) were higher at night than during the day for both young and mature drivers.

Proportions of young drivers were lower than the corresponding proportions of mature drivers for:

- *cars in the newest category (<1 to 3 years - Australia, or <1 to 2 years - Fatals and USA)*

Proportions of drivers with cars in the newest category were lower at night than during the day, for both age groups but marginally more so for young drivers

Numbers of people/injuries/deaths in vehicle/crash

Data on these variables are recorded in a wide variety of forms, in different combinations for different databases. They include numbers of:

- *vehicle occupants*
- *people involved in crash*
- *people injured/killed in vehicle*
- *people injured/killed in crash.*

Not surprisingly, many differences were found between different age groups and between daytime and night-time. For example:

- *proportions of drivers involved in daytime crashes with four or more people involved were higher for mature drivers than for young ones*
- *proportions of drivers involved in daytime crashes with two or more people injured did not vary with age group*
- *proportions of drivers involved in night-time crashes with two or more people injured were higher for young than mature drivers*
- *proportions of crashes with driver plus two or more passengers in the vehicle were higher for young drivers than mature ones, particularly at night.*

Day/night differences in numbers killed and injured generally reflect the differences in types of crash, as reported above. The full set of such results was presented in the previous section and will not be discussed further, since a major determinant of the observed differences is likely to be the varying patterns of exposure of different age groups at different times of the day and night. In very general terms, young driver crashes involve more people, and result in higher levels of injury, than those of mature drivers.

Times of crash

As for numbers of vehicle occupants, people injured, etc, the temporal pattern of road crashes probably reflects to a large degree the different temporal patterns of exposure.

Proportions of young drivers were higher than the corresponding proportions of mature drivers for:

- *weekend crashes*
- *during night-time darkness (night = 6 pm-6 am)*
- *for weekend crashes: noon-6 pm, and most strongly, midnight-6 am*
- *for weekday crashes: in the midnight-6 am time period*

Proportion of drivers in weekend crashes was higher at night than during the day for both young and mature drivers, slightly more so for the young.

DISCUSSION AND CONCLUSION

The above findings are consistent with the patterns identified in an earlier review of published information on young driver crashes (Macdonald, 1993a). However, the present overview analysis provides much more information than was previously available on day/night differences in crash patterns. It has been found that such day/night differences are often large but, interestingly, they are in most cases the same or similar for young and mature drivers.

Underlying reasons for young drivers' generally higher crash risk remain unclear. A major factor influencing at least some types of over-involvement is likely to be the difference in exposure to risk of young versus mature drivers, including differing proportions of exposure during the day relative to night. Information on actual exposure patterns is needed to determine the extent to which this is reflected in the pattern of crashes. Based simply on crash patterns, it is difficult or impossible to differentiate the relative importance as causes of young driver overinvolvement in various types of crash of:

- a greater relative proportion of young drivers on the road in the times and places where, independent of their skills and behaviour, crashes are most likely
- a higher-risk subset of young drivers on the road at some times and places
- most young drivers displaying 'riskier' behaviour at some times and places than at others
- most young drivers, under most conditions, displaying generally 'riskier' behaviour, whether due to lack of skill, lack of appropriate 'attitudes', or both.

One of the clearest features of the present overview analysis is that proportions of young drivers were higher than those of older drivers for all types of single vehicle crashes, most of which involved running off the road and/or hitting an object. They were more likely to crash on curves and slopes. Consistent with this pattern, young drivers were more likely to be travelling above the speed limit or at excessive speed, and more likely to be in a crash where 'loss of control' was identified as a causal factor; such circumstances were more likely at night.

Their higher incidence of single-vehicle crashes, often entailing a loss of control, may suggest inadequate vehicle control skills. Young drivers' less developed vehicle control skills are well documented in the driver performance literature (Macdonald, 1993b). However, another significant factor might be age-related differences in the way in which drivers perceive hazards and associated risks in relation to their own perceived capacity to cope with these hazards. Again, there is clear documentation in the literature that inexperienced drivers have poorer hazard perception abilities than drivers with greater experience. Perhaps young drivers are poorer than older drivers at perceiving and interpreting the available perceptual information concerning the curvature and gradient of the road ahead in terms of appropriate changes to vehicle

speed and position on the road. Such questions cannot be answered by reference to information on crashes.

It is frequently suggested that young drivers' higher crash risk may be due in large part to a relatively small sub-set of 'young problem drivers' who, because of their particular combination of personal and socio-economic characteristics, are likely to expose themselves to particularly high risk levels and/or to drive in a particularly risky fashion. The 'Young Problem Driver' issue was briefly reviewed by Macdonald (1993b). There is a little evidence from the present study of relevance to this issue.

In the present analyses, proportions of unlicensed Australian drivers, and proportions of drivers charged with Proscribed Alcohol Content, were both found to be higher at night than during the day, but this was equally so for young and older driver groups. Similarly, proportions of crashes in which the car was in the oldest category were higher at night than during the day for both young and older drivers. These findings are suggestive of a somewhat different driver population at night. There is evidence of a correlation, at least within young driver groups, between level of exposure to risk, the 'riskiness' of driving performance itself, and personal characteristics such as socio-economic status (Macdonald, 1993b, pp.33-35); it could therefore be hypothesised that the apparent differences between daytime and night-time driver populations indicate a probable increase in the riskiness of driving at night. Clearly, more direct evidence on this issue is needed.

The basic questions which were the focus of the present study were:

- do young driver and mature driver crashes have the same set of causes?
- do daytime and night-time crashes have the same set of causes?

Results indicated some differences between young and mature driver crash patterns, and large differences between daytime and night-time patterns, some (but relatively few) of which were related to driver age. To pursue these questions in greater depth, there is a need for more information on the different patterns of exposure to risk of young versus mature drivers, during the day and at night. There is also a need for more information on the driving performance capacities and actual driving behaviour of drivers of different ages and different levels of skill development.

1. INTRODUCTION

The Monash University Accident Research Centre has been commissioned by the Federal Office of Road Safety to undertake a Young Driver Research Program as part of the Federal Government's Road Safety Initiative.

One of the research projects in this Young Driver Research Program is focussed on young driver crashes. Research for the Young Driver Crashes Project during the first two years of the program has entailed:

- a review of published literature on the characteristics of young driver crashes
- a review of published literature on young driver performance and behavioural characteristics
- a series of analyses of Australian and USA crash databases.

The present report presents an overview and summary of outcomes from the latter component of the project.

The following databases were analysed:

Australian data

- **New South Wales casualty data for the years 1986 to 1990, provided by the Traffic Authority of New South Wales**
- **Victorian casualty data for the years 1984 to 1989, provided by VicRoads**
- **South Australian casualty data for the years 1986 to 1990, provided by the South Australian Department of Transport**
- **Federal Office of Road Safety (FORS) Fatality File for 1988 provided by the Federal Office of Road Safety. Fatality data for New South Wales, Victoria and South Australia were examined.**

USA data

- **General Estimates System (GES) 1989 data, from the National Highway Traffic Safety Administration (NHTSA), Washington D.C. This database is a probability sample of USA road crashes, compiled by the NHTSA from the original police crash reports.**

1.1 PREVIOUS REPORTS ON CRASH DATA ANALYSES

The results of analyses of the above Australian and USA data have been presented in a series of reports which are outlined below.

Australian data

Report N ^o	Data File	State	Year(s)
1	Casualty crash	New South Wales	1986-1990
	"	Victoria	1984-1989
2	"	South Australia	1986-1990
3	FORS Fatality	New South Wales	1988
4		Victoria	
5		South Australia	
6		NSW, Victoria and SA combined	

USA data

Report N ^o	Data File	US Region	Year(s)
7	GES	North-west	1989
8	"	Mid-west	"
9	"	West	"
10	"	South	"

Overview report

Report N ^o	
11	Reviews the main findings presented in Report N ^{os} 1 to 10

1.2 THE PRESENT REPORT

This report is Number 11 in the series. It presents two overview analyses which have been conducted to identify common trends related to driver age (young versus mature) and time of crash (day versus night) across several Australian and USA crash databases. Analyses of each of these databases have previously been reported separately (Reports 1 to 10).

Conclusions from the overview analyses are summarised and discussed in relation to findings from the two previous literature reviews on young drivers and road crashes (Macdonald 1994a; 1994b).

2. OVERVIEW ANALYSES OF AUSTRALIAN AND USA CRASH DATA

2.1 INTRODUCTION

The present report presents results of analyses of all of the Australian and USA mass databases previously reported separately (Reports 1 to 10). Results from each database are presented separately in Appendices 1 to 8 in the form of crash frequencies and percentages for each crash descriptor variable and its sub-categories. Percentages are calculated within each age group, subdivided by day and night.

In the main body of the report, cross-tabulations which incorporate results from all of the separate database cross-tabulations are presented. Results are shown in two large tables. Table 1 shows differences between age groups, for day and night separately; Table 2 shows differences between day and night for each age group separately. It should be noted that the Tables show crash-involved drivers, not crashes; a crash involving three drivers would appear three times in the data.

2.2 NATURE OF DATA AND FORM OF PRESENTATION

Driver-based files were created, consisting of car drivers only, as young car drivers were the group of primary interest. Drivers were selected if they were involved in the following types of crashes:

- NSW: crashes resulting in a fatality, or injuries requiring admission to hospital or medical treatment
- Victoria: crashes resulting in a fatality, serious (injuries requiring hospital admission) or 'other' injury (injuries requiring medical treatment)
- SA: fatal and casualty crashes. Casualty crashes were those where injuries required either medical treatment or admission to hospital
- FORS Fatality File: fatal crashes
- GES files: crashes resulting in fatalities, incapacitating injuries or non-incapacitating injuries. The four GES file regions were analysed separately because there were significant inter-regional differences in definitions of crash variables.

Drivers were divided into different age groups from those used in previous analyses, to focus more specifically on possible age-related differences between young drivers and other drivers. Previously, the age groups were: minimum licensing age to 25 years, 26 to 40 years, 41 to 55 years, and 56 to 98 years. For the present analyses, the oldest drivers (56 to 98 years) were omitted as their crash-related characteristics are different from those of other drivers, and not relevant to the present project. The 26-40 years and 41-55 years groups were combined into one. Thus, there are only two driver age groups in the overview analyses: minimum licensing age to 25 years ('young' drivers), and 26 years to 55 years ('mature' drivers).

'Day' and 'Night' were defined as in previous analyses: that is, day is the period between 6 am and 6 pm, while 'night' covers the period between 6 pm and 6 am. Data for the years 1986 to 1989 were combined within each of the three state databases.

Crash descriptor categories are not always mutually exclusive. Thus, for the crash descriptor variable 'DCA' ('Definitions for Classifying Accidents'), three of the sub-categories are 'opposing directions', 'head on' and 'right thru'; the latter two are included in the first, but are shown separately because they represent the main variations within the more general 'opposing directions' category.

The frequencies and proportions (of all young drivers at night; of all young drivers during the day; of all mature drivers at night; of all mature drivers during the day) for each category of DCA are shown in Appendices 1, 2 and 4. Differences between these proportions for each driver group (young/mature by day/night) are shown in Tables 1 and 2 (Tables 1 and 2 are presented at the end of this report).

Some of the data available in the original databases have been omitted from the Appendices, and not all results shown in the Appendices are represented in Tables 1 and 2. Crash variables which are peculiar to only one or two of the databases or which have low crash frequencies were either omitted, or combined into broader categories which could be meaningfully compared across databases.

Since the main focus of the research program is on elucidating causal factors underlying young driver crashes, rather than on quantifying the extent of the problem, priority has been given to identifying trends across the various databases which might be suggestive of underlying causal factors, rather than to establishing the extent and statistical significance of all differences. In particular, the aims of the present overview analyses were to identify general differences between daytime versus night-time patterns of crash involvement, and in this context, to identify differences in the crash involvement patterns of young versus mature drivers.

To allow for differences in the numbers of young versus mature drivers and in numbers involved during daytime versus night-time, trends are described in terms of percentage point differences (young versus mature drivers, daytime versus night-time) within crash variables. Tables 1 and 2 show the direction and size of all differences. Table 1 shows differences between age groups in their distribution over different levels of crash variables, for day and night separately. Table 2 shows differences between day and night in their distribution over different levels of crash variables, separately for young and mature drivers.

Table 1 identifies the types of crash in which young drivers are over-involved relative to the involvement of mature drivers, for day and night separately. For the purposes of this report, to say that young drivers are 'over-involved' in a certain type of crash means that the proportion of crash-involved young drivers who were involved in crashes of that type is greater than the proportion of crash-involved mature drivers who were involved in crashes of that type. This definition is best explained by use of an example. Inspecting the distribution of Road User Movement types shown in Appendix 1 reveals that among drivers involved in daytime crashes, 8.3% of young drivers were involved in 'off path on straight' crashes, while only 5.3% of mature

drivers were involved in crashes of this type. The difference between these two figures is 3.0 points, and this value is shown in Table 1 as a measure of the over-involvement of young drivers in 'off path on straight' crashes during the daytime. At night, Appendix 1 shows that 17.8% of young driver crash involvements and 11.7% of mature driver crash involvements occurred in 'off path on straight' crashes. Thus Table 1 shows that the over-representation of young drivers in 'off path on straight' crashes at night is 6 points.

Data in Table 2 are derived in similar fashion to those in Table 1; differences between daytime and night-time crash involvement levels are shown separately for young and mature drivers.

In both Tables 1 and 2, the identification of trends across databases is facilitated by highlighting some figures in bold: In Table 1, these were figures where the proportion of young drivers was five or more points higher than that for mature drivers (the value of five was arbitrarily chosen after inspection of the data); in Table 2, bolded figures were those where the proportion of drivers involved in night-time crashes was higher than the proportion involved in daytime crashes by at least five points. This approach was selected as more appropriate than the application of normal statistical tests and significance criteria because, in the present case, the numbers are so large and the number of testable differences so many, that statistical significance would bear little, if any, relationship to practical significance.

2.3 YOUNG VERSUS MATURE DRIVER DIFFERENCES, FOR DAY AND NIGHT SEPARATELY

The results from all databases of young versus mature driver comparisons, for day and night separately, are presented in Table 1. The pattern of results depicted is discussed below.

2.3.1 Description of crash

Severity

For the Australian databases, no differences between young and mature drivers were found, either for daytime or night-time involvement in casualty crashes for any levels of severity.

The USA data showed no consistent age group differences for injury overall, although some differences were apparent for the North-west and Mid-west regions when injuries were categorised into incapacitating and non-incapacitating. However, these differences did not suggest any consistent, age-related trend.

Responsibility for crash

This variable was available only for the Australian Fatals data (Appendix 4). A greater proportion of young drivers were recorded as responsible for the crash, for both day and night.

Number of traffic units/vehicles

Results for all databases showed that young drivers were more likely than mature drivers to be involved in single vehicle crashes rather than crashes involving other vehicles. This trend was as strong or stronger for daytime crashes as for night-time crashes (average age differences: 6 points day; 5 points night).

Number of persons in crash

Information on number of persons involved in the crash was not available for the Australian casualty crash files. There were higher proportions of young than mature Australian drivers for crashes during the day in which two or three people were in the crash, and fewer young than mature drivers for daytime crashes with four or more people in the crash. No overall trend was apparent.

Number of persons injured in crash

Young and mature drivers did not differ greatly in terms of number of persons injured in their crashes. The Australian fatality data showed that young drivers were less likely to be involved in a crash where no-one was injured at night, and more likely to be involved in a crash where one person was injured during the day. No overall trend was apparent.

Number of persons injured in vehicle

Although information on this variable is collected for the Australian casualty databases, it was not available on the data sets used for these analyses. From the other databases, it was evident that smaller proportions of young driver vehicles had no injuries. Young drivers were more likely than mature drivers to have two or more people injured in their vehicle, particularly at night.

Number of persons killed in crash

Young drivers did not differ from their mature counterparts in number of persons killed in the crash.

Number of persons killed in vehicle

Data for this variable were available only for the Australian Fatals file. A larger proportion of young drivers' crashes at night resulted in one or more persons killed, compared with mature drivers crashes at night.

2.3.2 When did the crashes occur?

Day of week

For the Australian data, young drivers were under-represented in weekday crashes and over-represented in weekend crashes, whether they occurred during the day or night. The trend within USA data was similar, although much weaker.

Weekday/Weekend, each subdivided by time of day

Time of day was sub-divided into four levels: 6 am-noon; noon-6 pm; 6 pm-midnight and midnight-6 am.

For weekday crashes there was no strong pattern of age-related differences, other than a small over-representation of young drivers in the midnight-6 am time period, and an under-representation of equal magnitude in the 6 pm-midnight period.

For weekend crashes, age differences were larger. Young drivers tended to be over-represented in afternoon crashes (noon-6 pm), and most strongly, young drivers were over-represented in the time period midnight-6 am.

2.3.3 Where did the crashes occur?

Metro/Rural

Information on whether drivers were involved in metropolitan or rural crashes was available from all databases under three different variables (LGA, city/rural, urban/rural), depending on the database. For the USA and Australian casualty databases, young drivers were generally under-represented in metro/urban crashes. This trend was reversed for the Australian Fatals data. Most differences were small.

Land use

Data was available only from the Australian Fatals database. A higher proportion of young drivers were involved in crashes in residential areas than mature drivers.

Type of road

Some age-related differences occurred, but there was no consistent trend across data sets.

Intersection

Differences between age groups were small, but there was a tendency for proportions of young driver crashes to be higher than those of mature drivers at non-intersections, and lower at intersections of all sorts.

Relation to roadway

This variable was present only in the USA databases. Young drivers were clearly over-represented in both day and night-time crashes which were off the road or on the shoulder (average differences: 7 points day; 8 points night).

Speed limit

Speed limit data were available for the USA data files, but as frequencies clustered in different zones for each database, comparisons were difficult. USA results for this variable are therefore omitted from Table 1 but can be found in Appendices 5 to 8.

The only evident age-related differences in the proportions of crashes occurring in different speed zones were for the Australian Fatals database. Young drivers were over-represented in 60 kph zones for both day and night-time fatal crashes.

Road alignment (straight/curved; level/slope)

Age-related differences were generally small. Overall, proportions of young driver crashes were higher on curves and on slopes, particularly at night.

Road surface (sealed)

This variable was present for three of the Australian databases. No age group differences were found.

Traffic controls

Age-related differences were generally small. Proportions of young driver crashes were slightly lower at traffic lights, and slightly higher where there were no controls.

2.3.4 What were the factors within the vehicle - driver

Sex of driver

Age group differences were generally small, particularly at night.

Highest BAC in crash

Data for NSW showed no age-related differences for the highest BAC level in the crash (this information was not available for other Australian data sets). The USA data simply stipulated whether or not there was 'alcohol involvement' in the crash. It can be seen that there is a slight tendency for young USA drivers to be under-represented in alcohol-involved crashes at night.

Driver BAC

Age group differences are very small and there is no pattern other than a very slight tendency for young drivers to be more often below 0.05, or not alcohol involved.

Restraint use

USA data on seat belt use was not available. In the Australian fatality data, young drivers in night-time fatal crashes were less likely than their mature counterparts to be wearing a seatbelt.

Licence status

As expected, young drivers were consistently under-represented among drivers who held a standard licence, and over-represented among drivers holding

provisional/probationary licences. There were no age group differences among drivers who were unlicensed. USA data on type of licence held were not available.

Years driving experience

Information on years driving experience for USA drivers was not available.

Inevitably, young drivers were over-represented in each year of driving experience up to five years for both day and night-time crashes, and under-represented in the six or more years of driving experience category.

State of licence issue

The great majority of Australian drivers were crash-involved in the same state in which they were licensed. Hence, there were no age group differences between home and out-of-state drivers. The USA data did not include this type of information.

Number of occupants

Although data on number of vehicle occupants were not available in the Victorian and SA casualty files analysed, reasonably consistent findings were evident for the remaining data sets.

- Driver only: young drivers were generally lower in proportional involvement than mature drivers, especially at night
- Driver plus one passenger: during the day there was a tendency for young drivers to be over-represented in this category; at night this trend was stronger.
- Driver plus two or more passengers: the trend was similar to that for Driver plus one passenger, but not as strong.

Overall, these findings indicate a greater risk for young drivers who are travelling at night accompanied by passengers.

2.3.5 What were the vehicle factors?

Vehicle speed

Speed of vehicle was available only for the Australian Fataals and NSW casualty data. Higher proportions of young drivers crashed at speeds greater than 60 kph, particularly at night.

Speed category

Only the Australian Fataals file included speed category as a variable, but it is useful information because of the lower number of missing frequencies compared to vehicle speed. Young drivers were over-represented in the 'definitely over the limit' category, particularly at night. When all categories which indicated speeding ('possibly over the limit', 'definitely over the limit' and 'within limit but excessive for conditions') were

collapsed into one group, the young driver over-involvement occurred equally for daytime and night-time crashes. Conversely, young drivers were less likely to be 'unlikely over limit'.

Year of vehicle manufacture

The Australian data showed that young drivers in crashes were consistently under-represented relative to mature drivers in vehicles less than eight years old. This finding was similar for the USA data (vehicles less than seven years old), although the trend there was more apparent for vehicles less than two years old.

Young drivers in vehicles aged nine to 13 years (eight to 12 years for the Australian fatality and USA data) tended to be over-represented both in Australia and the USA. For cars older than 14 years, young Australian drivers were strongly and consistently over-represented but in the USA the trend was much weaker.

2.3.6 What were the environmental conditions?

Natural light

Generally speaking, age group differences were small or non-existent during daylight hours; this finding was also true for the condition of being dark during the day ('day' was classified as the hours between 6 am and 6 pm). However, during the condition of night-time darkness (night was classified as the hours between 6 pm and 6 am), there was some young driver over-involvement.

Street lighting

Where street lighting was present, age group differences for drivers involved in crashes were small and inconsistent in direction.

The fatality data show young driver over-involvement where street lighting was off and under-involvement where street lighting was non-existent for daytime crashes. However, these differences are misleading because daytime crashes were recorded as 'missing' for this variable. Hence, the frequencies for street lighting conditions during the day were extremely low.

View of road

Whether or not the view of the road ahead was open or obscured did not differentiate the two age groups.

Road surface (dry, other)

A very large majority of drivers were involved in crashes when the road surface condition was dry; there were no age group differences.

Weather

Casualty data showed no major age group differences for weather conditions, other than for the Fatales data, where the proportion of young drivers was 7 points higher than that of mature drivers for daytime crashes when conditions were clear; conversely, young drivers were under-represented for 'other' weather conditions (rain, etc) during the day. Other databases tended, very slightly, to show a similar pattern for daytime crashes. For night-time crashes there was no age difference related to differences in the weather.

2.3.7 What other factors surrounded the crash?

Manoeuvre of unit

Details on vehicle manoeuvre were not present for the Victorian or Australian Fatales data. Available data showed a general tendency for young drivers to be under-represented in crashes where the vehicle was stationary. Young Australian drivers were over-represented where the vehicle was 'moving along roadway'. There were no such differences in the USA data.

There were no substantial age group differences for Australian drivers where the vehicle was turning or reversing, but young USA drivers tended to be over-represented for left-hand turns (equivalent to Australian right-hand turns) during the day.

Road User Movement/Definition for Classifying Accidents

This variable was available only for Australian fatality, NSW and Victorian data. Results are summarised below:

- pedestrian - the age groups did not differ in proportions hitting pedestrians, except for daytime fatal accidents where young drivers were over-represented.
- adjacent directions - there was no consistent pattern of age-related differences for vehicles travelling in adjacent directions, including 'cross traffic' crashes at intersections (the major sub-category under 'adjacent directions').
- opposing directions - proportions of young drivers tended to be lower than for mature drivers, particularly in fatal crashes. The pattern was the same for the sub-category of 'head-on' crashes, but not for 'right-through' collisions.
- same direction - the fatality data showed no age group differences for 'same direction' collisions. The casualty data, however, showed a young driver under-representation, particularly at night. The same pattern occurred for the sub-category 'rear-end' crashes.
- manoeuvring/overtaking/on path - no differences were found for these categories.

- off path, on straight - proportions of young drivers were higher than those for mature drivers in crashes where the vehicle left a straight road section, particularly at night.
- off path, on curve or turning - results were similar to those for off path on straight. Young drivers tended to be over-represented in crashes where the vehicle left the road while on a curve or turning, particularly at night.
- off road into object - results clearly show a general over-involvement of young drivers, particularly at night where the average difference between age group proportions was 9 points. The category 'off road into object' was created by selecting sub-categories within the DCA/Road User Movement variable which identified the vehicle running off the road into an object; ie. left or right off carriageway into object or parked vehicle crashes (off path, on straight) and off carriageway, left on right bend, right on right bend, right on left bend or left on left bend into object or parked vehicle crashes (off path, on curve or turning). Because this grouping is confined to off road crashes only, it differs from the impact type sub-category identifying vehicle/object collisions.

Impact type

For vehicle/vehicle collisions (including right angle, rear-end, head on and other angle collisions) there was a general tendency for young drivers to be under-represented.

On the other hand, Australian young driver proportions were higher than mature drivers' where the vehicle impacted something other than another vehicle; this was so for both day and night, but more so at night. These differences were not accounted for by collisions with pedestrians (although young drivers were over-represented in daytime fatality accidents where a pedestrian was hit) or cyclists. Rather, it was collisions with an object which differentiated young from mature drivers, and the over-representation was greater at night.

