



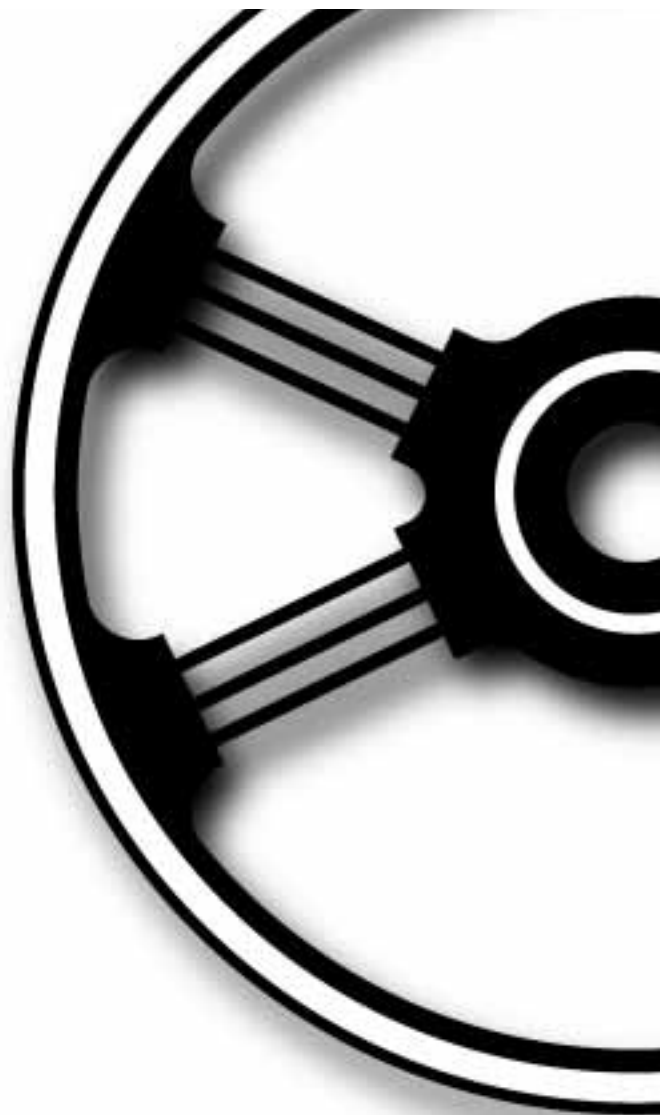
CR179

Driving Behaviour and Road  
Crash Involvement

# women

## Behind the Wheel





CR179

Driving Behaviour and Road  
Crash Involvement

A Dobson  
WJ Brown  
J Ball

**women**  
**Behind the Wheel**

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**Abstract**

This report forms part of a series published by the Federal Office of Road Safety (FORS) on women and road safety. This report provides an analysis of attitudes and driving behaviours of young and middle-aged women obtained through a recent survey of women from across Australia.

There are two other reports in this series: a review of the existing literature on male and female drivers and a statistical overview of female driver crash involvement.

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**Keywords**

Female Drivers, Driving Behaviour, Surveys, Road Safety

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**Notes**

- (1) FORS research reports are disseminated in the interests of information exchange.
- (2) The views expressed are those of the author(s) and do not necessarily represent those of the Commonwealth Government.



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# 1. SUMMARY

The aim of this project was to explore factors associated with risk of road crashes among two groups of women drivers aged 19-24 and 46-51. Subjects were randomly selected from participants in the baseline survey of the Australian Longitudinal Study on Women's Health (the Women's Health Australia or WHA project), which includes women from all walks of life in all States and Territories of Australia. Original selection for the WHA project was by random sampling from the Health Insurance Commission/Medicare database.

A questionnaire was mailed to 2,700 women in each age group in April 1997. It included questions about: driving patterns; behaviour in relation to social functions where alcohol is served; items from the Driver Behaviour Questionnaire<sup>9</sup> (DBQ); speed-related items from the Driving Style Questionnaire<sup>12</sup> (DSQ); 'thoroughness' items from the Decision Making Questionnaire<sup>12</sup> (DMQ); and crash history in the last three years. Completed questionnaires were received from 1621 young women (61%) and 1949 mid-age women (73%), of whom 1425 and 1834 respectively, were drivers. Social and demographic characteristics of the participants were taken from the WHA survey which was conducted one year before the driving survey.

Scores for errors and violations (from the Driver Behaviour Questionnaire, DBQ) and speed (from the Driving Style Questionnaire, DSQ) were higher in the young women, who also had higher reported rates of crashes in the last three years (1.87 per 100,000 km) than the mid-age women (0.59 per 100,000 km). The young women drivers were more likely than the mid-age drivers to be 'at fault' and were also more likely to report speeding, tailgating and overtaking on the inside lane. The results suggest a picture of young women who are impatient drivers.

In the young women, lapse scores on the DBQ were significantly associated with crashes. These scores were higher in young women who had reported high levels of stress, feeling rushed, higher usual alcohol consumption, and tertiary education in the WHA survey. Young women with fewer years of driving experience, lower life satisfaction scores and those born in non-English speaking countries were also more likely to be involved in crashes.

Among mid-age women, the rate of crashes reported was much lower than among the young women and scores on the DBQ were also low. Mid-age women with higher lapse scores were also more likely to be involved in crashes. Those who reported high levels of stress, being less satisfied with their lives and those with tertiary education were most likely to have higher lapse scores. Women born in non-English speaking countries were also more likely to be involved in a crash.

Overall, the results suggest that crash involvement is related to several factors including feeling stressed and rushed, low life satisfaction, usual alcohol consumption (drink driving itself was not a relevant factor for the young or mid-age group), and being born in a non English speaking country.

The crashes reported in this study were predominantly of low severity and some caution should be applied in extrapolating the results to high severity crashes where additional factors may be involved. Nonetheless the findings could be used to inform the development of strategies for reduction of road crashes among women drivers.

First, young women drivers display a number of intentional high-risk behaviours such as speeding, tailgating and overtaking on the inside lane. While there have been some attempts to target young

women drivers in media campaigns (eg the Federal Office of Road Safety's 'Rethink Your Second Drink' promotion), these campaigns could be refined in light of the study findings, to include some of the high risk behaviours reported by young women. These behaviours might also be the focus of specific enforcement programs.

Second, the study also found that women who were stressed or had low satisfaction with their lives were at increased risk of crash involvement. There is a need for further research to consider the mechanism through which lifestyle characteristics are transferred into increased risk and to identify the type of road safety countermeasures that may be appropriate to this issue.

Finally, women born overseas had higher rates of crash involvement, approximately twice that of Australian born women. This finding certainly requires further investigation to identify whether this is due to difficulties in transferring driving skills acquired in another country (ie changing from driving on the right hand side of the road to driving on the left hand side), difficulties in acquiring driving skills in Australia, or to other culturally related factors.

## 2. BACKGROUND TO THE PROJECT

The relevance of gender to road safety has long been recognised and it has been the contribution of male drivers to fatal and serious crashes which has, to date, attracted the most attention.

Historically, men have tended to be overrepresented in road crash fatalities. In 1996, 1,413 men were killed on Australian roads compared with 564 women.<sup>1</sup> This is consistent with men's overrepresentation in deaths from external causes by a factor of 2 to 1.<sup>2</sup> Evans<sup>3</sup> has noted that the overrepresentation of young men in road crashes is quantitatively similar to their overrepresentation in criminal activities (p 158).

It is also true that male drivers are more likely to be killed than female drivers for every kilometre travelled. According to FORS Monograph 12,<sup>4</sup> there were 0.74 male driver deaths and 0.47 female driver deaths per 100 million vehicle kilometres travelled. As a result, the road safety literature and road safety countermeasures have tended to concentrate on male drivers rather than female drivers, and the existing literature on female drivers tends to compare their behaviour with that of male drivers. While there is much of value in such an approach, there is also a danger that concentrating on the difference between male and female drivers may obscure identification of the major factors relevant to the safety of female drivers.

In general, research has also tended to concentrate on issues related to road fatalities. Certainly, the road toll is a matter of national significance and high public profile. Yet for every person killed on the road in Australia up to 15 are seriously injured. In fact, in economic terms, the costs of serious injury road crashes exceed those of fatal crashes. The Bureau of Transport and Communications Economics (Information Sheet 4)<sup>5</sup> has estimated that hospital injury crashes accounted for 32% of the costs associated with all road crashes in Australia during 1993. In comparison, fatal crashes accounted for 23% of the total cost.

In fact, while male drivers may be more at risk of death on the road, female drivers have a higher risk of sustaining serious injury. As noted in the FORS Monograph, there were 8.74 female driver admissions to hospital as a result of a road crash for every 100 million kilometres travelled compared to 7.24 admissions of male drivers.

An increase in risk for female drivers has been noted in the United States of America. The US Department of Transportation's National Highway Traffic Safety Administration released a report in 1994 which found that risk of being fatally injured in a road crash has been increasing for female drivers.<sup>6</sup>

It appears that the issue of female drivers is an emerging concern for road safety. They have a higher level of risk of hospital admission by distance travelled and, due to increased travel, they represent a growing proportion of road casualties. Since 1985, kilometres driven by female drivers have increased by 43.2% compared with an increase in travel of 6.7% by male drivers.<sup>4</sup> In fact, travel in Australia by female drivers has been increasing in a nearly linear fashion since 1976. While there were similar increases in travel by male drivers from 1976 to 1985, the amount of travel undertaken by male drivers has remained relatively stable since that date.<sup>7</sup>

As a result, the total number of female drivers admitted to hospital is now approaching that for male drivers, with seven female driver admissions for every 10 male driver admissions. This is in contrast to driver fatalities where male driver deaths outnumber female driver deaths by 3 to 1.

In 1996, over 4,000 women drivers were admitted to hospital and 213 killed as a result of crashes on Australian roads. The economic cost to the community is calculated at over \$600 million each year based on estimates of the cost of road crashes provided by the Bureau of Transport and Communications Economics (Information Sheet 4).<sup>5</sup> This is 10% of the estimated cost of all road crashes in Australia.

## 2.1 AIM OF THE PROJECT

The project described in this report focuses on behaviour of women drivers and is based on two large cohorts of women who are participants in the Australian Longitudinal Study on Women's Health. The women are in two age groups (19-24 and 46-51 years at the time of this study) and are from all walks of life, living in all States and Territories of Australia. The overall aim was to explore factors associated with the risk of road crashes for female drivers in Australia. Although the choice of the two age groups was dictated by the structure of the Australian Longitudinal Study on Women's Health, this choice also reflects a distinction between high risk (young) drivers and low risk (mid-age) drivers.<sup>8</sup> The study thus also investigates factors associated with road crashes in high and low risk groups.

The project was based on the work of the Manchester Driver Behaviour Research Group. Research conducted in the United Kingdom (UK) by the Manchester group, which has conducted several large scale national surveys, has focused on the relationship between driving behaviour and crashes. Based on this research, driving behaviours have been grouped into three basic factors: violations, errors and lapses.

The Manchester Group has found that high scores on a driving violation scale and a driving error scale (both sub-scales of a Driving Behaviour Questionnaire, DBQ) were associated with crashes in general.<sup>9,10</sup> A similar study carried out on a small sample in Western Australia, also using the DBQ, found that age and gender were predictors of dangerous errors, with women reporting more dangerous errors than men.<sup>11</sup>

Other studies in the UK have also looked at driving speed, using items from a Driving Style Questionnaire (DSQ) and thoroughness in decision making, using questions from a Decision Making Questionnaire (DMQ).<sup>12</sup> Both these factors were found to be associated with crashes where the respondent was the driver at fault.<sup>12</sup>

## 3. METHODS

### 3.1 SAMPLING FRAME

The Australian Longitudinal Study on Women's Health, now known as the Women's Health Australia (WHA) project, commenced in 1996, when more than 42,000 women from across Australia completed baseline surveys which aimed to explore factors which promote health or underlie the development of illness in women. The project involves three cohorts of women who were aged 18-23, 45-50 and 70-75 years at the time of the baseline survey in 1996. Selection was by random sampling from the Health Insurance Commission/Medicare database, with intentional over-sampling of women from rural and remote areas of Australia.

Two random sub-samples of women were selected from the young and mid-age WHA participants, (N=2,700 for each group) and invited to participate in this study on driver behaviour by completing a 'Women's Road Safety' survey.

### 3.2 THE QUESTIONNAIRES

#### 3.2.1 WOMEN'S ROAD SAFETY SURVEY

The questionnaire was developed by the research team, with the assistance of staff from the Federal Office of Road Safety. Wherever possible questions which had been included in previous research were used. If necessary, amendments were made to suit Australian road conditions or terminology, or to meet the specific requirements of the Federal Office of Road Safety. The questionnaire included sections on: driving patterns; driving experience (number of years); behaviour in relation to social functions where alcohol is served; items from the Driver Behaviour Questionnaire<sup>9</sup> (DBQ); speed-related items from the Driving Style Questionnaire<sup>12</sup> (DSQ); 'thoroughness' items from the Decision Making Questionnaire<sup>12</sup> (DMQ); and crash history in the last three years. A copy of the questionnaire, and a list of the original sources of the questions are included in Appendices 1 and 2.