The USA data did not include information specifically on vehicle/object collisions. The non-collision category (vehicles which overturned, caught fire, were immersed in water, etc.) showed no age effects.

Object hit (excluding other vehicles)

Only the NSW casualty data permits direct comparison of crashes with and without a collision with an object. The proportion of young drivers hitting an object was higher than for mature drivers, particularly at night.

Information on fixed object collisions was available for all data sets excluding the Australian fatality file. It showed a consistent tendency for young drivers to be over-represented, particularly at night.

Data on collisions with non-fixed objects were available only for NSW and the USA. In the USA data there was a very small but consistent under-representation of young drivers at night; in NSW there was no age effect.

Vehicle role

The USA data contains a variable which designates the striking and struck vehicles; for daytime crashes, young drivers were more likely to be in control of the 'striking' vehicle.

Major factor/error of driver

Descriptions of the factor or error recorded by the attending police as leading to the crash were available for three of the four Australian databases. The NSW and SA data showed that young drivers were under-represented in those cases where no particular factor or driver error was recorded (the majority of drivers were involved in 'no factor' crashes).

In NSW data, young drivers were over-represented, particularly at night, in 'loss of control' crashes, but there were no age-related differences for other factors, including excessive speed. The SA data showed young drivers to be proportionately more guilty of only one error: 'inattention'. In the Australian fatality data, young drivers were relatively under-represented in driving under the influence at night. Young drivers were over-represented for 'excessive speed', mainly during the day.

Legal action/violations

The NSW and USA databases were the only ones in which there was information on whether or not legal action was taken, or a violation charge was made. Results followed a consistent pattern.

A greater proportion of young drivers had legal action taken against them or were charged with a violation, for both daytime and night-time crashes. Consistent with this, in NSW young drivers were more likely than mature drivers to be charged with 'negligent driving', and with PCA (Proscribed Alcohol Concentration).

2.4 DAYTIME VERSUS NIGHT-TIME DIFFERENCES, FOR YOUNG AND MATURE DRIVERS SEPARATELY

The results from all databases of day versus night comparisons, for young and mature drivers separately, are presented in Table 2.

A positive value indicates that involvement level was higher at night than during the day, and vice versa for a negative value. *In cases where the difference exceeds five points in the direction of higher night-time involvement, the result is emphasised in bold.*

For example, the NSW casualty crash data (Appendix 1) shows that 41% of young driver night-time crashes and 31% of young driver daytime crashes occurred during the weekend. Thus, young drivers in casualty crashes during the weekend were more likely to crash at night than during the day. This finding is represented in Table 2 as +10 (night > day), for the crash descriptor variable 'Day of week' in the 'Weekend' category.

For mature NSW drivers in casualty crashes, the day/night difference was similar: 34% of mature driver night-time crashes and 25% of mature driver daytime crashes occurred over the weekend period. The difference of 9 points is shown in Table 2 as +9 (night > day), for the crash descriptor variable 'Day of week' in the 'Weekend' category.

The patterns of day/night differences depicted in Table 2 are discussed below.

2.4.1 Description of crash

Severity

Young Drivers

The general pattern here was for young driver crashes with the more severe levels of injury (ie. fatality; admitted; serious/incapacitating) to be over-represented at night. Conversely, proportions of less severe injuries (treated; other/non-incapacitating) were higher during the day. The pattern varied in strength between different databases, but was evident in both Australia and the USA.

Mature Drivers

The pattern here was very similar to that for young drivers. Proportions of mature drivers involved in crashes resulting in the more severe levels of injury were generally higher at night than during the day. Conversely, proportions involved in less severe injury crashes were lower at night.

Age-related Differences in Day/Night Variation

As noted above, the nature of the pattern of day/night differences was the same across age groups. Also, the absolute size of the day/night differences observed for both

young and mature drivers were very similar. Thus, there is no evidence of any age-related difference in this variable.

Responsibility for crash

This variable was available only for the Australian Fatals database.

Young Drivers

The proportion of young drivers involved in fatal crashes for which they were held responsible was 16 points higher at night than during the day. Conversely, in cases where the driver was not held responsible, the proportion of young drivers was 10 points higher during the day.

Mature Drivers

The proportion of mature drivers involved in fatal crashes for which they were held responsible was 10 points higher at night than during the day. Conversely, when the driver was not judged to be responsible, the proportion of mature drivers was 10 points higher during the day.

Age-related Differences in Day/Night Variation

For both young and mature drivers, there is a night-time increase in the proportion 'responsible for the crash'. The increase was greater among young drivers than mature drivers.

Number of traffic units/vehicles

Young Drivers

The proportion of young drivers involved in single vehicle crashes was consistently greater at night than during the day (average difference: 13 points). Conversely, the proportions of young drivers involved in multi-vehicle crashes were higher during the day than at night.

Mature Drivers

Proportions of mature drivers involved in single vehicle crashes were greater at night for all databases (average difference: 14 points). Conversely, for mature drivers involved in crashes between two vehicles, proportions were consistently lower at night, as were proportions for those involved in three or more vehicle crashes.

Age-related Differences in Day/Night Variation

The night-time increase in proportions of single-vehicle crashes and the relative decrease in multi-vehicle crashes applied fairly equally for young and mature drivers.

Number of persons in crash

This variable was present in the Australian Fatals database and the USA databases.

Young Drivers

For crashes in which only the driver was involved, proportions were consistently higher at night than during the day (average difference: 9 points). The converse was apparent for drivers in crashes involving driver plus one or two other people, where daytime proportions were higher than at night. With a total of four or more people involved, average day/night difference was close to zero.

Mature Drivers

For crashes in which only the driver was involved, proportions were higher at night than during the day (average difference: 13 points). The converse was apparent for mature drivers in crashes involving two or more people, where proportions were higher during the day than at night.

Age-related Differences in Day/Night Variation

The night-time increase in proportion of crashes with only the driver involved was greater for mature drivers.

Number of persons injured in crash

No strong pattern of day/night differences was evident for this variable, for young drivers. For mature drivers, the proportion in crashes with two or more people injured was a little higher during the day than at night.

Number of persons injured in vehicle

This variable was not present for the Australian state casualty databases.

Young Drivers

It was apparent that proportions of crashes in which there was no injury in the vehicle were generally higher in the daytime than at night. No consistent pattern of day/night differences was discernible for crashes with one or more people injured.

Mature Drivers

Proportions of mature drivers involved in crashes in which no injuries were reported were generally higher during the day. Proportions of crashes in which two, three or more were injured were generally higher at night.

Age-related Differences in Day/Night Variation

For both young and mature drivers, proportions in crashes with no injuries were lower at night.

Number of persons killed in crash

This variable was present for three of the four Australian databases. Young and mature drivers had almost identical patterns of day/night differences: for both, the proportions in crashes in which one or more people were killed was higher at night than during the day.

Number of persons killed in vehicle

This variable was present only in the Australian Fatals database.

Young Drivers

The proportion of young drivers in crashes in which one or more people were killed in the vehicle was higher at night than during the day. The day/night difference was around 18 points.

Mature Drivers

Proportion of mature drivers in night-time crashes in which one or more fatalities occurred in the vehicle was higher at night by 10 points.

Age-related Differences in Day/Night Variation

The night-time increase in proportion of drivers involved in crashes with one or more fatalities in the vehicle was greater for young drivers.

2.4.2 When did the crashes occur?

Day of week

Young Drivers

Proportions of young drivers involved in weekday crashes were considerably higher during the day than at night (average difference: 14 points). Conversely, at weekends the proportions were higher at night.

Mature Drivers

Proportions of mature drivers involved in crashes on weekdays were higher during the day than at night (average difference: 12 points); the converse was true at weekends.

Age-related Differences in Day/Night Variation

The pattern change in day/night proportions between weekday/weekend was similar for both age groups, although marginally larger for young drivers.

2.4.3 Where did the crashes occur?

Metro/Rural

Information on whether drivers were involved in metropolitan or rural crashes was available from all databases under three different variables (LGA, City/rural, Urban/rural), depending on the database.

Young Drivers

In eight of the nine databases, night-time proportions of young driver crashes were lower in urban areas; the difference was small (average difference: 2 points).

Mature Drivers

There was no difference between day and night proportions of crashes in urban versus rural areas for mature drivers.

Age-related Differences in Day/Night Variation

Whereas proportions of young driver crashes at night were slightly higher in rural areas, there was no such difference for mature drivers.

Land use

This variable was present only for the Australian Fatals database. For both age groups, the proportion at night in residential areas was a little higher than during the day.

Type of road

This variable was not present in the Victorian or SA databases.

Most day/night differences for both young and mature drivers were very small, and patterns of variation were not consistent.

Intersections

Young Drivers

Proportions of young drivers involved in crashes at intersections were generally lower at night than during the day (average difference: 5 points). The sub-categories of this variable ('cross intersection' and 'T-intersection' - present only in the Australian data), show the proportion of young drivers involved in fatal crashes (Australian Fatals database) at cross intersections was 17 points higher during the day than at night. The reverse was apparent for young drivers in fatal crashes at T-intersections, where the night-time proportion was 12 points higher than the daytime proportion.

For young drivers in 'non-intersection' crashes, night-time proportions were consistently higher than daytime proportions (average difference: 8 points).

Mature Drivers

Proportions of mature drivers involved in crashes at intersections were generally lower at night than during the day (average difference: 4 points). The sub-categories of this variable ('cross intersection' and 'T-intersection' - present only in the Australian data), show the proportion of mature drivers involved in fatal crashes (Australian Fatals database) at cross intersections was 15 points higher during the day than at night. The reverse was apparent for mature drivers in fatal crashes at T-intersections, where the night-time proportion was 19 points higher than the daytime proportion.

For mature drivers in 'non-intersection' crashes, night-time proportions were consistently higher than daytime proportions (average difference: 6 points).

Age-related Differences in Day/Night Variation

Almost identical patterns of day/night differences are apparent for the two age groups. The only age differences of any note appears to be the relatively higher (by 7 points) night-time proportions of mature Australian drivers in fatal crashes at T-intersection, and the slightly higher proportional involvement of young drivers at night in non-intersection crashes.

Relation to roadway

This variable was present only in the USA databases. It describes the position in relation to the roadway of the first impact in the crash.

Young Drivers

For 'on road' crashes, proportions for young drivers were much lower at night than during the day (average difference: 17 points); conversely, for 'off road/shoulder crashes' young driver proportions were much higher at night (average difference: 15 points).

Mature Drivers

For 'on road' crashes, proportions for mature drivers were lower at night than during the day (average difference: 17 points); conversely, for 'off road/shoulder crashes' mature driver proportions were much higher at night (average difference: 15 points).

Age-related Differences in Day/Night Variation

Clearly, there were no age-related differences in day/night variation for this variable.

Speed limit

For both age groups, day/night differences in proportions in different speed limit zones were mostly small and inconsistent in pattern.

Road alignment

Young Drivers

On straight sections of road, proportions of young driver crashes were consistently lower at night than during the day (average difference: 6 points); conversely, on curved sections of road, proportions of crash-involved young drivers were higher at night (average difference: 6 points).

Information on road gradient was available for Australian Fatal data and for the USA. The only major day/night difference for this variable was for the Australian fatal crashes: on slopes, proportion of young crash-involved drivers was 9 points higher at night than during the day; the converse was true for level roads.

Mature Drivers

On straight sections of road, proportions of mature driver crashes were lower at night than during the day (average difference: 4 points); conversely, on curved sections of road, proportions of crash-involved mature drivers were higher at night (average difference: 4 points).

Information on road gradient was available for Australian Fatal data and for the USA. There was no consistency in the pattern of day/night related to whether the road was level or sloping.

Age-related Differences in Day/Night Variation

For crashes on curves, day/night differences were in the same direction for young and mature drivers, and for both the Australian and USA casualty databases, differences were of similar magnitude. However, the Australian FataIs data showed a clear age difference: the night-time increase in fatal crashes on curves was 11 points higher for young drivers than for mature drivers.

For crashes on sloping sections of road, the Australian FataIs data again was different from the other databases. For young drivers, fatal crashes on slopes were 9 points higher at night, whereas for mature drivers, such crashes were 7 points lower at night.

Road surface (sealed)

No substantial day/night differences in proportional involvement for either young or mature drivers were found for this variable.

Traffic controls

Young Drivers

For crashes at traffic lights there was no consistent day/night difference. At stop or give way signs, proportions of young drivers generally were all either the same or lower at night compared to the day (average difference: 4 points). Contrary to this, for

crashes where no controls were present, proportions of young drivers were generally higher at night (average difference: 3 points).

Mature Drivers

For crashes at traffic lights there was no consistent day/night difference. At stop or give way signs, proportions of mature drivers were lower at night than during the day (average difference: 4 points). For crashes where no controls were present, proportions of mature drivers were generally higher at night (average difference: 5 points).

Age-related Differences in Day/Night Variation

For crashes at traffic lights, stop signs and give way signs, there were no differences between age groups. However, for crashes with no controls present, there was a somewhat larger night-time increase for mature drivers than for young drivers.

2.4.4 What were the factors within the vehicle - driver

Sex of driver

Young Drivers

For young males, proportions were higher at night than during the day (average difference: 12 points). Young female proportions were lower at night by the same amount. This pattern was consistent across all databases.

Mature Drivers

Proportional crash involvement for mature male drivers was consistently higher at night (average difference: 14 points). Proportions for mature female drivers were lower at night.

Age-related Differences in Day/Night Variation

The same pattern of day/night variation was evident across age groups. The magnitude of the night-time increase for males was marginally higher for mature drivers.

Highest BAC in crash, Alcohol involvement

Data on the highest BAC levels in the crash were available for the NSW database only. In the USA databases, crashes were coded as being either 'alcohol involved' or 'not alcohol involved', with no reference to BAC levels. Such a variable was not present in the other Australian databases.

Young Drivers

In NSW, the proportion of young drivers in zero BAC crashes was 27 points higher during the day than at night. Conversely, the proportion of young drivers in crashes in which BACs were above 0.05, was 25 points higher at night.

Proportions of young USA drivers in alcohol-involved crashes were higher at night than during the day (average difference: 18.5 points), with the converse being true for non-alcohol-involved crashes.

Mature Drivers

The proportion of mature NSW drivers in zero BAC crashes was 28 points higher in the daytime. For crashes in which the highest BAC was above 0.05, the proportion of mature drivers involved was 26 points higher at night.

Proportions of mature USA drivers in 'alcohol involved' crashes were higher at night (average difference: 22 points), than during the day.

Age-related Differences in Day/Night Variation

For the NSW data on proportions of drivers in zero-BAC crashes, pattern of day/night differences was the same for the two age groups.

For the USA data on alcohol involvement, the night-time increase in 'alcohol-involved' crashes was a little greater for mature drivers.

Driver BAC

Data were available for all databases other than NSW (because of the way the data were extracted from the original databases).

Young Drivers

Proportions of crash-involved young Australian drivers with BACs above 0.05 were much higher at night than during the day, particularly in fatal crashes (Victoria: 25 points; SA: 30 points; Fataals: 39 points). Night-time increases for young USA drivers in the 'alcohol involved' category were much smaller than for their Australian counterparts (average difference: 15 points).

Mature Drivers

Proportions of crash-involved mature Australian drivers with BACs above 0.05 were again much higher at night than during the day, particularly in fatal crashes (Victoria: 29 points; SA: 30 points; Fataals: 43 points). Night-time increases for mature USA drivers in the 'alcohol involved' category were much smaller than for their Australian counterparts (average difference: 16 points).

Age-related Differences in Day/Night Variation

The same patterns of day/night variation were apparent in both age groups: alcohol involvement was clearly much higher at night. In Australia, this night-time increase was a little greater for mature drivers.

Both for younger and mature drivers, the night-time increase was much greater in Australia; this national difference was more marked for the mature drivers.

Restraint use

This information was available only for NSW, Victorian and Australian Fatals databases.

Young Drivers

The only major day/night difference was for fatal crashes: for crashes in which seatbelts were not worn, proportion of young drivers was 15 points higher at night than during the day. The same trend was present, but much weaker, for the NSW and Victorian data.

Mature Drivers

Again, the only major difference was for fatal crashes. Proportion of mature drivers in fatal crashes in which seatbelts were not worn was 11 points higher at night than during the day.

Age-related Differences in Day/Night Variation

The same pattern was apparent for both age groups: the non-wearing of seatbelts was more common in night-time than daytime fatal crashes. The pattern was a little stronger for younger drivers.

Licence status

This information was available for all the Australian databases.

For young drivers, day/night difference were very small, but consistent across databases. Proportions of both provisional/probationary and non-licensed drivers were slightly higher at night.

For mature drivers, the same magnitudes of day/night differences and pattern of variation over licence status occurred as for younger drivers, except that the very low frequencies of provisional/probationary licences meant that differences were non-existent for this licence category.

Years of driving experience

Only the Australian databases provided this information.

Young Drivers

No substantial or consistent day/night differences were found related to years of driving experience within the age group. The largest difference was for fatal crashes, where the proportion of drivers with less than one year of experience was 6 points higher at night than during the day.

Mature Drivers

No consistent day/night differences in proportional involvement for mature drivers were found for this variable, except that for SA, the proportion of drivers with six or more years since licensing was 6 points lower at night.

Age-related Differences in Day/Night Variation

There was no consistent pattern of differences.

State of licence issue

No substantial day/night differences in involvement for either young or mature drivers were found for this variable.

Number of occupants

This variable was present in all databases except Victoria and SA.

Young Drivers

There was a very consistent trend for smaller night-time proportions of crashes with only one vehicle occupant (the driver), relative to daytime proportions (average difference: 10 points). For crashes with two, three or more vehicle occupants, proportions of young drivers were consistently higher at night than in the daytime.

Mature Drivers

Night-time proportions of crashes with only one vehicle occupant were lower at night for five out of the six databases, but the average difference was small (2 points). For vehicles with two occupants, proportions were consistently higher at night (average difference: 3 points). However, for three or more occupants there was little day/night difference.

Age-related Differences in Day/Night Variation

Young drivers' night-time decrease in the proportion of crashes with only one vehicle occupant was much larger than for mature drivers. Also, the proportions of young drivers with three or more vehicle occupants were consistently higher at night; this pattern did not occur for mature drivers.

2.4.5 What were the vehicle factors?

Vehicle speed

Information on this variable was available only for NSW and the Australian Fatals database.

Young Drivers

For young drivers involved in crashes at speeds below 60 kph, proportions were 6 points lower at night than during the day. Conversely, for crashes with speeds above 60 kph the proportions were 6 points higher at night. These figures applied for both the NSW and the Fatals databases.

Mature Drivers

For mature NSW drivers involved in crashes at speeds below 60 kph, proportions were 5 points lower at night than during the day. Conversely, for crashes with speeds above 60 kph the proportions were 5 points higher at night. Differences in fatal crashes were similar but of a smaller magnitude (2 points).

Age-related Differences in Day/Night Variation

Patterns were very similar for both age groups, except that the night-time increase for young drivers fatal crashes with a vehicle speeds greater than 60 kph was 4 points larger than the night-time increase for mature drivers.

Speed category

This variable only appears in the Australian Fatals database.

Young Drivers

For young drivers categorised as 'definitely travelling over the speed limit' prior to the impact, the night-time proportion was 16 points higher than the daytime. Similarly, for those categorised as 'possibly/definitely over limit', or 'within limit but excessive for conditions', the night-time proportion was 21 points higher than during the daytime.

Conversely, for young drivers involved in crashes in which vehicle speed was unlikely to have been over the limit, the night-time proportion was 21 points lower than the daytime.

Mature Drivers

For mature drivers who were 'definitely travelling over the speed limit' prior to the impact, the night-time proportion was 9 points greater than the daytime. Likewise, for those mature drivers who were 'possibly/definitely over limit' or 'within limit but excessive for conditions', the night-time proportion was 21 points above the daytime.

For mature drivers involved in crashes in which vehicle speed was unlikely to have been over the limit, the night-time proportion was 19 points below the daytime.

Age-related Differences in Day/Night Variation

The day/night variation in this variable is similar for the two age groups: proportions over the speed limit are clearly higher at night. The only difference is in the

magnitude of the night-time increase for the category 'definitely over limit', where the increase was 7 points larger for young drivers than for mature drivers.

Year of vehicle manufacture

Young Drivers

For crash-involved young drivers of vehicles older than 13 or 14 years, night-time proportions in seven of the eight databases were higher than (or equal to) those during the day (average difference: 3 points). For drivers of the newest cars, proportions were slightly but uniformly lower at night (average difference: 2 points).

Mature Drivers

Proportions of mature drivers of the oldest category of vehicle were higher at night in seven of the eight databases (average difference: 2 points). Proportions of mature drivers of the newest cars were generally lower at night (average difference: 2 points).

Age-related Differences in Day/Night Variation

There were no day/night differences between young and mature drivers in relation to vehicle age.

2.4.6 What were the environmental conditions?

View of road

There was no consistent day/night differences in proportional involvement related to view of road.

her

This variable was present for all except the Australian Fatals database. For the three Australian databases, proportions when the surface was 'other than dry' were 3-4 points higher at night for young drivers and 2-5 points for mature drivers. Differences were smaller and there was no consistent pattern for the USA databases.

Weather

Young Drivers

Proportions of young driver crashes when the weather was 'other than clear' were slightly but consistently higher at night (for six of the seven databases - average difference: 2 points).

Mature Drivers

There was no consistent pattern of day/night difference.

Age-related Differences in Day/Night Variation

Proportions of young driver crashes at night were slightly higher when the weather was not clear; this was not the case for mature drivers.

2.4.7 What other factors surrounded the crash?

Manoeuvre of unit

This variable was present in all except the Victorian and Australian Fatals databases.

Young Drivers

Proportions of young drivers involved in crashes whilst 'moving along the roadway' are consistently higher at night than during the day (average difference: 5 points).

Conversely, night-time proportions of young drivers in crashes when turning/reversing, or when stationary, were consistently lower at night (average differences: both 3 points).

Mature Drivers

Proportions of mature drivers involved in crashes whilst 'moving along the roadway' were consistently higher at night (average difference: 9 points).

Conversely, night-time proportions of mature drivers in crashes when turning/reversing, or when stationary, were consistently lower at night (average differences: 2 and 4 points, respectively).

Age-related Differences in Day/Night Variation

The night-time over-involvement in crashes whilst 'moving along the roadway' was a little higher for mature than for young drivers, and the night-time decrease in 'stationary' crashes was also greater.

Road User Movement/Definitions for Classifying Accidents (DCAs)

This variable was present in the NSW, Victorian and Australian Fatals databases.

Young Drivers

Results from the Fatals database showed that proportions of young drivers in pedestrian accidents, crashes with vehicles from adjacent directions and head-on collisions were all smaller at night than during the day. For NSW and Victoria, night-time proportions were also smaller for rear-end crashes involving young drivers, as they were for all types of 'same direction' crashes.

From among the remaining categories listed for this variable, three of them consistently indicated higher night-time as compared to daytime proportions, and these were all related to 'off path' crashes: 'off path on straight'; 'off path,

curve/turning', 'off road into object' (average differences: 8, 9, and 15 points, respectively).

Mature Drivers

Results for the Fatahs indicate that mature driver involvement in crashes with vehicles from adjacent directions, as well as with vehicles from opposing directions, were proportionally greater during the day. For NSW and Victoria, daytime proportions were also greater for rear-end crashes involving mature drivers.

Conversely, off-path crashes involving mature drivers resulted in higher night-time proportions: 'off path, on straight' (6 points); 'off path, curve/turning' (6 points); off road into object (10 points).

Age-related Differences in Day/Night Variation

The overall pattern across age groups is for higher night-time proportions of cars running off the road. These night-time increases are greater for young drivers by 2 points to 5 points, depending on the particular category.

Impact type

Young Drivers

For young drivers involved in vehicle/vehicle crashes, night-time proportions were consistently lower than daytime proportions (average difference: 15 points).

Proportions of young drivers involved in crashes categorised as 'vehicle/other' (Australian databases only) were higher at night than during the day (average difference: 15 points). The sub-category 'collision with object' appeared to account for the major portion of these vehicle/other crashes (average difference: 15 points).

For young drivers in 'non-collision' accidents, proportions were marginally higher at night (average difference: 2 points).

Mature Drivers

For mature drivers involved in vehicle/vehicle crashes, night-time proportions were consistently lower than daytime proportions (average difference: 15 points).

For vehicle/other crashes (Australia only), night-time proportions for mature drivers were higher than daytime (average difference: 12 points). As for young drivers, the sub-category 'collision with object' appeared to account for the major portion of these vehicle/other crashes (average difference: 10 points).

For mature drivers (USA and Australian Fatahs) in 'non-collision' crashes, proportions were marginally higher at night (average difference: 2 points).

Age-related Differences in Day/Night Variation

The night-time decrease in proportion of vehicle/vehicle crashes was the same for young and mature drivers. For the Australian vehicle/other categories of crash, night-time proportions were higher in both age groups, but more so (by 3 points) for young drivers. Drivers involved in the USA and Australian Fatal 'non-collision' crashes also increased at night for both groups, but only marginally.