#### 3.2.2 WHA BASELINE SURVEY

Data from the baseline survey of the WHA project<sup>13</sup> were also used in this project, to explore the associations between demographic, social, work and health-related factors, and driver behaviour and crashes. It should be noted however that these data were collected approximately one year before the collection of the driver behaviour data.

Demographic variables from the WHA project included: area of residence, marital status; country of birth; and level of education. Work related questions included: occupational status; hours worked each week; shift work; night work; a measure of time pressure (How often do you feel rushed, pressured or too busy?); and an indicator of ability to manage on available income. Health questions included questions about: stress; life events; life satisfaction; alcohol consumption (including binge drinking) and smoking. All the questions are included in Appendix 3, and the response categories are shown in Tables 1 - 3.

**Table 1: Demographic characteristics of the participants**

	Young (N=1425) %	Mid-age (N=1834) %
<b>Area of residence</b>		
Urban	56.8	33.3
Rural	39.6	59.6
Remote	3.6	7.1
<b>Marital status</b>		
Married, defacto	21.5	83.3
Separated, divorced, widowed	0.8	12.5
Single	76.6	3.6
Missing	1.1	0.6
<b>Country of birth</b>		
Australia	92.1	77.9
Other English speaking	3.0	13.4
Non-English speaking	3.7	7.9
Missing	1.2	0.8
<b>Education (highest qualification)</b>		
School certificate or less	11.4	44.2
Higher school certificate	56.2	17.6
Trade or college certificate	19.2	20.8
University degree	12.3	16.6
Missing	0.9	0.9
<b>Occupational Status</b>		
Manager, professional, paraprofessional	46.5	41.6
Trade/clerical/sales	42.3	43.3
Unskilled	4.9	10.6
Other, missing	6.3	4.5
<b>Employment Status</b>		
Full time	36.2	37.7
Part time/casual	18.2	32.7
No paid work	44.8	28.0
Missing	0.8	1.6

**Table 2: Social and work related characteristics of the participants**

	Young (N=1425) %	Mid-age (N=1834) %
<b>Hours worked each week</b>		
1 - 24 hours	10.7	20.7
25 - 40 hours	29.8	34.7
41 hours +	13.9	14.9
No paid work	44.8	28.0
Missing	0.8	1.6
<b>Shift/night work</b>		
Night & shift work	8.4	4.9
Shift, no night	5.9	5.0
Night, no shift	4.7	4.1
No shift, no night	80.7	85.8
Missing	0.3	0.2
<b>Rushed, pressured, busy</b>		
Every day	17.2	20.3
Few times a week	42.0	8.0
Once a week	20.6	18.4
Once a month/never	15.0	19.9
Other/missing	5.2	1.5
<b>Manage on available income</b>		
Impossible/always difficult	15.4	13.0
Sometimes difficult	31.7	26.9
Not too bad	37.1	42.5
Easy	15.0	17.1
Missing	0.8	0.5

### 3.3 SELECTION, CONTACT AND FOLLOW-UP METHODS

Two groups of women (2,700 in each) were selected randomly from the 14,760 young women and 14,200 mid-age women who participated in the baseline survey of the WHA project. An invitation to participate, and an 8 page questionnaire, were mailed to the selected women in April 1997.

After four weeks, all women who had not returned the survey and whose residential address was in NSW were telephoned to ask (1) whether they received the survey, and (2) whether they had returned, or intended to return it. When women said they had lost the survey or not received it, a replacement was mailed. Women living in the other States who did not respond within four weeks were sent a reminder card to thank them if they had already completed the survey and to remind them to do it if they had not.

A freecall number was supplied for women who had any questions about the study.



**Table 3: Social characteristics of the participants**

		Young (N=1425) %	Mid-age (N=1834) %
<b>Alcohol consumption</b>			
	Non drinker	8.2	13.6
	Rarely drink	33.3	29.0
	Low risk w/out binge drinking	23.4	41.1
	Low risk with binge drinking	27.9	14.2
	Intermediate/high risk	6.1	0.8
	Missing	1.1	1.2
<b>Smoking</b>			
	Never smoked	55.9	49.8
	Ex-smoker	14.5	31.8
	Current smoker	25.2	16.0
	Missing	4.4	2.3
<hr/>			
<b>Stress</b>	mean (sd)	0.88 (0.55)	0.65 (0.51)
	median (range)	0.8 (0,3.2)	0.5 (0,3.6)
<b>Life satisfaction</b>	mean (sd)	3.15 (0.49)	3.16 (0.50)
	median (range)	3.2 (1.4,4.0)	3.2 (1.4,4.0)
<b>Life events</b>	mean (sd)	15.1 (9.4)	10.9 (8.5)
	median (range)	14.3 (0,82.9)	10.7 (0,78.6)
<b>Years of driving</b>	mean (sd)	4.22 (1.7)	28.40 (4.7)
	median (range)	4.0 (0,8.0)	30 (1,36.0)

### 3.4 SCORING AND STATISTICAL ANALYSIS

Frequencies of responses to each of the selected items from the WHA baseline survey and all items in the Road Safety Survey were computed. (These are included in Tables 1 – 3 and Appendix 4).

#### 3.4.1 CALCULATION OF SCORES

Scores for stress, life events, life satisfaction and alcohol consumption were calculated as follows. A mean stress score was calculated for each participant who responded to more than half the 11 items (young women) or 10 (mid-age women) items included in the stress question in the WHA baseline survey. Scores ranged from 0 (not at all stressed or not applicable) to 4 (extremely stressed). A life events score was obtained by adding the number of life events experienced in the last twelve months, from a list of 35 items (young women) or 28 items (mid-age women). A life satisfaction score was calculated as the mean response to the five items in the WHA questionnaire, which asked about satisfaction with work, career, relationships, friendships and social activities. (Those who

responded to fewer than four of the items were excluded). These questions and a summary of the scoring procedures are included in Appendix 3.

An alcohol variable was derived from two questions about frequency and amount of alcohol consumed each week (How often do you usually drink alcohol? and On a day when you drink alcohol, how many drinks do you usually have?), and one question about binge drinking (How often do you have five or more drinks on one occasion). (See Appendix 3). Drinking patterns were classified into five categories: non-drinker; rarely drink; low risk drinker (an average of <2 alcoholic drinks/day) with no binge drinking; low risk drinker with binge drinking; intermediate or high-risk drinker (an average of >2 drinks/day) with or without binge drinking.

Scores for errors, lapses and violations were computed for each participant by adding the scores for the eight individual items relating to each of these factors in the DBQ (Q 12, see Table 5 for individual items included in each factor). Similarly, a 'speed' score was computed by adding the scores for the 3 speed related items from the DSQ (Q 13), and a 'thoroughness' score was computed by adding the four items from the DMQ (Q 14 with the scores for part b reversed). Mean scores were calculated for each cohort for the three DBQ factors (lapses, errors and violations) and for 'speed' and 'thoroughness'. (See Table 4a).

**Table 4a: Mean ( $\pm$  standard deviation) scores for lapses, errors, violations, speed and thoroughness in the two cohorts**

	Young	Mid-age	p (t test)
Lapse score	0.78 $\pm$ 0.46	0.79 $\pm$ 0.44	0.59
Error score	0.60 $\pm$ 0.40	0.47 $\pm$ 0.38	<0.0001
Violation score	0.82 $\pm$ 0.56	0.40 $\pm$ 0.35	<0.0001
Speed score	1.91 $\pm$ 1.00	1.37 $\pm$ 0.79	<0.0001
Thoroughness score	3.33 $\pm$ 0.36	3.97 $\pm$ 0.8	<0.0001

### 3.4.2 STATISTICAL ANALYSES

Mean lapse, error and violation scores were computed (Table 4a) and compared across age groups for type and 'fault' of crash (see Appendix 5). Correlations between the DBQ and DMQ variables were also computed (Table 4b).

Multiple stepwise linear regression analyses were then used to explore the associations between the WHA socio-demographic and health variables, and mean lapse, error, violation and speed scores in each group of drivers.

Multiple Poisson regression (using stepwise backwards elimination) was then used to find which characteristics were associated with crash rate (number of crashes in three years per kms driven in the same period). All the sociodemographic variables (marital status, country of birth, hours worked, shift and night work, time pressure, occupation, qualifications, manage on income), health-related variables (smoking, alcohol, stress, life events, life satisfaction), and driving variables (lapses,

errors, violations, speed and years driving) were included in the initial model. Variables which were not statistically significant were removed. The fit of the final model is described by the deviance; for an adequate model the deviance should be approximately equal to (or less than) the degrees of freedom.

**Table 4b: Correlations between lapses, errors, violations, speed and thoroughness scores (95% confidence intervals)**

	Young	Mid-age
Lapses vs Errors	0.56 (0.53,0.60)	0.58 (0.55,0.61)
Lapses vs Violations	0.28 (0.23,0.33)	0.38 (0.34,0.42)
Lapses vs Speed	0.24 (0.19,0.29)	0.30 (0.26,0.34)
Lapses vs Thoroughness	-0.22 (-0.28,-0.17)	-0.21 (-0.26,-0.17)
Errors vs Violations	0.45 (0.41,0.49)	0.42 (0.38,0.45)
Errors vs Speed	0.33 (0.29,0.38)	0.32 (0.28,0.36)
Errors vs Thoroughness	-0.31 (-0.36,-0.26)	-0.25 (-0.34,-0.25)
Violations vs Speed	0.65 (0.62,0.68)	0.57 (0.53,0.60)
Violations vs Thoroughness	-0.20 (-0.25,-0.15)	-0.17 (-0.21,-0.12)
Speed vs Thoroughness	-0.13 (-0.15,-0.07)	-0.16 (-0.20,-0.11)

## 4. RESULTS

### 4.1 PARTICIPANTS

Completed surveys were received from 1621 young women and 1949 women from the mid-age cohort and 51 surveys came back to WHA as 'return to sender'. Therefore the response rates were 61% and 73% for the young and mid-age groups respectively. Of the respondents in the younger cohort, 196 (12%) were not drivers, or had not driven in the last six months. The corresponding number for the mid-age cohort was 115 (6%). The following results are based only on the responses from the 1425 young women drivers and 1834 mid-age women drivers.

#### 4.1.1 DEMOGRAPHIC AND SOCIAL CHARACTERISTICS OF THE PARTICIPANTS

Selected demographic and social characteristics of the drivers (taken from the WHA survey data) are shown in Tables 1 - 3. The mean ( $\pm$  standard deviation) age of respondents in each group was  $21.8 \pm 1.45$  (young) and  $48.7 \pm 1.57$  (mid-age).

The proportion of married women and women not born in Australia, was higher in mid-age than in younger drivers (see Table 1). A smaller proportion of the young drivers was in the paid workforce (because they were students), but a higher proportion of the paid workers in the younger group was involved in shift or night work. More mid-age women reported being rushed, pressured or busy every day (see Table 2).

The young women reported higher levels of stress than the mid-age group, and had experienced relatively more life events in the last twelve months. Distribution of life satisfaction scores was however remarkably similar in the two groups (see Table 3). The proportion of smokers in the young group was higher than in the mid-age group. A greater proportion of young women was in the intermediate/high risk alcohol category and the prevalence of binge drinking was higher among the young women.

### 4.2 DRIVING PATTERNS

Frequencies of responses to all the questions are included in Appendix 4.

The younger women reported driving slightly longer distances per week: (mean distance for young women, 225 km; and for mid-age women, 211 km; young, median 173, first and third quartiles 70 and 300; mid-age, 150, 80, 300). A greater proportion of young women (17%) than mid-age women (13%) reported driving more than 400 km per week. While the mid-age group spent more time transporting children, the younger group tended to spend more time in leisure-related driving (eg movies, sport, visiting friends), and were more likely to drive during the evening or at night. A summary of distances driven and the number of crashes in each group is shown below:

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## Reported crashes and travel

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	Young	Mid
Average number of crashes/year	0.206	0.067
Average km driven per year	11722	10992
Crashes per 100,000km driven	1.87	0.59

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### 4.3 DRIVING AND SOCIAL FUNCTIONS

In relation to social functions where alcohol is served, young women were more likely to drink alcohol (69% reported at least sometimes drinking alcohol, compared with 55% of the mid-age group; difference = 14%, 95% confidence interval (CI) 11-17%. However, young women were more likely to decide who would drive before leaving home (84% compared with 64%; difference = 20%, 95% CI 17-23%) and much more likely than the mid-age group to use public transport to get home from social functions (52% compared with 15%; difference = 37%, 95% CI 34-40%) (see Appendix 4).

Knowledge of current recommendations for alcoholic drinks and driving was generally good in both groups; 88% of the young women and 78% of the mid-age group correctly thought the number of drinks which could be consumed without exceeding the legal blood alcohol limit for driving was three (or fewer than three) in a three hour period. In deciding who would drive home after a social function, considering themselves to be a safer driver (than their partner) was more common amongst the young women, while considering the importance of a partner not losing their licence was more important for the mid-age group (see Appendix 4).

### 4.4 DRIVER BEHAVIOUR QUESTIONNAIRE SCORES

Mean scores for lapses (8 items), errors (8 items), violations (8 items), speed (3 items) and thoroughness (4 items) are shown in Table 4a. There were significant differences between the two age groups for all scores except lapses.

#### 4.4.1 LAPSES, ERRORS AND VIOLATIONS

Mean scores for each of the individual items relating to lapses, errors and violations in the DBQ are shown in Tables 5a, 5b and 5c. Also shown in these tables are the corresponding scores reported by other investigators who have used these items in driver behaviour research in the UK and Western Australia.

The most marked differences between the young and mid-age cohorts in these scores was for the violation scores, with mean scores for young women higher than those for mid-age women on every violation item. The mean score for violations (8 items) in the young women was almost twice that of the mid-age women (see Table 4a).

**Table 5a: Mean (and sd) scores for each 'lapse' item on the DBQ scale: comparison with previous research**

question number	Lapses	Young (N=1452)	Mid-age (N=1834)	Reason *	Parker **	Blockey ***
		mean sd	mean sd	mean sd	mean sd	mean sd
b	Get into the wrong lane when approaching a roundabout or a junction.	1.02	1.13	1.49	1.36	0.75
		0.81	0.77	1.00	0.81	0.82
d	Misread the signs and exit from the roundabout on the wrong road.	0.57	0.62	1.19	1.22	0.33
		0.74	0.73	0.95	0.85	0.57
g	Forget where you left your car in the car park.	1.18	1.27	1.14	1.07	1.07
		1.08	0.95	1.20	1.02	0.98
l	Hit something when reversing that you had not previously seen.	0.42	0.45	0.56	0.54	0.56
		0.66	0.61	0.78	0.70	0.63
m	Attempt to drive away from the traffic lights in third gear.	0.48	0.25	0.41	0.33	0.36
		0.77	0.55	0.67	0.62	0.66
r	Switch on one thing, such as the headlights, when you meant to switch on something else, such as the wipers.	0.77	0.89	1.18	1.23	0.67
		0.84	0.79	1.12	0.95	0.90
t	Intending to drive to destination A, you 'wake up' to find yourself on the road to perhaps destination B, because the latter is your more usual destination.	0.77	0.82	0.89	0.86	0.97
		0.89	0.85	0.97	0.89	0.88
w	Realise you have no clear recollection of the road along which you have just been travelling.	1.04	0.89	1.23	1.30	0.99
		1.03	0.88	1.23	1.05	1.12

\* N = 520 males and females aged 20-78 years (UK).<sup>10</sup>\*\* N = 1656 males and females aged 17-69 years (UK).<sup>9</sup>\*\*\* N = 61 males and 74 females aged up to 70 years (WA).<sup>11</sup>

**Table 5b: Mean (and sd) scores for each 'error' item on the DBQ scale: comparison with previous research**

question number	Errors	Young	Mid-age	Reason	Parker	Blockey	Lawton
		(N=1425) mean sd	(N=1834) mean sd	* mean sd	** mean sd	*** mean sd	**** mean sd
a	Attempt to overtake someone that you	0.51	0.35	0.45	0.40	0.36	1.44
	hadn't noticed to be signalling a right turn.	0.69	0.65	0.63	0.59	0.51	0.67
c	Miss 'Give Way' signs, and narrowly avoid	0.43	0.41	0.28	0.35	0.26	1.31
	colliding with traffic having right of way.	0.61	0.55	0.60	0.53	0.47	0.56
e	Fail to notice that pedestrians are crossing	0.85	0.53	0.63	0.57	0.24	1.65
	when turning into a side street from a	0.80	0.63	0.75	0.66	0.44	0.76
h	Queuing to turn left onto a main road, you	0.78	0.50	0.83	0.77	0.53	1.75
	pay such close attention to the mainstream	0.77	0.64	0.87	0.80	0.61	0.81
k	On turning left nearly hit a cyclist who has	0.24	0.25	0.47	0.39	0.30	1.38
	come up on your inside.	0.51	0.49	0.76	0.64	0.55	0.59
n	Fail to check your rearview mirror before	0.69	0.54	0.74	0.58	0.45	1.68
	pulling out, changing lanes, etc.	0.79	0.67	0.92	0.78	0.57	0.90
q	Under estimate the speed of an oncoming	0.67	0.59	0.88	0.93	0.64	1.78
	vehicle when overtaking.	0.73	0.66	0.75	0.74	0.69	0.80
s	Brake too quickly on a slippery road, or	0.60	0.55	0.61	0.67	0.73	1.49
	steer the wrong way in a skid.	0.69	0.65	0.74	0.74	0.70	0.67

\* N = 520 males and females aged 20-78 years (UK).<sup>10</sup>

\*\* N = 1656 males and females aged 17-69 years (UK).<sup>9</sup>

\*\*\* N = 61 males and 74 females aged up to 70 years (WA).<sup>11</sup>

\*\*\*\* N = 830 males and females aged 17-40 (mean = 29) (UK).<sup>14</sup>

**Table 5c: Mean (and sd) scores for each 'violation' item on the DBQ scale: comparison with previous research**

question number	Violations	Young	Mid-age	Reason	Parker	Blockey	Lawton
		(N=1425) mean sd	(N=1834) mean sd	* mean sd	** mean sd	*** mean sd	**** mean sd
f	Drive especially close to the car in front	1.14	0.38	0.85	0.73	0.79	1.75
	as a signal to its driver to go faster or get out of the way.	1.18	0.69	1.22	1.03	0.85	1.00
j	Cross a junction knowing that the traffic lights have already turned red.	0.48	0.25	1.02	0.75	0.33	1.63
		0.73	0.51	1.21	0.87	0.62	0.86
l	Disregard the speed limits late at night or early in the morning.	1.60	0.87	1.83	1.68	1.54	2.59
		1.24	0.91	1.61	1.37	1.30	1.37
o	Have an aversion to a particular class of road user, and indicate your hostility by whatever means you can.	0.81	0.48	0.62	0.50	0.54	1.56
		0.97	0.73	1.12	0.92	0.78	0.96
p	Become impatient with a slow driver in the outer lane and overtake on the inside (left) lane.	1.48	0.79	0.90	0.67	0.50	2.05
		1.19	0.91	1.23	0.96	0.95	1.16
u	Drive even though you realise that you may be over the legal blood-alcohol limit.	0.32	0.27	0.55	0.28	0.61	1.16
		0.62	0.55	1.00	0.63	0.80	0.52
v	Get involved with unofficial 'races' with other drivers.	0.42	0.10	0.59	0.37	0.50	1.22
		0.71	0.34	1.05	0.80	0.75	0.62
x	Angered by another driver's behaviour, you give chase with the intention of giving him/her a piece of your mind.	0.27	0.07	0.44	0.32	0.29	1.40
		0.65	0.31	0.89	0.74	0.68	0.82

\* N = 520 males and females aged 20-78 years (UK).<sup>10</sup>

\*\* N = 1656 males and females aged 17-69 years (UK).<sup>9</sup>

\*\*\* N = 61 males and 74 females aged up to 70 years (WA).<sup>11</sup>

\*\*\*\* N = 830 males and females aged 17-40 (mean = 29) (UK).<sup>14</sup>

The 'violation' items with the three highest mean scores were:

- "disregard the speed limit late at night or early in the morning" (young 1.60; mid-age 0.87; difference = 0.73, 95% CI 0.65, 0.81);
- "become impatient with a slow driver in the outer lane and overtake on the inside (left) lane" (young 1.48; mid-age 0.79; difference = 0.69, 95% CI 0.63, 0.77); and
- "drive especially close to the car in front as a signal to its driver to go faster or get out of the way" (young 1.14; mid-age 0.38; difference = 0.76, 95% CI 0.69, 0.83).



Differences between women in the two age groups were also evident in the error scores, with the young drivers scoring higher than their mid-age counterparts on every item. The differences between the two cohorts were however not so marked for the mean error scores as for the mean violation scores (see Table 2).

The two most common error items were:

- “fail to notice that pedestrians are crossing when turning into a side street from a main road” (young 0.85; mid-age 0.53; difference = 0.32, 95% CI 0.27, 0.37).
- “queuing to turn left onto a main road, you pay such close attention to the mainstream of traffic that you nearly hit the car in front” (young 0.78; mid-age 0.50; difference = 0.28, 95% CI 0.23, 0.33).

Mean scores for lapses were similar in the two cohorts (see Tables 4 and 5a). Mid-age women scored higher for items relating to roundabouts, forgetting where the car was and switching on the wrong instruments. Scores for attempting to drive away in third gear and having no clear recollection of the road just travelled were higher in the younger group. Scores for lapses, errors and violations were highly correlated in both age groups (Table 4b). The pattern of correlations was the same in both age groups. The highest correlations are between lapse and error scores and between violation and speed scores.

#### 4.4.2 SPEED AND THOROUGHNESS

Mean scores for the three speed related items from the DSQ were higher in the young cohort than in the mid-age group (see Table 4a). Both groups were more likely to report speeding on open roads than in built-up areas. The reverse was true for the mean score for the four thoroughness items, with mid-age women scoring higher on the items relating to logical decision making, planning ahead and working out the pros and cons of a decision. Scores for speed were positively correlated and thoroughness scores were negatively correlated with violations, errors and lapses for both age groups (Table 4b).

### 4.5 CRASHES

Despite the fact that some of the younger women had driven for less than three years, the proportion of drivers who had had at least one crash in the last three years was much higher in the young than in the mid-age group (young, 43%, mid-age 17%; difference = 26%, 95% CI 23-29%). The average number of crashes in the last three years was three times greater in the young group (mean = 0.62, median = 0, range 0-5) than in the mid-age group (mean = 0.20, median = 0, range 0-4), (mean difference = 0.42, 95% CI 0.37-0.47). The proportion of women reporting more than one crash was also higher in the young (14%) than in the mid-age women (2%). The rate of crashes in the last 3 years was 1.87 per 100,000 km in the young drivers and 0.59 crashes per 100,000 km in the mid-age women.

In relation to the most recent crash, 35% of young women (217 out of the 618 who reported a crash) reported that it was ‘fully’ their fault, and 27% (165) said it was partially their fault. In contrast, in the mid-age group, 26% said the last crash was ‘fully’ their fault (81 out of 315), and another 26% said it was partially their fault. (See Appendix 4).

In relation to damage caused by the most recent crash, the two groups were very similar, with around 85% of women involved in crashes in both groups reporting damage only, 12% reporting slight injury to a person, and 1-2% serious injury. No fatal crashes were reported.

At the time of the most recent crash, around one third of the vehicles involved in crashes for both groups (young 38%, mid-age 33%) were carrying passengers. The mid-age women were more likely to have children in the car at the time of the crash (18% of the mid-age women involved in crashes had at least one child in the car, compared with 6% of the younger group).

Although the number of crashes was higher in the young group (young 618; mid-age 315), the types of crash were similar in both groups. Around one third of the most recent crashes (young, 35%; mid-age, 36%) occurred at an intersection (question 20). The most common types of crash (question 21) were rear-end collisions (young, 32%; mid-age, 28%), angular collisions (young, 28%; mid-age 29%) and collision with another object (eg parked car, tree; young, 25%; mid-age, 23%). The proportion of crashes involving head-on collisions and overturned vehicles was low, but more common in the young group (young, head-on 2.1%, overturned 2.4%; mid-age, head-on 1.2%, overturned 1.9%). There was only one collision with a pedestrian in each group.

In relation to conditions at the time of the most recent crash, young women were more likely to report listening to music (young 40%, mid-age 13%), driving too fast (young 10%, mid-age 4%), or talking to a passenger (young 11%; mid-age 6%). About 14% of women involved in crashes reported being tired and few reported they had been drinking alcohol ( young 1.8%; mid-age 0.6%).

The relationships between lapse, error and violation scores and the proportion of women reporting at least one crash in the last three years are given in Figures 1-3.