Object hit

This variable was present in the NSW, SA and USA databases.

Young Drivers

For young drivers involved in crashes with fixed objects (easily the largest category for this variable), proportions were consistently higher than during the day (average difference: 15 points).

Mature Drivers

For mature drivers involved in crashes with fixed objects, proportions were also consistently higher than during the day (average difference: 12 points).

Age-related Differences in Day/Night Variation

A higher night-time incidence of collisions with fixed objects was evident for both young and mature drivers; the night-time increase was slightly less (by 3 points) for the mature drivers.

Vehicle role

This variable was only present in the USA databases.

Young Drivers

Proportions of young drivers involved in multiple vehicle crashes were generally lower at night than during the day, particularly when the young driver controlled the 'striking vehicle' (average difference: 10 points), rather than the vehicle 'struck' (average difference: 4 points).

In the 'single vehicle - striking' category, proportions of young drivers were consistently higher at night than during the day (average difference: 15 points).

Mature Drivers

Proportions of mature drivers involved in multiple vehicle crashes were lower at night than during the day, particularly when they controlled the 'struck' vehicle (average difference: 9 points), rather than the 'striking vehicle' (average difference: 5 points).

In the 'single vehicle - striking' category, proportions of mature drivers were consistently higher at night than during the day (average difference: 17 points).

Age-related Differences in Day/Night Variation

A lower night-time incidence of multiple-vehicle collisions (two or more) was evident for both young and mature drivers; the night-time decrease was greater for young drivers when they drove the striking vehicle, and greater for mature drivers when they drove the vehicle struck.

For both age groups there was a higher proportion of 'single-vehicle - striking' crashes at night; the night-time increase was a little (2 points) larger for the mature drivers.

Major factor/error of driver

This variable was present in the NSW, SA and Australian Fatals databases. However, the various factor/error categories did not apply consistently to all three databases.

Young Drivers

Proportion of crashes in which 'loss of control' was identified by attending police as a factor was 7 points higher at night for young NSW drivers; 'inattention' among young SA drivers was 11 points higher at night; the proportion for 'driving under the influence' in the Australian Fatals data was 35 points higher at night. In the Fatals data, 'failure to observe person/vehicle' was 10 points lower at night.

Mature Drivers

Proportion of crashes in which 'inattention' was identified as a factor was 10 points higher at night for mature SA drivers. In the Australian Fatals data, 'driving under the influence' was 40 points higher at night, and 'failure to observe person/vehicle' was 8 points lower at night.

Age-related Differences in Day/Night Variation

Young and mature driver groups were similar in their much higher relative levels of 'driving under the influence' in fatal crashes at night; the night-time increase was 5 points less for young drivers. The Fatals error category 'failure to observe person/vehicle' was lower at night for both groups; the night-time decrease was 2 points more for young drivers.

For the SA data, young and mature drivers both had similar higher night-time proportions of crashes in which 'inattention' was a factor.

Finally, for both age groups in the NSW data, 'loss of control' was a factor in more night-time crashes compared to daytime; the increase was 7 points for young drivers and 4 points for mature drivers.

Legal action

This variable was present in the NSW and USA databases.

Young Drivers

Proportions of young drivers against whom legal action was taken, following involvement in a crash, were consistently higher at night than during the day (average difference: 5 points). This was particularly so for the category PCA (Proscribed Concentration of Alcohol) for which the proportion was 15 points higher at night.

Mature Drivers

In the NSW and four USA databases, night-time proportions for mature drivers against whom legal action was taken following a crash, were consistently higher than daytime (average difference: 8 points), particularly for the PCA category which increased by 14 points at night.

Age-related Differences in Day/Night Variation

For both young and mature drivers, legal action ensued for a higher proportion of night-time crashes; the overall night-time increase was 3 points higher for mature than young drivers, and the PCA increase was 1 point lower for mature than young drivers.

3. SUMMARY, DISCUSSION AND OVERVIEW OF MAIN FINDINGS

In this section, the patterns described in Section 2 above are summarised, and then discussed in the context of findings from the two literature reviews previously completed for this project, the first of which focussed on crash literature (Macdonald, 1994a) and the second on driver performance (Macdonald, 1994b).

3.1 SUMMARY OF RESULTS FROM THE OVERVIEW ANALYSES

Major results from the overview analyses are presented below, grouped within the following main categories of crash variables: type and location of crash (the largest category); vehicle speed; control of vehicle; inattention, failure to observe; responsibility for crash; weather, dry/other road surface; alcohol involvement; legal aspects; seatbelt wearing; vehicle driven; numbers of people/injuries/deaths in vehicle/crash; time of crash.

Results related to young versus mature drivers and day versus night are presented together within each category.

3.1.1 Type and location of crash

Proportions of young drivers were higher than the corresponding proportions of mature drivers for the following types of crashes:

- on curves and on slopes, as opposed to straight and level road sections, particularly at night

Proportions of drivers involved in crashes on curves rather than on straight road sections were higher at night than during the day for both young and mature drivers; the difference was a little greater for young drivers.

For the Australian Fatals database, proportion of drivers in crashes on slopes was considerably higher at night than during the day for young drivers, but for mature drivers the proportion on slopes was considerably lower at night. The only other databases having this variable were the USA ones, where no trend in either direction was apparent.

- off the road, or on the road shoulder

Proportions of drivers in 'off road/shoulder' crashes were much higher at night, for young and mature drivers equally.

- off path, on straight - particularly at night
- off path, on curve or turning - particularly at night

Proportions of drivers in 'off path on straight' and 'off path, curve/turning' crashes were higher at night for both young and mature drivers; the relative increase was a little greater for young drivers.

- crashes in which the impact was with an object other than another vehicle - particularly at night

Proportions of drivers involved in these crashes were always considerably higher at night than during the day for both young and mature drivers; the night-time increase was considerably greater for young Australian drivers, but for USA drivers the night-time increase was a little greater for the mature drivers.

The broader category of 'single vehicle crashes' (not confined to collisions) also showed higher proportions of night-time relative to daytime drivers involved, in this case for young and mature drivers fairly equally.

- in vehicle/vehicle crashes when the young driver was in the striking vehicle, rather than the struck - but only in daytime (USA data only)

Proportions of drivers in vehicle/vehicle collisions (two or more vehicles) were lower at night than during the day for both young and mature drivers; the night-time decrease was greater for young drivers when they drove the striking vehicle, and greater for mature drivers when they drove the vehicle struck.

- in urban rather than rural areas, and in 60 kph speed zones, for both day and night-time fatal crashes (Australian Fatals database only - not in other databases)
- where there were no controls, as opposed to where there were traffic lights, stop/give way signs or other forms of control

Proportions of drivers who were crash-involved at stop or give way signs tended to be lower at night than during the day, equally for young and mature drivers

- when the vehicle was 'moving along roadway' as opposed to turning, reversing or stationary
- mature drivers showed a greater night-time increase than young drivers

Proportions of drivers who were crash-involved while turning/reversing or stationary, were lower at night than during the day for both young and mature drivers.

- left turns, USA - daytime only
- pedestrian - daytime Australian Fatals only

The converse of young drivers' relatively higher proportions of the 'single vehicle' types of crash were their relatively lower proportions of vehicle/vehicle collisions, including right-angle, adjacent directions, rear-end, and head-on.

Proportions of drivers in vehicle/vehicle crashes were generally lower at night than during the day - again, the converse of the pattern for single vehicle crashes.

As would be expected in view of this pattern of day/night variation in vehicle/vehicle crashes, proportions of drivers at most types of intersection crashes were lower at night than during the day for both young and mature drivers, and proportions of non-intersection crashes were higher at night.

3.1.2 Vehicle speed (data only from NSW and Australian Fatals databases)

Proportions of young drivers were higher than the corresponding proportions of mature drivers for the following types of crash:

- speeds greater than 60 kph, particularly at night
- 'definitely over the speed limit', particularly at night; the increase in night-time proportions was greater for young than for mature drivers
- combination of all 'speeding' categories: 'possibly over limit', 'definitely over limit' and 'within limit but excessive for conditions'

Proportions were much higher at night than during the day, equally for young and mature drivers

- 'excessive speed' identified as a causal factor, mainly day (Australian Fatals)

3.1.3 Control of vehicle

Proportions of young drivers were higher than the corresponding proportions of mature drivers for:

- 'loss of control' identified as a causal factor, particularly at night
- the night-time increase was greater for young drivers (data only for NSW)

3.1.4 Inattention, failure to observe

Proportions of young drivers were higher than the corresponding proportions of mature drivers for:

- crashes when driver 'inattention' was judged to be a factor, both day and night (SA database only)

Proportions of 'inattentive' drivers were higher at night than during the day, for young and mature drivers equally.

Proportions of drivers coded with 'failure to observe person/vehicle' recorded as a causal factor were lower at night than during the day for both young and mature drivers (Australian Fatals database only).

3.1.5 Responsibility for crash

Proportions of young drivers were higher than the corresponding proportions of mature drivers for crashes where:

- driver designated as responsible for the crash (Australian Fatals database only), both day and night

Proportions of 'responsible' drivers were higher at night than during the day for both young and mature drivers, but more so for young drivers.

3.1.6 Weather, dry/other road surface

Proportions of young drivers were lower than the corresponding proportions of mature drivers:

- when weather conditions were wet or non-clear - daytime only
- for young drivers only, proportions were higher at night than during the day

Proportions of both young and mature Australian drivers were higher at night than during the day when the road surface was wet; this pattern did not occur in the USA databases

3.1.7 Alcohol involvement

Proportions of young drivers were lower than the corresponding proportions of mature drivers for:

- drivers in 'alcohol-involved' crashes at night - USA data only; proportions of drivers in alcohol-involved crashes were higher at night than during the day, equally for both young and mature drivers
- driving under the influence at night (Australian Fatals only)

Drivers apportioned to crashes where 'driving under the influence' was a factor were much higher at night than during the day: a little more so for mature than young drivers

Proportions of drivers with a BAC above 0.05 were much higher at night, particularly in fatal crashes: a little more so for mature than young drivers

Proportions of drivers with zero BAC were much lower at night, equally for young and mature drivers (NSW data only)

Proportions of drivers involved in crashes where the highest BAC was above 0.05 were much higher at night, equally for young and mature drivers (NSW data only)

3.1.8 Legal aspects

Proportions of young drivers were higher than the corresponding proportions of mature drivers for crashes where:

- legal action taken against driver, or driver charged with violation, particularly during the day (NSW, USA data only).

Proportions of drivers involved in crashes where legal action taken against a driver were higher at night than during the day, particularly for mature drivers.

- driver charged with 'negligent driving' (NSW data only)

Proportions of non-licensed drivers (no USA data) were slightly but consistently higher at night, equally for young and mature drivers.

Proportions of provisional/probationary licensed drivers (no USA data - young drivers only) were a little higher at night.

Proportions of drivers charged with 'proscribed alcohol content' were higher at night, equally for young and mature drivers (NSW data only).

3.1.9 Seatbelt wearing

Proportions of young drivers were higher than the corresponding proportions of mature drivers for:

- driver not wearing a seatbelt - night-time (found only in Australian Fatals data (no USA data; trend not present in other two databases)

Proportions of drivers not wearing seatbelts were higher at night than during the day, particularly for young drivers and particularly in fatal crashes.

3.1.10 Vehicle driven

Proportions of young drivers were higher than the corresponding proportions of mature drivers for:

- cars aged 9 to 13 years (8 to 12 years for Fatals and the USA databases)
- cars aged 14+ years (13+ years for Fatals and USA databases) - trend much stronger in the Australian data

Proportions of drivers with cars in the oldest category (14+ or 13+ years) were higher at night than during the day for both young and mature drivers.

Proportions of young drivers were lower than the corresponding proportions of mature drivers for:

- cars in the newest category (<1 to 3 years - Australia, or <1 to 2 years - Fatalis and USA)

Proportions of drivers with cars in the newest category were *lower* at night than during the day, for both age groups but marginally more so for young drivers

3.1.11 Numbers of people/injuries/deaths in vehicle/crash

Data on these variables are recorded in a wide variety of forms, in different combinations for different databases. They include numbers of:

- vehicle occupants
- people involved in crash
- people injured/killed in vehicle
- people injured/killed in crash.

Not surprisingly, many differences were found between different age groups and between daytime and night-time. For example:

- proportions of drivers involved in daytime crashes with four or more people involved were higher for mature drivers than for young ones
- proportions of drivers involved in daytime crashes with two or more people injured did not vary with age group
- proportions of drivers involved in night-time crashes with two or more people injured were higher for young than mature drivers
- proportions of crashes with driver plus two or more passengers in the vehicle were higher for young drivers than mature ones, particularly at night.

Day/night differences in numbers killed and injured generally reflect the differences in types of crash, as reported above. The full set of such results was presented in the previous section and will not be discussed further, since a major determinant of the observed differences is likely to be the varying patterns of exposure of different age groups at different times of the day and night. In very general terms, young driver crashes involve more people, and result in higher levels of injury, than those of mature drivers.

3.1.12 Times of crash

As for numbers of vehicle occupants, people injured, etc, the temporal pattern of road crashes probably reflects to a large degree the different temporal patterns of exposure.

Proportions of young drivers were higher than the corresponding proportions of mature drivers for:

- weekend crashes
- during night-time darkness (night = 6 pm-6 am)
- for weekend crashes: noon-6 pm, and most strongly, midnight-6 am
- for weekday crashes: in the midnight-6 am time period

Proportion of drivers in weekend crashes was higher at night than during the day for both young and mature drivers, slightly more so for the young.

3.2 DISCUSSION AND OVERVIEW

3.2.1 Conceptual basis

According to the conceptual framework which forms the basis for the present research program (Macdonald, 1993a, Figure 1), young driver crash risk is determined by two major sets of factors. The first set of factors determine driving performance and its inherent 'riskiness' - *how* a driver drives. Skill and motivational factors are both important determinants of *how* drivers perform - what they do, and how well they do it.

The second set of factors determine when, where, how far and in what circumstances a driver is on the road and therefore exposed to risk. These factors include a wide range of factors related to drivers' socio-economic and personal characteristics, social factors, the physical characteristics of the road traffic and broader transport systems.

Analysis of mass crash databases is not a very useful means of investigating the operation of the second set of factors related to driver exposure. However, information from such databases can help to further our understanding of some aspects of driver performance as they relate to crash occurrence.

In the present analyses, focus has been on differences between crashes of young and mature drivers, and subsidiary to this, differences between daytime and night-time crashes. The project framework identified day/night variation as a factor likely to interact with many other factors in their influence on crash risk (see Macdonald, 1993b), and a decision was made to investigate possible reasons for the documented differences in crash risk between day and night as they relate particularly to young drivers. The present report has explored this issue in detail, within the bounds of information available from mass databases.

3.2.2 Discussion of results

In interpreting results of the present analyses, it must be remembered that their basis is the information reported by police following the crash. Accordingly, it is biased towards information which is either directly observable, or able to be reported by those involved in the crash with a reasonable degree of reliability. Mass databases of crash information are of limited value as a source of information on crash causation, since crashes almost invariably have several, interacting causal factors associated with

them, and some (probably most) of the causal factors are unlikely to be either observable or reliably reported.

In the present study, another problem in interpreting observed patterns in such data is that a major determinant is likely to be the varying patterns of exposure of different age groups at different times of the day and night. Information on actual exposure patterns is needed, to determine the extent to which this is reflected in the pattern of crashes, and whether there appears to be variation in the riskiness of driving performance associated with varying numbers of vehicle occupants, for example, for different age groups at different times of the day.

Exposure patterns are likely to be a stronger determinant of some types of crash data than others. As noted already, patterns of results in the information categories 'numbers of people/injuries/deaths in vehicle/crash', and 'time of crash' are particularly likely to reflect exposure patterns.

For example, it was found that proportions of young drivers were higher than the corresponding proportions of mature drivers in crashes involving the oldest cars. The obvious explanation is exposure - young drivers generally are more likely to own older cars. But it was also found that proportions of crashes involving the oldest cars were higher at night than during the day for both young and mature drivers. Does this imply that there is a socio-economically different group of mature drivers (with a higher crash risk) on the road at night? And/or is there a greater crash risk associated with driving old cars at night? Similar questions arise in relation to the slightly lower night-time proportions of young drivers in the newest cars: is this because young drivers who own such cars are less likely to drive at night, or does driving a new car itself reduce crash risk?

In the case of seatbelt wearing, young drivers in fatal crashes at night were less likely to be wearing a belt, and proportions of drivers not wearing seatbelts were higher at night than during the day, particularly for young drivers and particularly in fatal crashes. The fact that this pattern occurred only for the Fatals database probably reflects the fact that two crashes in which impact forces are similar, but in one of which seatbelts are not worn, are likely to have different outcomes: a crash with an unbelted driver is more likely to enter the Fatals database. However, it also appears that wearing rates are lower at night; whether this is because people behave differently at night, or because different people drive at night, is unclear.

Evidence of a slightly different night-time population is provided by results in the Legal Aspects category: for Australia, proportions of crash-involved non-licensed drivers were slightly but consistently higher at night, equally for young and mature drivers. An alternative explanation might be that levels of police enforcement are higher at night.

In the case of alcohol involvement, both factors are undoubtedly at work. That is, both proportions of drivers with proscribed BAC levels, and levels of police action to detect such drivers, are known to be higher at night. Accordingly, proportions of drivers charged with 'proscribed alcohol content' were higher at night. The same patterns of day/night variation were apparent in both age groups: alcohol involvement was much higher at night. In Australia, this night-time increase was a little greater for

mature drivers. Interestingly, the night-time increase was much greater in Australia for both younger and mature drivers; this national difference was more marked for the mature drivers. It is unclear to what extent this might reflect different enforcement levels, and to what extent it reflects different drink-driving patterns in the two countries. In the present context it is noteworthy that alcohol is a greater factor in mature driver crashes.

The most outstanding feature of the results emerged from the information on type and location of the crash. Proportions of young drivers were higher than those of mature drivers for all types of single vehicle crashes, most of which involved running off the road and/or hitting an object. They were more likely to crash on curves and slopes.

Proportions of these types of crash were much higher at night for all drivers. For the Australian databases there was a small but consistent tendency for the young driver night-time increase to be greater than that of the mature driver night-time increase. However, for the USA databases the night-time increases were a little greater for mature drivers. It seems likely that this national difference may be related to the similar difference in alcohol patterns noted above.

Consistent with this pattern, young drivers were more likely to be travelling above the speed limit or at excessive speed, and more likely to be in a crash where 'loss of control' was identified as a causal factor; such circumstances were more likely at night.

In view of the above pattern, it is interesting that proportions of young driver crashes in the Australian Fatalis database were higher than those of mature drivers in urban rather than rural areas and in 60 kph speed zones. Perhaps this simply reflects different exposure patterns for the two age groups.

When weather conditions were wet or otherwise 'non-clear', proportions of young driver daytime crashes were lower than those of mature drivers. However, proportions of these crashes were higher at night for young drivers, whereas for mature drivers there was no day/night difference. When the road surface was non-dry, proportions of crashes were higher at night for both age groups; this day/night difference was not present in the USA data.

Two categories of data which have a more subjective basis than the others discussed, are 'Responsibility for Crash' and 'Inattention, Failure to Observe'. In both cases, proportions of young drivers tended to be higher than those of mature drivers, although each finding was confined to only one database ('Responsibility': Australian Fatalis; 'Inattention': SA; 'Failure to Observe': Australian Fatalis). Proportions for all of these were higher at night than during the day for both young and mature drivers; the night-time increase in 'Responsibility' was higher for young drivers than for mature ones, perhaps due to their higher incidence of night-time single vehicle crashes. The USA databases recorded information about which vehicle was the 'striking' one and which was 'struck'. Consistent with the pattern for 'Responsibility' in the Australian Fatalis data, young USA drivers were more likely to be in the 'striking' vehicle than were mature drivers.

3.2.3 Overview

The aim of the present analyses has not been to determine levels of crash risk; rather, it has been to investigate differences in recorded crash characteristics between young and mature drivers, and between daytime and night-time. The purpose has been to gain insight into differences between these groups in terms of possible causes of the crashes. Do young driver and mature driver crashes have the same set of causes? Do daytime and night-time crashes have the same set of causes? These were the questions of greatest interest.

The present report complements a previous review of published information on young driver crashes (Macdonald, 1993a, p.45). The review found that:

" the youngest and most inexperienced drivers (usually late teenagers) are involved in a greater proportion of single vehicle crashes than older drivers, particularly young male drivers at night. Such single-vehicle crashes typically involve running off the road, often due to excessive speed or 'reckless driving', and are more common in rural areas."

Very young drivers appear to be involved in crashes due to poor vehicle control skills more often than in the case of mature drivers, and are more often responsible for causing the crash. "(The oldest drivers are also 'at fault' in a high proportion of their crashes)" (Macdonald, 1993a, p.45).

The present analyses generally confirmed this pattern. The only things mentioned above that were not found in the present analyses were the male/female difference (the present analyses did not investigate male/female differences), and the higher incidence of single-vehicle crashes in rural areas (this also was not investigated).

The present analyses provided much more information on day/night differences; overall, the finding was that day/night differences are often large, and in most cases are the same or similar for young and mature drivers.

Macdonald (1993a, p.45) also found that:

"Other crash types in which some studies have found young drivers to be over-represented are head on, rear-end where the young driver was in the rear vehicle (Catchpole, Cairney and Macdonald, in press) and overtaking. However, there is conflicting evidence on the latter crash type: some studies have specifically noted that young drivers were *not* over-represented in crashes due to 'following too closely'." (emphasis in original)

The present analyses did not find young driver over-representation in the above types of crash. However, in this study proportions were calculated within each age group across different types of crash, and the higher proportions of young drivers' single-vehicle crashes were the dominant factor. It may be that, if proportions were calculated within a narrower set of crash types, such as vehicle-vehicle crashes, a different pattern of age-related differences would emerge.

Macdonald (1993a, p.45) concluded that:

"Inattention or failure to anticipate was identified as a problem in the older group of young drivers (early 20s), especially males; this problem appears to be associated with perceptual and cognitive errors. Drivers in this age group also tend to have a high rate of alcohol involvement."

The present analyses did not sub-divide young drivers in this way, so these conclusions are not directly comparable with the present ones. The higher proportions of 'Inattention' and 'Failure to Observe' found for young drivers are consistent with the earlier conclusion. However, changes in alcohol involvement with age were found by Macdonald (1993a) to be greatest for drivers in the 21-29 years range, which straddles the present two age groupings. The two studies agree on the relatively lower involvement of young drivers; there is some uncertainty, and no doubt considerable variation between different places in accord with sociological differences, as to which age groups display the highest alcohol involvement. Difference between the Australian and USA involvement patterns within the present study was noted.

It can be seen from the above that in general, the characteristics which distinguish young driver crashes from those of mature drivers are clear. Much less clear are the underlying reasons for young drivers' high crash risk, in terms such as inadequately developed overall skill level, particular types of skill deficit, or specifically 'youthful' motives.

The higher incidence among young drivers of single-vehicle crashes, often entailing a loss of control, may suggest inadequate vehicle control skills. Young drivers' less developed vehicle control skills are well documented in the driver performance literature (Macdonald, 1993b). However, another significant factor might be age-related differences in the way in which drivers perceive hazards and associated risks in relation to their own perceived capacity to cope with these hazards. Again, there is clear documentation in the literature that inexperienced drivers have poorer hazard perception abilities than drivers with greater experience. Perhaps young drivers are poorer than mature drivers at perceiving and interpreting the available perceptual information concerning the curvature and gradient of the road ahead in terms of appropriate changes to vehicle speed and position on the road. Such questions cannot be answered by reference to information on crashes.

It is frequently suggested that young drivers' higher crash risk may be due in large part to a relatively small sub-set of 'young problem drivers' who, because of their particular combination of personal and socio-economic characteristics, are likely to expose themselves to particularly high risk levels and/or to drive in a particularly risky fashion. The 'Young Problem Driver' issue was briefly reviewed by Macdonald (1993b). There is a little evidence from the present study which is relevant to this issue.

In Australia, proportions of unlicensed drivers, and proportions of drivers charged with Proscribed Alcohol Content, were both found to be higher at night than during the day, but this was equally so for young and mature driver groups. Similarly, proportions of crashes in which the car was in the oldest category were higher at night than during the day for both young and mature drivers.

These findings are suggestive of a somewhat different driver population at night. There is evidence of a correlation, at least within young driver groups, between level of exposure to risk, the 'riskiness' of driving performance itself, and personal characteristics such as socio-economic status (Macdonald, 1993b, p.33-35); it could therefore be hypothesised that the above differences between daytime and night-time driver populations indicate a probable increase in the riskiness of driving at night. Clearly, more direct evidence on this issue is needed.

The basic questions which were the focus of the present study were:

- do young driver and mature driver crashes have the same set of causes?
- do daytime and night-time crashes have the same set of causes?

Results have indicated some differences between young and mature driver crash patterns, and large differences between daytime and night-time patterns, some (but relatively few) of which are related to driver age. To pursue these questions in greater depth, there is a need for more information on the different patterns of exposure to risk of young versus mature drivers, during the day and at night. There is also a need for more information on the driving performance capacities and actual driving behaviour of drivers of different ages and different levels of skill development.