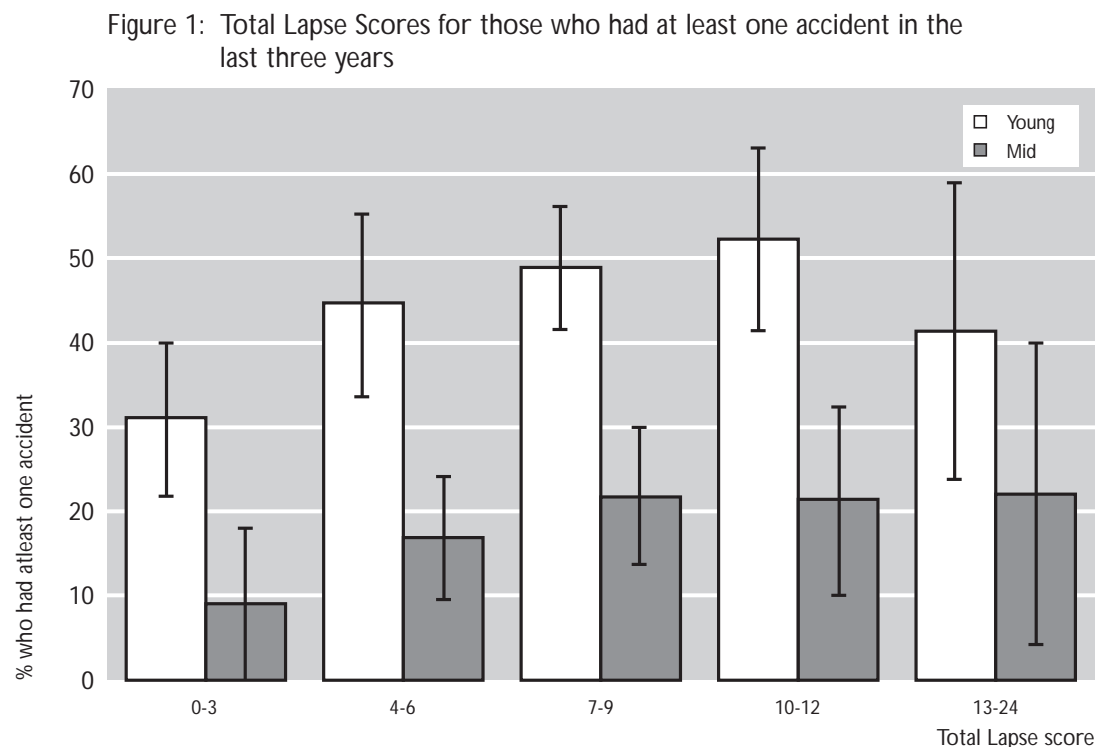


Figure 1: Total Error Scores for those who had at least one accident in the last three years

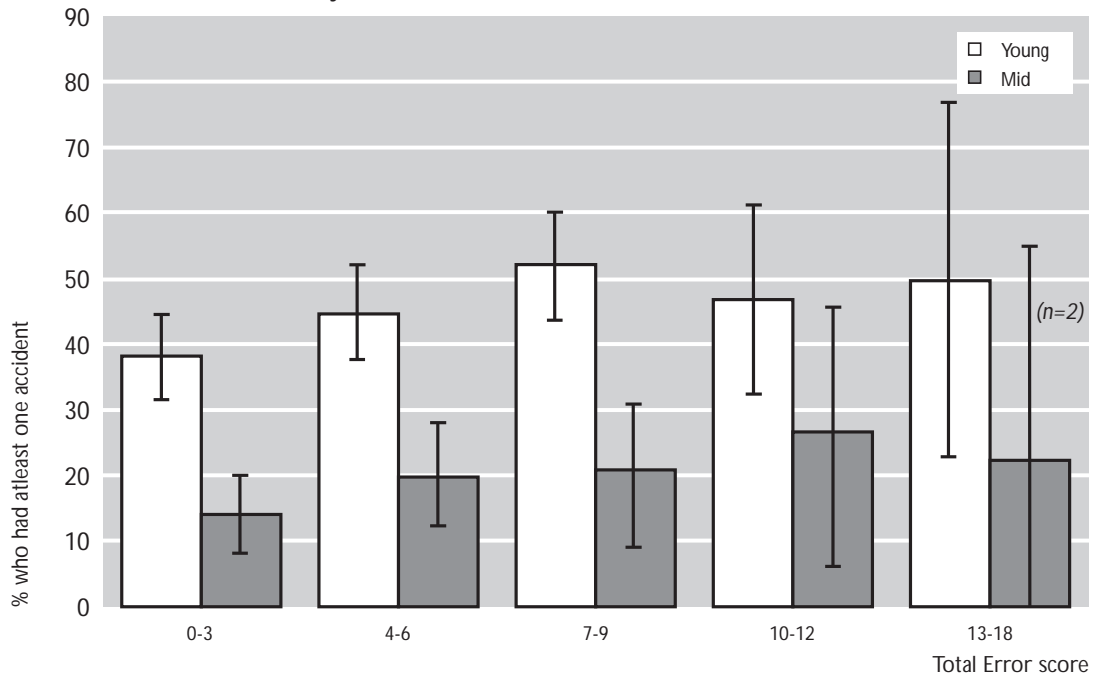
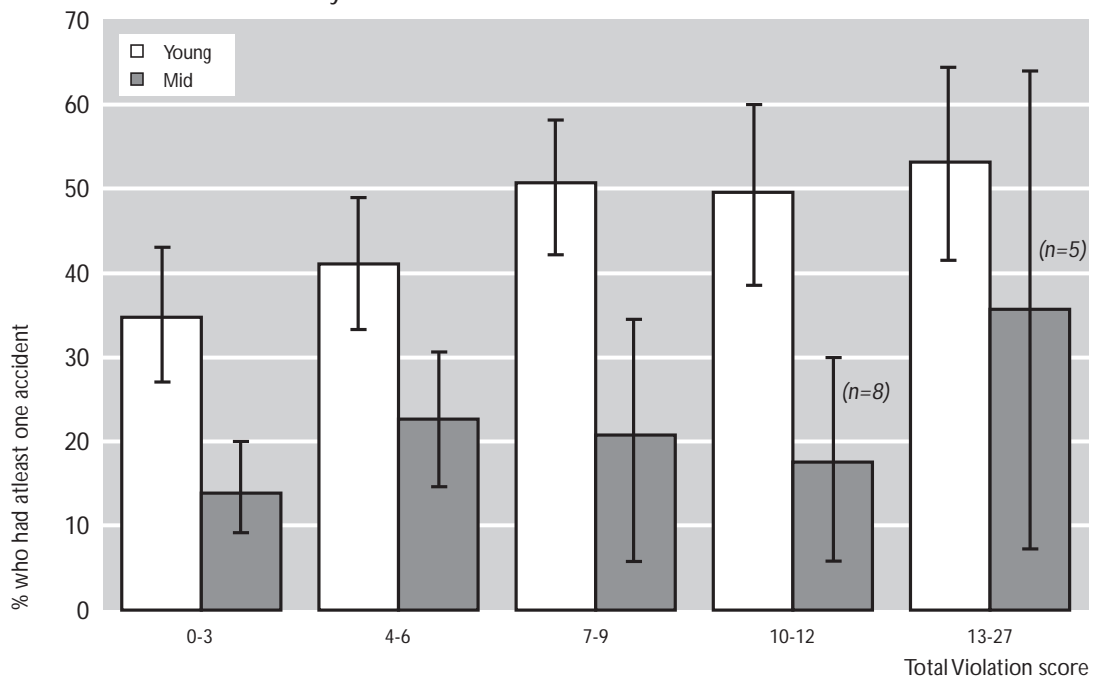


Figure 1: Total Violation Scores for those who had at least one accident in the last three years



## 4.6 CHARACTERISTICS ASSOCIATED WITH DRIVER BEHAVIOUR SCORES

The multiple regression models which describe the associations between the WHA variables and the DBQ (lapse, error, violation) and DSQ (speed) scores are shown in Tables 6 – 9 (young drivers) and Table 10 – 13 (mid-age drivers)

In the young group, increased alcohol consumption was significantly associated with higher scores on all four variables, and increased stress was associated with increased scores for lapses, violations and speed. More life events, more years of driving, longer hours worked, feeling rushed, higher status occupations and higher levels of education were each associated with one or more of the driving variables.

In the mid-age group higher education and lower life satisfaction scores were each associated with three of the driver behaviour scores. Feeling rushed, higher stress scores, longer hours worked, years driving, and general alcohol consumption were also significantly associated with two of the driving scores

**Table 6: Characteristics associated with violations in young women**

Characteristic	Coefficient	Standard error	p-value	Explanation (violations are associated with)
<b>Alcohol</b>			<b>&lt;0.0001</b>	more alcohol consumption
non-drinker	0	-	-	
rarely drink	0.157	0.062	0.012	
low risk w/out binge	0.230	0.064	<0.001	
low risk with binge	0.353	0.063	<0.001	
intermediate/high risk	0.393	0.085	<0.001	
<b>Stress</b>	0.143	0.033	<b>&lt;0.0001</b>	higher stress score
<b>Years of Driving</b>	0.046	0.009	<b>&lt;0.0001</b>	more years driving
<b>Life Events</b>	0.013	0.006	<b>0.018</b>	higher life events score

R-squared = 0.10 for model

**Table 7: Characteristics associated with errors in young women**

Characteristic	Coefficient	Standard error	p-value	Explanation (errors are associated with)
<b>Alcohol</b>			<b>&lt;0.0001</b>	alcohol consumption, especially binge drinking
non-drinker	0	-	-	
rarely drink	0.006	0.046	0.900	
low risk w/out binge	0.100	0.048	0.037	
low risk with binge	0.181	0.047	<0.001	
intermediate/high risk	0.104	0.063	0.098	
<b>Rushed</b>			<b>0.0013</b>	feeling rushed
never	0	-	-	
monthly	0.046	0.039	0.238	
weekly	0.089	0.034	0.010	
every day	0.151	0.040	<0.001	
<b>Education</b>			<b>0.0095</b>	university education
school certificate or less	0	-	-	
higher school cert	0.028	0.041	0.497	
trade/certificate	0.036	0.045	0.416	
university degree	0.115	0.053	0.029	
<b>Occupation</b>			<b>0.0303</b>	manager/professional
unskilled	0	-	-	
trade/service/clerk	0.095	0.054	0.081	
manager/professional/ para-professional	0.138	0.056	0.014	
<b>Life Events</b>	0.007	0.004	<b>0.048</b>	higher life events score

R-squared = 0.08 for model

**Table 8: Characteristics associated with lapses in young women**

Characteristic	Coefficient	Standard error	p-value	Explanation (lapses are associated with)
<b>Education</b>			<b>&lt;0.0001</b>	university qualifications
school certificate or less	0	-	-	
higher school cert	0.018	0.044	0.691	
trade or certificate	-0.076	0.050	0.124	
university degree	0.190	0.054	<0.001	
<b>Alcohol</b>			<b>&lt;0.0001</b>	alcohol consumption
non-drinker	0	-	-	
rarely drink	0.106	0.052	0.040	
low risk w/out binge	0.209	0.053	<0.001	
low risk with binge	0.236	0.053	<0.001	
intermediate/high risk	0.267	0.070	<0.001	
<b>Stress</b>	0.081	0.025	<b>0.0016</b>	higher mean score for stress
<b>Rushed</b>			<b>0.0007</b>	feeling rushed
never	0	-	-	
monthly	-0.034	0.044	0.435	
weekly	0.057	0.039	0.145	
every day	0.140	0.048	0.004	
<b>Hours worked</b>			<b>0.0040</b>	working fewer hours
no work	0	-	-	
< 25 hours	0.044	0.044	0.318	
25-40 hours	-0.087	0.032	0.007	
>40 hours	-0.097	0.041	0.020	

R-squared = 0.10 for model

**Table 9: Characteristics associated with DSQ in young women**

Characteristic	Coefficient	Standard error	p-value	Explanation <i>(speed is associated with)</i>
<b>Stress</b>	0.917	0.156	<b>&lt;0.0001</b>	higher mean score for stress
<b>Alcohol</b>			<b>&lt;0.0001</b>	alcohol consumption
non-drinker	0	-	-	
rarely drink	0.500	0.339	0.141	
low risk w/out binge	0.853	0.351	0.015	
low risk with binge	1.380	0.344	<0.001	
intermediate/high risk	1.737	0.460	<0.001	
<b>Occupation</b>			<b>0.0006</b>	manager/professional compared to
unskilled	0	-	-	trades/service/
trade/service/clerk	0.144	0.398	0.718	para-professional clerk
manager/professional/	0.537	0.399	0.178	
<b>Years driving</b>	0.158	0.050	<b>0.0016</b>	more years driving

R-squared = 0.08 for model

**Table 10: Characteristics associated with violations in mid-age women**

Characteristic	Coefficient	Standard error	p-value	Explanation (violations are associated with)
<b>Alcohol</b>			<b>&lt;0.0001</b>	alcohol consumption
non-drinker	0	-	-	
rarely drink	0.037	0.028	0.183	
low risk w/out binge	0.109	0.027	<0.001	
low risk with binge	0.181	0.033	<0.001	
intermediate/high risk	0.344	0.097	<0.001	
<b>Hours worked</b>			<b>0.0019</b>	working longer hours
no work	0	-	-	
<25 hours	0.032	0.024	0.183	
25-40 hours	0.074	0.021	<0.001	
>40 hours	0.079	0.027	0.004	
<b>Years driving</b>	0.005	0.002	<b>0.0103</b>	more years driving
<b>Stress</b>	0.046	0.019	<b>0.0126</b>	higher stress score
<b>Satisfaction</b>	-0.046	0.019	<b>0.0148</b>	lower satisfaction score
<b>Smoking</b>			<b>0.0307</b>	
non-smoker	0	-	-	
ex-smoker	0.029	0.019	0.132	being a current smoker
current smoker	0.062	0.024	0.011	