TABLE 1: COMPARISON OF YOUNG AND MATURE DRIVER PROPORTIONS WITHIN EACH CRASH VARIABLE FOR DAY AND NIGHT SEPARATELY

Data in each cell of the table show the direction and size of difference between proportions of young and mature drivers involved in crashes for day and night separately. A higher young driver proportion is indicated by a plus sign, and the opposite direction of difference by a minus sign. Figures in bold highlight cases where young driver crash proportions exceeded mature driver crash proportions by at least five percentage points. Crash proportions and the crash frequencies upon which these figures are based are shown in Appendices 1 to 8. Proportions were calculated over the different categories within each crash descriptor variable. The 'Fatales' column includes data for New South Wales, Victoria and South Australia.

DESCRIPTION OF CRASH		AUSTRALIA				USA REGION				Row	
						Nth-west	Mid-west	West	South	Average	
Severity	Fatality	Day	0	0	0	-1	+1	+1	+1	0	
		Night	0	0	0	0	0	0	+1	0	
	Injury:	Day	0	0	0	+4	0	0	-1	0	
		Night	0	0	0	+3	0	-1	-1	0	
		incapacitating	Day				+4	-6	+2	+1	0
		Night					-8	+6	-1	0	-1
		non-incapacitating	Day				-1	+6	-3	-2	0
		Night					+11	-4	0	-1	+2
Responsibility for crash	This driver responsible	Day								+8	
		Night									+14
	This driver not responsible	Day									-10
		Night									-10
	Pedestrian responsible	Day									0
		Night									-3
Number of traffic units/vehicles units: NSW, SA vehicles: Victoria, FORS, GES	One	Day	+7	+4	+2	+11	+10	+6	+5	+7	+8
		Night	+13	+8	+3	+6	0	+7	0	+7	+6
	Two	Day	-3	-3	0	-10	-6	+2	-1	-2	-3
		Night	-8	-4	-1	-2	+2	-1	0	-5	-2
	Three or more	Day	-4	-2	-1	-1	-4	-7	-4	-4	-3
		Night	-5	-4	-2	-3	-2	-6	-1	-2	-3

DESCRIPTION OF CRASH CONT...

Number of persons in crash

One

Day -3 +7 +4 +2 +1 +2

Night -4 -4 +1 -2 +2 -1

Two

Day +10 -8 -1 -1 -1 0

Night -1 0 -1 -3 -1 -1

Three

Day +8 +3 -1 +4 +1 +2

Night +2 +1 -1 +8 -1 +1

Four or more

Day -12 -2 -2 -4 -2 -4

Night +3 +3 +1 +1 0 +2

Number of persons injured in crash

None

Day 0 -3 -1 0 +1 -1

Night 0 -5 +1 0 +2 0

One

Day 0 +7 -3 -2 -1 0

Night -2 +3 -8 -1 -3 -3

Two or more

Day 0 -4 +4 +2 +1 +1

Night +2 +2 +7 +1 +1 +4

Number of persons injured in vehicle

None

Day -5 -9 -8 -4 -4 -6

Night -5 -9 -2 -6 -6 -6

One

Day +4 +2 +7 0 +1 +3

Night 0 +1 -5 -2 -2 -2

Two or more

Day +2 +7 +1 +4 +2 +3

Night +6 +7 +7 +8 +8 +7

Number of persons killed in crash

None

Day 0 0 0 0 0 0

Night 0 0 0 0 0 0

One or more

Day +1 0 0 0 0 0

Night 0 0 0 0 0 0

Number of persons killed in vehicle

None

Day 0 0 0 0 0 0

Night -8 -8 -8 -8 -8 -8

One or more

Day -1 -1 -1 -1 -1 -1

Night +8 +8 +8 +8 +8 +8

WHEN DID THE CRASH OCCUR

Day of week

Weekday

Day -8 -5 -6 -3 -5 -2

Night -7 -8 -10 -8 -1 -2

Weekend

Day +6 +6 +6 +3 +6 +2

Night +7 +8 +10 +8 +1 +2

				AUSTRALIA				USA REGION				Row
				NSW	Victoria	SA	Fatals	Nth-west	Mid-west	West	South	Average
DESCRIPTION OF CRASH CONT...												
Number of persons in crash												
	One	Day					-3	+7	+4	+2	+1	+2
		Night					-4	-4	+1	-2	+2	-1
	Two	Day					+10	-8	-1	-1	-1	0
		Night					-1	0	-1	-3	-1	-1
	Three	Day					+8	+3	-1	+4	+1	+2
		Night					+2	+1	-1	+8	-1	+1
	Four or more	Day					-12	-2	-2	-4	-2	-4
		Night					+3	+3	+1	+1	0	+2
Number of persons injured in crash												
	None	Day	0				-3	-1	0	+1	-1	-1
		Night	0				-5	+1	0	+2	0	0
	One	Day	0				+7	-3	-2	-1	0	0
		Night	-2				+3	-8	-1	-3	-4	-3
	Two or more	Day	0				-4	+4	+2	+1	+1	+1
		Night	+2				+2	+7	+1	+1	+4	+3
Number of persons injured in vehicle												
	None	Day					-5	-9	-8	-4	-4	-6
		Night					-5	-9	-2	-6	-6	-6
	One	Day					+4	+2	+7	0	+1	+3
		Night					0	+1	-5	-2	-2	-2
	Two or more	Day					+2	+7	+1	+4	+2	+3
		Night					+6	+7	+7	+8	+8	+7
Number of persons killed in crash												
	None	Day	0	0								0
		Night	0	0								0
	One or more	Day	+1	0			0					0
		Night	0	0			0					0
Number of persons killed in vehicle												
	None	Day					0					0
		Night					-8					-8
	One or more	Day					-1					-1
		Night					+8					+8
WHEN DID THE CRASH OCCUR												
Day of week												
	Weekday	Day	-8	-5	-6		-3	-5	-2	-3	0	-4
		Night	-7	-8	-10		-8	-1	-2	-5	-5	-6
	Weekend	Day	+6	+6	+6		+3	+6	+2	+3	0	+4
		Night	+7	+8	+10		+8	+1	+2	+8	+8	+6

WHEN DID THE CRASH OCCUR CONT...

		AUSTRALIA				USA REGION				Row	
		NSW	Victoria	SA	Fatals	Nth-west	Mid-west	West	South	Average	
Weekday	6 am - noon	Day	-7	-3	-3	+2	-3	0	-2	-6	-3
	Noon - 6 pm	Day	-3	+3	+3	-4	+3	0	+2	+6	+1
	6 pm - midnight	Night	+8	-3	-5	-14	+3	-1	-2	-4	-2
	Midnight - 6 am	Night	+2	+3	+5	+5	-3	+2	+2	+4	+3
Weekend	6 am - noon	Day	-7	-6	-6	+1	+3	-5	-9	-1	-4
	Noon - 6 pm	Day	-5	+6	+6	+2	-2	+6	+9	+1	+3
	6 pm - midnight	Night	+1	-10	-17	+2	-5	-12	-5	-9	-7
	Midnight - 6 am	Night	+12	+10	+17	+7	+5	+12	+5	+9	+10
WHERE DID THE CRASH OCCUR											
LGA	Metro	Day	-5	-3	-3						-4
		Night	-5	-3	-3						-4
	Rural	Day	+5	+3	+3						+4
		Night	-5	+3	+3						0
City/rural boundaries	Capital city	Day				+2					+2
		Night				+4					+4
	General rural	Day				-6					-6
		Night				-5					-5
Urban/rural boundaries	Urban	Day					-8	-7	-3	-9	-7
		Night					-4	-10	-2	-3	-5
	<50% rural	Day					+3	-1	+2	+6	+3
		Night					+2	+4	+4	0	+3
	>50% rural	Day					+5	+8	+1	+3	+4
		Night					+8	+6	-2	+3	+4
Land use	Residential	Day				+6					+6
		Night				+6					+6
	Rural	Day				-7					-7
		Night				-6					-6
Type of road	Two-way undivided	Day	+4			-7	+1	+7	+4	+6	+3
		Night	+6			+2	-3	+4	-3	+5	+2
	Divided road/dual carriageway/ GES: divided highway)	Day				+8	-1	-5	-3	-5	-1
		Night				0	-1	-3	+2	-5	-1

WHERE DID THE CRASH OCCUR CONT...

Intersection

Intersection:

AUSTRALIA				USA REGION				Row
NSW	Victoria	SA	Fatals	Nth-west	Mid-west	West	South	Average
Day	-3	-2	+1	-6	0	+2	0	-1
Night	-5	-2	+2	+3	+2	-4	-12	-2
Day	-3	-2	-2					-2
Night	-4	-2	+1					-2
Day	-1	-1	+2					+2
Night	-1	-1	-1					-1

cross intersection

T-Intersection

Related to intersection

Non-Intersection

Relation to roadway

On road

Off road/shoulder

Day			0					0
Night			+4					+4
Day	+3	+2	-1	+8	0	0	+2	+2
Night	+6	+2	-6	+3	+3	+6	+14	+4
Day				-14	-6	-5	-6	-8
Night				-9	-9	-2	-12	-8
Day				+13	+6	+4	+6	+7
Night				+8	+8	+2	+13	+8

Speed limit

80 kph

100 kph

110 kph

Day	-1	0	-1	+6				+1
Night	0	+1	+1	+6				+2
Day	+1	+1	0	-3				0
Night	+1	-1	0	-5				-1
Day	0	0	+1	-2				0
Night	0	0	-1	-3				-1

Road alignment

Straight

Curved

Level

Slope

Day	-3	-1	-3	+7	-4	-1	-1	-3	-1
Night	-5	-2	-3	-4	-3	-2	+2	-3	-3
Day	+3	+1	+2	-7	+4	+1	+1	+3	+1
Night	+6	+2	+3	+4	+3	+2	-2	+3	+3
Day				+7	-6	0	-2	-5	-1
Night				-6	0	-6	+1	-1	-3
Day				-5	+3	+1	+2	+4	+1
Night				+10	0	+6	-3	0	+3

Road surface

Sealed

Day	-1		-1	0					-1
Night	-1		-1	0					-1

WHERE DID THE CRASH OCCUR CONT...

Traffic controls

Traffic lights
 Stop/give way signs
 Other controls
 No controls

	AUSTRALIA				USA REGION				Row
	NSW	Victoria	SA	Fatals	Nth-west	Mid-west	West	South	Average
Day	-2	-1	-2	-2	-10	-2	-2	-5	-3
Night	-3	-1	-3	+1	-3	0	0	-1	-1
Day	-2	-2	-1	-2	-2	-1	+2	+3	-1
Night	-2	-1	-2	-1	+1	+1	-3	-1	-1
Day	0	0	0	-1	-2	+1	0	-1	0
Night	0	0	0	+1	+2	0	-2	0	0
Day		+2	+4	+4	+11	+1	0	+3	+4
Night		+3	+4	-1	0	-2	+6	+2	+2

WHAT WERE THE FACTORS WITHIN THE VEHICLE - DRIVER

Sex of driver

Males
 Females

Day	+4	+2	+4	+3	+7	+2	+4	+4	+4
Night	+1	-1	+3	+2	+3	+6	0	0	+2
Day	-4	-2	-4	-3	-7	-2	-4	-4	-4
Night	-1	+1	-3	-2	-3	-5	0	0	-2

Highest BAC in accident

Zero BAC
 <.05
 >.05

Day	-1								-1
Night	0								0
Day	0								0
Night	+1								+1
Day	0								0
Night	-2								-2
Day					0	0	0	0	0
Night					-3	-4	-5	-2	-4
Day					0	0	0	0	0
Night					+3	+4	+6	+2	+4

Driver BAC (SA: Forensic BAC)

<.05
 >.05
 Alcohol involved
 Not alcohol involved

Day		0	-1	-2					-1
Night		+4	-1	+2					+2
Day		0	+1	+2					+1
Night		-4	+1	-2					-2
Day					0	0	0	-1	0
Night					-2	-4	-2	0	-2
Day					0	0	0	+1	0
Night					+2	+4	+2	0	+2

WHAT WERE THE FACTORS WITHIN THE VEHICLE - DRIVER CONT..

Restraint use

Worn

Day

+1

0

SA

Fatals

0

0

Night

+1

0

-5

-1

Not worn

Day

-1

0

0

0

Night

-1

0

+5

+1

Licence status

(Victorian data included
conditional licences)

Standard

Day

-22

-40

-18

-27

-27

Night

-22

-42

-21

-27

-28

Provisional/probationary

Day

+19

+39

+18

+23

+24

Night

+19

+41

+18

+25

+28

Non-licensed

Day

+1

+1

+1

+1

+1

Night

+2

0

+1

-1

+1

Years driving experience

(SA: vehicle driving experience)

< One

Day

+17

+9

+14

+10

+13

Night

+17

+11

+12

+15

+14

One

Day

+8

+11

+10

+20

+12

Night

+9

+11

+12

+16

+12

Two

Day

+16

+16

+9

+13

+14

Night

+17

+17

+10

+18

+16

Three

Day

+13

+16

+5

+9

+11

Night

+12

+16

+8

+11

+12

Four

Day

+10

+12

+5

+12

+10

Night

+10

+12

+5

+7

+9

Five

Day

+8

+8

+4

+9

+7

Night

+8

+6

+3

+8

+7

Six or more

Day

-72

-48

-48

-73

-60

Night

-72

-50

-44

-76

-61

State of licence issue

State of accident

Day

0

-1

+1

0

Night

0

0

+1

0

Other

Day

0

+1

-1

0

Night

0

0

-1

0

		AUSTRALIA				USA REGION				Row
		NSW	Victoria	SA	Fatals	Nth-west	Mid-west	West	South	Average
Restraint use	Worn	Day	+1	0						0
		Night	+1	0						-1
	Not worn	Day	-1	0						0
		Night	-1	0						+1
Licence status (Victorian data included conditional licences)	Standard	Day	-22	-40	-18	-27				-27
		Night	-22	-42	-21	-27				-28
	Provisional/probationary	Day	+19	+39	+18	+23				+24
		Night	+19	+41	+18	+25				+28
	Non-licensed	Day	+1	+1	+1	+1				+1
		Night	+2	0	+1	-1				+1
Years driving experience (SA: vehicle driving experience)	< One	Day	+17	+9	+14	+10				+13
		Night	+17	+11	+12	+15				+14
	One	Day	+8	+11	+10	+20				+12
		Night	+9	+11	+12	+16				+12
	Two	Day	+16	+16	+9	+13				+14
		Night	+17	+17	+10	+18				+16
	Three	Day	+13	+16	+5	+9				+11
		Night	+12	+16	+8	+11				+12
	Four	Day	+10	+12	+5	+12				+10
		Night	+10	+12	+5	+7				+9
	Five	Day	+8	+8	+4	+9				+7
		Night	+8	+6	+3	+8				+7
Six or more	Day	-72	-48	-48	-73				-60	
	Night	-72	-50	-44	-76				-61	
State of licence issue	State of accident	Day	0	-1	+1					0
		Night	0	0	+1					0
	Other	Day	0	+1	-1					0
		Night	0	0	-1					0

WHAT WERE THE FACTORS WITHIN THE VEHICLE - PASSENGERS**Number of occupants**

One

Day +1 0 -8 -1 -4 -5 -3

Night -7 -13 -10 -9 -13 -13 -11

Two

Day +4 +4 +7 +4 +3 +7 +6

Night +6 +7 +4 +7 +6 +7 +6

Three or more

Day -4 -4 +1 -3 +1 -1 -2

Night +2 +7 +8 +2 +7 +8 +6

WHAT WERE THE VEHICLE FACTORS**Vehicle speed**

< 60 kph

Day -4 -6 -5

Night -6 -10 -8

> 60 kph

Day +4 +6 +6

Night +6 +10 +6

Speed category

Unlikely over limit

Day -10 -10

Night -13 -13

Definitely over limit

Day +6 +6

Night +16 +16

Possibly/definitely over limit/within
limit but excessive for conditions

Day +14 +14

Night +16 +16

Year of vehicle manufacture

< 1 - 3 years (GES, FORS: <1 - 2 years)

Day -6 -8 -8 -12 -9 -11 -7 -4 -8

Night -5 -8 -8 -13 -7 -9 -10 -4 -8

4 - 8 years (GES, FORS: 3 - 7 years)

Day -8 -10 -12 -6 -1 -2 -3 -2 -5

Night -8 -9 -15 -8 -7 +4 -2 +3 -5

9 - 13 years (GES, FORS: 8 - 12 years)

Day +4 +6 +4 +4 +6 +8 +7 +3 +6

Night +4 +6 -7 +1 +1 +6 +6 +2 +2

14+ years (GES, FORS: 13+ years)

Day +10 +11 +16 +14 +4 +3 +3 +2 +8

Night +10 +18 +14 +19 -1 +2 +5 -1 +8

WHAT WERE THE ENVIRONMENTAL CONDITIONS**Natural light**

Daylight

Day -2 -1 -1 -2 +2 +2 +1 +1 0

Night -2 -3 -5 -5 +2 -6 +3 -3 -2

Darkness

Day +1 0 +1 -2 -2 +1 0 -1 0

Night +3 +3 +6 +9 0 +6 0 +5 +4

AUSTRALIA				USA REGION				Row					
NSW	Victoria	SA	Fatals	Nth-west	Mid-west	West	South	Average					
WHAT WERE THE FACTORS WITHIN THE VEHICLE - PASSENGERS													
Number of occupants		One		Day	+1			0	-8	-1	-4	-5	-3
				Night	-7			-13	-10	-9	-13	-13	-11
		Two		Day	+4			+4	+7	+4	+3	+7	+6
				Night	+6			+7	+4	+7	+6	+7	+6
		Three or more		Day	-4			-4	+1	-3	+1	-1	-2
				Night	+2			+7	+8	+2	+7	+8	+6
WHAT WERE THE VEHICLE FACTORS													
Vehicle speed		< 60 kph		Day	-4			-6					-5
				Night	-6			-10					-8
		> 60 kph		Day	+4			+6					+6
				Night	+6			+10					+6
Speed category		Unlikely over limit		Day				-10					-10
				Night				-13					-13
		Definitely over limit		Day				+6					+6
				Night				+16					+16
		Possibly/definitely over limit/within limit but excessive for conditions		Day				+14					+14
				Night				+16					+16
Year of vehicle manufacture		< 1 - 3 years (GES, FORS: <1 - 2 years)		Day	-6	-8	-8	-12	-9	-11	-7	-4	-8
				Night	-5	-8	-8	-13	-7	-9	-10	-4	-8
		4 - 8 years (GES, FORS: 3 - 7 years)		Day	-8	-10	-12	-6	-1	+2	-3	-2	-5
				Night	-8	-9	-15	-8	-7	+4	-2	+3	-5
		9 - 13 years (GES, FORS: 8 - 12 years)		Day	+4	+6	+4	+4	+6	+8	+7	+3	+6
				Night	+4	+6	-7	+1	+1	+6	+6	+2	+2
		14+ years (GES, FORS: 13+ years)		Day	+10	+11	+16	+14	+4	+3	+3	+2	+8
				Night	+10	+18	+14	+19	-1	+2	+5	-1	+8
WHAT WERE THE ENVIRONMENTAL CONDITIONS													
Natural light		Daylight		Day	-2	-1	-1	-2	+2	+2	+1	+1	0
				Night	-2	-3	-5	-5	+2	-6	+3	-3	-2
		Darkness		Day	+1	0	+1	-2	-2	+1	0	-1	0
				Night	+3	+3	+6	+9	0	+6	0	+5	+4

			AUSTRALIA				USA REGION				Row
			NSW	Victoria	SA	Fatals	Nth-west	Mid-west	West	South	Average
WHAT WERE THE ENVIRONMENTAL CONDITIONS CONT...											
Street lighting	On	Day	+1	0		-2	-3	+1	-1	-1	-1
		Night	0	+2		+4	-2	0	-3	-1	0
	Off	Day	-3	0		+8					+2
		Night	-2	0		-1					-1
	Nil	Day	+2	0		-9					-2
		Night	+2	+1		-2					0
View of road	Open (GES: no obstruction)	Day	0				-1	0	+1	-1	0
		Night	0				-1	+1	-1	-3	-1
	Obscured (GES: obstruction)	Day	0				+1	0	-1	+1	0
		Night	0				+1	-1	+1	+3	+1
Road surface	Dry	Day	0	0	0		0	+4	-1	+1	+1
		Night	+1	+1	-1		+3	0	0	-4	0
	Other	Day	0	0	0		0	-4	+1	-1	-1
		Night	-1	-1	+1		-3	0	0	+4	0
Weather	Clear (SA: not raining; GES: no adverse conditions)	Day		0	0	+7	0	+4	0	+1	+2
		Night		+1	-1	0	+3	-1	-1	-3	0
	Other (SA: raining; GES: other)	Day		0	0	-7	0	-4	0	-1	-2
		Night		-1	+1	0	-3	0	+1	+3	0
WHAT OTHER FACTORS SURROUNDED THE CRASH											
Manoeuvre of unit	Stationary:	Day	-5		-8		0	-8	-9	-5	-6
		Night	-4		-7		-3	-4	-9	-2	-5
	stopped on carriageway (GES: stopped in traffic)	Day	-5		-7		0	-8	-9	-5	-6
		Night	-4		-5		-3	-4	-9	-2	-5
	Moving along roadway:	Day	+7		+7		+1	+3	+8	+3	+6
		Night	+6		+6		-1	0	-1	+1	+2
	proceeding along lane	Day	+4		+6		-1	+2	+7	+1	+3
		Night	+3		+2		-4	+1	+1	-1	0
	Turning/reversing:	Day	-1		0		+6	+2	+1	+2	+2
		Night	-2		+2		+1	+2	0	0	+1
	turning left	Day			-1		+8	+2	+3	+3	+3
		Night			+1		+2	0	-2	0	0
	right turn	Day			+1		+1	0	-1	-1	0
		Night			+1		0	+2	+1	-1	+1

WHAT OTHER FACTORS SURROUNDED THE CRASH CONT...

**Road User Movement/
Definition for classifying
accidents**

Pedestrian
Adjacent directions:
 cross traffic (intersection)
Opposing directions:
 head on
 right thru
Same direction:
 rear-end
Manoeuvring
Overtaking
On path
Off path, on straight
Off path, curve/turning
Passengers/miscellaneous

Off road into object

	AUSTRALIA				USA REGION				Row
	NSW	Victoria	SA	Fatals	Nth-west	Mid-west	West	South	Average
Day	0	0		+6					+2
Night	-1	-1		-3					-2
Day	-3	-2		0					-2
Night	-4	-1		+1					-1
Day	-3	-2		0					-2
Night	-3	-1		+2					-1
Day	-1	0		-6					-3
Night	-4	-1		-8					-4
Day	-1	-1		-8					-3
Night	-3	-1		-8					-4
Day	0	+1		-1					0
Night	-1	0		0					0
Day	-3	-3		0					-2
Night	-5	-5		+1					-3
Day	-3	-2		0					-2
Night	-5	-4		+1					-3
Day	0	0		0					0
Night	0	+1		+1					+1
Day	0	0	0	+1					0
Night	0	0	0	0					0
Day	0	0		-1					0
Night	0	0		-1					0
Day	+3	+2		+3					+3
Night	+6	+6		+2					+6
Day	+4	+2		+2					+3
Night	+7	+3		+7					+6
Day	0	0		-1					0
Night	0	0		0					0
Day	+6	+3		+6					+5
Night	+11	+7		+8					+9

WHAT OTHER FACTORS SURROUNDED THE CRASH CONT...

Impact type

Vehicle/vehicle:

right angle

nose/tail

head on

other angle

Vehicle/other:

pedestrian

cyclist

object

Non-collision

Object hit

None

Fixed

Non-fixed

Vehicle role

Multiple vehicles - striking

Multiple vehicles - struck

Single vehicle - striking

				AUSTRALIA				USA REGION				Row
				NSW	Victoria	SA	Fatals	Nth-west	Mid-west	West	South	Average
	Day			-6	-4	-5	-9	-11	-5	-5	-6	-6
	Night			-12	-7	-13	-6	+1	-7	0	-8	-6
	Day	right angle		-3		0						-2
	Night			-4		-4						-4
	Day	nose/tail		-3		-6		-3	-7	-5	-6	-5
	Night			-5		-6		0	-5	+1	-1	-3
	Day	head on		-1		0		-1	+1	+1	+1	0
	Night			-3		-2		-4	-1	0	0	-2
	Day	other angle		0				-6	0	0	-1	-1
	Night			0				+1	0	+1	-5	-1
	Day	Vehicle/other:		+6	+4	+5	+10					+6
	Night			+12	+6	+13	+6					+9
	Day	pedestrian		0	0	0	+6	-3	-2	0	+1	0
	Night			-1	-1	0	-3	-3	0	-3	-2	-2
	Day	cyclist						0	-1	-1	+2	0
	Night							-5	-2	-1	-3	-3
	Day	object		+6	+3	+3	+6					+4
	Night			+11	+7	+10	+7					+9
	Day	Non-collision					-1	+1	+2	+1	+1	+1
	Night						+1	-1	0	+2	+1	+1
	Day	Object hit	None	-6								-6
	Night			-11								-11
	Day	Fixed		+6	+3	+3		+13	+4	+3	+6	+6
	Night			+11	+7	+10		+8	+8	-1	+11	+8
	Day	Non-fixed		0				-3	-1	0	0	-1
	Night			0				-9	-3	-1	-6	-4
	Day	Vehicle role	Multiple vehicles - striking					+3	+6	+9	+2	+6
	Night							+2	-2	+1	0	0
	Day	Multiple vehicles - struck						-10	-9	-10	-6	-9
	Night							-2	-4	-2	-7	-4
	Day	Single vehicle - striking						+12	+4	+6	+6	+7
	Night							+1	+8	+1	+8	+6

TABLE 2: COMPARISON OF DAYTIME AND NIGHT-TIME PROPORTIONS OF DRIVERS WITHIN EACH CRASH VARIABLE FOR YOUNG AND MATURE DRIVERS SEPARATELY

Data in each cell of the table show the direction and size of difference between daytime and night-time proportions of drivers involved in crashes for young and mature drivers separately. A higher night-time proportion is indicated by a plus sign, and the opposite direction of difference by a minus sign. Figures in bold highlight cases where night exceeded day by at least five percentage points. Crash proportions and the crash frequencies upon which these figures are based are shown in Appendices 1 to 8. Proportions were calculated over the different categories within each crash descriptor variable. The 'Fatales' column includes data for New South Wales, Victoria and South Australia.