R-squared = 0.08 for model



**Table 11: Characteristics associated with errors in mid-age women**

Characteristic	Coefficient	Standard error	p-value	Explanation (errors are associated with)
<b>Education</b>			<b>&lt;0.0001</b>	university degree
school certificate or less	0	-	-	
higher school cert	0.014	0.027	0.589	
trade or certificate	0.038	0.025	0.133	
university degree	0.127	0.028	<0.001	
<b>Satisfaction</b>	-0.049	0.020	<b>0.0142</b>	lower satisfaction score
<b>Rushed</b>			<b>0.0174</b>	being rushed
never	0	-	-	
monthly	0.072	0.031	0.019	
weekly	0.044	0.027	0.094	
every day	0.092	0.031	0.003	

R-squared = 0.03 for model

**Table 12: Characteristics associated with lapses in mid-age women**

Characteristic	Coefficient	Standard error	p-value	Explanation (lapses are associated with)
<b>Education</b>			<b>&lt;0.0001</b>	university degree
school certificate or less	0	-	-	
higher school cert	0.028	0.030	0.352	
trade or certificate	0.078	0.030	0.010	
university degree	0.210	0.036	<0.001	
<b>Satisfaction</b>	-0.114	0.024	<b>&lt;0.0001</b>	lower satisfaction score
<b>Country of Birth</b>			<b>0.0037</b>	born in an English speaking country other than Australia
Australia	0	-	-	
other English speaking	0.094	0.031	0.003	
non English speaking	0.048	0.042	0.262	
<b>Stress</b>	0.070	0.025	<b>0.0047</b>	higher stress
<b>Rushed</b>			<b>0.0077</b>	being rushed
never	0	-	-	
monthly	0.075	0.034	0.030	
weekly	0.075	0.030	0.013	
every day	0.122	0.036	<0.001	
<b>Occupation</b>			<b>0.0090</b>	manager/professional
manual/machine	0	-	-	
trade/service/clerk	0.088	0.037	0.016	
manager/professional/ para-professional	0.122	0.040	0.002	

R-squared = 0.11 for model

**Table 13: Characteristics associated with DSQ in mid-age women**

Characteristic	Coefficient	Standard error	p-value	Explanation (speed is associated with)
<b>Alcohol Status</b>			<b>&lt;0.0001</b>	alcohol consumption
non drinker	0	-	-	
rarely drink	0.263	0.194	0.176	
low risk w/out binge	0.656	0.185	<0.001	
low risk with binge	0.973	0.221	<0.001	
intermediate/high risk	0.765	0.680	0.261	
<b>Years Driving</b>	0.050	0.013	<b>0.0002</b>	more years driving
<b>Stress</b>	0.372	0.119	<b>0.0017</b>	higher stress score
<b>Education</b>			<b>0.0019</b>	higher level of education
school certificate or less	0	-	-	
higher school cert	0.247	0.164	0.131	
trade or certificate	0.466	0.154	0.003	
university degree	0.583	0.177	0.001	
<b>Hours worked/week</b>			<b>0.0043</b>	working more hours per week
no work	0	-	-	
<25 hours	0.022	0.169	0.896	
25-40 hours	0.330	0.151	0.029	
>40 hours	0.612	0.196	0.002	

R-squared = 0.07 for model

## 4.7 CHARACTERISTICS ASSOCIATED WITH CRASHES

### 4.7.1 YOUNG WOMEN

In the Poisson regression analyses, 18 variables were entered in to the initial model. Of these, seven showed significant associations with crash rate, and remained in the final model, which is shown in Table 14. The variables associated with higher crash rates were:

- Higher mean lapse score;
- Fewer years of driving;
- Lower life satisfaction score;
- Being born in a non-English speaking country;
- Not experiencing any difficulty managing on income;
- Higher life events score;
- Lower reported speed score.

**Table 14: Characteristics associated with crash rate in young women**

Characteristic	Coefficient	Standard error	p-value	Explanation (crashes are associated with)
<b>Lapses</b>	0.455	0.080	<0.001	higher mean lapse score
<b>Years driving</b>	-0.135	0.025	<0.001	fewer years driving
<b>Satisfaction</b>	-0.392	0.080	<0.001	lower life satisfaction score
<b>Country of Birth</b>			<0.001	born in a non-English speaking country
Australia	0	-	-	
other English speaking	0.226	0.178	0.205	
non-English speaking	0.784	0.175	<0.001	
<b>Manage on Income</b>			0.001	
easy	0	-	-	no difficulty
not too bad	-0.157	0.111	0.157	managing on
difficult sometimes	-0.435	0.118	<0.001	income
impossible/always difficult	-0.283	0.140	0.043	
<b>Life Events</b>	0.032	0.011	0.005	higher life events score
<b>DSQ (Speed)</b>	-0.025	0.012	0.041	lower score for speed

Deviance = 1718, degrees of freedom = 1153

A summary of the inter-relationships between the WHA variables and the driving variables, and between all these variables and crash rate for young women, is shown in Figure 4.

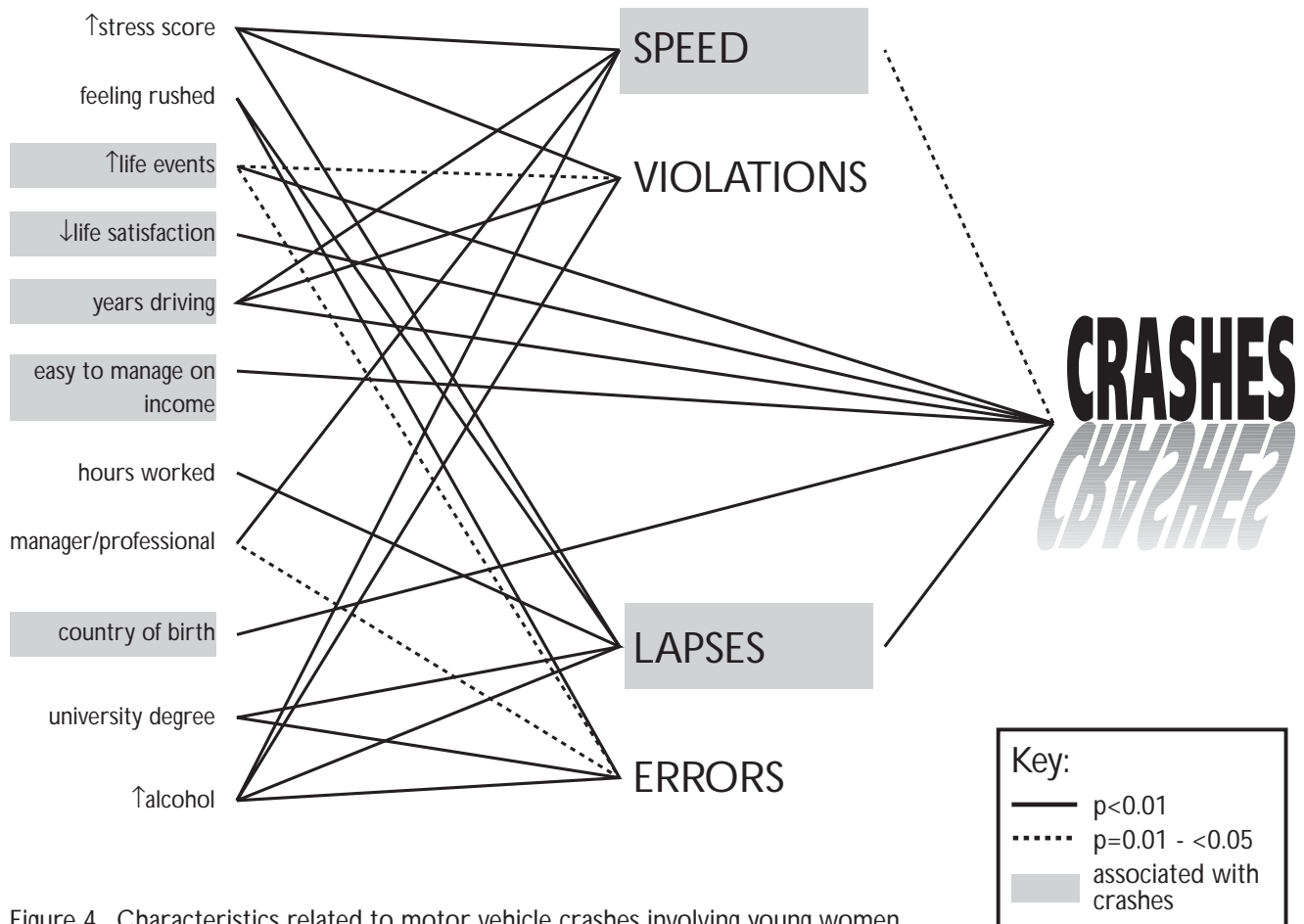


Figure 4. Characteristics related to motor vehicle crashes involving young women

## 4.7.2 MID-AGE WOMEN

In the model for the mid-age women, five variables were significantly associated with higher crash rates (see Table 15). They were:

- Higher lapse score;
- Being born in a non-English speaking country;
- Being an ex-smoker;
- No difficulty managing on income;
- Lower life satisfaction score.

**Table 15: Characteristics associated with crash rate in mid-age women**

Characteristic	Coefficient	Standard error	p-value	Explanation (crashes are associated with)
<b>Lapse</b>	0.520	0.133	<b>&lt;0.001</b>	higher mean lapse score
<b>Country of Birth</b>			<b>0.002</b>	born in a non-English speaking country
Australia	0	-	-	
other English speaking	0.234	0.153	0.126	
non English speaking	0.656	0.182	<0.001	
<b>Smoking</b>			<b>0.016</b>	ex-smoker
never smoked	0	-	-	
ex-smoker	0.256	0.124	0.039	
current smoker	-0.252	0.200	0.208	
<b>Manage on Income</b>			<b>0.017</b>	no difficulty managing on income
easy	0	-	-	
not too bad	-0.454	0.153	0.003	
impossible/always difficult	-0.471	0.171	0.006	
Sometimes difficult	-0.454	0.198	0.022	
<b>Satisfaction</b>	-0.260	0.119	<b>0.029</b>	lower mean satisfaction score

A summary of the inter-relationships between the WHA variables and the driving variables, and between all these variables and crash rate for young women, is shown in Figure 5.

Women who described their most recent crash as fully or partially their fault also tended to have higher scores for lapses, errors and violations than women who did not have crashes or who believed their most recent crash was not their fault. Thus, lapses errors and violations appear to be related to both the incidence of crashes and responsibility for those crashes in both young and mid age women drivers.

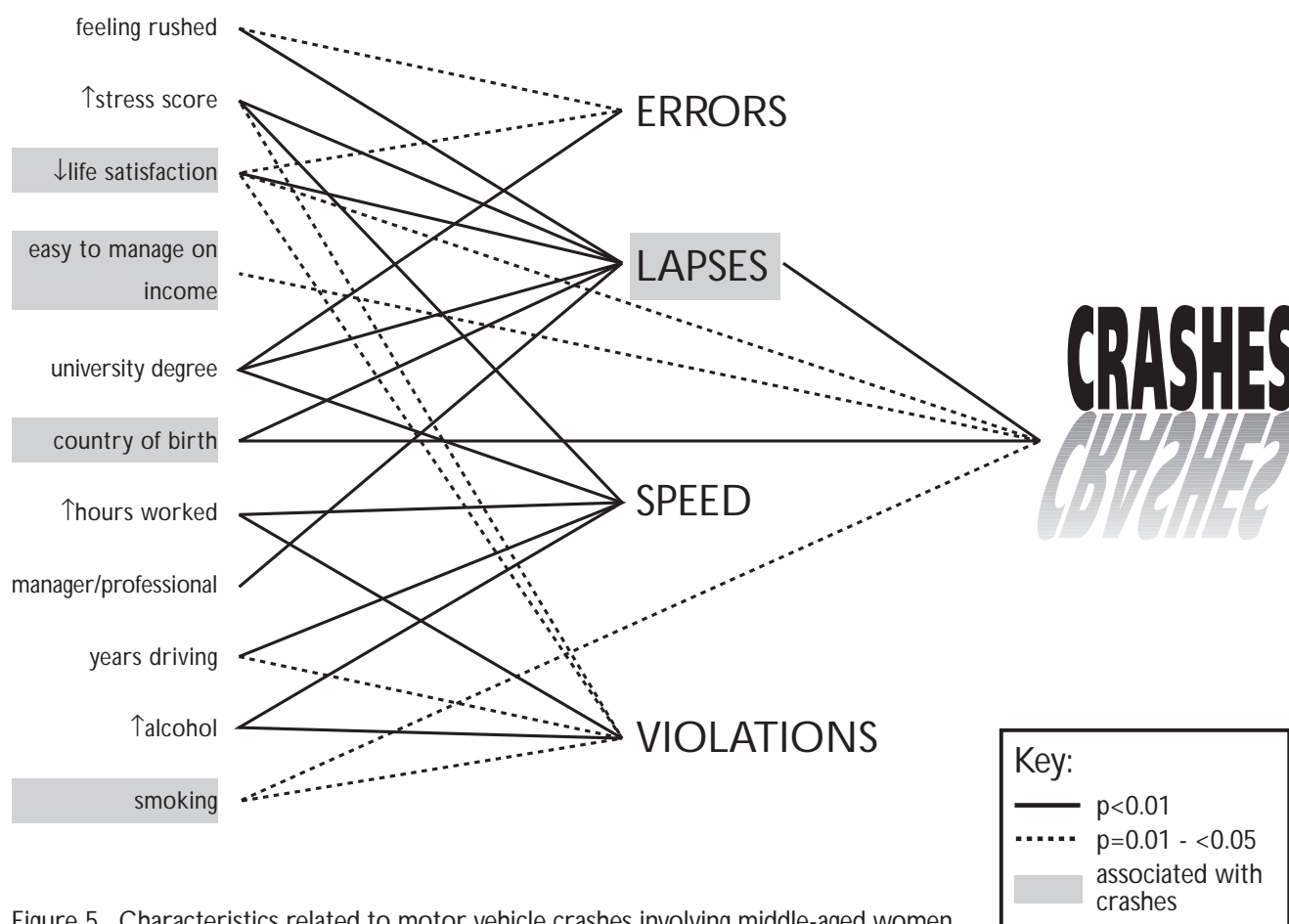


Figure 5. Characteristics related to motor vehicle crashes involving middle-aged women

## 5. DISCUSSION

The results of this survey clearly illustrate the increased risk of road traffic crashes for young Australian women drivers compared with their mid-age counterparts. The crash rate for younger drivers was three times that for mid-age women. Scores on the error and violation items of the Driver Behaviour Questionnaire and the speed items of the Driving Style Questionnaire were also higher in the young women.