DESCRIPTION OF CRASH			AUSTRALIA				USA REGION				Row	
			NSW	Victoria	SA	Fatales	Nth-west	Mid-west	West	South	Average	
Severity	Fatality	Mature	+2	+2	+3		-2	+2	0	+2	+1	
		Young	+2	+2	+2		0	+1	0	+2	+1	
	Injury:	admitted	Mature	-2	-2	-3		+3	-2	0	-2	-1
			Young	-2	-2	-2		0	-1	0	-2	-1
		treated	Mature	+7								+7
			Young	+8								+8
		serious (GES: incapacitating)	Mature	-8								-8
			Young	-10								-10
	other (GES: non-incapacitating)	Mature		+8			+15	-3	+6	0	+5	
		Young		+8			+2	+8	+1	-2	+4	
	Responsibility for crash	This driver responsible	Mature									
			Young				+10					+10
This driver not responsible	Mature									-10		
	Young									-10		
Pedestrian responsible	Mature									0		
	Young									-3		
Number of traffic units/vehicles units: NSW, SA vehicles: Victoria, FORS, GES	One	Mature	+11	+10	+3	+19	+23	+14	+14	+17	+14	
		Young	+17	+13	+4	+13	+13	+16	+9	+18	+13	
	Two	Mature	-6	-7	-3	-19	-15	-9	-4	-10	-9	
		Young	-11	-8	-4	-12	-8	-12	-3	-13	-9	
	Three or more	Mature	-5	-3	0	0	-7	-5	-10	-7	-5	
		Young	-6	-5	0	-1	-5	-4	-6	-5	-4	

		AUSTRALIA				USA REGION				Row
		NSW	Victoria	SA	Fatals	Nth-west	Mid-west	West	South	Average
DESCRIPTION OF CRASH CONT...										
Number of persons in crash	One	Mature			+13	+19	+12	+11	+10	+13
		Young			+12	+8	+9	+7	+11	+9
Two		Mature			0	-8	-8	-8	-6	-6
		Young			-11	+2	-8	-10	-7%	-5
Three		Mature			+1	-8	-4	-1	-1	-3
		Young			-3	-10	-4	0	-2	-4
Four or more		Mature			-13	-5	-1	-2	-3	-5
		Young			+3	0	+3	+3	-2	+1
Number of persons injured in crash	None	Mature	+1		+7	-1	+1	0	0	+1
		Young	+1		+6	0	+1	+2	+1	+2
One		Mature	-4		-1	+4	-1	+1	+1	0
		Young	-6		-4	-1	0	-1	-2	-2
Two or more		Mature	+3		-6	-3	0	-1	-1	-1
		Young	+6		-1	0	-1	-1	+2	+1
Number of persons injured in vehicle	None	Mature			+4	-10	-9	-6	-5	-5
		Young			+4	-10	-3	-9	-7	-5
One		Mature			+1	+6	+6	+3	+2	+3
		Young			-3	+4	-6	+1	-2	-1
Two or more		Mature			-5	+6	+2	+3	+3	+2
		Young			-2	+7	-8	+7	+6	+2
Number of persons killed in crash	None	Mature	-2	-2						-2
		Young	-2	-2						-2
One or more (Fatals: one)		Mature			+3	+2				0
		Young			+2	+2				0
(Fatals: two or more)		Mature			+4					+4
		Young			+6					+6
Number of persons killed in vehicle	None	Mature			-10					-10
		Young			-17					-17
One or more		Mature			+10					+10
		Young			+18					+18

		AUSTRALIA			USA REGION					Row	
					Fatals	Nth-west	Mid-west	West	South	Average	
WHEN DID THE CRASH OCCUR											
Day of week	Weekday	Mature	-9	-10	-13	-9	-15	-15	-11	-13	-12
		Young	-10	-11	-18	-15	-11	-15	-13	-18	-14
	Weekend	Mature	+9	+10	+13	+9	+15	+15	+11	+13	+12
		Young	+10	+11	+18	+15	+11	+15	+13	+18	+14
WHERE DID THE CRASH OCCUR											
LGA	Metro	Mature	+3	+1	-5						0
		Young	+3	+1	-5						0
	Rural	Mature	-3	-1	+5						0
		Young	-3	-1	+5						0
City/rural boundaries	Capital city	Mature				+1					+1
		Young				+4					+4
	General rural	Mature				-3					-3
		Young				-1					-1
Urban/rural boundaries	Urban	Mature				+2	+5	+1	-5		+1
		Young				+5	+3	+2	+1		+3
	<50% rural	Mature				-3	-7	-5	+7		-2
		Young				-4	-3	-4	+1		-3
	>50% rural	Mature				+1	+1	+5	-2		+1
		Young				+5	0	+2	-2		+1
Land use	Residential	Mature				+4					+4
		Young				+3					+3
	Rural	Mature				-4					-4
		Young				-3					-3
Type of road	Two-way undivided	Mature	+4			-3	0	+2	+5	+2	+2
		Young	+5			+5	-4	-1	-1	+1	+1
	Divided road/dual carriageway/ divided highway (GES)	Mature				+4	-1	-1	-4	-1	-1
		Young				-4	-1	+1	+1	-1	-1

AUSTRALIA

					USA REGION				Row					
					Nth-west	Mid-west	West	South	Average					
WHERE DID THE CRASH OCCUR CONT...	Traffic controls	Traffic lights	Mature	+5	+4	+2	-1	-5	-1	-5	-3	-1		
		Young	+3	+3	+1	+2	+2	0	-3	+1	+1	+1		
	Stop/give way signs	Mature	-5	-5	-3	-5	-3	-4	0	-3	-3	-4		
		Young	-5	-5	-3	-4	0	-3	-5	-6	-4	-4		
	Other controls	Mature	-1	-1	-1	-2	-4	+1	+1	+1	+1	-1		
		Young	-1	-1	0	-1	+1	+1	-1	+2	0	0		
	No controls	Mature		+3	+2	+8	+9	+5	+4	+4	+4	+5		
		Young		+3	+2	+3	-3	+2	+9	+3	+3	+3		
WHAT WERE THE FACTORS WITHIN THE VEHICLE - DRIVER	Sex of driver	Males	Mature	+12	+13	+16	+10	+16	+12	+17	+16	+15	+14	
			Young	+9	+10	+14	+9	+11	+14	+14	+11	+11	+12	
	Females	Mature	-12	-13	-15	-10	-15	-12	-17	-15	-15	-14		
		Young	-9	-10	-14	-9	-11	-14	-14	-11	-11	-12		
	Highest BAC in crash	Zero BAC	Mature										-28	
			Young											-27
		<.05	Mature											+2
			Young											+3
>.05		Mature											+26	
		Young											+26	
Alcohol involved		Mature					+17	+25	+26	+19	+19	+19	+22	
		Young					+14	+21	+22	+17	+17	+17	+19	
Not alcohol involved	Mature					-17	-25	-26	-19	-19	-19	-22		
	Young					-14	-21	-22	-17	-17	-17	-19		
Driver BAC (SA: Forensic BAC)	<.05	Mature		-29	-30	-43							-34	
		Young		-25	-30	-39								-31
	>.05	Mature		+29	+30	+43								+34
		Young		+26	+30	+39								+31
	Alcohol involved	Mature					+16	+19	+18	+13	+13	+13	+16	
		Young					+12	+16	+17	+14	+14	+14	+16	
	Not alcohol involved	Mature					-15	-19	-18	-13	-13	-13	-16	
		Young					-12	-15	-17	-14	-14	-14	-15	

59

AUSTRALIA				USA REGION				Row		
NSW	Victoria	SA	Fatals	Nth-west	Mid-west	West	South	Average		
WHAT WERE THE FACTORS WITHIN THE VEHICLE - DRIVER CONT...										
Restraint use	Worn	Mature	-2	-1					-5	
		Young	-2	-2					-6	
	Not worn	Mature	+2	+1					+5	
		Young	+2	+2					+6	
Licence status (Victorian data included conditional licences)	Standard	Mature	-2	-2	-1				-2	
		Young	-2	-4	-4				-3	
	Provisional/probationary	Mature	0	0	0				0	
		Young	0	+3	+2				+2	
	Non-licensed	Mature	+2	+2	+1				+2	
		Young	+2	+2	+2				+2	
	Years driving experience (SA: vehicle driving experience)	< One	Mature	0	0	+1				+1
			Young	0	+2	-1				+2
One		Mature	0	0	0				0	
		Young	+1	0	+1				-1	
Two		Mature	0	0	0				0	
		Young	+1	+1	+1				+2	
Three		Mature	0	0	-1				-1	
		Young	0	0	+2				+1	
Four		Mature	0	0	-1				0	
		Young	0	0	-1				-1	
Five		Mature	0	0	-1				0	
		Young	0	-1	-1				-1	
Six or more		Mature	-1	+1	-6				-2	
		Young	-2	-1	-2				-2	
State of licence issue		State of crash	Mature	0	-1	0				0
			Young	0	0	0				0
	Other	Mature	0	+1	0				0	
		Young	0	0	0				0	

WHAT WERE THE FACTORS WITHIN THE VEHICLE - DRIVER CONT...

Restraint use

Worn

Mature

-2

-1

-5

Young

-2

-2

-6

Not worn

Mature

+2

+1

+5

Young

+2

+2

+6

Licence status

(Victorian data included
conditional licences)

Standard

Mature

-2

-2

-1

-2

Young

-2

-4

-4

-3

Provisional/probationary

Mature

0

0

0

0

Young

0

+3

+2

+2

Non-licensed

Mature

+2

+2

+1

+2

Young

+2

+2

+2

+2

Years driving experience

(SA: vehicle driving experience)

< One

Mature

0

0

+1

+1

Young

0

+2

-1

+2

One

Mature

0

0

0

0

Young

+1

0

+1

-1

Two

Mature

0

0

0

0

Young

+1

+1

+1

+2

Three

Mature

0

0

-1

-1

Young

0

0

+2

+1

Four

Mature

0

0

-1

0

Young

0

0

-1

-1

Five

Mature

0

0

-1

0

Young

0

-1

-1

-1

Six or more

Mature

-1

+1

-6

-2

Young

-2

-1

-2

-2

State of licence issue

State of crash

Mature

0

-1

0

0

Young

0

0

0

0

Other

WHAT WERE THE FACTORS WITHIN THE VEHICLE - PASSENGERS

Number of occupants	One	Mature	-3			+6	-3	-3	-9	-1	-2
		Young	-10			-8	-5	-12	-17	-9	-10
	Two	Mature	+2			+1	+2	+3	+9	+3	+3
		Young	+3			+3	-1	+6	+11	+3	+4
	Three or more	Mature	+1			-6	+2	+1	0	-2	-1
		Young	+7			+6	+6	+6	+6	+6	+6

WHAT WERE THE VEHICLE FACTORS

Vehicle speed	< 60 kph	Mature	-5			-2					-4
		Young	-6			-6					
	> 60 kph	Mature	+6			+2					+4
		Young	+6			+6					+6

Speed category	Unlikely over limit	Mature				-19					-19
		Young				-21					-21
	Definitely over limit	Mature				+9					+9
		Young				+18					+18
	Possibly/definitely over limit/within limit but excessive for conditions	Mature				+21					+21
		Young				+21					+21

Year of vehicle manufacture	< 1 - 3 years (FORS, GES: <1 - 2 years)	Mature	-2	0	-1	-3	-5	-4	+2	-2	-2
		Young	-1	-1	-3	-4	-3	-3	-1	-2	-2
	4 - 8 years (FORS, GES: 3 - 7 years)	Mature	-3	-3	-5	-5	0	-4	-3	-4	-3
		Young	-2	-2	-8	-7	+7	-2	-2	+1	-2
	9 - 13 years (FORS, GES: 8 - 12 years)	Mature	+1	0	0	+3	+3	+6	-2	+3	+2
		Young	0	0	-10	+1	-2	+3	-2	+1	-1
	14+ years (FORS, GES: 13+ years)	Mature	+3	-4	+6	+4	+2	+2	+3	+3	+2
		Young	+3	+3	+6	+10	-3	+2	+6	0	+3

WHAT WERE THE ENVIRONMENTAL CONDITIONS

Natural light	Daylight	Mature	-79	-76	-78	-80	-81	-71	-75	-77	-77
		Young	-79	-78	-82	-82	-80	-79	-73	-81	-79
	Darkness	Mature	+76	+73	+77	+78	+76	+71	+72	+74	+76
		Young	+78	+76	+81	+89	+78	+76	+71	+79	+79

		AUSTRALIA				USA REGION				Row	
		NSW	Victoria	SA	Fatals	Nth-west	Mid-west	West	South	#	
WHAT WERE THE FACTORS WITHIN THE VEHICLE - PASSENGERS											
Number of occupants	One	Mature	-3			+6	-3	-3	-9	-1	-2
		Young	-10			-8	-5	-12	-17	-9	-10
	Two	Mature	+2			+1	+2	+3	+9	+3	+3
		Young	+3			+3	-1	+6	+11	+3	+4
	Three or more	Mature	+1			-6	+2	+1	0	-2	-1
		Young	+7			+6	+6	+6	+6	+6	+6
WHAT WERE THE VEHICLE FACTORS											
Vehicle speed	< 60 kph	Mature	-5			-2					-4
		Young	-6			-6					-6
	> 60 kph	Mature	+6			+2					+4
		Young	+6			+6					+6
Speed category	Unlikely over limit	Mature				-19					-19
		Young				-21					-21
	Definitely over limit	Mature				+9					+9
		Young				+18					+18
	Possibly/definitely over limit/within limit but excessive for conditions	Mature				+21					+21
		Young				+21					+21
Year of vehicle manufacture	< 1 - 3 years (FORS, GES: <1 - 2 years)	Mature	-2	0	-1	-3	-5	-4	+2	-2	-2
		Young	-1	-1	-3	-4	-3	-3	-1	-2	-2
	4 - 8 years (FORS, GES: 3 - 7 years)	Mature	-3	-3	-5	-5	0	-4	-3	-4	-3
		Young	-2	-2	-8	-7	+7	-2	-2	+1	-2
	9 - 13 years (FORS, GES: 8 - 12 years)	Mature	+1	0	0	+3	+3	+6	-2	+3	+2
		Young	0	0	-10	+1	-2	+3	-2	+1	-1
	14+ years (FORS, GES: 13+ years)	Mature	+3	-4	+6	+4	+2	+2	+3	+3	+2
		Young	+3	+3	+6	+10	-3	+2	+6	0	+3
WHAT WERE THE ENVIRONMENTAL CONDITIONS											
Natural light	Daylight	Mature	-79	-76	-78	-80	-81	-71	-75	-77	-77
		Young	-79	-78	-82	-82	-80	-79	-73	-81	-79
	Darkness	Mature	+76	+73	+77	+78	+76	+71	+72	+74	+76
		Young	+78	+76	+81	+89	+78	+76	+71	+79	+79

		AUSTRALIA				USA REGION				Row	
		NSW	Victoria	SA	Fatals	Nth-west	Mid-west	West	South	Average	
WHAT WERE THE ENVIRONMENTAL CONDITIONS CONT...											
Street lighting	On	Mature	+62	+66		+23	+69	+42	+61	+38	+47
		Young	+61	+69		+28	+69	+41	+49	+37	+48
	Off	Mature	-61	+1		-6					-22
		Young	-60	+1		-14					-24
	Nil	Mature	-1	+14		-10					+1
		Young	-1	+15		-2					+4
View of road	Open (GES: no obstruction)	Mature	+2			0	-2	+2	+1	+1	
		Young	+2			+1	0	0	-1	0	
	Obscured (GES: obstruction)	Mature	-2			0	+2	-2	-1	-1	
		Young	-2			-1	0	0	+1	0	
Road surface	Dry	Mature	-5	-5	-2	-3	+7	-2	+1	-1	
		Young	-4	-4	-3	+1	+3	-1	-3	-2	
	Other	Mature	+6	+6	+2	+3	-7	+2	-1	+1	
		Young	+4	+4	+3	-1	-3	+1	+3	+2	
Weather	Clear (SA: not raining/ GES: no adverse conditions)	Mature		-5	-1	+6	-2	+3	-1	0	0
		Young		-4	-1	-1	+1	-2	-2	-4	-2
	Other (SA: raining)	Mature		+6	+1	-6	+2	-2	+1	-1	0
		Young		+4	+1	+1	-1	+1	+1	+4	+2
WHAT OTHER FACTORS SURROUNDED THE CRASH											
Manoeuvre of unit	Stationary:	Mature			-4		-1	-4	-3	-7	-4
		Young			-3		-4	-1	-3	-4	-3
	stopped on carriageway (NSW, GES: stopped in traffic)	Mature			-4		-1	-4	-3	-7	-5
		Young			-3		-4	-1	-3	-4	-4
	Moving along roadway:	Mature			+7		+10	+7	+10	+8	+9
		Young			+7		+8	+3	+1	+7	+6
	proceeding along lane	Mature			+6		+6	+3	+6	+6	+6
		Young			+5		+2	+2	-2	+3	+2
	Turning/reversing:	Mature			-3		-2	-3	0	-2	-2
		Young			-4		-6	-3	-1	-3	-3
	turning left	Mature					+2	-3	+2	0	0
		Young					-4	-4	-3	-3	-3
	right turn	Mature			-1		0	-1	-1	-1	-1
		Young			-2		-2	0	+1	-1	-1

WHAT OTHER FACTORS SURROUNDED THE CRASH CONT...

Road User Movement/
Definition for Classifying
Accidents

Pedestrian

Adjacent directions:

cross traffic (intersection)

Opposing directions:

head on

right thru

Same direction:

rear-end

Manoeuvring

Overtaking

On path

Off path, on straight

Off path, curve/turning

Passengers/miscellaneous

Off road into object

AUSTRALIA				USA REGION				Row
NSW	Victoria	SA	Fatals	Nth-west	Mid-west	West	South	Average
Mature	-1	0	+2					0
Young	-2	-1	-7					-3
Mature	-4	-5	-7					-5
Young	-5	-4	-5					-5
Mature	-1	-2	-5					-3
Young	-2	-1	-3					-2
Mature	+2	+2	-7					-1
Young	0	+1	-6					-2
Mature	+2	+1	-7					-1
Young	0	0	-6					-2
Mature	0	+1	0					0
Young	-1	+1	0					0
Mature	-8	-9	-2					-6
Young	-10	-11	0					-7
Mature	-7	-6	-1					-5
Young	-9	-8	0					-6
Mature	-2	-2	-3					-2
Young	-2	-2	-2					-2
Mature	-1	0	-1					-1
Young	0	-1	-2					-1
Mature	+2	+4	+2					+3
Young	+2	+3	+1					+2
Mature	+6	+6	+6					+6
Young	+10	+10	+6					+8
Mature	+6	+1	+11					+6
Young	+8	+3	+16					+9
Mature	0	0	-1					0
Young	0	0	0					0
Mature	+10	+7	+16					+11
Young	+16	+12	+17					+16

WHAT OTHER FACTORS SURROUNDED THE CRASH CONT...

Impact type

Vehicle/vehicle:

right angle

nose/tail

head on

other angle

Vehicle/other:

pedestrian

cyclist

object

Non-collision

Object hit

None

Fixed

Non-fixed

Vehicle role

Multiple vehicles - striking

Multiple vehicles - struck

Single vehicle - striking

AUSTRALIA				USA REGION				Row	
NSW	Victoria	SA	Fatals	Nth-west	Mid-west	West	South	Average	
Mature	-10	-10	-13	-18	-25	-15	-14	-18	-15
Young	-15	-13	-21	-15	-13	-16	-9	-18	-15
Mature	-4		-5						-5
Young	-5		-8						-7
Mature	-7		-14	-14	-5	-14	-12		-11
Young	-9		-15	-11	-4	-8	-8		-9
Mature	+2		+2	+1	+1	0	+1		+1
Young	0		+1	-2	-1	-1	0		-1
Mature	-1			-11	-11	-2	-6		-6
Young	-1			-1	-11	-2	-10		-5
Mature	+18	+8	+13	+17					+12
Young	+18	+12	+21	+11					+18
Mature	-1	0	0	+2	-1	0	+2	+4	+1
Young	-2	-1	0	-7	-2	+2	-2	+2	-1
Mature				0	-2	-4	+2		-1
Young				-4	-3	-4	-3		-4
Mature	+9	+7	+9	+15					+10
Young	+14	+11	+16	+17					+16
Mature				+2	+1	+2	+2	+1	+2
Young				+4	-1	+1	+3	+1	+2
Mature	-10								-10
Young	-16								-16
Mature	+9		+9	+21	+11	+12	+11		+12
Young	+15		+16	+18	+15	+8	+16		+16
Mature	+1			+2	+2	-1	+8		+2
Young	+1			-4	+1	-2	0		-1
Mature				-8	-3	-2	-6		-5
Young				-8	-12	-10	-8		-10
Mature				-12	-9	-7	-9		-9
Young				-3	-4	+1	-9		-4
Mature				+25	+13	+14	+16		+17
Young				+16	+17	+9	+18		+16

64

WHAT OTHER FACTORS SURROUNDED THE CRASH CONT...

Factor/error

None

AUSTRALIA				USA REGION				Row
NSW	Victoria	SA	Fatals	Nth-west	Mid-west	West	South	Average
Mature		-11						-8
Young		-14						-12
Mature		-1						-2
Young		0						-1
Mature								+4
Young								+7
Mature		+10						+10
Young		+11						+11
Mature			-8					-8
Young			-10					-10
Mature		-2						-2
Young		-3						-3
Mature		+2	+40					+21
Young		+1	+36					+18
Mature			+2					+2
Young			-3					-3
Mature	0		+2					+1
Young	0		-1					-1

LEGAL ACTION/VIOLATIONS

Legal action

(GES: violations)

None

Legal action taken:

negligent driving

other driving offence

PCA

Mature	-9			-11	-11	-6	-5	-8
Young	-8			-8	-3	-4	-2	-5
Mature	+8			+11	+11	+6	+6	+8
Young	+8			+8	+4	+4	+2	+6
Mature	-2							-2
Young	-4							-4
Mature	-4							-4
Young	-5							-5
Mature	+14							+14
Young	+18							+16

REFERENCES

- Macdonald, W (1994a). A Review of Information on Young Driver Crashes, FORS Report CR 128. Canberra: Federal Office of Road Safety
- Macdonald, W (1994b). A Review of Information on Young Driver Performance Characteristics and Capacities, FORS Report CR 129. Canberra: Federal Office of Road Safety

APPENDICES

Results from each database are presented separately in Appendices 1 to 8 in the form of crash frequencies and percentages for each crash descriptor variable and its sub-categories. Percentages are calculated within each age group by day and night separately. Day was operationally defined as the period between 6 am and 6 pm, while night covers the period between 6 pm and 6 am. Data for the years 1986 to 1989 were combined within each of the databases for the three Australian states.

Crash descriptor categories are not always mutually exclusive. Thus, for the crash descriptor variable 'DCA' ('Definitions for Classifying Accidents'), three of the sub-categories are 'opposing directions', 'head on' and 'right thru'; the latter two are included in the first, but are shown separately because they represent the main variations within the more general 'opposing directions' category.