Analysis of the type of crashes reported here suggests that the majority were low severity rear-end or angular collisions, or involved a collision with another object, such as a parked car or a tree. The highest mean violation scores were for young women involved in rear-end collisions and those where they were 'at fault.' The highest error scores were observed in mid-age women who reported a head-on collision, and in young women who had a rear-end or object collision.

The violation scores were consistently higher in the young group, and while our survey did not ask about 'active' crashes (eg 'I hit...') and 'passive' crashes (eg 'I was hit by...'), previous research has found that high violators are more likely to be involved in both types of crash.<sup>9,10</sup> Thus while violators are clearly more likely to run into others, they are also more likely to put themselves into situations where others may run into them. It is however interesting to note that, for the most recent crashes, younger women were more likely to be 'at fault' than the mid-age women.

The results suggest a picture of young women who are impatient drivers. Scores for two violation items in particular were higher than reported in previous research, and much higher in the younger than the mid-age women. These were overtaking on the inside and driving close to a slower car to try to signal for it to get out of the way.<sup>9-11,14</sup> Scores for disregarding the speed limit late at night or early in the morning were also high, a finding which has previously been noted in the UK.<sup>12</sup>

According to the findings of the Manchester Driver Research Group, it is the drivers who score high on violations and errors, not those who score high on lapses, who are statistically more likely to have been involved in a crash in the past, and are also more likely to be involved in a crash in the future. However, our results indicate clearly that lapse scores are the strongest predictors of crashes, even when adjustments are made for the confounding effects of the social and demographic characteristics which are associated with the DBQ scores. In both age groups the women with higher lapse scores were those who had university education, had higher self-reported stress scores and reported feeling rushed everyday.

In addition to higher lapse scores, three socio-demographic variables were found to be strongly associated with crash rate in both groups: lower life satisfaction; no difficulty managing on available income; and being born in a non-English speaking country. In addition, young women who reported experiencing major events in their lives, such as the death of a family member or close friend, exam stress, or relationship problems, and those with fewer years of driving experience, were also more at risk of being involved in a crash.

Alcohol consumption was not found to be directly associated with crash rate in either cohort. It was, nevertheless, associated with lapses, errors, violations and speeding in the younger women and violations and speed in the mid-age group. As drink-driving is a particular public health concern for young people in Australia, it was, however, encouraging to find that few young women reported



that they had been drinking alcohol at the time of their most recent crash. Indeed, many of the young women who participated in this survey demonstrated characteristics of 'responsible partying', such as deciding who would drive home before going to a party, or taking public transport, and their knowledge of current 'drinking and driving' recommendations for women was good.

Nevertheless, 11% of the young women and 4% of the mid-age women who were involved in crashes said they were driving too fast at the time of their most recent crash.

Overall, the results suggest that involvement in crashes and unsafe driving behaviour is closely related to several factors:

- Feeling stressed or rushed;
- Low satisfaction with achievements in life;
- General alcohol consumption (not prior to driving);
- Being born in a non-English speaking country.

These results suggest that strategies for the reduction of road crashes among young women drivers will need to focus on:

- Reducing driving violations by young women such as speeding, 'tail gating' and overtaking on the inside;
- Developing specific strategies to reduce crashes among women from non-English speaking backgrounds.

A longitudinal study of this group of women will be needed to determine whether for the younger drivers, driving behaviour and style improve with age, or whether the 'high risk' characteristics seen in this cohort persist with increased age and driving experience.

## **ACKNOWLEDGMENTS**

The authors are grateful to Dr Steve Stradling from the Manchester Driver Behaviour Group, and Ms Lyn Adamson and Ms Joy Goldsworthy from the Women's Health Australia project for their expert assistance with this research. We also acknowledge the assistance of the Federal Office of Road Safety in developing the questions for the driver survey. The Australian Longitudinal Study on Women's Health is funded by the Commonwealth Department of Health and Family Services, and the Women's Road Safety Survey was funded by the Federal Office of Road Safety.

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# APPENDIX 1 -

# THE QUESTIONNAIRE



















## APPENDIX 2 -

# SOURCES OF THE QUESTIONS

Question 1	WHA (drivers licence)
Question 2	Standard as Manchester University Driver Behaviour Research Group Parker et al 1995 pg 1038 (driven in last 6 months)
Question 3	Modified from Manchester University Driver Behaviour Research Group (type of car)
Question 4	WHA (age obtained driving licence)
Question 5	Modified from Manchester University Driver Behaviour Research Group (time spent driving)
Question 6	Modified from Manchester University Driver Behaviour Research Group (distance driven)
Question 7	Modified from Manchester University Driver Behaviour Research Group (reason for driving)
Question 8	WHA (who drives)
Question 9	WHA/FORS (alcohol & social function)
Question 10	WHA/FORS (legal limit)
Question 11	WHA/FORS (decision about who drives)
Question 12	Manchester University Driver Behaviour Research Group's Driver Behaviour Questionnaire. (DBQ)
Question 13	Manchester University Driver Behaviour Research Group's Driver Style Questionnaire. (DSQ)

- Question 14 Manchester University Driver Behaviour Research Group's Decision Making Questionnaire.  
(DMQ)
- Question 15 Manchester University Driver Behaviour Research Group Questionnaire  
(accidents in past 3 years)
- Question 16 Manchester University Driver Behaviour Research Group Questionnaire  
(results of accidents)
- Question 17 Manchester University Driver Behaviour Research Group Questionnaire  
(most recent result of accident)
- Questions 18-23 FORS  
(car description)  
(no. of passengers)  
(no. of children)  
(accident at intersection)  
(type of accident)  
(fault)  
(description of accident (true or false))

## **APPENDIX 3 -**

# **ITEMS FROM THE WOMEN'S HEALTH AUSTRALIA QUESTIONNAIRE**

















## **APPENDIX 4 -**

# **RESPONSES - FREQUENCY TABLES**

	Young (n=1425) %	Mid (n=1834) %
<b>Q4) How old were you when you first obtained your driver's licence?</b>		
<17 yrs	14.5	5.3
17-18 yrs	70.6	41.7
19-20 yrs	10.0	17.7
21-25 yrs	2.5	22.0
26-30 yrs	0.0	6.8
30+ yrs	0.0	3.3
Missing	2.4	3.0
<b>Q5) On average how many hours per week do you spend driving?</b>		
<b>a) During peak hours on weekdays</b>		
No hours	8.0	1.8
1-2 hrs	40.0	38.4
3-5 hrs	24.8	23.4
6-10 hrs	12.3	10.2
11-20 hrs	2.0	1.5
>20 hrs	0.3	0.3
Missing	12.6	24.4
<b>b) At other times during the day on weekdays</b>		
No hours	6.1	0.6
1-2 hrs	46.9	45.7
3-5 hrs	25.3	25.8
6-10 hrs	10.2	10.0
11-20 hrs	2.0	2.7
>20 hrs	0.5	0.5
Missing	9.1	14.7
<b>c) During the day on weekends</b>		
No hours	1.9	0.8
1-2 hrs	57.3	67.1
3-5 hrs	27.2	16.3
6-10 hrs	6.3	2.8
11-20 hrs	1.1	0.6
Missing	6.3	12.4
<b>d) During the evening or at night on any day of the week</b>		
No hours	3.0	2.0
1-2 hrs	61.5	64.6
3-5 hrs	22.1	8.1
6-10 hrs	4.8	1.3
11-20 hrs	1.0	0.3
>20 hrs	0.7	0.0
Missing	7.4	23.5



	Young (n=1425) %	Mid (n=1834) %
<b>Q6) How many kilometres do you personally drive in an average week?</b>		
0-99	26.0	22.8
100-199	18.3	24.0
200-299	15.2	16.7
300-399	9.8	10.1
400-599	12.9	8.4
600-999	3.0	3.7
>=1000	1.1	1.0
Missing	13.7	13.4
<b>Q7) How often:</b>		
<b>a) Do you drive to and from your workplace?</b>		
Every day	35.8	33.9
3-6 times week	26.2	23.6
1,2 times week	10.5	9.5
Less frequently	6.4	4.3
Never	20.0	25.7
Missing	1.0	3.1
<b>b) Do you drive for work purposes, (eg delivery/sales rep/bus or taxi driver)?</b>		
Every day	4.4	7.0
3-6 times week	4.1	7.9
1,2 times week	5.3	8.4
Less frequently	12.9	13.1
Never	72.4	60.2
Missing	0.9	3.4
<b>c) Do you drive for personal reasons, (eg shopping, paying bills etc)?</b>		
Every day	17.9	17.5
3-6 times week	30.4	31.0
1,2 times week	39.6	41.1
Less frequently	9.3	8.1
Never	2.0	0.4
Missing	0.8	1.9
<b>d) Do you drive in your leisure time (eg movies, sport, visit friends)?</b>		
Every day	11.9	5.0
3-6 times week	36.6	20.3
1,2 times week	35.6	42.0
Less frequently	13.6	28.4
Never	1.5	2.1
Missing	0.8	2.1

	<b>Young (n=1425) %</b>	<b>Mid (n=1834) %</b>
<b>e) Do you drive children to and from school and for after school activities</b>		
Every day	1.0	10.1
3-6 times week	2.3	9.0
1,2 times week	3.8	8.5
Less frequently	7.9	8.8
Never	84.0	60.6
Missing	1.0	3.0
<b>f) Do you drive long distance journeys (ie longer than 2 hours)?</b>		
Every day	0.6	0.5
3-6 times week	0.6	0.5
1,2 times week	5.1	4.5
Less frequently	72.8	75.5
Never	20.2	17.0
Missing	0.8	2.0
<b>Q8) When driving with your partner/spouse, who usually does the driving?</b>		
No partner/spouse	44.8	15.1
Self	9.9	8.9
Partner/spouse	23.0	47.4
Shared equally	21.0	26.7
Missing	1.3	2.0
<b>Q9) Please describe your behaviour at social functions?</b>		
<b>a) I drink alcohol</b>		
Always	5.0	7.3
Often	24.8	16.6
Sometimes	39.0	30.9
Rarely	20.4	23.8
Never	8.2	15.2
No social functions	1.1	2.8
Missing	1.5	3.4
<b>b) I drink less than my spouse/partner/friend</b>		
Always	27.4	46.7
Often	25.2	12.8
Sometimes	27.0	15.0
Rarely	8.7	6.3
Never	5.4	7.1
No social functions	1.7	2.2
Missing	4.6	9.9

	<b>Young (n=1425) %</b>	<b>Mid (n=1834) %</b>
<b>c) We decide before leaving home who will drive home</b>		
Always	63.6	44.7
Often	13.0	10.7
Sometimes	7.2	8.9
Rarely	3.0	7.0
Never	7.6	16.3
No social functions	1.6	2.3
Missing	4.1	10.2
<b>d) I am the one who drives home</b>		
Always	11.1	30.8
Often	22.5	17.6
Sometimes	38.8	23.6
Rarely	13.5	11.5
Never	9.8	7.5
No social functions	1.4	2.1
Missing	3.0	7.0
<b>e) We use public transport to get home (bus, taxi etc)</b>		
Always	6.9	1.9
Often	19.5	3.5
Sometimes	25.8	9.8
Rarely	19.9	16.5
Never	24.2	57.7
No social functions	1.5	2.4
Missing	2.3	8.1
<b>Q10) The legal limit for the amount of alcohol a driver can have in his/her blood is 0.05. How many standard drinks do you think can be consumed over a 3 hour period without exceeding this limit, by:</b>		
<b>a) A female</b>		
None	0.1	0.2
1-2	53.6	55.0
3	34.0	22.9
4	7.1	6.4
5	0.9	1.3
6 or more	0.4	1.2
Missing	4.0	13.1

	Young (n=1425) %	Mid (n=1834) %
<b>b) A male</b>		
None	0.1	0.0
1-2	10.1	11.2
3	37.7	31.3
4	27.3	20.1
5	11.0	10.5
6	7.0	6.3
7-8	1.2	1.5
9 or more	0.6	1.0
Missing	5.2	18.1

**Q11) When the decision is made that you will drive, how important is each of the following in this decision?**

<b>a) Your partner/spouse is over the limit and you are not</b>		
Very important	61.8	66.3
Somewhat important	6.4	3.3
Not important	8.3	2.6
Not applicable	21.7	21.5
Missing	1.8	6.3
<b>b) You are considered to be a safer driver</b>		
Very important	34.0	30.4
Somewhat important	25.0	12.8
Not important	20.8	18.9
Not applicable	18.3	31.5
Missing	2.0	6.5
<b>c) It would be worse for my partner/spouse to lose their licence</b>		
Very important	13.3	23.4
Somewhat important	13.1	12.8
Not important	30.7	19.1
Not applicable	40.6	37.3
Missing	2.3	7.5

**Q12) How often do you do each of the following?**

<b>a) Attempt to overtake someone that you hadn't noticed to be signalling a right turn</b>		
Never	60.2	67.8
Hardly ever	30.3	29.0
Occasionally	7.4	2.6
Quite often	1.2	0.0
Frequently	0.4	0.1
Nearly always	0.1	0.0
Missing	0.4	0.6

	Young (n=1425) %	Mid (n=1834) %
<b>b) Get into the wrong lane when approaching a roundabout or a junction</b>		
Never	28.6	22.0
Hardly ever	43.1	44.8
Occasionally	25.8	31.6
Quite often	1.9	1.3
Frequently	0.2	0.2
Nearly always	0.1	0.0
Missing	0.4	0.2
<b>c) Miss 'Give Way' signs, and narrowly avoid colliding with traffic having right of way</b>		
Never	63.0	62.5
Hardly ever	31.4	34.1
Occasionally	5.1	3.2
Quite often	0.4	0.0
Missing	0.1	0.3
<b>d) Misread the signs and exit from the roundabout on the wrong road</b>		
Never	56.7	52.7
Hardly ever	30.2	32.9
Occasionally	12.2	13.6
Quite often	0.6	0.5
Frequently	0.1	0.0
Missing	0.1	0.4
<b>e) Fail to notice that pedestrians are crossing when turning into a side street from a main road</b>		
Never	38.5	53.8
Hardly ever	40.4	38.5
Occasionally	19.3	7.1
Quite often	1.5	0.2
Frequently	0.2	0.0
Missing	0.1	0.4
<b>f) Drive especially close to the car in front as a signal to its driver to go faster or get out of the way</b>		
Never	40.5	73.0
Hardly ever	22.1	17.3
Occasionally	24.1	8.3
Quite often	9.1	0.9
Frequently	3.4	0.2
Nearly always	0.6	0.0
Missing	0.2	0.3

	Young (n=1425) %	Mid (n=1834) %
<b>g) Forget where you left your car in the car park</b>		
Never	32.4	24.2
Hardly ever	30.9	33.6
Occasionally	26.6	34.8
Quite often	7.2	5.1
Frequently	2.3	1.8
Nearly always	0.7	0.2
Missing	0.1	0.3
<b>h) Queuing to turn left onto a main road, you pay such close attention to the mainstream of traffic that you nearly hit the car in front</b>		
Never	40.4	57.0
Hardly ever	42.3	35.4
Occasionally	15.3	7.1
Quite often	1.5	0.2
Frequently	0.1	0.0
Nearly always	0.1	0.0
Missing	0.4	0.3
<b>i) Hit something when reversing that you had not previously seen</b>		
Never	66.1	60.7
Hardly ever	26.1	33.2
Occasionally	6.8	5.7
Quite often	0.6	0.2
Frequently	0.1	0.0
Missing	0.2	0.3
<b>j) Cross a junction knowing that the traffic lights have already turned red</b>		
Never	63.44	78.8
Hardly ever	26.0	17.6
Occasionally	9.1	3.2
Quite often	0.8	0.1
Frequently	0.4	0.1
Nearly always	0.1	0.0
Missing	0.3	0.3
<b>k) On turning left nearly hit a cyclist who has come up on your inside</b>		
Never	78.8	76.9
Hardly ever	18.4	20.6
Occasionally	2.5	2.2
Quite often	0.2	0.1
Frequently	0.0	0.1
Nearly always	0.1	0.0
Missing	0.1	0.3

	Young (n=1425) %	Mid (n=1834) %
<b>l) Disregard the speed limits late at night or early in the morning</b>		
Never	22.1	43.1
Hardly ever	26.6	32.4
Occasionally	29.8	19.7
Quite often	13.4	4.0
Frequently	6.3	0.6
Nearly always	1.6	0.1
Missing	0.2	0.2
<b>m) Attempt to drive away from the traffic lights in third gear</b>		
Never	66.2	80.0
Hardly ever	21.1	14.5
Occasionally	10.5	4.9
Quite often	1.7	0.3
Frequently	0.3	0.0
Missing	0.3	0.4
<b>n) Fail to check your rearview mirror before pulling out, changing lanes, etc</b>		
Never	47.6	54.9
Hardly ever	38.3	36.0
Occasionally	11.5	8.5
Quite often	2.2	0.3
Frequently	0.3	0.1
Nearly always	0.1	0.1
Missing	0.1	0.3
<b>o) Have an aversion to a particular class of road use, and indicate your hostility by whatever means you can</b>		
Never	48.0	64.2
Hardly ever	28.6	24.4
Occasionally	17.1	9.9
Quite often	3.9	0.7
Frequently	0.9	0.1
Nearly always	0.5	0.1
Missing	1.0	0.6
<b>p) Become impatient with a slow driver in the outer lane and overtake on the inside (left) lane</b>		
Never	28.1	48.6
Hardly ever	20.0	26.7
Occasionally	33.1	21.3
Quite often	14.3	2.4
Frequently	3.4	0.4
Nearly always	0.9	0.2
Missing	0.3	0.4

	Young (n=1425) %	Mid (n=1834) %
<b>q) Under estimate the speed of an oncoming vehicle when overtaking</b>		
Never	46.5	49.9
Hardly ever	40.9	40.6
Occasionally	11.2	8.9
Quite often	1.2	0.3
Frequently	0.1	0.0
Missing	0.1	0.4
<b>r) Switch on one thing, such as the headlights, when you meant to switch on something else, such as the wipers</b>		
Never	44.9	35.7
Hardly ever	36.8	40.7
Occasionally	15.0	22.0
Quite often	2.5	1.2
Frequently	0.6	0.1
Missing	0.2	0.3
<b>s) Brake too quickly on a slippery road, or steer the wrong way in a skid</b>		
Never	51.0	53.7
Hardly ever	38.9	37.2
Occasionally	9.2	8.6
Quite often	0.6	0.1
Frequently	0.1	0.0
Missing	0.1	0.4
<b>t) Intending to drive to destination A, you 'wake up' to find yourself on the road to destination B, perhaps because the latter is your more usual destination</b>		
Never	48.0	44.1
Hardly ever	30.7	31.4
Occasionally	17.7	22.1
Quite often	2.7	1.6
Frequently	0.6	0.3
Nearly always	0.1	0.0
Missing	0.2	0.5
<b>u) Drive even though you realise that you may be over the legal blood-alcohol limit</b>		
Never	75.2	77.6
Hardly ever	18.2	17.6
Occasionally	6.0	4.3
Quite often	0.4	0.2
Frequently	0.1	0.1
Nearly always	0.1	0.0
Missing	0.1	0.3



	Young (n=1425) %	Mid (n=1834) %
<b>v) Get involved with unofficial 'races' with other drivers</b>		
Never	68.7	91.3
Hardly ever	21.8	7.3
Occasionally	7.9	1.2
Quite often	1.0	0.1
Frequently	0.4	0.0
Missing	0.3	0.2
<b>w) Realise you have no clear recollection of the road along which you have just been travelling</b>		
Never	38.7	40.3
Hardly ever	29.1	33.2
Occasionally	23.7	22.6
Quite often	6.8	2.7
Frequently	1.2	0.5
Nearly always	0.4	0.0
Missing	0.2	0.7
<b>x) Angered by another driver's behaviour, you give chase with the intention of giving him/her a piece of your mind</b>		
Never	80.6	94.7
Hardly ever	13.5	4.0
Occasionally	4.4	1.0
Quite often	1.1	0.1
Frequently	0.2	0.0
Nearly always	0.2	0.1
Missing	0.1	0.2
<b>Q13) The following questions ask about speed. Please answer as truthfully as you can.</b>		
<b>a) Do you exceed the speed limit in built-up areas?</b>		
Never	15.0	21.4
Hardly ever	35.0	42.5
Occasionally	33.1	30.0
Quite often	11.5	4.9
Frequently	3.7	0.7
Nearly always	1.6	0.3
Missing	0.1	0.2
<b>b) Do you exceed the speed limit on open roads?</b>		
Never	6.2	16.3
Hardly ever	19.2	30.6
Occasionally	40.2	41.3
Quite often	21.3	9.7
Frequently	9.3	1.4
Nearly always	3.7	0.6
Missing	0.1	0.2

	Young (n=1425) %	Mid (n=1834) %
<b>c) Do you drive fast?</b>		
Never	8.2	19.2
Hardly ever	28.0	35.2
Occasionally	37.3	34.2
Quite often	15.4	8.0
Frequently	7.2	2.4
Nearly always	3.6	0.4
Missing	0.3	0.6
<b>Q14) The following questions ask about how you make decisions when driving, eg when changing lanes, turning right, considering whether to stop when the light has changed to orange etc.</b>		
<b>a) Is your decision making a deliberate logical process?</b>		
Never	2.4	2.4
Hardly ever	6.3	3.1
Occasionally	14.0	5.6
Quite often	26.0	13.5
Frequently	26.3	21.0
Nearly always	23.2	51.9
Missing	1.8	2.6
<b>b) Do you make decisions without considering the implications?</b>		
Never	15.4	26.3
Hardly ever	53.4	54.4
Occasionally	24.8	14.8
Quite often	4.0	1.1
Frequently	1.1	0.8
Nearly always	0.9	1.9
Missing	0.4	0.8
<b>c) Do you plan well ahead?</b>		
Never	0.8	0.6
Hardly ever	5.1	1.5
Occasionally	17.1	5.1
Quite often	27.4	17.0
Frequently	29.5	26.1
Nearly always	19.9	49.2
Missing	0.3	0.6
<b>d) Do you work out all the pros and cons before making a decision?</b>		
Never	3.2	2.1
Hardly ever	13.3	4.3
Occasionally	27.7	12.4
Quite often	25.1	20.9
Frequently	19.4	26.4
Nearly always	11.0	32.8
Missing	0.4	1.1

	Young (n=1425) %	Mid (n=1834) %
<b>Q15) How many accidents have you been involved in as a driver in the last three years?</b>		
No accidents	56.6	82.8
>=1 accident	29.5	14.9
2 accidents	10.3	1.7
3 accidents	2.7	0.4
4 accidents	0.6	0.1
5 accidents	0.3	0.0
<b>Q16) Of the accidents in the last three years in which you were the driver, how many resulted in:</b>		
<b>a) Damage only</b>		
None	2.5	1.5
One	29.1	13.6
Two	9.1	1.6
Three	1.8	0.4
Four	0.6	0.1
Five	0.3	0.0
No accidents	56.6	82.8
<b>b) Slight injury (to any person)</b>		
None	37.3	15.1
One	6.0	1.9
Two	0.1	0.2
Three	0.0	0.1
No accidents	56.6	82.8
<b>c) Serious injury (to any person)</b>		
None	42.5	17.0
One	0.8	0.2
Two	0.1	0.0
No accidents	56.6	82.8
<b>d) Fatality (of any person)</b>		
None	43.4	17.2
No accidents	56.6	82.8
<b>Q17) Did your MOST RECENT accident result in:</b>		
<b>a) Damage only</b>		
Yes	39.6	15.7
No	3.8	1.5
No accidents	56.6	82.8
<b>b) Slight injury (to any person)</b>		
Yes	5.5	2.1
No	37.9	15.1
No accidents	56.6	82.8