APPENDIX 1: NSW CASUALTY FILE (1986-1989)

DESCRIPTION OF CRASH		Age of driver			
		16-25		26-55	
		Time of crash			
		Day	Night	Day	Night
Severity	Fatal	581	701	968	725
		2.2	3.9	2.1	3.9
	Admitted injury	5599	5295	9314	4969
		20.8	29.2	20.4	27.0
	Treated injury	20782	12117	35345	12715
		77.1	66.9	77.5	69.1
Number of traffic units	One	4351	5953	4312	3725
		16.1	32.9	9.5	20.2
	Two	17751	9939	31429	11571
		65.8	54.9	68.9	62.9
	Three or more	4860	2221	9886	3113
		18	12.3	21.7	16.9
Number of persons injured	None	219	269	369	344
		0.8	1.5	0.8	1.9
	One	18869	11596	32019	12135
		70	64.0	70.2	65.9
	Two or more	7874	6248	13239	5930
		29.2	34.5	29.0	32.2
Number of persons killed	None	26381	17412	44659	17684
		97.8	96.1	97.9	96.1
	One or more	581	701	606	725
		2.2	3.9	1.3	3.9
WHEN DID THE CRASH OCCUR					
Day of week	Weekday	18610	10723	34037	12137
		69.0	59.2	74.6	65.9
	Weekend	8352	7390	11590	6272
		31.0	40.8	25.4	34.1
Hour/day	Weekday:	mid - 6 am			
		6 am - noon			
		noon - 6 pm			
		6 pm - mid			

		Age of driver			
		16-25		26-55	
		Time of crash			
		Day	Night	Day	Night
WHEN DID THE CRASH OCCUR CONT...					
Hour/day cont...	Weekend:	mid - 6 am			
		6 am - noon			
		noon - 6 pm			
		6 pm - mid			
WHERE DID THE CRASH OCCUR					
LGA	Metro	15450	10866	28226	12028
		57.3	60.0	61.9	65.3
	Rural	11512	7247	17401	6381
		42.7	40.0	38.1	34.7
Type of road	Two-way undivided	10331	7960	15680	7052
		38.3	43.9	34.4	38.3
Intersection	Intersection:	13723	8126	24733	9141
		50.9	44.9	54.2	49.7
	cross intersection	6497	3997	12207	4719
		24.1	22.1	26.8	25.6
	T-intersection	6644	3700	11549	4001
		24.6	20.4	25.3	21.7
	Non-intersection	13237	9986	20893	9267
		49.1	55.1	45.8	50.3
Speed limit	60 kph	20758	13860	35694	14032
		78.9	78.3	80.2	78.1
	100 kph	3569	2558	5455	2473
		13.6	14.5	12.3	13.8
	110 kph	150	105	308	178
		0.6	0.6	0.7	1.0
Adjacent land use - too many missing cases					
Road alignment	Straight	21799	13553	38250	14711
		81.0	74.9	83.9	80.0
	Curved	5127	4533	7324	3683
		19.0	25.1	16.1	20.0
Road surface	Sealed	25919	17493	44453	17977
		96.2	96.7	97.5	97.7

		Age of driver			
		16-25		26-55	
		Time of crash			
		Day	Night	Day	Night
WHERE DID THE CRASH OCCUR CONT...					
Signal operation	None present	23707	15466	39440	15057
		87.9	85.4	86.5	81.8
	On	3076	2587	5863	3251
		11.4	14.3	12.9	17.7
Other traffic controls	None	21353	15497	35363	15407
		79.2	85.6	77.5	83.7
	Stop/give way sign	4798	2314	9014	2683
		17.8	12.6	19.8	14.6
	Other controls	807	302	1239	318
		3.0	1.7	2.7	1.7
WHAT WERE THE FACTORS WITHIN THE VEHICLE - DRIVER					
Sex of driver	Males	17558	13424	27966	13410
		65.1	74.1	61.3	72.9
	Females	9393	4684	17643	4988
		34.9	25.9	38.7	27.1
Highest BAC in accident 21% missing	Zero BAC	20526	10049	34225	9853
		91.5	64.1	92.0	63.7
	<.05	831	1004	1240	815
		3.7	6.4	3.3	5.6
	>.05	1082	4631	1744	4807
		4.8	29.5	4.7	31.1
Restraint use	Worn	26018	17021	43707	17149
		98.5	96.7	97.9	95.8
	Not worn (but fitted)	334	523	863	686
		1.3	3	1.9	3.8
Licence status	Standard	19655	12735	42801	16757
		74.5	72.2	96.1	93.7
	Provisional	5464	3672	709	352
		20.7	20.8	1.6	2.0
	Non-licensed	737	895	602	635
		2.8	5.1	1.4	3.6

		Age of driver			
		16-25		26-55	
		Time of crash			
		Day	Night	Day	Night
WHAT WERE THE FACTORS WITHIN THE VEHICLE - DRIVER CONT...					
Years driving experience 13% missing	< One	4512	2976	501	253
		17.9	18.1	1.2	1.5
	One	2167	1585	310	149
		8.6	9.7	0.7	0.9
	Two	4471	3095	693	308
		17.8	18.8	1.6	1.9
	Three	3545	2297	569	271
		14.1	14	1.3	1.6
	Four	2864	1810	614	211
		11.4	11.0	1.4	1.3
	Five	2690	1711	960	426
		10.7	10.4	2.3	2.6
	Six or more	4939	2946	38848	14941
		19.6	17.9	91.4	90.2
State of licence issue	NSW	24738	16242	42699	16827
		95.3	95.4	95.7	95.5
	Other	1226	784	1950	789
		4.7	4.6	4.4	4.5
WHAT WERE THE FACTORS WITHIN THE VEHICLE - PASSENGERS					
Number of occupants 6% missing	One	15254	8442	25569	9815
		57.1	47.0	56.6	53.9
	Two	7336	5463	10780	4698
		27.5	30.4	23.9	25.8
	Three or more	4132	4047	8832	3696
		15.5	22.5	19.5	20.3
WHAT WERE THE VEHICLE FACTORS					
Vehicle speed 14% missing	<60 kph:	21217	12362	37907	13649
		84.7	78.3	88.8	84.3
	0-20 kph	7685	3327	17581	4947
		30.7	21.1	41.2	30.5
	41-60 kph	9375	6669	12623	5946
		37.4	42.3	29.6	36.7
	>60 kph	3838	3416	4787	2550
		15.3	21.7	11.2	15.7

		Age of driver			
		16-25		26-55	
		Time of crash			
		Day	Night	Day	Night
WHAT WERE THE VEHICLE FACTORS CONT...					
Year vehicle manufacture 12% missing	<1 - 3 years	2218	1264	6181	2209
		8.8	7.4	14.5	12.8
	4 - 8 years	7189	4449	15722	5888
		28.5	26.2	36.8	34.2
	9 - 13 years	8064	5493	11827	4908
	32.0	32.4	27.7	28.5	
	14+ years	7729	5769	9025	4211
		30.7	34.0	21.1	24.5
WHAT WERE THE ENVIRONMENTAL CONDITONS					
Natural light	Daylight	23956	1882	41532	2314
		89.1	10.4	91.2	12.6
	Darkness	1321	14960	1613	14630
		4.9	82.8	3.5	79.6
Street lighting	On	1725	12183	2285	12346
		6.4	67.5	5.0	67.2
	Off	18997	1923	33544	2327
		70.7	10.7	73.7	12.7
	Nil	6162	3944	9679	3686
		22.9	21.9	21.3	20.1
View of road	Open	25347	17326	42704	17637
		94.4	96.0	94.0	96.1
	Obscured	1493	718	2724	716
		5.6	4.0	6.0	3.9
Road surface	Dry	21401	13651	36153	13757
		79.7	75.7	79.6	75
	Other (wet/snow/ice)	5445	4386	9268	4588
		20.3	24.3	20.4	25
WHAT OTHER FACTORS SURROUNDED THE CRASH					
Manoeuvre of unit	Stationary:	1852	728	5587	1471
		6.9	4.0	12.2	8.0
	stopped in traffic	1775	669	5319	1366
		6.6	3.7	11.7	7.4
	Moving along roadway	20569	14991	31840	14211
		76.3	82.8	69.8	77.2
	proceeding along lane	18286	13243	29087	12840
		67.8	73.1	63.7	69.7

		Age of driver			
		16-25			
		Time of crash			
		Night			
WHAT OTHER FACTORS SURROUNDED THE CRASH CONT...					
Manoeuvre of unit cont...	Turning/reversing:	4541	2394	8200	2727
		16.8	13.2	18.0	14.8
	turning right out of own lane	2972	1702	5054	1880
		11.0	9.4	11.1	10.2
Road User Movement	Pedestrian (on foot or in toy/pram)	2531	1398	4362	1535
		9.4	7.7	9.6	8.3
	Adjacent directions: (intersections only)	5710	3029	10848	3774
	cross traffic	3390	1998	6879	2526
		12.6	11.0	15.1	13.7
	Opposing directions:	5162	3408	9250	4146
	head on	2235	1567	4304	2138
		8.3	8.7	9.4	11.6
	right thru	2908	1834	4911	1995
		10.8	10.1	10.8	10.8
	Same direction:	6517	2506	12467	3485
	rear-end	5597	2090	10673	3034
		20.8	11.5	23.4	16.5
	Manoeuvring	1504	584	2501	637
		5.6	3.2	5.5	3.5
	Overtaking	490	265	787	222
		1.8	1.5	1.7	1.2
	On path	392	612	666	609
		1.5	3.4	1.5	3.3
	Off path, on straight	2229	3232	2414	2147
		8.3	17.8	5.3	11.7
	Off path, curve/turning	2344	2978	2174	1797
	8.7	16.4	4.8	9.8	
Passengers/misc.	76	98	151	83	
	0.3	0.5	0.3	0.5	
	Off road into object	3303	5132	3243	3208
		12.3	28.3	7.1	17.4
First impact type	Vehicle/vehicle:	19875	10578	36580	12949
	right angle	6168	3205	11687	3949
		22.9	17.7	25.6	21.5
	nose/tail	5621	2108	10717	3047
		20.9	11.6	23.5	16.6
	head on	2332	1632	4486	2200
		8.7	9.0	9.8	12.0
other angle	5754	3633	9690	3753	
	21.4	20.1	21.2	20.4	

		Age of driver			
		16-25		26-55	
		Time of crash			
		Day	Night	Day	Night
WHAT OTHER FACTORS SURROUNDED THE CRASH CONT...					
First impact type cont...	Vehicle/other:	7040	7460	8965	5404
		26.1	41.2	19.7	29.4
	pedestrian	2531	1397	4362	1535
		9.4	7.7	9.6	8.3
	object	3439	4923	3421	3036
	12.8	27.2	7.5	16.5	
Object hit	None	23089	12673	41617	14949
		85.6	70.0	91.2	81.2
	Fixed	3775	5282	3865	3279
		14.0	29.2	8.5	17.8
	Non-fixed	98	157	145	181
	0.4	0.9	0.3	1.0	
Major factor/ error	None	19326	11196	35455	13510
		71.7	61.8	77.7	73.4
	Disobeyed traffic control	2261	1317	4111	1388
		8.4	7.3	9.0	7.5
	Loss of control (police description)	2299	2817	2041	1592
	8.5	15.6	4.5	8.6	
Excessive speed	61	108	35	56	
	0.2	0.6	0.1	0.3	
LEGAL ACTION					
None		13223	7343	27669	9545
		49.1	40.7	60.7	52.0
Negligent driving		7591	4312	8350	2932
		28.2	23.9	18.3	16.0
Other driving offence		4603	2230	7840	2350
		17.1	12.4	17.2	12.8
PCA		628	3044	854	2828
		2.3	16.9	1.9	15.4

APPENDIX 2: VICTORIAN CASUALTY FILE (1986-1989)

DESCRIPTION OF CRASH		Age of driver			
		16-25		26-55	
		Time of crash			
		Day	Night	Day	Night
Severity	Fatal	444	628	718	689
		1.7	3.5	1.6	3.7
	Serious injury	7015	6522	11669	6273
		27	35.9	26.4	34.0
	Other injury	18549	11042	31785	11510
		71.3	60.7	72.0	62.3
Number of vehicles	One	4643	5690	6010	4372
		17.9	31.3	13.6	23.7
	Two	16674	10155	29426	11053
		64.1	55.8	66.6	59.8
	Three or more	4691	2347	8736	3047
		18.0	12.9	19.8	16.5
Number of persons seriously injured	None	18814	11401	32202	11948
		72.3	62.7	72.9	64.7
	One	5626	4892	9420	4911
		21.6	26.9	21.3	26.6
	Two or more	1568	1899	2550	1613
		6.0	10.4	5.8	8.7
Number of persons with 'other' injury	None	5601	5210	9140	5140
		21.5	28.6	20.7	27.8
	One	14775	8642	25367	9095
		56.8	47.5	57.4	49.2
	Two or more	5632	4340	9665	4237
		21.7	23.9	21.9	22.9
Number of persons not injured	None	4979	5462	6797	4790
		19.1	30.0	15.4	25.9
	One	10899	5795	18867	6207
		41.9	31.9	42.7	33.6
	Two or more	10130	6935	18508	7475
		38.9	38.1	41.9	40.5
Number of persons killed	None	25564	17564	43454	17783
		98.3	96.5	98.4	96.3
	One or more	444	628	718	689
		1.7	3.5	1.6	3.7

		Age of driver			
		16-25		26-55	
		Time of crash			
		Day	Night	Day	Night
WHERE DID THE CRASH OCCUR CONT...					
Road feature (11% missing)	Straight	22772	15350	39032	15891
		92.1	88.6	93.3	90.9
	Curved	1896	1932	2704	1522
		7.7	11.1	6.5	8.7
Traffic controls	Traffic lights	4033	3397	7139	3632
		15.6	18.8	16.3	19.8
	Stop/give way sign	4670	2364	8673	2657
		18.1	13.1	19.8	14.5
	Other controls	901	493	1550	502
		3.5	2.7	3.5	2.7
	None	16231	11857	26501	11582
		62.8	65.5	60.4	63.0
WHAT WERE THE FACTORS WITHIN THE VEHICLE - DRIVER					
Sex of driver	Males	15398	12603	25328	13015
		59.2	69.3	57.4	70.5
	Females	10596	5576	18797	5441
		40.8	30.7	42.6	29.5
Driver BAC 72% missing	<.05	5340	3905	7530	3120
		94.3	69.1	94.2	65.6
	>.05	305	1726	432	1617
		5.4	30.5	5.4	34.0
Restraint use 14% missing	Worn	23851	15916	40630	16224
		98.8	97.2	98.6	97.3
	Not worn	197	383	347	357
		0.8	2.3	0.8	2.1
Type of licence 11% missing	Standard/conditional	13960	8968	40777	16448
		56.5	52.2	96.2	94.1
	Probationary/conditional	10221	7556	1156	517
		41.3	44.0	2.7	3.0
	Non-licensed	272	455	273	431
		1.1	2.6	0.6	2.5
State of issue 9% missing	Victoria	24292	16623	41918	16989
		96.3	96.6	96.9	96.4
	Other	922	589	1353	636
		3.7	3.4	3.1	3.6

		Age of driver			
		16-25		26-55	
		Time of crash			
		Day	Night	Day	Night
WHAT WERE THE FACTORS WITHIN THE VEHICLE - DRIVER CONT...					
Years driving experience 17% missing	Less than one	2173	1719	474	225
		10.6	12.4	1.2	1.4
	One	2456	1695	465	231
		12.0	12.2	1.1	1.4
	Two	3767	2669	854	402
		18.4	19.2	2.1	2.4
	Three	3836	2598	1095	436
		18.8	18.7	2.7	2.6
	Four	2951	2007	1137	428
		14.4	14.4	2.8	2.6
	Five	2142	1286	1046	467
		10.5	9.2	2.6	2.8
	Six or more	2931	1816	25572	10491
		14.3	13.0	62.3	63.4
WHAT WERE THE FACTORS WITHIN THE VEHICLE - PASSENGERS					
No data					
WHAT WERE THE VEHICLE FACTORS					
Year of vehicle manufacture 22% missing, but data not collected for 1986. This amounts to 15%	<1 - 3 years	1700	1001	5382	2184
		8.9	7.6	16.4	16.0
	4 - 8 years	4646	2969	11251	4321
		24.2	22.6	34.2	31.7
	9 - 13 years	6244	4292	8673	3575
		32.6	32.7	26.4	26.3
	14 or more years	6575	4881	7569	2588
		34.3	37.1	23.0	19.0
WHAT WERE THE ENVIRONMENTAL CONDITONS					
Light conditions	Daylight	23901	2559	40912	3054
		92.0	14.1	92.8	16.6
	Dark:	677	14203	1130	13846
		2.6	78.2	2.6	75.1
	street lights on	549	11007	919	10743
		2.1	60.6	2.1	58.3
	street lights off	14	224	24	213
		0.1	1.2	0.1	1.2
	no street lights	96	2755	168	2696
		0.4	15.2	0.4	14.6
Road surface	Dry	19938	13167	33999	13289
		77.2	73.1	77.6	72.6
	Other (wet/muddy/icy)	5885	4844	9829	5019
	22.8	26.9	22.4	27.4	

		Age of driver			
		16-25		26-55	
		Time of crash			
		Day	Night	Day	Night
WHAT WERE THE ENVIRONMENTAL CONDITONS CONT...					
Weather	Clear	21720	14419	36947	14532
		84.2	80.3	84.4	79.5
	Other	4090	3546	6834	3738
		15.8	19.7	15.6	20.5
WHAT OTHER FACTORS SURROUNDED THE CRASH					
DCA	Pedestrian	1624	980	2693	1177
		6.2	5.4	6.1	6.4
	Adjacent directions:	5686	3236	10441	3533
		21.9	17.8	23.6	19.1
	cross traffic	3178	1986	6039	2198
		12.2	10.9	13.7	11.9
	Opposing directions:	4549	3362	7614	3613
		17.5	18.5	17.2	19.6
	head on	1332	1000	2493	1250
		5.1	5.5	5.6	6.8
	right thru	3161	2305	5011	2315
		12.2	12.7	11.3	12.5
	Same direction:	7936	3506	14609	4548
		30.5	19.3	33.1	24.6
	rear end	4914	2020	9000	2760
		18.9	11.1	20.4	14.9
	Manoeuvring	1679	909	2968	840
		6.5	5.0	6.7	4.5
	Overtaking	535	297	873	304
		2.1	1.6	2.0	1.6
	On path	493	904	765	983
		1.9	5.0	1.7	5.3
	Off path, on straight	1970	3139	2286	2125
		7.6	17.3	5.2	11.5
	Off path, curve/turning	1536	1540	1923	1006
		5.9	8.5	4.4	5.4
	Passengers/misc.	420	319	758	343
		1.6	1.8	1.7	1.9
	Off road into object	2144	3578	2291	2329
		8.2	19.7	5.2	12.6

APPENDIX 3: SOUTH AUSTRALIAN CASUALTY FILE (1986-1989)

		Age of driver				
		16-25		26-55		
		Time of crash				
		Day	Night	Day	Night	
DESCRIPTION OF CRASH						
Severity 24% missing	Fatality	126	216	159	179	
		1.7	4.1	1.4	4.1	
	Injury	7174	5060	11598	4178	
		98.3	95.9	98.6	95.9	
Number of units involved 24% missing	One	399	495	465	290	
		5.5	9.4	4.0	6.7	
	Two	5430	3727	8751	3128	
		74.4	70.6	74.4	71.8	
	Three or more	1471	1054	2541	939	
		20.2	20.0	21.6	21.6	
Number of casualties 22% missing	One	5335	3330	8558	2913	
		73.1	63.1	72.8	66.9	
	Two	1370	1231	2059	887	
		18.8	23.3	17.5	20.4	
	Three or more	595	715	1040	557	
		8.2	13.6	8.8	12.8	
WHEN DID THE CRASH OCCUR						
Day of week 24% missing	Weekday	5419	2991	9384	2915	
		74.2	56.7	79.8	66.9	
	Weekend	1881	2285	2373	1442	
		25.8	43.3	20.2	33.1	
Hour/day	Weekday	mid - 6 am	512		351	
			17.1		12.0	
		6 am - noon	2099		3925	
			38.7		41.8	
		noon - 6 pm	3320		5459	
		61.3		58.2		
		6 pm - mid		2479	2564	
				82.9	88.0	
	Weekend	mid - 6 am		1103		457
				48.3		31.7
		6 am - noon	573		863	
			30.5		36.4	
	noon - 6 pm	1308		1510		
		69.5		63.6		
	6 pm - mid		1182		985	
			51.7		68.3	

		Age of driver			
		16-25		26-55	
		Time of crash			
		Day	Night	Day	Night
WHERE DID THE CRASH OCCUR					
LGA	Metro	5741	3868	9592	3318
		78.6	73.3	81.6	76.2
	Rural	1559	1408	2165	1039
		21.4	26.7	18.4	23.8
Intersection 58% missing	Cross intersection	1763	1190	3135	1062
		44.1	48.5	46.3	47.3
	T-intersection	2097	1193	3406	1103
		52.5	48.6	50.3	49.2
Speed limit 24% missing	60 kph	5962	4049	9769	3321
		82.1	77.4	83.5	76.7
	100 kph	83	68	128	57
		1.1	1.3	1.1	1.3
	110 kph	830	844	1202	719
		11.4	16.1	10.3	16.6
Road alignment 24% missing	Straight	6547	4427	10844	3792
		89.7	83.9	92.2	87.0
	Curved	708	816	853	536
		9.7	15.5	7.3	12.3
Road surface 24% missing	Sealed	6915	4949	11290	4137
		94.7	93.8	96.0	95.0
Traffic controls 24% missing	Traffic lights	1111	852	2034	821
		15.2	16.2	17.3	18.8
	Stop/give way sign	870	450	1558	445
		11.9	8.5	13.3	10.2
	Other controls	93	70	180	45
		1.3	1.3	1.5	1.0
	None	5223	3903	7977	3045
		71.6	74.0	67.9	69.9
WHAT WERE THE FACTORS WITHIN THE VEHICLE - DRIVER					
Sex of driver 24% missing	Males	4326	3839	6560	3064
		59.3	72.8	55.8	70.3
	Females	2973	1437	5195	1293
		40.7	27.2	44.2	29.7
Forensic BAC 67% missing	<.05	2690	1806	3857	1303
		94.4	64.7	95.4	65.5
	>.05	160	987	186	686
		5.6	35.3	4.6	34.5

		Age of driver			
		16-25		26-55	
		Time of crash			
		Day	Night	Day	Night
WHAT WERE THE FACTORS WITHIN THE VEHICLE - DRIVER CONT...					
Licence status 38% missing	Standard	4845	2988	9982	3246
		80.5	76.5	98.5	97.2
	Provisional	1009	721	86	29
		16.8	18.4	0.8	0.9
	Non-licensed	61	114	32	52
		1.0	2.9	0.3	1.6
Years vehicle driving experience 44% missing	< One	1141	688	587	216
		20.1	19.6	6.3	7.5
	One	946	633	585	172
		16.7	18.0	6.3	6.0
	Two	914	596	638	189
		16.1	17	6.8	6.6
	Three	675	482	539	152
		11.9	13.7	5.8	5.3
	Four	504	294	405	92
		8.9	8.4	4.3	3.2
Five		432	238	370	96
		7.6	6.8	4.0	3.4
	Six or more	1064	584	6229	1746
	18.7	16.6	66.6	61	
State of licence issue 34% missing	SA	6182	4142	10268	3513
		96.6	96.6	96.0	95.8
	Other	215	144	423	154
	3.4	3.4	4.0	4.2	
WHAT WERE THE FACTORS WITHIN THE VEHICLE - PASSENGERS					
Variable not available					
WHAT WERE THE VEHICLE FACTORS					
Year vehicle manufacture 51% missing	<1 - 3 years	321	171	1028	338
		6.8	3.6	13.1	11.9
	4 - 8 years	1023	652	2632	812
		21.6	13.8	33.6	28.5
	9 - 13 years	1451	966	2107	768
	30.6	20.4	26.9	26.9	
14 or more years		1940	1549	2060	932
		41.0	46.4	26.3	32.7

		Age of driver			
		16-25			
		Time of crash			
		Night	Day	Night	
WHAT WERE THE ENVIRONMENTAL CONDITONS					
Natural light 24% missing	Daylight	6985	722	11328	821
		95.7	13.7	96.4	18.8
	Darkness	264	4472	341	3477
		3.6	84.8	2.9	79.8
Weather 24% missing	Raining	635	501	1058	439
		8.7	9.5	9.0	10.1
	Not raining	6665	4775	10699	3918
		91.3	90.5	91.0	89.9
Road surface 24% missing	Dry	6109	4264	9879	3554
		83.7	80.8	84.0	81.6
	Wet	1191	1012	1878	803
		16.3	19.2	16.0	18.4
WHAT OTHER FACTORS SURROUNDED THE CRASH					
Vehicle movement 24% missing	Stationary:	1055	532	2604	743
		14.5	10.1	22.1	17.1
	stopped on road	972	370	2358	510
		13.3	7.0	20.1	11.7
	Moving along roadway:	4866	3847	6973	2960
		66.7	72.9	59.3	67.9
	straight ahead	4502	3453	6598	2763
		61.7	65.4	56.1	63.4
	overtaking	86	40	104	20
		1.2	0.8	0.9	0.5
Turning/reversing:	1208	824	1900	589	
	16.5	15.6	16.2	13.5	
	turning left	186	127	366	84
		2.5	2.4	3.1	1.9
	turning right	865	586	1286	445
		11.8	11.1	10.9	10.2
Crash type 24% missing	Vehicle/vehicle:	5844	3133	10029	3146
		80.1	59.4	85.3	72.2
	right angle	1918	963	3128	958
		26.3	18.3	26.6	22
	rear end	2326	899	4397	1003
	31.9	17.0	37.4	23.0	
	head on	291	235	441	260
		4.0	4.5	3.8	6.0

		Age of driver			
		16-25		26-55	
		Time of crash			
		Day	Night	Day	Night
WHAT OTHER FACTORS SURROUNDED THE CRASH CONT...					
Crash type cont...	Vehicle/other:	1456	2143	1728	1211
		19.9	40.6	14.7	27.8
	pedestrian	454	313	691	257
		6.2	5.9	5.9	5.9
	object:	516	1207	472	582
		7.1	22.9	4.0	13.4
	<i>fixed object</i>	512	1200	463	576
		7.0	22.7	3.9	13.2
Apparent error 24% missing	None	3754	1957	7317	2246
		51.4	37.1	62.2	51.5
	Inattention	1447	1604	1521	991
		19.8	30.4	12.9	22.7
	Fail to give way to right	507	218	704	175
		6.9	4.1	6.0	4.0
	Disobey traffic control	356	265	666	223
		4.8	4.9	5.7	5.1
	DUI	10	56	12	69
		0.1	1.1	0.1	1.6

APPENDIX 4: FORS FATALITY FILE (1988) - NSW, VICTORIA AND SA

DESCRIPTION OF CRASH		Age of driver			
		16-25		26-55	
		Time of crash			
		Day	Night	Day	Night
Person responsible	This driver responsible	154	264	204	216
		54.4	70.0	46.6	56.3
	Not responsible	67	50	147	91
		23.7	13.3	33.6	23.7
	Pedestrian responsible	39	41	59	53
		13.8	10.9	13.5	13.8
	>1 person responsible	14	17	15	18
		4.9	4.5	3.4	4.7
No fault		5	1	7	1
		1.8	0.3	1.6	0.3
	Unit/person in prior event only	4	4	6	5
	1.4	1.1	1.4	1.3	
Number of vehicles	One	122	212	143	197
		43	55.9	32.3	51.0
	Two	152	159	280	170
		53.5	42.0	63.2	44.0
Three or more	10	8	20	19	
	3.5	2.1	4.5	4.9	
Number of persons in crash	One	14	63	33	79
		5.0	16.8	7.5	20.6
	Two	117	113	141	121
		41.5	30.2	31.9	31.5
	Three	70	81	86	77
		24.8	21.7	19.5	20
Four	32	59	70	49	
	11.3	15.8	15.8	12.8	
Five or more	49	58	112	58	
	17.4	15.5	25.3	15.1	
Number of persons injured in crash	None	112	168	188	192
		39.4	44.8	42.6	49.7
	One	84	95	101	86
		29.6	25.3	22.9	22.2
	Two	41	53	53	52
		14.4	14.1	12.0	13.5
	Three or more	47	59	99	56
	16.5	15.7	22.4	14.5	

DESCRIPTION OF CRASH CONT...		Age of driver				
		16-25		26-55		
		Time of crash				
		Day	Night	Day	Night	
Number of persons injured in vehicle	None	146 51.4	209 55.6	251 56.8	234 60.6	
	One	81 28.5	97 25.8	109 24.7	100 25.9	
	Two or more	57 20.1	70 18.6	82 18.6	52 13.5	
Number of persons killed in crash	One	258 90.8	326 86.0	395 89.2	330 85.5	
	Two or more	26 9.2	53 13.9	48 10.8	56 14.5	
Number of persons killed in vehicle	None	150 52.8	134 35.4	235 53.0	166 43.0	
	One	117 41.2	213 56.2	185 41.8	191 49.5	
	Two or more	17 6.0	32 8.5	23 5.2	29 7.6	
WHEN DID THE CRASH OCCUR						
Day of week	Weekday	190 66.9	197 52.0	308 69.5	233 60.4	
	Weekend	94 33.1	182 48.0	135 30.5	153 39.6	
Hour/day	Weekday	mid - 6 am	67 17.7		48 12.4	
		6 am - noon	92 32.4		137 30.9	
		noon - 6 pm	98 34.5		171 38.6	
		6 pm - mid		130 34.3	185 47.9	
	Weekend	mid - 6 am		98 25.9		75 19.4
		6 am - noon	34 12.0		47 10.6	
		noon - 6 pm	60 21.1		88 19.4	
		6 pm - mid		84 22.2	78 20.2	

		Age of driver			
		16-25		26-55	
		Time of crash			
		Day	Night	Day	Night
WHERE DID THE CRASH OCCUR					
City/rural boundaries	Capital city	137	196	206	184
		48.2	51.7	46.5	47.7
	General rural	104	134	190	156
		36.6	35.4	42.9	40.4
Land use	Residential	88	131	113	116
		33.6	36.7	27.6	31.6
	Rural	114	143	205	168
		43.5	40.1	50.0	45.8
Type of road 30% missing	Two-way undivided	158	230	271	247
		78.2	84.2	85.2	82.3
	Divided road (dual carriageway)	37	38	33	42
		18.3	13.9	10.4	14.0
Intersection	Intersection:	63	73	94	65
		22.2	19.3	21.3	16.9
	Cross intersection	45	40	71	36
		54.9	37.7	56.8	41.9
	T-intersection	36	59	48	49
		43.9	55.7	38.4	57
	Related to intersection	21	33	31	20
		7.4	8.7	7.0	5.2
	Non-intersection	200	272	317	299
		70.4	72.0	71.7	77.9
Speed limit	60 kph	140	187	192	167
		49.5	49.3	43.6	43.3
	100 kph	99	109	166	132
		35.0	28.8	37.7	34.2
	110 kph	14	25	28	37
		4.9	6.6	6.4	9.6
Road alignment: horizontal	Straight	213	240	262	262
		75.0	63.7	67.9	67.9
	Curved	71	137	124	124
		25.0	36.3	32.1	32.1
Road alignment: vertical	Level	220	257	313	297
		78.6	70.4	71.8	79
	Slope	42	87	91	53
		15.0	23.8	20.9	14.1
Road surface	Sealed	272	365	427	372
		96.8	96.6	96.4	96.4

		Age of driver			
		16-25		26-55	
		Time of crash			
		Day	Night	Day	Night
WHERE DID THE CRASH OCCUR					
Traffic controls	Traffic lights	13	26	29	23
		4.7	7.0	6.6	6.0
	Stop/give way signs	32	27	57	31
		11.5	7.2	13	8.0
	Other controls	23	28	40	26
	8.2	7.5	9.1	6.8	
	No controls	211	293	314	305
		75.6	78.3	71.4	79.2
WHAT WERE THE FACTORS WITHIN THE VEHICLE - DRIVER					
Sex of driver	Males	211	317	317	315
		74.3	83.6	71.6	81.6
	Females	73	62	126	71
		25.7	16.4	28.4	18.4
Driver BAC 23% missing	<.05	185	167	295	162
		90.2	51.4	92.2	49.5
	>.05	20	158	25	165
		9.8	48.6	7.8	50.5
Restraint use 19% missing	Worn	210	227	351	254
		91.3	75.9	91.6	80.4
	Not worn	20	72	32	62
		8.7	24.1	8.4	19.6
Licence status 12% missing	Standard	182	227	400	326
		70.5	68.4	97.8	95.3
	Provisional	63	87	5	5
		24.4	26.2	1.2	1.5
	Disqualified	4	6	2	8
		1.6	1.8	0.5	2.3
Years driving experience 45% missing	< One	18	36	1	2
		10.1	16.4	0.4	1.0
	One	39	40	4	4
		21.8	18.2	1.6	2.1
	Two	25	40	2	1
		14.0	18.2	0.8	0.5
	Three	17	23	2	-
	9.5	10.5	0.8	-	
	Four	23	19	2	3
		12.8	8.6	0.8	1.6
	Five	19	22	3	2
		10.6	10.0	1.2	1.0
	Six or more	38	40	239	181
		21.2	18.2	94.5	93.8

		Age of driver			
		16-25		26-55	
		Time of crash			
		Day	Night	Day	Night
WHAT WERE THE FACTORS WITHIN THE VEHICLE - PASSENGERS					
Number of occupants	One	146	166	228	220
		51.8	44.0	51.5	57.3
	Two	76	113	101	90
		27.0	30.0	22.8	23.4
	Three or more	60	98	114	74
		21.3	26.0	25.7	19.3
WHAT WERE THE VEHICLE FACTORS					
Vehicle speed 54% missing	<60 kph	72	67	123	80
		48.3	42.4	54.2	51.9
	>60 kph	77	91	104	74
		51.7	57.6	45.8	48.1
Speed category 9% missing	Unlikely over limit	189	173	335	224
		71.9	50.6	82.1	63.6
	Definitely over limit	36	102	24	53
		13.7	29.8	5.9	15.1
	Possibly/definity over limit/within limit but excessive for conditions	73	168	56	121
		27.8	49.1	13.7	34.4
Year vehicle manufacture 12% missing	<1 - 2 years	24	23	79	60
		10.7	7.2	22.8	20.0
	3 - 7 years	65	71	120	90
		29.0	22.3	34.6	30.0
	8 - 12 years	61	89	81	80
		27.2	27.9	23.3	26.7
	13 or more years	74	136	67	70
		33.0	42.6	19.3	23.3
WHAT WERE THE ENVIRONMENTAL CONDITONS					
Natural light	Day	250	23	400	41
		88.0	6.1	90.3	10.6
	Night	9	350	22	322
		3.2	92.3	5.0	83.4
Street lighting	On:	9	192	12	172
		25.7	54.1	27.3	50.0
	visibility good	1	85	6	76
		2.9	23.9	13.6	22.1
	visibility status unknown	6	76	5	62
		17.1	21.4	11.4	18.0

		Age of driver			
		16-25		26-55	
		Time of crash			
		Day	Night	Day	Night
WHAT WERE THE ENVIRONMENTAL CONDITONS CONT...					
Street lighting cont...	Off	6	10	4	12
		17.1	2.8	9.1	3.5
	Nil	15	144	23	147
		42.9	40.6	52.3	42.7
Weather	Fine	241	319	349	323
		85.5	84.6	78.8	84.6
	Other than fine	41	58	94	59
		14.5	15.4	21.2	15.4
WHAT OTHER FACTORS SURROUNDED THE CRASH					
DCA	Pedestrian	65	62	78	75
	(on foot or in toy/pram)	22.9	16.4	17.6	19.4
	Adjacent directions:	42	36	67	33
	(intersections only)	14.8	9.5	15.1	8.5
	cross traffic	29	29	47	21
		10.2	7.7	10.6	5.4
	Opposing directions:	80	84	165	116
		28.2	22.2	37.2	30.1
	head on	69	69	145	100
		24.3	18.2	32.7	25.9
	right thru	11	14	20	16
		3.9	3.7	4.5	4.1
	Same direction:	14	17	22	13
		4.9	4.5	5.0	3.4
	rear-end	8	10	11	5
		2.8	2.6	2.5	1.3
	Manoeuvring	8	4	14	2
		2.8	1.1	3.2	0.5
	Overtaking	15	13	18	13
		5.3	3.4	4.1	3.4
	On path	1	7	4	11
	0.4	1.8	0.9	2.8	
Off path, on straight	35	64	43	56	
	12.3	16.9	9.7	14.5	
Off path, curve/turning	22	89	24	65	
	7.7	23.5	5.4	16.8	
Passengers/misc.	2	3	8	2	
	0.7	0.8	1.8	0.5	
Off road into object	49	131	49	101	
	17.3	34.6	11.1	26.2	

WHAT OTHER FACTORS SURROUNDED THE CRASH CONT...

		Age of driver			
		16-25		26-55	
		Time of crash			
		Day	Night	Day	Night
Primary accident class	Vehicle/vehicle:	160	158	287	182
		56.3	41.7	64.8	47.2
	Vehicle/other:	117	198	137	183
		41.2	52.2	30.9	47.4
	pedestrian	65	62	78	75
		22.9	16.4	17.6	19.4
	object	52	134	56	108
		18.3	35.4	12.6	28.0
Non collision		7	23	17	21
		2.5	6.1	3.8	5.4
Major factor/error 7% missing	Driver intoxication	19	150	29	173
		7.1	41.6	6.9	46.9
	Pedestrian/cyclist at fault	42	45	56	56
		15.8	12.5	13.4	15.2
	Excessive speed	36	44	33	37
		13.5	12.2	7.9	10.0
	Failure to observe person/vehicle	33	9	52	16
		12.4	2.5	12.4	4.3

**Origin/Destination of trip - too many
missing cases**

APPENDIX 5: GES FILE (1989) - NORTH-WESTERN REGION

		Age of driver			
		16-25		26-55	
		Time of crash			
		Day	Night	Day	Night
Severity	Fatal	8	6	17	6
		2.2	1.8	3.1	1.6
	Incapacitating	78	79	93	115
		21.1	23.5	16.8	31.4
	Nonincapacitating	254	229	385	210
		68.8	68.2	69.4	57.4
Number of vehicles involved	One	134	167	148	180
		35.6	48.7	26.0	48.6
	Two	200	156	336	162
		53.2	45.5	59.1	43.8
	Three or more	42	20	85	28
		11.2	5.8	14.9	7.6
Number of persons in crash	One	41	58	27	80
		12.5	20.8	5.5	24.6
	Two	102	91	189	105
		31	32.6	38.6	32.3
	Three	98	56	134	62
		29.8	20.1	27.3	19.1
Four or more	88	74	140	78	
	26.7	26.5	28.6	24.0	
Number of persons injured in crash	None	7	7	14	4
		1.9	2.0	2.5	1.1
	One	215	194	342	238
		57.2	56.6	60.1	64.3
	Two	100	77	132	75
		26.6	22.4	23.2	20.3
Three or more	54	65	81	53	
	14.4	19.0	14.2	14.3	
Number of persons injured in vehicle	None	129	83	247	123
		34.3	24.2	43.4	33.2
	One	181	177	260	189
		48.1	51.6	45.7	51.1
	Two or more	66	83	62	58
		17.6	24.2	10.9	15.7

		Age of driver				
		16-25		26-55		
		Time of crash				
		Day	Night	Day	Night	
WHEN DID THE CRASH OCCUR						
Day of week	Weekday	265	205	430	226	
		70.5	59.8	75.7	61.1	
	Weekend	111	138	138	144	
		29.5	40.2	24.3	38.9	
Hour/day	Weekday	6 am - noon	94		165	
			35.5		38.4	
		Noon - 6 pm	171		265	
			64.5		61.6	
				155		165
				75.6		73.0
				50		61
				24.4		27.0
	Weekend	6 am - noon	41		47	
			36.9		34.0	
		Noon - 6 pm	70		91	
			63.6		66.0	
			69		79	
			50.0		54.9	
			69		65	
			50.0		45.1	
WHERE DID THE CRASH OCCUR						
Percentage rural	Urban	72	85	154	107	
		19.1	24.8	27.1	28.9	
	<50% Rural	254	218	367	229	
		67.6	63.4	64.5	61.9	
>50% Rural	50	40	48	34		
	13.3	18.5	8.4	9.2		
Trafficway flow	Two way undivided	187	159	273	164	
		83.5	79.5	82.5	82.4	
	Divided highway	34	29	53	30	
		15.2	14.5	16.0	15.1	
Relation to junction	Intersection	126	109	226	106	
		34.1	32.4	40.1	29.4	
	Non junction	168	185	203	187	
		45.5	55.1	36.1	51.8	

		Age of driver			
		16-25		26-55	
		Time of crash			
		Day	Night	Day	Night
WHERE DID THE CRASH OCCUR CONT...					
Relation to roadway	On road	286	200	513	247
		76.3	58.0	90.5	67.3
	Off road/shoulder	76	123	39	102
		20.3	36.0	6.9	27.8
Speed limit	25 mph (40 kph)	44	39	85	67
		25.6	31.0	30.5	40.9
	35 mph (56 kph)	52	47	89	47
		30.2	37.3	31.9	28.7
	45 mph (72 kph)	26	13	52	16
		15.1	10.3	18.6	9.8
Roadway alignment: horizontal	Straight	308	257	490	284
		83.7	77.2	87.5	80.2
	Curved	60	76	70	70
		16.3	22.8	12.5	19.8
Roadway profile: vertical	Level	224	356	195	229
		70.2	73.9	76.6	74.1
	Grade	88	120	63	75
		27.6	23.9	24.4	24.3
Traffic control device	Traffic lights	64	65	155	81
		17.2	19.3	27.4	22.3
	Stop/give way sign	47	43	81	42
		12.6	12.8	14.3	11.5
	Other traffic controls	52	50	91	45
		14.0	14.8	16.1	12.4
	No controls	252	219	318	237
		67.7	65.0	56.3	65.1
Traffic device functioning	No controls	252	219	318	237
		69.6	67.4	57.3	66.2
	Device functioning	109	106	237	116
		30.1	32.6	42.7	32.4
WHAT WERE THE FACTORS WITHIN THE VEHICLE - DRIVER					
Sex of driver	Males	231	249	312	257
		61.4	72.6	54.8	69.5
	Females	145	94	257	113
		38.6	27.4	45.2	30.5
Alcohol use (driver)	Alcohol involved	7	48	9	60
		1.9	14.3	1.6	16.7
	No alcohol involved	366	287	554	299
		98.1	85.7	98.4	83.3

		Age of driver			
		16-25		26-55	
		Time of crash			
		Day	Night	Day	Night
WHAT WERE THE FACTORS WITHIN THE VEHICLE - DRIVER CONT...					
Alcohol involved in crash	Alcohol involved	11	57	17	73
		2.9	16.8	3.0	20.2
	No alcohol involved	363	283	548	289
		97.1	83.2	97.0	79.8
Driver impairment	No impairment	361	322	559	347
		97	95.3	98.6	96.1
	Drowsy/fatigue	8	5	3	8
		2.2	1.5	0.5	2.2
WHAT WERE THE FACTORS WITHIN THE VEHICLE - PASSENGERS					
Number of occupants	One	197	162	343	213
		53.0	47.9	61.0	57.7
	Two	91	78	98	71
		24.5	23.1	17.4	19.2
	Three or more	84	98	121	85
		22.6	29.0	21.5	23.0
WHAT WERE THE VEHICLE FACTORS					
Vehicle speed					
83% missing - very low frequency overall					
Year vehicle manufacture	<1 - 2 years	126	105	236	137
		33.7	31.0	42.2	37.5
	3 - 7 years	127	139	193	125
		34.0	41.0	34.5	34.2
	8 - 12 years	87	73	100	76
	23.3	21.5	17.9	20.8	
Vehicle defects	13 or more years	34	22	30	27
		9.1	6.5	5.4	7.4
	No defects	369	332	555	357
		98.7	96.8	98.4	97.8
	Defects	5	11	9	8
	1.3	3.2	1.6	2.2	
WHAT WERE THE ENVIRONMENTAL CONDITIONS					
Light conditions	Daylight	352	50	520	46
		94.9	14.7	93.4	12.6
	Dark:	8	271	22	291
		2.1	80.0	3.9	80.0
	dark but lighted	3	203	19	226
	0.8	59.9	3.4	62.1	

		Age of driver			
		16-25		26-55	
		Time of crash			
		Day	Night	Day	Night
Visual obstructions	No obstruction	361	334	558	358
		97.0	97.7	98.4	98.6
	Obstruction	11	8	9	5
		3.0	2.3	1.6	1.4
Road surface conditions	Dry	253	235	385	241
		68.2	68.9	68.4	65.8
	Other (wet/snow/ice)	118	106	178	125
		31.8	31.1	31.6	34.2
Atmospheric conditions	No adverse conditions	283	264	431	275
		76.5	77.6	76.8	75.1
	Other (rain/sleet/snow/fog)	87	76	130	91
		23.5	22.3	23.2	24.8
WHAT OTHER FACTORS SURROUNDED THE CRASH					
Vehicle manoeuvre	Stationary	24	10	37	21
		6.5	3.0	6.6	5.8
	Moving along roadway:	221	228	327	245
		59.6	67.7	58.5	68.2
	proceeding along lane	194	183	298	210
		52.3	54.3	53.3	58.5
	Turning/reversing:	77	51	91	50
		20.8	15.1	16.3	13.9
	turning left	57	39	41	34
		15.4	11.6	7.3	9.5
	turning right	16	8	17	10
		4.3	2.4	3.0	2.8
Manner of collision	Vehicle/vehicle:	236	171	417	178
		63.1	50.1	73.7	49
	angle	134	118	236	111
		35.8	34.6	41.7	30.6
	rear-end	81	37	141	38
		21.7	10.9	24.9	10.5
	head on	16	9	31	23
		4.3	2.6	5.5	6.3
	No collision with moving vehicle	138	170	149	183
		36.9	49.9	26.3	50.4

		Age of driver			
		16-25		26-55	
		Time of crash			
		Day	Night	Day	Night
WHAT OTHER FACTORS SURROUNDED THE CRASH CONT...					
First harmful event	Fixed object	74	128	40	104
		19.7	37.3	7.0	28.4
	Non-fixed:	57	38	102	72
		15.2	11.0	17.9	19.7
	pedestrian	25	17	54	30
		6.7	5.0	9.5	8.2
	cyclist	25	9	38	26
		6.7	2.6	6.7	7.1
	Non collision	8	4	8	9
		2.1	1.2	1.4	2.5
Vehicle role	Multiple vehicle - striking	130	92	183	90
		35.3	27.3	32.6	25.1
	Multiple vehicle - struck	88	69	193	82
		23.9	20.5	34.3	22.8
	Single vehicle - striking	116	155	110	161
		31.5	46.0	19.6	44.8
LEGAL ACTION/VIOLATIONS					
Violations charged	None	262	212	461	259
		70.4	62.4	81.7	70.6
	Violations charged	110	128	103	108
		29.6	37.6	18.3	29.4

APPENDIX 6: GES FILE (1989) - MID-WESTERN REGION

DESCRIPTION OF CRASH		Age of driver			
		16-25		26-55	
		Time of crash			
		Day	Night	Day	Night
Severity	Fatality	16	21	18	22
		2.1	3.3	1.6	3.6
	Incapacitating	180	196	325	161
		23.1	31	28.7	26.2
	Nonincapacitating	581	414	782	429
		74.5	65.4	69.0	69.8
Number of vehicles involved	One	228	292	275	238
		29.1	45.3	24.1	37.9
	Two	463	305	656	305
		59.1	47.3	57.4	48.6
	Three or more	93	48	212	85
		11.8	7.4	18.5	13.5
Number of persons in crash	One	84	123	81	115
		11.2	20.3	7.5	19.8
	Two	278	175	405	173
		36.9	28.9	37.4	29.8
	Three	184	126	274	124
		24.4	20.8	25.3	21.3
	207	182	324	169	
	27.5	30.0	29.9	29.1	
Number of persons injured in crash	None	4	12	10	13
		0.5	1.9	0.9	2.1
	One	426	349	643	346
		54.3	54.1	56.3	55.1
	Two	224	161	307	160
		28.6	25.0	26.9	25.5
	130	123	183	109	
	16.5	19.1	16.0	17.3	
Number of persons injured in vehicle	None	243	183	443	191
		31.0	28.4	38.9	30.4
	One	427	314	547	338
		54.5	48.7	47.9	53.8
	Two or more	114	148	153	99
		14.5	22.9	13.4	15.8

		Age of driver					
		16-25		26-55			
		Time of crash					
		Day	Night	Day	Night		
WHEN DID THE CRASH OCCUR							
Day of week	Weekday	607	402	908	404		
		77.4	62.3	79.4	64.3		
	Weekend	177	243	235	224		
		22.6	37.7	20.6	35.9		
Hour/day	Weekday	6 am - noon	226		339		
			37.2		37.3		
		Noon - 6 pm	381		569		
			62.8		62.7		
				322		331	
				81.0		81.9	
		Mid - 6 am		80		73	
				19.9		18.1	
		Weekend	6 am - noon	44		71	
				24.9		30.2	
			Noon - 6 pm	133		164	
				75.1		69.8	
				115		132	
				47.3		58.9	
			128		92		
			52.7		41.1		
WHERE DID THE CRASH OCCUR							
Percentage rural	Urban	255	229	456	284		
		32.5	35.5	39.9	45.2		
	< 50% Rural	303	233	447	204		
		38.6	36.1	39.1	32.5		
	>50% Rural	226	183	240	140		
		28.8	28.4	21.0	22.3		
Trafficway flow	Two way undivided	403	299	521	298		
		76.3	75.7	69.7	71.3		
	Divided highway	108	83	197	102		
		20.5	21.0	25.1	24.4		
Relation to junction	Intersection	321	211	464	194		
		41.1	32.7	40.8	31.2		
	Non intersection	303	327	437	300		
		38.8	50.7	38.4	48.2		

WHERE DID THE CRASH OCCUR CONT...