	Young (n=1425) %	Mid (n=1834) %
<b>c) Serious injury (to any person)</b>		
Yes	0.6	0.3
No	42.7	16.9
No accidents	56.6	82.8
<b>d) Fatality (of any person)</b>		
No	43.4	17.2
No accidents	56.6	82.8
<b>Q19 a)</b>		
<b>How many passengers were in the vehicle with you?</b>		
None	27.0	11.5
One	11.9	3.4
Two	3.1	1.4
Three	1.0	0.6
Four or more	0.4	0.3
No accidents	56.6	82.8
<b>b) How many of the passengers were children?</b>		
None	40.6	14.0
One	1.8	1.9
Two	0.6	0.8
Three	0.1	0.3
Four or more	0.0	0.2
No accidents	56.6	82.8
Missing	0.3	0.1
<b>Q20) Did the accident occur at an intersection?</b>		
Yes	15.4	6.2
No	27.6	10.6
No accidents	56.6	82.8
Missing	0.4	0.4
<b>Q21) What type of accident was it?</b>		
<b>a) Head on collision with another vehicle</b>		
Yes	0.9	0.2
No	42.5	17.0
No accidents	56.6	82.8
<b>b) Rear end collision with another vehicle</b>		
Yes	13.9	4.9
No	29.5	12.3
No accidents	56.6	82.8
<b>c) Angular (ie. side-on) collision with another vehicle</b>		
Yes	12.2	5.0
No	29.5	12.2
No accidents	56.6	82.8

	Young (n=1425) %	Mid (n=1834) %
<b>d) Collision with a pedestrian</b>		
Yes	0.1	0.1
No	43.3	17.1
No accidents	56.6	82.8
<b>e) Collision with another object eg. parked car, animal, tree</b>		
Yes	10.8	4.0
No	32.5	13.1
No accidents	56.6	82.8
<b>f) Overturned vehicle</b>		
Yes	1.1	0.3
No	42.3	16.9
No accidents	56.6	82.8
<b>g) Other</b>		
Yes	5.9	2.8
No	37.5	14.3
No accidents	56.6	82.8
<b>Q22) Was the accident your fault?</b>		
Not at all	16.4	8.0
Partially	11.6	4.5
Fully	15.2	4.4
No accidents	56.6	82.8
Missing	0.2	0.2
<b>Q23) Were the following statements true or false at the time of the accident?</b>		
<b>a) I had been drinking alcohol before driving</b>		
Yes	0.8	0.1
No	42.6	17.1
No accidents	56.6	82.8
<b>b) I felt tired</b>		
Yes	6.3	2.3
No	37.1	14.9
No accidents	56.6	82.8
<b>c) I was driving too fast</b>		
Yes	4.6	0.7
No	38.7	16.5
No accidents	56.6	82.8
<b>d) I was talking to a passenger in the vehicle</b>		
Yes	7.0	1.0
No	36.4	16.1
No accidents	56.6	82.8

	Young (n=1425) %	Mid (n=1834) %
<b>e) I was listening to music or the radio</b>		
Yes	17.5	2.2
No	25.8	14.9
No accidents	56.6	82.8
<b>f) I was talking on a mobile phone</b>		
Yes	0.1	0.1
No	43.2	17.1
No accidents	56.6	82.8
<b>g) I was trying to pick up something from the seat or floor</b>		
Yes	0.8	0.1
No	42.5	17.1
No accidents	56.6	82.8
<b>h) I was adjusting the radio/cassette/cd or fan/air conditioning</b>		
Yes	0.7	0.3
No	42.7	16.9
No accidents	56.6	82.8
<b>i) I was checking the instruments (eg fuel gauge or speedometer)</b>		
Yes	1.3	0.1
No	42.1	17.1
No accidents	56.6	82.8
<b>j) I was daydreaming</b>		
Yes	4.8	1.3
No	38.6	15.9
No accidents	56.6	82.8
<b>k) I was distracted by something inside the vehicle</b>		
Yes	2.1	0.3
No	41.3	16.9
No accidents	56.6	82.8
<b>l) I was distracted by something outside the vehicle</b>		
Yes	7.1	2.7
No	36.3	14.4
No accidents	56.6	82.8

## **APPENDIX 5 -**

# **TABLES OF MEAN LAPSE, ERROR AND VIOLATION SCORES WITH 'FAULT', TYPE OF ACCIDENT, ALCOHOL AND TIME PRESSURE SCORES**

Note: The scores reported here are totals, whereas those in table 4 have been divided by the number of items comprising the scales. Thus, approximately, the scores are 8 times higher.

## LAPSE SCORES

	YOUNG AGE GROUP			MID AGE GROUP		
	n	Mean	SD	n	Mean	SD
<b>Q21) What type of accident was it?</b>						
<b>a) Head on collision with another vehicle</b>						
No accidents	800	5.9	3.7	1494	6.1	3.5
Yes	13	5.5	3.2	4	7.5	2.4
No	597	6.8	3.6	308	7.1	3.3
p-value	0.0001			0.0001		
<b>b) Rear end collision with another vehicle</b>						
No accidents	800	5.9	3.7	1494	6.1	3.5
Yes	193	6.3	3.4	88	7.0	3.3
No	417	7.0	3.6	224	7.2	3.3
p-value	0.0001			0.0001		
<b>c) Angular (ie side-on) collision with another vehicle</b>						
No accidents	800	5.9	3.7	1494	6.1	3.5
Yes	172	6.6	3.5	91	7.2	3.4
No	438	6.9	3.6	221	7.1	3.3
p-value	0.0001			0.0001		
<b>d) Collision with a pedestrian</b>						
No accidents	800	5.9	3.7	1494	6.1	3.5
Yes	1	7.0	0	1	8.0	0
No	609	6.8	3.6	311	7.1	3.3
p-value	0.0001			0.0001		
<b>e) Collision with another object eg parked car, animal, tree</b>						
No accidents	800	5.9	3.7	1494	6.1	3.5
Yes	155	7.8	3.8	72	7.8	3.5
No	455	6.4	3.4	240	7.0	3.2
p-value	0.0001			0.0001		
<b>f) Overturned vehicle</b>						
No accidents	800	5.9	3.7	1494	6.1	3.5
Yes	14	6.4	4.0	6	5.7	3.7
No	596	6.8	3.6	306	7.2	3.3
p-value	0.0001			0.0001		
<b>g) Other</b>						
No accidents	800	5.9	3.7	1494	6.1	3.5
Yes	84	6.4	3.5	52	6.8	3.1
No	526	6.8	3.6	260	7.2	3.4
p-value	0.0001			0.0001		



	YOUNG AGE GROUP			MID AGE GROUP		
	n	Mean	SD	n	Mean	SD
<b>Q22) Was the accident your fault?</b>						
No accidents	800	5.9	3.7	1494	6.1	3.5
Not at all	230	6.1	3.2	147	7.0	3.1
Partially	163	7.0	3.7	82	7.2	3.4
Fully	214	7.3	3.8	79	7.4	3.6
p-value	0.0001			0.0001		
<b>Alcohol status</b>						
Non drinker	116	5.2	3.4	243	5.8	3.5
Rarely drink	466	5.7	3.5	521	5.9	3.2
Low risk without binge	331	6.6	3.8	750	6.8	3.6
Low risk with binge	394	6.7	3.5	258	6.3	3.6
Intermediate/high risk	87	7.2	4.2	15	5.7	4.1
p-value	0.0001			0.0001		

## VIOLATION SCORES

	YOUNG AGE GROUP			MID AGE GROUP		
	n	Mean	SD	n	Mean	SD
<b>Q21) What type of accident was it?</b>						
<b>a) Head on collision with another vehicle</b>						
No accidents	789	6.0	4.3	1505	3.1	2.8
Yes	13	4.8	2.7	4	4.5	2.4
No	596	7.2	4.6	306	3.7	2.8
p-value	0.0001			0.0032		
<b>b) Rear end collision with another vehicle</b>						
No accidents	789	6.0	4.3	1505	3.1	2.8
Yes	197	7.9	4.5	86	3.7	2.8
No	412	6.8	4.5	224	3.6	2.8
p-value	0.0001			0.0019		
<b>c) Angular (ie side-on) collision with another vehicle</b>						
No accidents	789	6.0	4.3	1505	3.1	2.8
Yes	169	7.1=0	4.5	91	3.2	2.9
No	440	7.2	4.6	220	3.9	2.8
p-value	0.0001			0.0002		
<b>d) Collision with a pedestrian</b>						
No accidents	789	6.0	4.3	1505	3.1	2.8
Yes	1	10.0	.	1	4.0	.
No	608	7.2	4.6	309	3.7	2.8
p-value	0.0001			0.0038		
<b>e) Collision with another object eg parked car, animal, tree</b>						
No accidents	789	6.0	4.3	1505	3.1	2.8
Yes	154	6.9	4.8	74	4.0	3.1
No	455	7.3	4.5	236	3.6	2.7
p-value	0.0001			0.0028		
<b>f) Overturned vehicle</b>						
No accidents	789	6.0	4.3	1505	3.1	2.8
Yes	15	6.3	4.7	6	3.0	1.8
No	594	7.2	4.5	304	3.7	2.8
p-value	0.0001			0.0032		
<b>g) Other</b>						
No accidents	789	6.0	4.3	1505	3.1	2.8
Yes	82	7.0	4.4	51	3.8	2.4
No	527	7.2	4.6	259	3.6	2.9
p-value	0.0001			0.0036		

	YOUNG AGE GROUP			MID AGE GROUP		
	n	Mean	SD	n	Mean	SD
<b>Q22) Was the accident your fault?</b>						
No accidents	789	6.0	4.3	1505	3.1	2.8
Not at all	228	6.8	4.4	145	3.4	2.8
Partially	162	7.7	4.7	81	3.6	2.6
Fully	216	7.2	4.5	80	4.2	3.0
p-value	0.0001			0.0020		
<b>Alcohol status</b>						
Non drinker	115	4.7	3.4	246	2.3	2.2
Rarely drink	460	5.7	4.3	529	2.8	2.5
Low risk without binge	328	6.5	4.2	748	3.4	2.8
Low risk with binge	395	7.6	4.6	258	4.1	3.1
Intermediate/high risk	84	8.3	4.7	15	4.9	2.9
p-value	0.0001			0.0001		

## ERROR SCORES

	YOUNG AGE GROUP			MID AGE GROUP		
	n	Mean	SD	n	Mean	SD
<b>Q21) What type of accident was it?</b>						
<b>a) Head on collision with another vehicle</b>						
No accidents	795	4.5	3.2	1497	3.6	3.0
Yes	13	2.3	2.0	4	6.5	2.5
No	602	5.2	3.2	305	4.3	3.1
p-value	0.0001			0.0001		
<b>b) Rear end collision with another vehicle</b>						
No accidents	795	4.5	3.2	1497	3.6	3.0
Yes	197	5.1	3.0	87	4.3	2.9
No	418	5.2	3.3	222	4.4	3.1
p-value	0.0004			0.0002		
<b>c) Angular (ie side-on) collision with another vehicle</b>						
No accidents	795	4.5	3.2	1497	3.6	3.0
Yes	173	5.1	3.3	90	4.5	3.1
No	442	5.2	3.2	219	4.3	3.1
p-value	0.0004			0.0002		
<b>d) Collision with a pedestrian</b>						
No accidents	795	4.5	3.2	1497	3.6	3.0
Yes	1	3.0	.	1	2.0	.
No	614	5.2	3.2	308	4.4	3.1
p-value	0.0003			0.0001		
<b>e) Collision with another object eg parked car, animal, tree</b>						
No accidents	795	4.5	3.2	1497	3.6	3.0
Yes	155	5.4	3.4	71	4.0	3.0
No	460	5.1	3.1	238	4.5	3.1
p-value	0.0002			0.0001		
<b>f) Overturned vehicle</b>						
No accidents	795	4.5	3.2	1497	3.6	3.0
Yes	15	4.5	2.8	6	4.5	2.7
No	600	5.2	3.2	303	4.4	3.1
p-value	0.0003			0.0002		
<b>g) Other</b>						
No accidents	795	4.5	3.2	1497	3.6	3.0
Yes	83	4.9	3.2	51	4.3	3.4
No	532	5.2	3.2	258	4.4	3.0
p-value	0.0003			0.0002		

	YOUNG AGE GROUP			MID AGE GROUP		
	n	Mean	SD	n	Mean	SD
<b>Q22) Was the accident your fault?</b>						
No accidents	795	4.5	3.2	1497	3.6	3.0
Not at all	232	4.5	3.0	146	4.3	3.1
Partially	164	5.6	3.2	81	4.7	3.2
Fully	216	5.6	3.3	78	4.0	2.8
p-value	0.0001			0.0006		
<b>Alcohol status</b>						
Non drinker	116	4.2	2.8	241	3.5	3.0
Rarely drink	471	4.2	3.1	527	3.5	2.9
Low risk without binge	328	4.9	3.3	746	3.9	3.1
Low risk with binge	394	5.5	3.2	257	3.9	3.0
Intermediate/high risk	85	5.0	3.8	15	3.3	2.3
p-value	0.0001			0.218		