		Age of driver			
		16-25		26-55	
		Time of crash			
		Day	Night	Day	Night
Relation to roadway	On road	650	419	1011	462
		82.9	65.0	88.5	73.8
	Off road/shoulder	121	202	109	146
		15.4	31.3	9.5	23.3
Speed limit	25 mph (40 kph)	70	83	102	59
		15.4	22.9	16.9	16.8
	35 mph (56 kph)	89	66	142	74
		19.5	18.2	23.6	21
	55 mph (89 kph)	148	100	165	102
		32.5	27.6	27.4	29.0
Roadway alignment: horizontal	Straight	702	542	1031	541
		91.4	86.0	92.2	87.7
	Curved	66	88	87	76
		8.6	14.0	7.8	12.3
Roadway profile: vertical	Level	320	252	421	272
		76.0	73.9	75.6	79.8
	Grade	97	86	121	65
		23.0	25.2	21.8	19.1
Traffic control device	Traffic lights	162	135	255	131
		20.8	21.0	22.5	21.2
	Stop/give way signs	116	78	175	68
		14.9	12.2	15.4	11.0
	Other traffic controls	24	23	23	20
		3.1	3.6	2.0	3.2
	No controls	476	404	681	400
		61.2	63.1	60.0	64.6
Traffic device functioning	No controls	476	404	681	400
		62.4	63.7	61.0	66.0
	Device functioning	286	228	431	204
		37.5	36.0	39.0	33.6

WHAT WERE THE FACTORS WITHIN THE VEHICLE - DRIVER

Sex of driver	Males	415	434	585	393
		53.1	67.3	51.3	62.8
	Females	367	211	556	233
		46.9	32.7	48.7	37.2
Alcohol use (driver)	Alcohol involved	25	118	33	137
		3.2	18.5	2.9	22.1
	No alcohol involved	756	521	1106	483
		96.8	81.5	97.1	77.9

		Age of driver			
		16-25		26-55	
		Time of crash			
		Day	Night	Day	Night
WHAT WERE THE FACTORS WITHIN THE VEHICLE - DRIVER CONT...					
Alcohol involved in crash	Alcohol involved	38	165	56	187
		4.9	25.7	4.9	29.9
	No alcohol involved	744	477	1087	438
		95.1	74.3	95.1	70.1
Driver impairment	No impairment	756	562	1108	556
		97.3	89.3	97.6	91.0
	Drowsy/fatigue	11	19	8	7
		1.4	3.0	0.7	1.1
WHAT WERE THE FACTORS WITHIN THE VEHICLE - PASSENGERS					
Number of occupants	One	490	326	724	376
		62.7	50.8	63.6	60.2
	Two	188	193	233	144
		24.0	30.1	20.5	23.0
	Three or more	104	123	181	105
		13.4	19.2	15.9	16.8
WHAT WERE THE VEHICLE FACTORS					
Vehicle speed					
72% missing - very low frequency overall					
Year vehicle manufacture	<1 - 2 years	213	160	432	212
		27.6	25.1	38.2	34.2
	3 - 7 years	270	211	374	181
		34.9	33.1	33.1	29.2
	8 - 12 years	237	212	259	173
		30.7	33.3	22.9	27.9
	13 or more years	53	54	47	40
		6.9	8.4	4.2	6.5
Vehicle defects	No defects	774	614	1121	606
		99.1	96.7	99.0	97.3
	Defects	7	21	11	17
		0.8	3.4	1.0	2.7
WHAT WERE THE ENVIRONMENTAL CONDITONS					
Light conditions	Daylight	731	96	1047	131
		93.5	15.0	91.9	21.0
	Dark:	35	516	42	467
		4.5	80.8	3.7	75.0
	dark but lighted	24	281	21	274
		3.1	44.0	1.8	44.0

		Age of driver			
		16-25		26-55	
		Time of crash			
		Day	Night	Day	Night
WHAT WERE THE ENVIRONMENTAL CONDITIONS CONT...					
Visual obstructions	No obstruction	757	620	1104	597
		96.8	96.7	97.0	95.5
	Obstruction	25	21	34	28
		3.2	3.3	3.0	4.5
Road surface conditions	Dry	537	453	732	440
		68.6	71.3	64.3	71.1
	Other (wet/snow/ice)	246	182	407	179
		31.4	28.7	35.7	28.9
Atmospheric conditions	No adverse conditions	647	514	899	504
		82.9	80.7	78.9	81.4
	Other (rain/sleet/snow/fog)	133	123	241	115
		17.5	18.9	21.0	18.6
WHAT OTHER FACTORS SURROUNDED THE CRASH					
Vehicle manoeuvre	Stationary	45	33	153	59
		5.8	5.2	13.5	9.5
	Moving along roadway:	509	442	711	429
		65.8	69.2	62.8	69.3
	proceeding along lane	468	396	667	381
		60.5	62.0	58.9	61.5
	Turning/reversing:	128	84	166	70
		16.5	13.1	14.7	11.3
	turning left	103	59	131	55
		13.3	9.2	11.6	8.9
	turning right	22	20	31	10
		2.8	3.1	2.7	1.6
Manner of collision	Vehicle/vehicle:	546	344	852	378
		70.2	53.8	75.1	60.6
	angle	347	214	503	209
		44.6	33.5	44.3	33.5
	rear-end	146	98	290	129
		18.8	15.3	25.6	20.7
	head on	33	22	41	26
		4.2	3.4	3.6	4.2
	No collision with moving vehicle	232	295	282	246
		29.8	46.2	24.9	39.4

		Age of driver				
		16-25		26-55		
		Time of crash				
		Day	Night	Day	Night	
WHAT OTHER FACTORS SURROUNDED THE CRASH CONT...						
First harmful event	Fixed object:		104	181	101	121
			13.3	28.3	8.9	19.4
	Non-fixed		106	93	170	107
			13.6	14.5	14.9	17.2
	pedestrian		49	51	92	52
			6.3	7.9	8.1	8.3
	cyclist		43	14	68	27
			5.5	2.2	6.0	4.3
Non collision		22	21	11	18	
		2.8	3.3	1.0	2.9	
Vehicle role	Multiple vehicle - striking		315	185	387	191
			40.3	28.7	34.0	30.6
	Multiple vehicle - struck		214	153	411	170
			27.4	23.7	36.0	27.2
Single vehicle - striking		183	262	220	204	
		23.4	40.6	19.3	32.7	
LEGAL ACTION/VIOLATIONS						
Violations charged	None		441	341	845	397
			56.5	53.1	74.0	63.0
	Violations charged		339	301	297	229
			43.4	46.9	26.0	36.6

APPENDIX 7: GES FILE (1989) - WESTERN REGION

DESCRIPTION OF CRASH		Age of driver			
		16-25		26-55	
		Time of crash			
		Day	Night	Day	Night
Severity	Fatal	14	8	19	9
		2.3	1.9	1.8	2.0
	Incapacitating	152	106	228	120
		24.5	25.8	22.1	26.6
	Nonincapacitating	455	294	783	322
		73.3	71.5	76.0	71.4
Number of vehicles involved	One	171	155	235	165
		27.5	36.4	22.6	36.2
	Two	359	230	603	245
		56.8	54.0	57.9	53.7
	Three or more	99	41	204	46
		15.7	9.6	19.6	10.1
Number of persons in crash	One	35	50	42	65
		5.7	12.7	4.2	14.8
	Two	241	115	409	143
		39.3	29.2	40.7	32.6
	Three	153	100	215	89
		25	25.4	21.4	20.3
	Four or more	184	129	338	141
		30.0	32.7	33.7	32.2
Number of persons injured in crash	None	11	15	12	5
		1.7	3.5	1.2	1.1
	One	345	227	580	257
		54.6	53.3	55.7	56.4
	Two	167	89	269	107
		26.4	20.9	25.8	23.5
	Three or more	109	95	181	87
		17.4	22.4	17.4	19.1
Number of persons injured in vehicle	None	243	127	437	165
		38.4	29.8	41.9	36.2
	One	276	192	459	215
		43.7	45.1	44	47.1
	Two or more	113	107	146	76
		18.0	25.1	14.0	16.7

		Age of driver					
		16-25		26-55			
		Time of crash					
		Day	Night	Day	Night		
WHEN DID THE CRASH OCCUR							
Day of week	Weekday	481	268	822	311		
		76.1	62.9	78.9	68.2		
	Weekend	151	158	220	145		
		23.9	37.1	21.1	31.8		
Hour/day	Weekday	6 am - noon	151		277		
			31.4		33.7		
		Noon - 6 pm	330		545		
			68.6		66.3		
		6 pm - mid		224		265	
				83.6		85.2	
		Mid - 6 am		44		46	
				16.4		14.8	
		Weekend	6 am - noon	41		79	
				27.2		35.9	
			Noon - 6 pm	110		141	
				72.8		64.0	
		6 pm - mid		93	93		
				58.9	64.1		
		Mid - 6 am		65	52		
				41.1	35.9		
WHERE DID THE CRASH OCCUR							
Percent rural	Urban	241	170	424	191		
		38.1	39.9	40.7	41.9		
	< 50% Rural	365	230	583	229		
		57.8	54.0	56.0	50.2		
	>50% Rural	26	26	35	36		
		4.1	6.1	3.4	7.9		
Trafficway flow	Two way undivided	332	221	522	244		
		63.4	62.6	59.4	65.1		
	Divided highway	182	125	331	125		
		34.7	35.4	37.7	33.3		
Relation to junction	Intersection	266	160	421	192		
		42.7	38.1	41.0	42.4		
	Non intersection	232	195	380	186		
		37.2	46.4	37.0	41.1		

		Age of driver			
		16-25			
		Time of crash			
		Night	Day	Night	
Relation to roadway	On road	543	312	951	345
		86.5	73.6	91.7	76
	Off road/shoulder	67	89	69	87
		10.7	21.0	6.7	19.2
Speed limit	30 mph (48kph)	91	51	144	67
		15.7	13.2	14.9	15.7
	35 mph (56 kph)	194	125	294	144
		33.4	32.3	30.5	33.8
	55 mph (89 kph)	52	54	134	74
		9.0	14.0	13.9	17.4
Roadway alignment: horizontal	Straight	558	359	934	380
		91.2	88.0	92.4	86.2
	Curved	54	49	77	61
		8.8	12.0	7.6	13.8
Roadway profile: vertical	Level	361	233	600	233
		76.0	74.2	77.5	72.8
	Grade	107	73	161	83
		22.5	23.2	20.8	25.9
Traffic control device	Traffic lights	142	83	253	91
		23.6	20.8	25.2	20.6
	Stop/give way sign	81	33	113	48
		13.5	8.3	11.3	10.9
	Other traffic controls	45	25	76	38
		7.5	6.3	7.6	8.6
	No controls	334	259	561	265
		55.5	64.8	55.9	60.0
Traffic device functioning	No controls	334	259	561	265
		55.5	65.2	55.9	60.2
	Device functioning	268	137	442	173
		44.5	34.5	44.1	39.3
WHAT WERE THE FACTORS WITHIN THE VEHICLE - DRIVER					
Sex of driver	Males	321	273	492	294
		50.9	64.4	47.2	64.5
	Females	310	151	550	162
		49.1	35.6	52.8	35.5
Alcohol use (driver)	Alcohol involved	19	79	36	95
		3.1	19.8	3.5	21.3
	No alcohol involved	595	321	983	351
		96.9	80.3	96.5	78.7

		Age of driver			
		16-25		26-55	
		Time of crash			
		Day	Night	Day	Night
WHAT WERE THE FACTORS WITHIN THE VEHICLE - DRIVER CONT...					
Alcohol involved in crash	Alcohol involved	37	114	63	145
		5.9	27.6	6.1	32.2
	No alcohol involved	586	299	968	305
		94.1	72.4	93.9	67.8
Driver impairment	No impairment	600	392	1008	430
		97.7	95.6	98.4	94.9
	Drowsy/fatigue	8	12	4	9
		1.3	2.9	0.4	2.0
WHAT WERE THE FACTORS WITHIN THE VEHICLE - PASSENGERS					
Number of occupants	One	390	188	684	261
		62.7	45.5	66.7	58.0
	Two	139	138	198	125
		22.3	33.4	19.3	27.8
	Three or more	93	87	144	64
		15.0	21.1	14.0	14.2
WHAT WERE THE VEHICLE FACTORS					
Vehicle speed					
63% missing - very low frequency overall					
Year of vehicle manufacture	<1 - 2 years	150	96	319	146
		23.8	22.6	30.9	32.4
	3 - 7 years	182	114	326	128
		28.8	26.8	31.6	28.4
	8 - 12 years	199	124	252	103
		31.5	29.2	24.4	22.9
	13 or more years	100	91	136	73
		15.9	21.4	13.2	16.2
Vehicle defects	No defects	585	393	938	423
		98.7	97.8	93.8	97.0
	Defects	8	9	17	13
		1.3	2.1	1.7	3.0
WHAT WERE THE ENVIRONMENTAL CONDITONS					
Light conditions	Daylight	580	85	956	78
		93.7	20.6	92.8	17.5
	Dark:	21	311	41	337
		3.9	75.3	4.0	75.7
	dark but lighted	13	211	33	242
		2.6	51.1	3.2	54.4

		Age of driver			
		16-25		26-55	
		Time of crash			
		Day	Night	Day	Night
WHAT WERE THE ENVIRONMENTAL CONDITIONS CONT...					
Visual obstructions	No obstruction	607	411	996	440
		97.6	97.2	96.2	97.8
	Obstruction	15	12	39	10
		2.4	2.7	3.8	2.2
Road surface conditions	Dry	512	342	872	372
		83.8	82.6	85.2	82.9
	Other (wet/snow/ice)	99	72	151	77
		16.2	17.4	14.8	17.1
Atmospheric conditions	No adverse conditions	550	365	913	398
		88.9	87.1	89.2	88.2
	Other (rain/sleet/snow/fog)	69	54	111	53
		11.2	12.4	10.9	11.7
WHAT OTHER FACTORS SURROUNDED THE CRASH					
Vehicle manoeuvre	Stationary	64	31	194	74
		10.3	7.3	18.8	16.3
	Moving along roadway:	391	267	565	292
		62.8	63.3	54.7	64.3
	proceeding along lane	366	241	538	257
		58.7	57.1	52.1	56.6
	Turning/reversing:	127	82	197	88
		20.4	19.4	19.1	19.4
	turning left	104	60	146	73
		16.7	14.2	14.1	16
	turning right	20	18	42	14
		3.2	4.3	4.1	3.1
Manner of collision	Vehicle/vehicle:	449	265	792	284
		71.5	62.6	76.2	62.6
	angle	246	158	405	167
		39.2	37.4	39.0	36.8
	rear-end	170	79	330	79
		27.1	18.7	31.8	17.4
	head on	26	15	32	16
		4.1	3.5	3.1	3.5
	No collision with moving vehicle	179	158	247	170
		28.5	37.4	23.8	37.4

		Age of driver			
		16-25			
		Time of crash			
		Night	Day	Night	
WHAT OTHER FACTORS SURROUNDED THE CRASH CONT...					
First harmful event	Fixed object	53	71	58	79
		8.4	16.7	5.6	17.4
	Non-fixed:	106	96	170	72
		16.8	14.4	16.4	15.8
	pedestrian	43	22	66	36
		6.8	5.2	6.4	7.9
	cyclist	48	17	94	21
	7.6	4.0	9.0	4.6	
	Non collision	20	26	19	18
		3.2	6.1	1.8	4.0
Vehicle role	Multiple vehicle - striking	251	125	320	131
		40.1	30	31.3	29
	Multiple vehicle - struck	171	119	383	138
		27.3	28.5	37.5	30.5
	Single vehicle - striking	135	129	165	137
		21.6	30.9	16.1	30.3
LEGAL ACTION/VIOLATIONS					
Violations charged	None	369	227	683	272
		60.0	56.0	67.1	61.5
	Violations charged	246	178	335	170
		40.0	44.0	32.9	38.5

APPENDIX 8: GES FILE (1989) - SOUTHERN REGION

DESCRIPTION OF CRASH		Age of driver			
		16-25		26-55	
		Time of crash			
		Day	Night	Day	Night
Severity	Fatal	26	37	25	29
		1.9	3.9	1.2	2.8
	Incapacitating	569	382	821	422
		42.1	40.6	41.0	40.7
	Nonincapacitating	754	519	1149	581
		55.7	55.2	57.4	56.1
Number of vehicles involved	One	323	395	348	362
		23.8	41.5	17.2	34.6
	Two	854	478	1321	577
		62.9	50.3	65.3	55.1
	Three or more	181	78	355	108
		13.3	8.2	17.5	10.3
Number of persons in crash	One	100	158	119	160
		7.9	18.5	6.5	16.8
	Two	444	246	666	285
		35.4	28.7	36.3	29.9
	Three	292	181	408	207
		23.3	21.1	22.2	21.7
	Four or more	417	271	644	301
		33.3	31.7	35.0	31.6
Number of persons injured in crash	None	6	12	21	12
		0.4	1.3	1.0	1.3
	One	738	495	1104	584
		54.3	52.1	54.5	55.8
	Two	395	257	559	251
		29.1	27	27.6	24.0
	Three or more	219	187	340	201
		16.1	19.7	16.8	19.2
Number of persons injured in vehicle	None	436	241	733	324
		32.1	25.3	36.2	30.9
	One	691	469	993	540
		50.8	49.3	49.6	51.6
	Two or more	231	241	298	183
		17.0	25.3	14.7	17.5

WHEN DID THE CRASH OCCUR

Day of week Weekday
 Weekend

Hour/day Weekday 6 am - noon
 Noon - 6 pm
 6 pm - mid
 Mid - 6 am
 Weekend 6 am - noon
 Noon - 6 pm
 6 pm - mid
 Mid - 6 am

WHERE DID THE CRASH OCCUR

Percentage rural Urban
 < 50% Rural
 >50% Rural

Trafficway flow Two way undivided
 Divided highway

Relation to junction Intersection
 Non intersection

		Age of driver				
		16-25		26-55		
		Time of crash				
		Day	Night	Day	Night	
Day of week	Weekday	1039	562	1552	669	
		76.6	59	76.7	64.0	
Day of week	Weekend	318	389	472	377	
		23.4	40.9	23.3	36.0	
Hour/day	Weekday	6 am - noon	316		558	
			30.4		36.0	
		Noon - 6 pm	723		994	
			69.6		64.0	
	Weekday	6 pm - mid		457		568
				81.3		84.9
		Mid - 6 am		105		101
				18.7		15.1
	Weekend	6 am - noon	90		140	
			28.3		29.7	
		Noon - 6 pm	228		332	
			71.7		70.3	
Weekend	6 pm - mid		225		251	
			57.8		66.6	
	Mid - 6 am		164		126	
			42.2		33.4	
Percentage rural	Urban	375	272	739	335	
		27.6	28.6	36.5	32.0	
	< 50% Rural	638	459	840	504	
		47.0	48.3	41.5	48.1	
	>50% Rural	345	220	445	208	
		25.4	23.0	22.0	19.9	
Trafficway flow	Two way undivided	810	558	1086	567	
		66.8	67.3	60.6	62.7	
	Divided highway	370	247	632	314	
		30.5	29.8	35.3	34.7	
Relation to junction	Intersection	573	334	851	493	
		42.3	35.3	42.2	47.4	
	Non intersection	525	477	741	379	
		38.9	50.4	36.7	36.4	

		Age of driver			
		16-25		26-55	
		Time of crash			
		Day	Night	Day	Night
WHERE DID THE CRASH OCCUR CONT...					
Relation to roadway	On road	1144	622	1818	808
		84.2	65.5	89.9	77.4
	Off road/shoulder	193	302	179	199
		14.2	31.8	8.8	19.1
Speed limit	35 mph (56 kph)	279	185	415	212
		21.5	20.4	21.4	21.3
	45 mph (72 kph)	216	158	346	177
		16.6	17.4	17.9	17.8
	55 mph (89 kph)	284	222	403	223
		21.8	24.5	20.8	22.4
Roadway alignment: horizontal	Straight	1169	779	1794	881
		87.5	83.2	90.0	86.2
	Curved	167	157	199	141
		12.5	16.8	10.0	13.8
Roadway profile: vertical	Level	777	536	1221	578
		68.6	70.4	73.3	71.6
	Grade	306	195	391	204
		27.0	25.6	23.5	25.3
Traffic control device	Traffic lights	258	189	482	219
		19.2	20.2	24.0	21.0
	Stop/give way sign	222	98	278	115
		16.5	10.5	13.9	11.2
	Other traffic controls	84	81	154	87
		6.3	8.6	7.7	8.4
	No controls	778	569	1096	606
		58.0	60.7	54.7	58.9
Traffic device functioning	No controls	778	569	1090	606
		59.1	62.9	56.1	60.9
	Device functioning	534	335	851	382
		40.6	37	43.8	38.4
WHAT WERE THE FACTORS WITHIN THE VEHICLE - DRIVER					
Sex of driver	Males	702	599	972	656
		51.7	63.1	48.1	63.0
	Females	656	351	1050	391
		48.3	36.9	51.9	37.3
Alcohol use (driver)	Alcohol involved	34	151	68	169
		2.5	16.4	3.4	16.5
	No alcohol involved	1300	769	1932	857
		97.5	83.6	96.6	83.5

		Age of driver				
		16-25		26-55		
		Time of crash				
		Day	Night	Day	Night	
WHAT WERE THE FACTORS WITHIN THE VEHICLE - DRIVER CONT...						
Alcohol involved in crash	Alcohol involved	62	203	95	248	
		4.6	21.7	4.7	24.0	
	No alcohol involved	1290	732	1914	785	
		95.4	78.3	95.3	76.0	
Driver impairment	No impairment	1310	886	1950	940	
		97.4	94.3	97.1	91.7	
	Drowsy/fatigue	16	23	16	20	
		1.2	2.4	0.8	2.0	
WHAT WERE THE FACTORS WITHIN THE VEHICLE - PASSENGERS						
Number of occupants	One	743	435	1214	608	
		54.9	46.3	60.2	58.9	
	Two	341	267	378	223	
		25.2	28.4	18.7	21.6	
	Three or more	269	238	426	202	
		19.9	25.3	21.1	19.6	
	WHAT WERE THE VEHICLE FACTORS					
	Vehicle speed					
42% missing - very low frequency overall						
Year vehicle manufacture	< 1 - 2 years	436	288	726	353	
		32.4	30.4	36.2	33.9	
	3 - 7 years	443	316	691	320	
		32.9	33.4	34.5	30.8	
	8 - 12 years	339	251	443	258	
		25.2	26.5	22.1	24.8	
	13 or more years	129	91	144	108	
		9.6	9.6	7.2	10.4	
Vehicle defects	No defects	1305	910	1965	1007	
		97.9	97.6	98.4	98.0	
	Defects	28	22	32	21	
		2.1	2.4	1.6	2.0	
WHAT WERE THE ENVIRONMENTAL CONDITIONS						
Light conditions	Daylight	1278	129	1875	170	
		94.7	13.9	93.3	16.7	
	Dark:	32	757	77	781	
		2.4	81.4	3.8	76.9	
	dark but lighted	18	359	44	406	
		1.3	38.6	2.2	40.0	

		Age of driver			
		16-25		26-55	
		Time of crash			
		Day	Night	Day	Night
WHAT WERE THE ENVIRONMENTAL CONDITIONS CONT...					
Visual obstructions	No obstruction	1288	886	1945	1008
		95.3	93.9	96.3	97.1
	Obstruction	64	58	73	30
		4.7	6.1	3.6	2.9
Road surface conditions	Dry	1049	703	1553	810
		77.9	74.7	77.4	78.6
	Other (wet/snow/ice)	297	238	454	221
		22.1	25.3	22.6	21.4
Atmospheric conditions	No adverse conditions	1137	758	1677	863
		84.3	80.6	83.4	83.8
	Other (rain/sleet/snow/fog)	211	183	334	167
		15.7	19.4	16.9	16.2
WHAT OTHER FACTORS SURROUNDED THE CRASH					
Vehicle manoeuvre	Stationary	120	49	288	75
		8.9	5.2	14.3	7.2
	Moving along roadway: proceeding along lane	874	674	1251	728
		64.8	71.5	62.0	70.1
		795	584	1176	656
		58.9	61.9	58.3	63.2
	Turning/reversing: turning left	219	121	288	132
		16.2	12.8	14.3	12.7
		175	94	209	104
		13.0	10.0	10.4	10.0
turning right	31	17	59	24	
	2.3	1.8	2.9	2.3	
Manner of collision	Vehicle/vehicle: angle	1028	547	1657	662
		75.9	57.7	82.0	63.7
		611	334	934	420
		45.1	35.2	46.2	40.4
	rear-end	315	148	586	172
		23.2	15.6	29.0	16.6
	head on	75	49	97	55
		5.5	5.2	4.8	5.3
No collision with moving vehicle		327	401	364	377
		24.0	42.0	18.0	36.0

		Age of driver			
		16-25		26-55	
		Time of crash			
		Day	Night	Day	Night
WHAT OTHER FACTORS SURROUNDED THE CRASH CONT...					
First harmful event	Fixed object	173	276	145	186
		13.0	29.0	7.0	18.0
	Non-fixed:	154	87	181	160
		8.7	9.1	8.9	15.3
	pedestrian	51	53	66	81
		3.8	5.6	3.3	7.7
	cyclist	57	11	41	39
	4.2	1.2	2.0	3.7	
	Non collision	36	37	37	32
		2.7	3.9	1.8	3.0
Vehicle role	Multiple vehicle - striking	546	308	777	339
		40.5	32.5	38.7	32.6
	Multiple vehicle - struck	427	213	765	306
		31.7	22.5	38.1	29.4
	Single vehicle - striking	271	363	291	317
		20.1	38.3	14.5	30.5
LEGAL ACTION/VIOLATIONS					
Violations charged	None	899	611	1472	707
		66.2	64.5	72.8	67.8
	Violations charged	458	337	549	336
		33.8	35.5	27.2	32.2